Thornton Tomasetti
Building Solutions

ONE VANDERBILT
NEW YORK, NY

STRUCTURAL PEER REVIEW REPORT
FOUNDATION PACKAGE

February 9, 2016

Prepared For

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A. EXECUTIVE SUMMARY

The following report contains a summary of Thornton Tomasetti's (TT) peer review of the foundation documents for the One Vanderbilt project located at 1 Vanderbilt Avenue, New York, NY. The peer review has been performed in accordance with the NYC 2014 Building Code Requirements. This peer review is based on design documents issuance No. 3 dated December 7, 2015.

This peer review report has evaluated the foundation elements based on foundation loads from the analysis of tower above provided by the Severud Associates, the Engineer of Record (EOR). This peer review report does not extend to elements outside the foundation design or documents as noted in Section D. A superstructure peer review will be completed as the superstructure design is competed. ds

1. *Confirm that the design loads conform to this code.*

   Thornton Tomasetti has reviewed the design loads for conformance with the NYC Building code loading requirements. The design dead, superimposed dead and live loads appear to be in conformance with the NYC Building Code.

   We have reviewed wind and seismic base shear based on 2014 NYC Building and based on the building geometry from an Architectural Revit model issued on December 9, 2015. Any discrepancies have been discussed and resolved with the EOR. A building of this height and massing requires a wind tunnel test to validate the wind loads on the building structure. A wind tunnel has been performed, and wind loads have been estimated from this wind tunnel using preliminary building stiffness properties. As a normal part of the design process, final building properties will be determined as the Tower design above is finalized, and a final wind tunnel report with final wind loads recommendations will be produced. We will peer review these final wind load recommendations with the superstructure peer review.

2. *Confirm that other structural design criteria and design assumptions conform to this code and are in accordance with general accepted engineering practice.*

   The structural design criteria and design assumptions appear to be in accordance with general engineering practice.

   As noted above the foundation loads are based upon a wind tunnel test combined with preliminary building properties which will be finalized upon completion of the tower design. We will peer review these final wind load recommendations with the superstructure peer review and amend this report as needed with any additional

observations.

3. *Review geotechnical and other engineering investigations that are related to the foundation and structural design and confirm that the design properly incorporates the results and recommendations of the investigations.*

We have reviewed the geotechnical report produced by Langan Engineering, dated October 16, 2015, including supplemental information provided to us during the peer review process. The foundation documents appear consistent with these recommendations.

4. *Confirm that the structure has a complete load path.*

The foundation documents appear to have a complete load path for the design loads indicated. The load path of the tower above will be confirmed with the superstructure peer review.

5. *Perform Independent calculations for a representative fraction of systems, members and details to check their adequacy. The number of representative systems, members, and details verified shall be sufficient to form a basis for the review's conclusions.*

We have performed independent calculations for the design loads indicated, including footings, the mat design and bearing pressures, foundation walls and rock anchors. Any discrepancies have been discussed with the EOR and resolved accordingly.

6. *Verify that performance-specified structural components (such as certain precast concrete elements) have been appropriately specified and coordinated with the primary building structure.*

This item is not applicable to the foundation design documents. No performance-specified structural components are included as part of the foundation package.

7. *Confirm that the structural integrity provisions of the code are being followed.*

The foundation elements as indicated on the foundation documents do not contain elements subject to the integrity provisions of the code. The peer review of the tower above will address these items.

8. Review the structural and architectural plans for the building. Confirm that the structural plans are in general conformance with the architectural plans regarding *loads and other conditions that may affect the structural design.*

We have reviewed the foundation documents for the Tower size and massing obtained from BIM model issued on December 9, 2015. In addition, we have reviewed the architectural drawings of foundation issued on October 16, 2015 which is in general conformance with structural drawings regarding loads. The foundation design loads appear to be adequate for the imposed tower Loads from above.

As the tower design above the foundations is finalized, a peer review will be performed to confirm final loading, including final wind loads as recommended by the wind tunnel consultant. We will amend this report as needed with any additional observations.

9. *Confirm that major mechanical items are accommodated in the structural plans.*

The foundation elements as indicated on the foundation documents do not contain major mechanical items. We have performed representative column load takedowns with general assumptions for mechanical loads as indicated on the structural documents. The peer review of the tower above will address this item.

10. *Attest to the general completeness of the structural plans and specifications.*

The foundation documents peer reviewed for this report appear generally complete.

B. INTRODUCTION AND STRUCTURAL DESCRIPTION

1.0 INTRODUCTION

Thornton Tomasetti (TT) was retained by SL Green Realty Corporation to conduct a structural peer review for the One Vanderbilt Avenue project located in New York, NY.

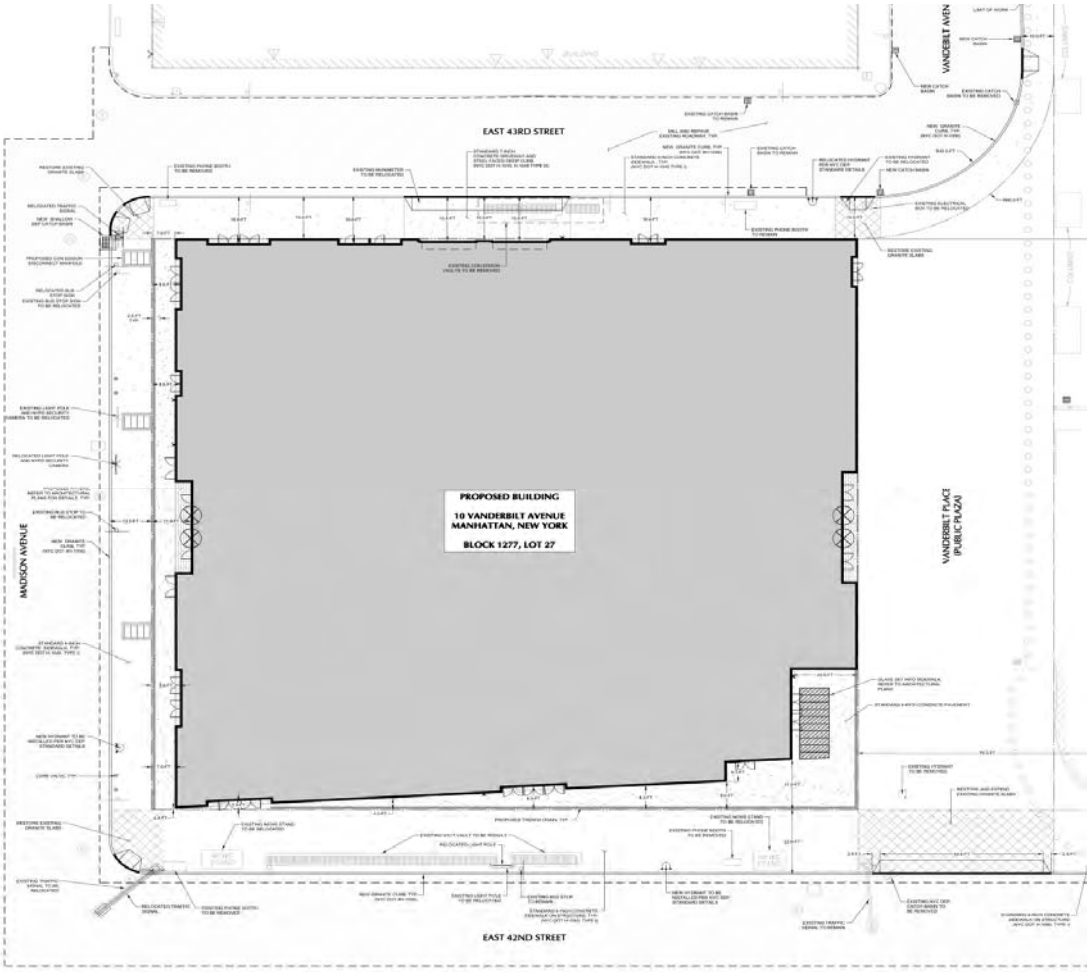


Figure 1. Site Map

The building is a 58-story high-rise office tower with a height of approximately 1,400 feet above grade, with 4 below-grade levels. Levels 1, 2, and 3 contain lobby and amenity spaces. Mechanical areas are located on Levels 4, 5, 12, 13, 36, 50, and 58.

The lot size is approximately 216 feet wide x 201 feet deep, with a tower that tapers to approximately 120 feet wide by 120 feet deep at the top occupiable floor.

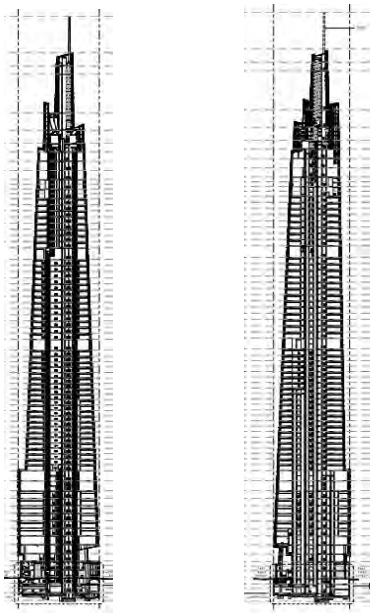


Figure 2. Building Sections

TT's role is to perform a peer review of the foundation system, which includes the overall building behavior. TT's review is based on the Foundation Permit Set Issuance 3 Architectural and Structural drawings dated December 7, 2015 prepared by Kohn Pederson Fox Associates (KPF) and Severud Associates Consulting Engineers respectively. TT also studied the structural design for compliance to the recommendations in the Geotechnical report by Langan dated November 20, 2014 and the Wind-Induced Structural Responses report by RWDI dated June 23, 2014.

In general for peer reviews, the reviewers provide different, complimentary services to advance the design of a building project. In this peer review report, the comments, suggestions and observations on the structural design performed to date are intended to assist the designers by providing another perspective.

TT's scope of work is as follows:

- Confirm that the design loads conform to the 2014 New York City Building Code.
- Confirm that other structural design criteria and design assumptions conform to the 2014 New York City Building Code and are in accordance with generally accepted engineering practice.
- Review geotechnical and other engineering investigations that are related to the foundation and structural design and confirm that the design properly incorporates the results and recommendations of the investigations.
- Review wind tunnel reports and confirm that the design properly incorporates the results and recommendations of the investigation.

- Confirm that the structure has a complete load path.
- Independently assess the structural responses and stability of the building under actions of lateral and gravity loads.
- Perform independent calculations for a representative fraction of systems, members, and details to check their adequacy. The number of representative systems, members, and details verified shall be sufficient to form a basis for TT's conclusions.
- Confirm that the structural integrity provisions of the 2014 New York City Building Code are being followed.
- Attest to the general completeness of the structural plans.
- Provide a written report that covers all aspects of the review performed, including conclusions reached by the reviewer.

2.0 STRUCTURAL SYSTEM DESCRIPTION

The lateral load resisting system is composed of a reinforced concrete shear wall core with steel truss outriggers. The outriggers are one story deep at the 36th, 50th, and 59th floors, and span between the concrete core roughly at the center of the floor plans and the perimeter steel columns. The upper and lower chords are comprised of built-up box beam members, while the diagonals are standard hot-rolled wide-flange shapes.

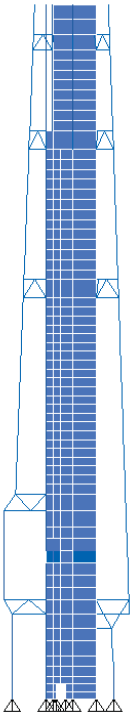


Figure 3. ETABS Image of Lateral System

In addition to the trusses described above acting as outirggers, there is a series of trusses on floors 5, 6, 12, and 13 that allow gravity loads to transfer where the buiding increases or decreases in width. These trusses are primarily gravity system elements, but they do contribute to the lateral system behavior as well.

The typical office floor construction is a 3” metal deck with an additional 2 1/2" of concrete, while mechanical floors and floors directly above the mechanical floors include a 4 ½” thick normal weight concrete topping over 3” metal deck. Steel framing supports the deck and spans between the concrete core and perimeter steel wide-flange columns.

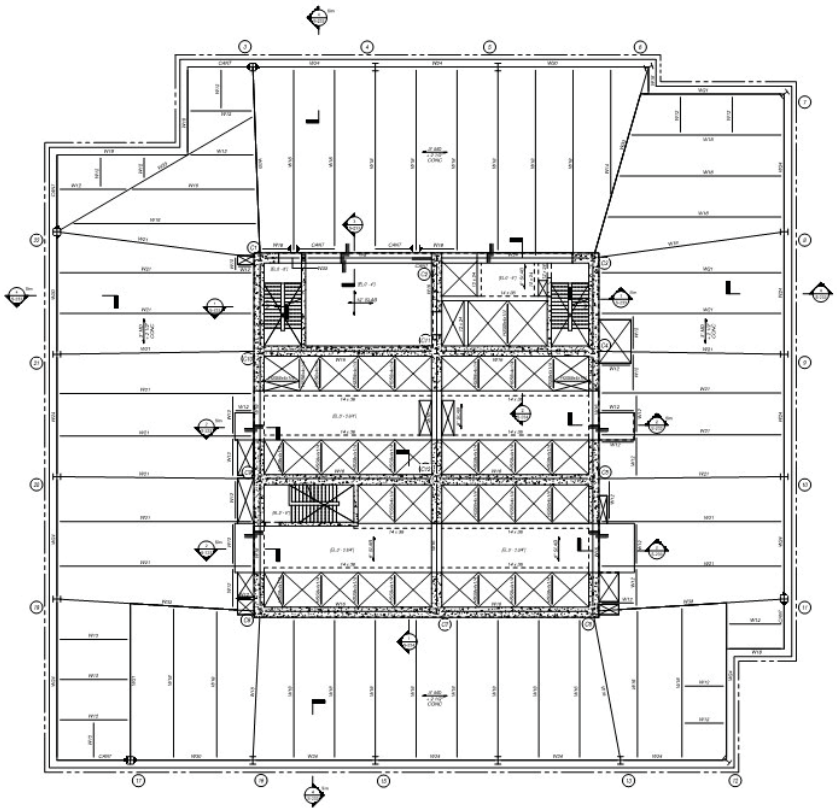


Figure 4. Typical Framing Plan

The foundation system consists of spread footings bearing on rock with an allowable bearing capacity of 60tsf. A 10-foot thick mat is set beneath the core, and individual spread footings support most of the perimeter columns. Foundation walls typically consist of 24" double-reinforced concrete walls.

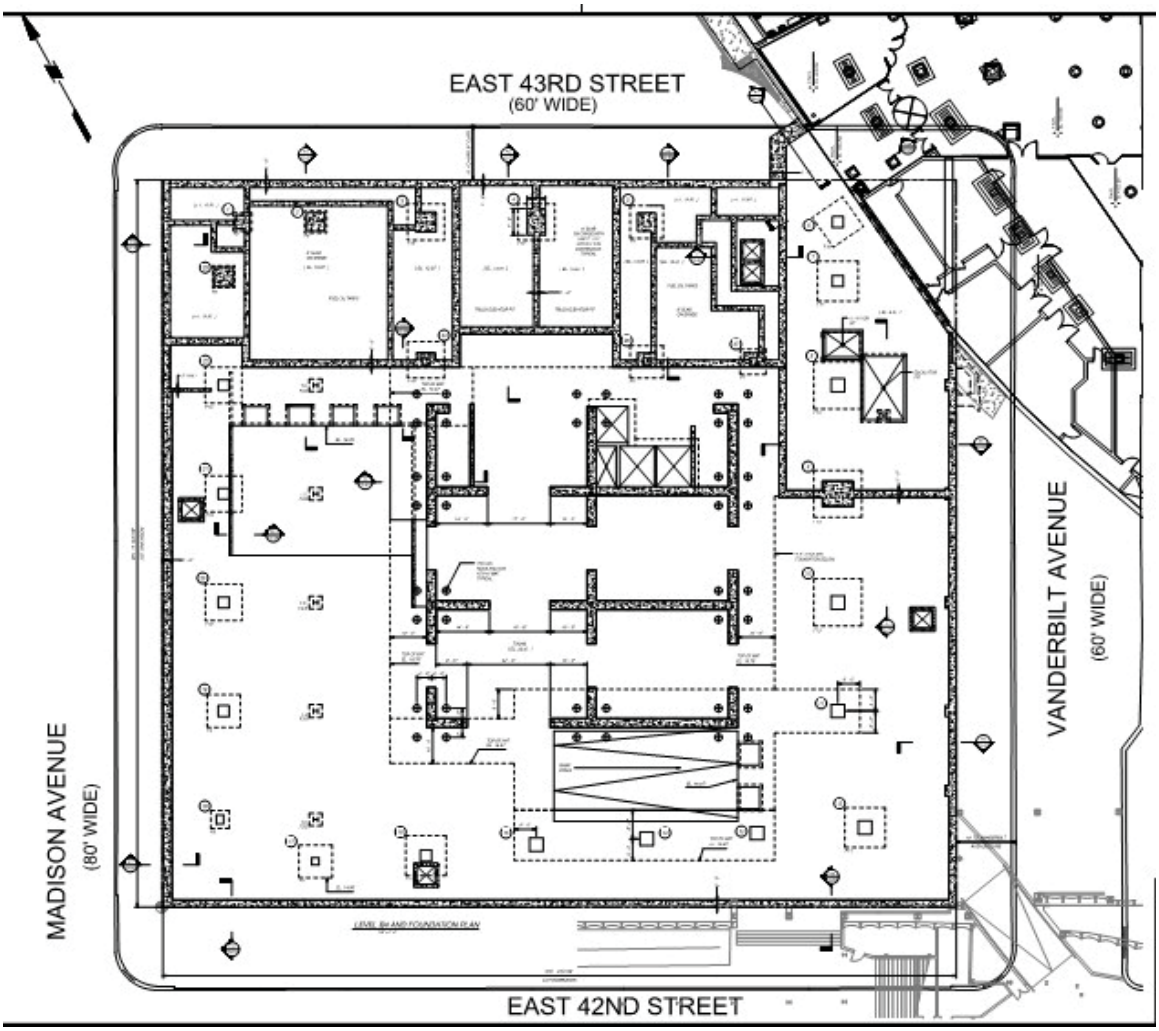


Figure 5. Typical Foundation Section

C. FINDINGS AND COMMENTS

1.0 BUILDING CODES

Based on the General Notes on S-701, and Loading Schedule on S-702, the structural design was conducted according to the following building codes:

- 2014 Edition of the New York City Building Code
- ASCE-7 (2010), Minimum Design Loads for Buildings and other Structures
- ASCE-7 (2005), Minimum Design Loads for Buildings and other Structures
- AISC 360 (2005), Specification for Structural Steel Buildings.
- ACI-318 (2011), Building code requirements for Reinforced Concrete
- AWS D1.1 (2004), Structural Welding Code
- ASTM Standards
- AISC Design Guide 11

The building codes listed on the Peer Review Set drawings are consistent and appropriate for this project.

2.0 MATERIAL PROPERTIES

The material properties noted in the General Notes on S.001.0 for the major structural elements are noted below.

Structural Steel:	ASTM A992 or ASTM A572, Grade 50
HSS Steel:	ASTM A500, Grade B
Footings and Foundation Mat:	10,000 psi
Piers and Buttresses:	10,000 psi
Foundation Walls	10,000 psi
Slabs On Grade	4,000 psi
Shear Walls – Foundation to 13th Floor	14,000 psi
Raised Slabs	4,000 psi
Concrete on Metal Deck	4,000 psi
Bar Reinforcing	ASTM A 615, Grade 60

3.0 STRUCTURAL LOADING

3.1 GRAVITY LOADS

The gravity loading consists of the member self-weight, the superimposed dead load (floor finish, partitions, ceiling & hung mechanical), and live load. The Gravity Design Loads are shown in the Loading Schedule on S-702 of the 100% SD structural drawings. The following

tables summarize the types of dead loads and live loads used, as well as TT comments.

Table 1. Dead Loads per S-702

SLAB CONSTRUCTION	LOAD (PSF)	TT COMMENTS
6" NWC SLAB	75	
CONCRETE RISERS*	130	
TYPE 1	55	2 1/2" NWC on 3" DECK (TYP.)
TYPE 2	80	4 1/2" NWC on 3" DECK (TYP.)
TYPE 3	80	4 1/2" NWC on 3" DECK (TYP.)
TYPE 4	80	4 1/2" NWC on 3" DECK (TYP.)
18" NWC SLAB	225	
24" NWC SLAB	300	

Table 2. Live Loads per S-702

AREA	LIVE LOAD (PSF)	TT COMMENTS
Core	100	Treat as Lobby Space
Core - Stairs	100	Per Code
Typical - Mechanical	150	75 Req'd for Equipment Rooms
Elevator Machine Room	75+*	
Core- Freight Elevator Vestibule	100	Treat as a Lobby Space
Core - Mer	100	75 Req'd for Equipment Rooms
Core - Passenger Elevator Lobby	100	Treat as a Lobby Space
Core - Toilet Rooms	100	Same as Floor Load
Terrace	100	Roof for Promenade Purposes
Typical - Office	50	Office Load Eplicitly Addressed in Code
Core - Elevator Machine Room	75+*	Treat as an equipment rooms
Core - Back of House	100	Conservative estimation, Engineering Judgement
Temporary Construction Loading - Staging Area	250	Equivalent to "Heavy Storage Warehouses" - Reasonable
Temporary Construction Loading - Truck Areas	600	Typical Construction Surcharge Load
Typical - Amenity	100	Reasonably Conservative for this Stage - Recheck as design progresses
Typical - Dock Master	100	Not addressed in Code, reasonable assumption
Typical - Messenger Center	100	Not addressed in Code, reasonable assumption
Typical - Office Lobby	100	Office Lobby Load Eplicitly Addressed in Code
Typical - Retail	100	Retail Load Explicitly Addressed in Code
Typical - Subway Entrance	100	Treat as a Lobby Space
Typical - Transit Hall	100	
Core - Circulation	100	Treat as a Lobby Space

Typical - Toilet Rooms	50	Assumed same as floor load
Roof - Glass	40	20 psf requirred for Roofs
Roof - Slab	100	20 psf requirred for Roofs
BMU-1	100	75 Req'd for Equipment Rooms
BMU-2	100	75 Req'd for Equipment Rooms
BMU-3	100	75 Req'd for Equipment Rooms
Top Of Building	40	
Typical - Trading Floor	100	
B1 (Cellar) East	100	
B1 (Cellar) Northwest	100	
B1 (Cellar) West	100	
Shuttle Platform	100	

*+ Sheave Beam Reactions

TT found the Gravity loads to be acceptable and in conformance with the NYC Building Code 2014.

3.2 WIND LOADS

The wind loads for the foundation design are based on the following parameters per ASCE 7-05 and the New York City Building Code:

Design Wind Speed, V	100mph
Occupancy Category	II
Wind Exposure	A
Importance Factor	1.00

These parameters are relevant for the equivalent lateral force procedure, and were relevant at the beginning of the project where the 2008 New York City Building Code governed. Since the update to the 2014 New York City Building Code, TT finds that the following parameters are required to be used for the equivalent lateral force method.

Design Wind Speed, V	98mph
Occupancy Category	III
Wind Exposure	B
Importance Factor	1.15

The wind loads under the 2008 NYC Building Code were verified as conservative with the wind tunnel testing conducted by RWDI. Their findings and recommendations were issued in a report dated 6/23/2014.

The wind tunnel report provides Effective Static Floor-by-Floor Wind loads for Fx, Fy and Mz. In turn, these loads were used in TT's analysis with the load factors given in 24 load combinations. These loads were applied per the ASCE7-05 load combinations.d

3.3 SEISMIC LOADS

The General Notes indicate that the seismic loads are in compliance with Chapter 16 of the NYC Building Code using the following seismic parameters:

Table 3. Seismic Parameters

Seismic Parameters per 2014 NYC Code		
Parameter	**Value**	**Reference**
Occupancy Category	III	Table 1604.5
Importance Factor, Ie	1.15	Table 11.5.1
Ss	0.281g	1613.5.1
S1	0.073g	1613.5.1
Site Class	B	Per Geotech
Fa	1.0	Table 1613.5.3(1)
Fv	1.0	Table 1613.5.3(2)
Sms	0.281g	Section 1613.5.3
Sm1	0.073g	Section 1612.5.3
Sds	0.187g	Section 1612.5.4
Sd1	0.049g	Section 1612.5.4
Design Category	B	Table 1616..5.6
Seismic Force Resisting System	Ordinary Reinforced Concrete Shear Walls	
Response Mod., R	4.0	Table 12.2-1, ASCE 7-10
Deflection Amp., Cd	4.0	Table 12.2-1, ASCE 7-10
Approx. Fundamental Period, Ta	2.00s	Eq. 12.8-7 ASCE 7-10
Fund. Period, T	3.40s	Not Listed
Seismic Weight, W	Not Provided	
Base Shear, V	Not Provided	Section 11.7.2

TT found that these parameters are consistent with the NYC Building Code and ASCE 7-10. Additionally TT has performed an independent analysis of the seismic loads, and found the Seismic Weight to be approximately 440,000k, and the seismic base shear to be approximately 4,600k.

3.4 LOAD COMBINATIONS

The following load combinations in accordance with the NYCBC 2014 have been used to verify members' strength and service design.

Ultimate (Strength) Design
1.4D
1.2D+1.6L+0.5(Lr or S or R)
1.2D+1.6(Lr or S or R)+(f_1L or 0.8W)
1.2D+1.6W+f_1L+0.5(Lr or S or R)
1.2D+1.0E+f_1L+f_2S
0.9D+1.6W
0.9D+1.0E

The load factor on L in combinations 3,4 and 5 is permitted to equal 0.5 for all occupancies in which Live load is less than or equal to 100 psf.

Allowable Stress (Service) Design
D
D+L
D+L+(Lr or S or R)
D+0.75L+0.75(Lr or S or R)
D+(0.6W or 0.7E)
D+0.75L+0.75(0.6W)+0.75(Lr or S or R)
D+0.75L+0.75(0.7E)+0.75S
0.6D+0.6W
0.6D+0.7E

4.0 GEOTECHNICAL REPORT REVIEW

TT reviewed the Geotechnical Engineering Study for One Vanderbilt Avenue prepared by Langan and dated October 16, 2015.

TT has the following comments:

1. A subgrade modulus of 1000 pci was utilized in analysis model of the core mat foundation. This value is not in the report but was communicated through correspondence (see Appendix, page 1, email item 1).

2. The Langan report specifies that an allowable bearing capacity of 120 ksf should be used for foundation checks but that a higher bearing capacity can be used when footings are embedded into rock. Subsequent correspondence with Langan (see Appendix, page 1, email

item 4) verifies that a 10% increase in bearing capacity for each foot of embedment is acceptable.

3. Langan report specifies that friction between the mat and subgrade should be neglected if a waterproofing membrane and mud slab are installed. Subsequent Langan correspondence (see Appendix, page 1, email item 5) states that minimal sliding resistance due to friction (5000 kips) when a waterproofing membrane and mud slab are installed and that passive side bearing resistance (9400 kips) is achievable for the current foundation scheme. TT calculated wind base shears were typically on the order of 7000 kips which results in a factor of safety against sliding over 2.0. Therefore, TT confirms the tower foundation satisfies a sliding stability check.

4. Langan confirms that surcharge loading diagram as specified in the report has been amended and that loading diagrams as provided by Severud (EOR) for typical basement wall sections are appropriate for design (see Appendix, page 1, email item 2).

5.0 MEMBER DESIGN CHECK

5.1 MAT FOUNDATION

The core wall of One Vanderbilt is supported on a reinforced concrete mat foundation. In a few locations the reinforced concrete mat extends out to support isolated tower columns. The mat varies in thickness between 8'-9.5' typical, with thicker zones that grow up to 13'-6" at mat steps and 24'-2" at elevator pits.

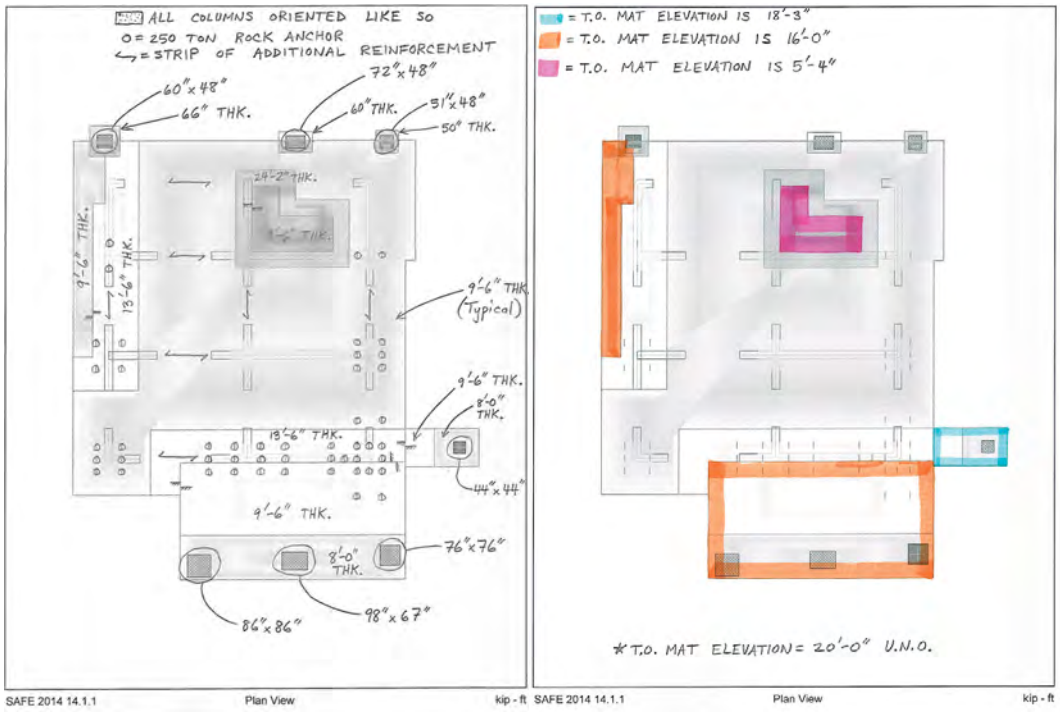
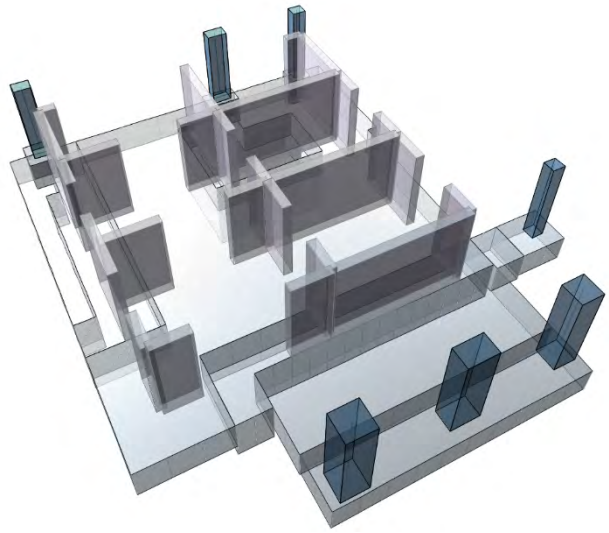


Figure 10. TT Foundation Mat SAFE Model Geometry

Diagrams above show the TT SAFE analysis model that was developed to check Severud (EOR) foundation design with the assumed extents of varied mat thicknesses and assumed top of mat elevations. Tower column and wall loads were applied on a SAFE model that took into account stiff bearing of walls and columns above by applying point loads at the top of double story height walls and columns.



An isometric view of the SAFE model used for analysis with extruded tower columns and walls for loading is shown. Additionally, tower and column loads were provided by Severud (EOR) for foundation design checks in a load diagram issued on 1/8/2016. The tower load diagram included service dead, live, and wind x and wind y loads. TT used these loads to conduct the appropriate service and ultimate foundation design load combination checks.

Figure 11. TT SAFE Model

Figure 12. Severud (EOR) Provided Tower Loads (Service DL, LL, WindX, WindY)

5.1.1 MAT BEARING AND ROCK ANCHOR CAPACITY CHECKS

Using a 1000 pci subgrade modulus for compression of the rock subgrade under the mat and a rock anchor stiffness derived for a 3"Φ high strength steel rock anchor rod, TT checked the design for appropriate service cases per ASCE 7.

TT reviewed the enveloped maximum bearing pressures over the extent of the mat for all the appropriate service load combinations. The maximum bearing pressures underneath the mat were typically around 40 ksf with pressure concentrations up to 90 ksf in one isolated location. These maximum pressures are well below the allowable capacity of 120 ksf (see diagram in psf below).

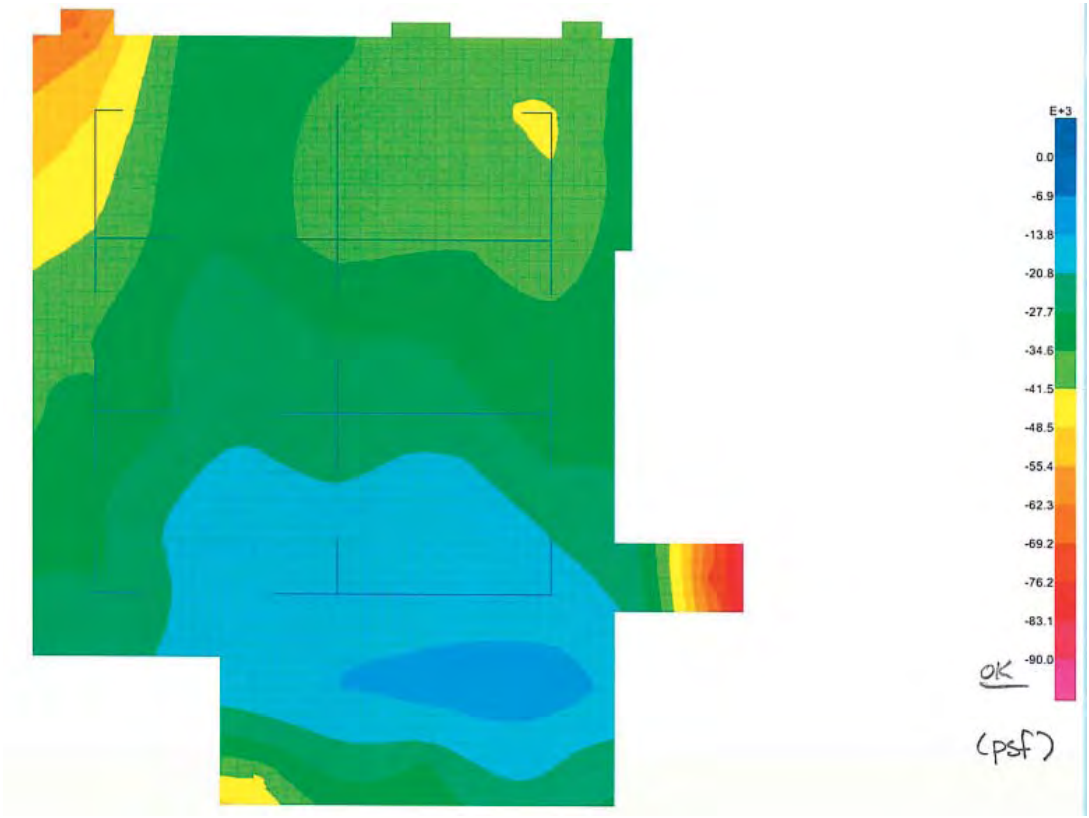


Figure 13. TT SAFE Model Enveloped Bearing Pressures (psf)

5.1.2 MAT SHEAR CHECK

The reinforced concrete mat thickness was verified by checking one-way shear in the mat under a typical line of core wall. Assuming the core wall could reach full axial capacity (see ACI section 14.5.2) and taking into account the amount wall load that goes into direct bearing underneath the core wall, a one-way shear check was conducted. The shear check confirmed that a 9'-6" thick reinforced concrete mat typically is sufficient (see Appendix page 2).

5.1.3 MAT FLEXURE CHECK

The mat flexure was checked by calculating the mat flexural capacity over strip widths defined by primary core wall lines in plan. Additional rebar specified on the Severud (EOR) drawings along these lines is understood to extend to the edges of the mat. Bottom and top moment flexural reinforcement demands and capacities were calculated for each design strip and the results of these checks are included in the following images. Locations where Demand-Capacity Ratios (DCR) exceed 100% for flexural reinforcement (section is over-stressed) are identified in the plans. Some additional notes are included on diagrams to confirm design is acceptable in some conditions (for example continuous shear walls above that stiffen the mat). TT calculations still point out a few locations where the mat is over-stressed (see figures 14-17).

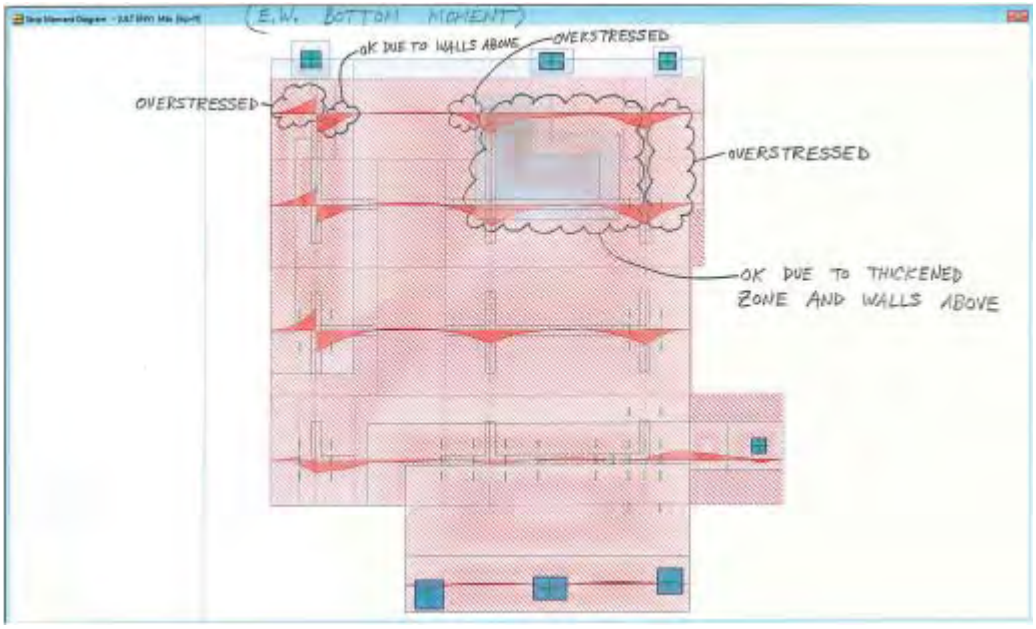


Figure 14. TT SAFE Flexure Check X-direction, Bottom Rebar (4 locations)

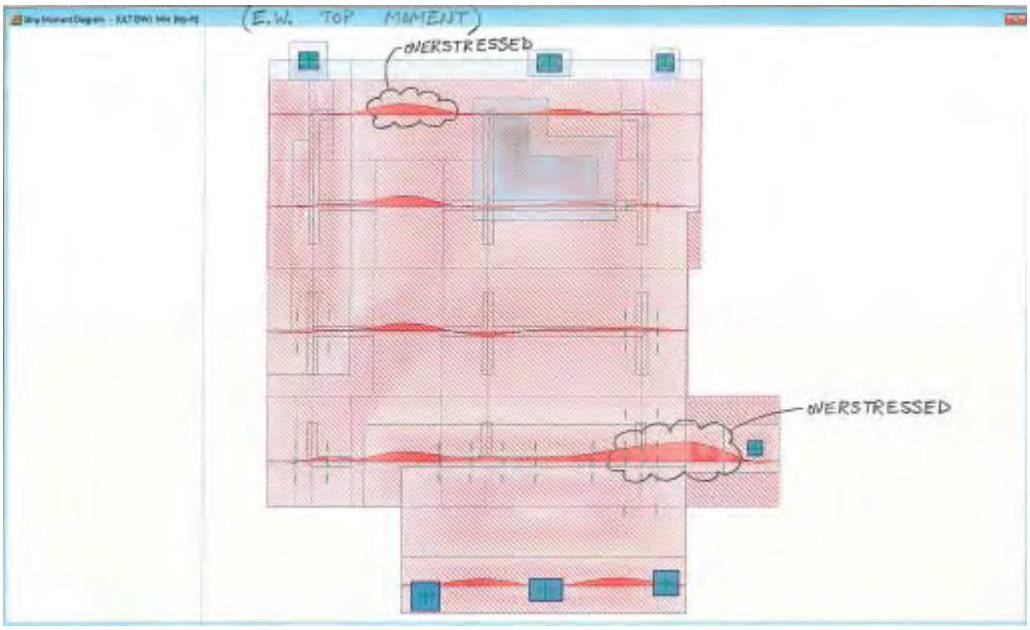


Figure 15. TT SAFE Flexure Check X-direction, Top Rebar (2 locations)

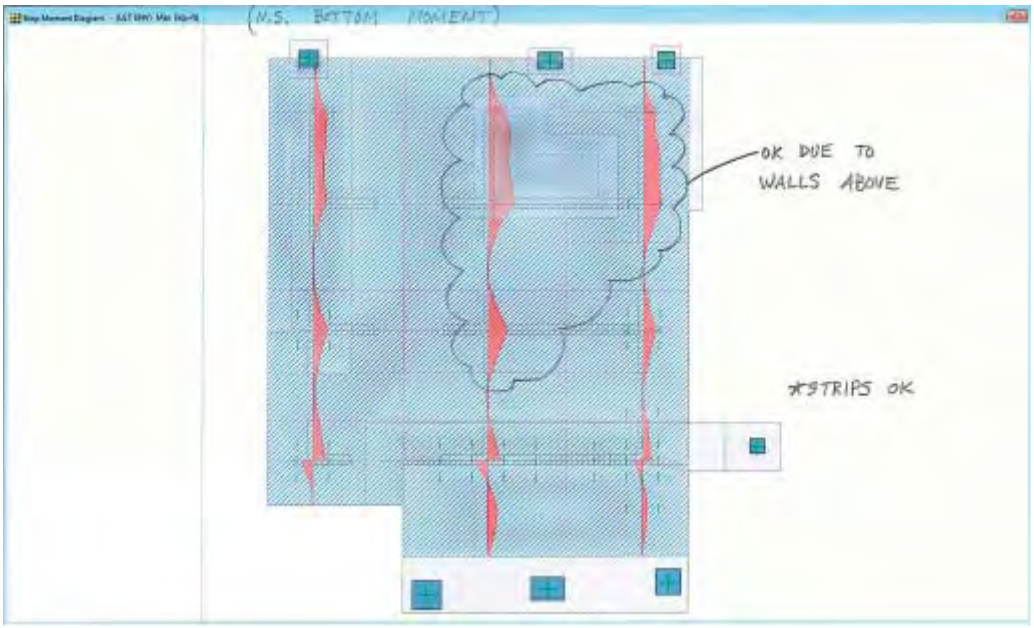


Figure 16. TT SAFE Flexure Check Y-direction, Bottom Rebar (OK)

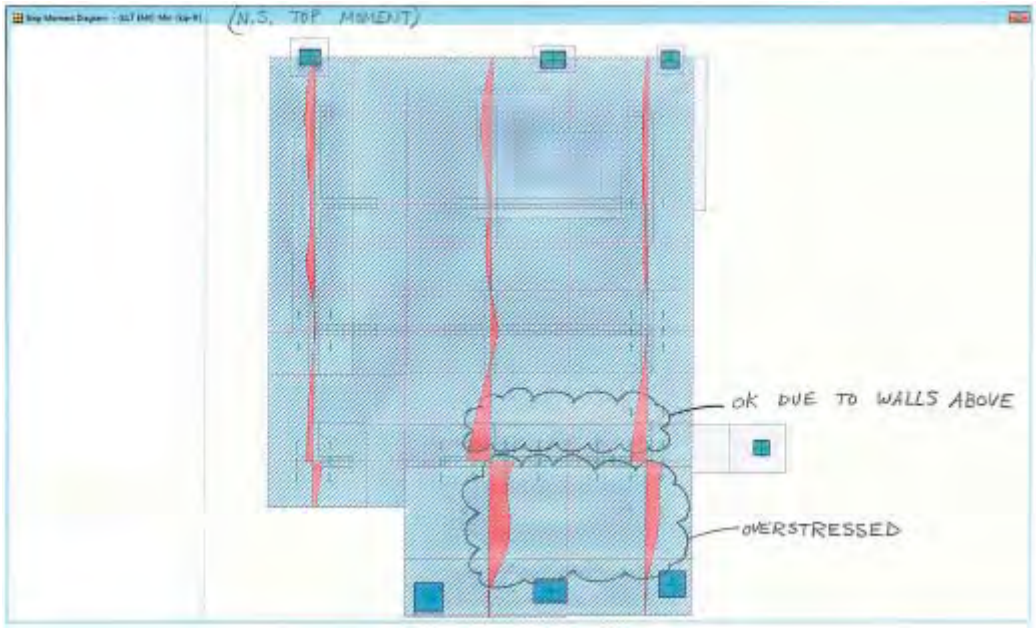


Figure 17. TT SAFE Flexure Check Y-direction, Top Rebar (2 locations)

5.1.4 SETTLEMENT

The geotechnical report estimates a maximum mat settlement of 1/2" to 3/4".

TT reviewed the short-term settlement of the mat due to dead load and live load, using the mat and pile spring properties described earlier. TT obtained settlements of 1/2" which is in line with Langan predicted values.

5.2 SPREAD FOOTINGS

Tower Column Spread footings were checked as isolated footings with an allowable bearing capacity of 120 ksf. Spread footing designs were found to be generally acceptable. In areas where slightly higher bearing pressures were realized in the calculations, additional bearing capacity can be enhanced based on recommendations from Langan (see Appendix, page 1, email item 4). Spread footing design checks for all isolated tower column footings are included in Appendix (see Appendix, pages 3-22).

5.3 FOUNDATION WALLS

Severud (EOR) provided basement wall criteria sheet for each primary wall system along the basement perimeter (South, West, North, and East). TT reviewed the design of the four primary basement wall sections along each side of the building.

The results of TT design checks are as follows:

1. South Wall general basement wall section design is acceptable (see Appendix, page 23).

2. West Wall design is slightly over-stressed in two locations but once the surcharge is adjusted to revised loading profile, TT confirms the design is acceptable (see Appendix, page 24).

3. North Wall design as provided by Severud (EOR) is acceptable based on adjusted loading diagram approved by Langan (see Appendix, pages 25-26).

4. East Wall general basement wall section design is acceptable (see Appendix, page 27).

5.4 ROCK ANCHORS

Using a 1000 pci subgrade modulus for compression of the rock subgrade under the mat and a rock anchor stiffness derived for a 3"Φ high strength steel rod, TT checked the design for appropriate service cases per ASCE 7. The maximum force in any of the rock anchors was found to be 470 kips which is below the 500 kip allowable capacity (see Appendix, page 28). Subsequent information provided by Langan in correspondence (see Appendix, page 1, email item 3 and pages 29-30) demonstrates that group effects were considered in calculation of rock anchor embedment capacity and that bond length and free length specified is appropriate.

Additionally, TT provided a group check of anchor rod embedment into the foundation mat. The embedment check confirmed that the anchor rod embedment shown in the mat was generally acceptable (see Appendix, page 31).

5.5 SHEAR WALLS

For review of the shear wall design, TT used the Shear Wall Design module in ETABS and extracted the required reinforcement area for each pier. These values were compared to the provided reinforcement shown in the shear wall schedules on drawings S.221.0~236.0. Overall, the horizontal reinforcement in the shear walls was found to be acceptable with some exceptions noted below. For some regions along the height, TT found that the vertical reinforcement was not sufficient.

5.6 COLUMNS

While reviewing the rebar provided in the columns based on the schedules in the drawings, TT found that a majority of the columns do not have a minimum area of longitudinal reinforcement as per ACI318 Section 10.9.1. The ACI code states "area of longitudinal reinforcement, Ast, for non-composite compression members shall not be less than 0.01Ag or more than 0.08Ag." The ACI318 code commentary, in the ACI Committee 105 report minimum reinforcement ratios of 0.01 and 0.005 were recommended for spiral and tied columns, respectively.

TT checked the axial capacity of the columns for the longitudinal reinforcement shown in the schedules and found all column reinforcement was sufficient for the axial forces. Please note this design check was done without considering moments in the columns.

In reality, the columns may take some lateral forces as load is distributed from the walls, through the slabs, and into the columns. However, the EOR's approach is that the structure will behave in accordance to the fact that the loads will remain or redistribute to the shear walls.

A few typical column designs were spot-checked for both axial load and moment and the current design was found to be acceptable.

D. DOCUMENTS RECEIVED

TT used as a basis of this review the Architectural drawings, Structural drawings, and reports listed below. In addition, a drawing list of the structural foundation permit drawings is included in the appendix.

Table 4. List of Documents Received

	Document Name	By	Date	Received
1	Geotechnical Evaluation	Langan	11/20/2014	05/05/2015
2	Wind Tunnel Testing	RWDI	06/23/2014	01/15/2015
3	Structural Foundation Permit Drawings – Issuance 3	Severud	12/07/2015	12/09/2015
4	Architectural Foundation Permit Drawings – Issuance 3	KPF	12/07/2015	12/09/2015
5	Structural 100% SD Drawings	Severud	08/14/2015	08/14/2015
6	Architectural 100% SD Drawings	KPF	08/14/2015	08/14/2015

APPENDIX 1

Viise, John

From: Arthur Alzamora <aalzamora@Langan.com>
Sent: Friday, February 05, 2016 3:51 PM
To: Farimani, Reza; O'Reilly, Daniel
Cc: Viise, John; Daniel Surrett; Heinze, Douglas; Ghate, Sai; Seth Martin; Gutmann, Jim; DePaola, Ed; Squarzini, Michael
Subject: RE: TT Foundation review comments
Attachments: Tie-down Anchor Calcs - Cone Pull-out Failure Mode.pdf

Importance: High

Hello Reza and Daniel,

It was nice to speak with you yesterday. We have provided responses below to your comments on the Langan related items.

1. Langan takes no exception to the use of a subgrade modulus of 1,000 pci. We provided this value to Severud during foundation design.
2. Langan and Severud agreed on a lateral pressure from surcharge loading as an inverted triangular distribution starting at 300 psf at the surface and decreasing to 0 psf at 15 feet below grade. The surcharge loading extents at grade are assumed to be limited and therefore dissipates with depth.
3. Langan analyzed the tie-down anchors geotechnical capacity based on an individual anchor capacity and a global cone pull-out failure mode, which accounts for the tensile strength of the rock and the weight of the cone. See attached excerpt from our analysis. We also note that the project specifications are written so that the contractor's engineer must submit shop drawings and calculations for their anchor design.
4. The 2014 NYC Building Code allows a 10 percent increase in the allowable bearing capacity of rock for each foot of embedment. This is summarized in our geotechnical engineering study. Based on the footing embedment in Class 1a rock is sufficient to justify an 8 percent increase in the allowable bearing capacity of the rock.
5. Langan assessed the mat's lateral resistance based on the passive resistance (embedment in the rock) in the rock mass and minimal frictional resistance. We estimate the passive resistance of the rock mass is about 9,400 kips. We note that a frictional coefficient of 0.02 (less than 10 percent of typical values for rock-concrete interfaces) below the mat would provide an additional sliding resistance of about 5,000 kips. The combination of passive resistance along the sides of the mat plus minimal friction below the mat would provide adequate lateral resistance at the base of the mat.

Please let us know if you have any other comments or questions. Have a great weekend!

Arthur J. Alzamora, Jr., PE, LEED AP
Senior Associate/VP
Direct: 212.479.5442
Mobile: 917.912.4832
File Sharing Link

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www.langan.com

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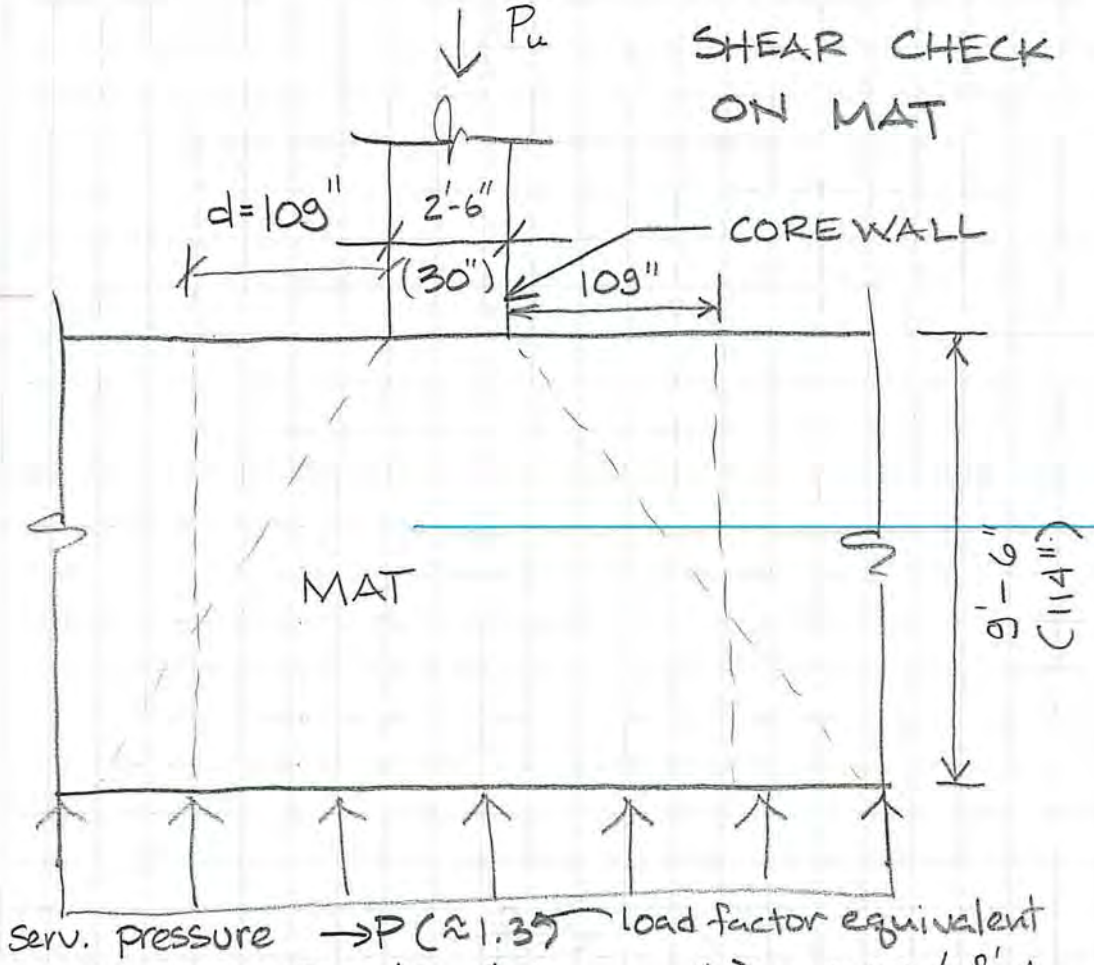
Thornton Tomasetti

PROJECT ONE VANDERBILT		PROJECT NO.	DATE 2/5/16
		BY JRV	SHEET of
SUBJECT FOUNDATION PEER REVIEW		CHECKED BY	DRAWING NO.



SHEAR CHECK ON MAT

Serv. pressure → P (≈1.3) load factor equivalent

ASSUME $P_u = \phi P_n$ (shear wall) $= 0.55\phi f'_c A_w$

$= 0.55(0.65)(10ksi)(30")(12") = 1287\ K/'$

$35ksf(1.3)\left(\frac{109(2)+30}{12}\right)(1) = 940K/'$

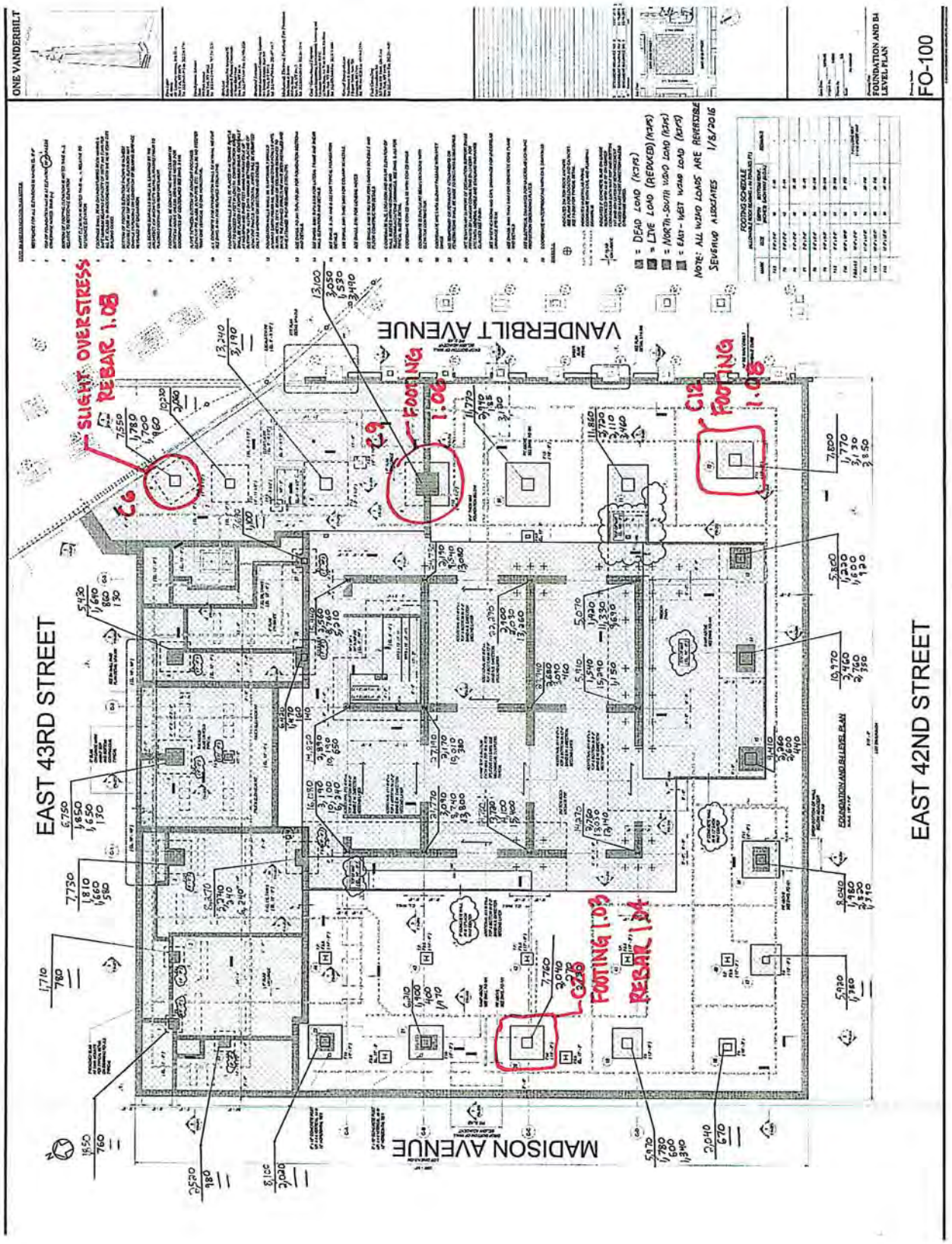
$1287 - 940 = \frac{347\ K/'}{2}$ ← ONE WAY SHEAR

$\phi V_c = 0.75(2)\frac{\sqrt{10000}}{1000}(109")(12") = 196^K > \frac{347}{2} = 173^K$

O.K.

THIS CHECK ASSUMES WALL DEVELOPED TO FULL CAPACITY W/O STIRRUPS OR COMPRESSION STEEL. NO DETAILS FOR WALL PROVIDED.

APPENDIX 3

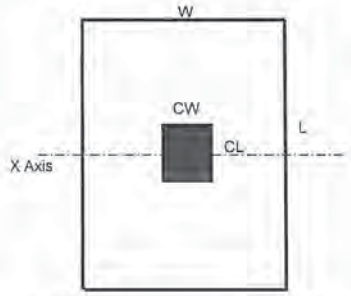

ONE VANDERBILT
FOUNDATION AND B1 LEVEL PLAN
FO-100
EAST 43RD STREET
EAST 42ND STREET
VANDERBILT AVENUE
MADISON AVENUE
SLIGHT OVERSTRESS REBAR 1.08
C6
FOOTING 1.06
C9
C12
FOOTING 1.08
C26
FOOTING 1.03
REBAR 1.04
= DEAD LOAD (KIPS)
= LIVE LOAD (REDUCED) (KIPS)
= NORTH-SOUTH WIND LOAD (KIPS)
= EAST-WEST WIND LOAD (KIPS)
NOTE: ALL WIND LOADS ARE REVERSIBLE
SEVERUD ASSOCIATES
1/8/2016

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C1

P live load	760	K	LL Factor	1.6	
P dead load	1850	K	DL Factor	1.2	
Mll about X axis		K-ft	WL Factor	1.6	
Mdl about X axis		K-ft	Shear Fact	0.75	
Mwl about X axis		K-ft (Moment caused by Wind load)			
CW=Width of Col	38	Inches			
CL=Depth of Col	38	Inches			
q allowable	120	Ksf (compare to E24)			
W = Footing Width used	5	Ft	(X direction)		
L = Footing Length used	5	Ft	(Y direction)		
f'c	10000	Psi			
fy	60	Ksi			
Est. Ftg thickness	42	Inches	(d shown below)		
Include Ftg weight	y	(Y or N)			

Bar	Ld	Area
3	9.00	0.11
4	12.00	0.2
5	15.00	0.31
6	18.00	0.44
7	26.25	0.6
8	30.00	0.79
9	33.84	1
10	38.10	1.27
11	42.30	1.57



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	12.69	K	(included in qs)
Ps=	2610.00	K	without ftg weight
Pu=	3436.00	K	without ftg weight
Mu X axis=	0	K-ft	
Actual max soil pressure qs =	**104.91**	**Ksf**	**OK**
Actual min soil pressure qs =	104.91	Ksf	includes ftg weight
Ultimate max soil pressure qu =	138.05	Ksf	without ftg weight
Ultimate min soil pressure qu =	138.05	Ksf	without ftg weight
d =	38	inches	(assume thickness-4 inches)

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	3436	K (same as previously calculated)
Average qu=	138.049	Ksf
Vu=	-2101.30	K
Vn=	-2801.73	K
bo=	304	(Inches: perimeter around column, d/2 away)
β	1	
Vc=	4620.80	K **OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	60	inches	(same as footing width)
cs-e=	-2.25	Ft:	(Distance: from crit. section to edge of footing) -27.00 Inches
quc=	138.05	Ksf:	qu at critical section (d from face of column) 0.958674 Ksi
Vu Component 1:	-1553.051		
Vu Component 2:	0		
Vu=	-1553.05	K	
Vn=	-2070.74	K	
Vc=	456.00	K	**OK**

Short Moment Calculations

Face of Col to Edge of Footing:	0.92	Ft	11.00	Inches	
Footing Mu Short=	**290.00**	**K-Ft**	Uses Average ultimate soil pressure		**3479.99 K-In**
Required for moment As=	1.70	Sq-Inches			
Minimum As=	4.54	Sq-Inches			
Use=	**4.54**	**Sq-Inches**			
As in Mid Band=	**4.54**	**Sq-Inches**			
Short Rebar used	9		Ld Reqd 33.84	Ld Available 8.00	
Number of Rebars	8		Average Spacing 7.7143 inches	Maximum Spacing is 18"	
Total As provided=	8.000	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)		
Min. # of Rebars Req'd in Mid Band:	5				
			As prov/As reqd 1.764		
			Reduced Ld 19.19		

Long Moment Calculations

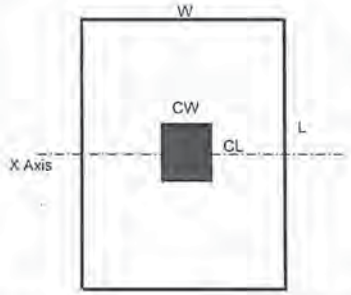
Face of Column to edge of footing	0.92	Ft	11.00	Inches	
qu at face of col:	138.05	Ksf	(ultimate soil pressure at face of column)		0.958674 Ksi
Moment Force Component 1:	632.72	K	(based on rectangular area)		
Moment Force Component 2:	0.00	K	(based on triangular area)		
Moment Arm 1:	0.46	Ft			
Moment Arm 2:	0.61	Ft			
Footing Mu Long=	**290.00**	**K-Ft**	Uses true ultimate soil pressure profile		**3479.99 K-in**
Required As=	1.70	Sq-Inches			
Minimum As=	4.54	Sq-Inches			
Use=	**4.54**	**Sq-Inches**			
Long Rebar used	9		Ld Reqd 33.84	Ld Available 8.00	
Number of Rebars	8		Average Spacing 7.7143 inches	Maximum Spacing is 18"	
Total As provided=	8.000	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)		
			As prov/As reqd 1.764		
			Reduced Ld 19.19		

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C2

P live load	780	K	LL Factor	1.6	
P dead load	1710	K	DL Factor	1.2	
Mll about X axis		K-ft	WL Factor	1.6	
Mdl about X axis		K-ft	Shear Fact	0.75	
Mwl about X axis		K-ft (Moment caused by Wind load)			
CW=Width of Col.	40	Inches			
CL=Depth of Col.	40	Inches			
q allowable	120	Ksf (compare to E24)			
W = Footing Width used	6	Ft	(X direction)		
L = Footing Length used	6	Ft	(Y direction)		
f'c	10000	Psi			
fy	60	Ksi			
Est. Ftg thickness	48	Inches	(d shown below)		
Include Ftg weight	y	(Y or N)			

Bar	Ld	Area
3	9.00	0.11
4	12.00	0.2
5	15.00	0.31
6	18.00	0.44
7	26.25	0.6
8	30.00	0.79
9	33.84	1
10	38.10	1.27
11	42.30	1.57



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	20.88	K	(included in qs)
Pa=	2490.00	K	without ftg weight
Pu=	3300.00	K	without ftg weight
Mu X axis=	0	K-ft	
Actual max soil pressure qs =	**69.75**	**Ksf**	**OK**
Actual min soil pressure qs =	69.75	Ksf	includes ftg weight
Ultimate max soil pressure qu =	92.36	Ksf	without ftg weight
Ultimate min soil pressure qu =	92.36	Ksf	without ftg weight
d =	44	inches	(assume thickness-4 inches)

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	3300	K	(same as previously calculated)
Average qu=	92.363	Ksf	
Vu=	-1225.77	K	
Vn=	-1634.36	K	
bo=	336	(Inches: perimeter around column, d/2 away)	
β	1		
Vc=	5913.60	K	**OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	72	Inches	(same as footing width)		
cs-e=	-2.33	Ft:	(Distance: from crit. section to edge of footing)	-28.00	Inches
quc=	92.36	Ksf:	qu at critical section (d from face of column)	0.641407	Ksi
Vu Component 1:	-1293.077				
Vu Component 2:	0				
Vu=	-1293.08	K			
Vn=	-1724.10	K.			
Vc=	633.60	K	**OK**		

Short Moment Calculations

Face of Col to Edge of Footing:	1.33	Ft	16.00	Inches	
Footing Mu Short=	**492.60**	**K-Ft**	Uses Average ultimate soil pressure	**5911.21**	**K-In**
Required for moment As=	2.49	Sq-Inches			
Minimum As=	6.22	Sq-Inches			
Use=	**6.22**	**Sq-Inches**			
As in Mid Band=	**6.22**	**Sq-Inches**			
Short Rebar used	9		Ld Reqd **33.84**	Ld Available	13.00
Number of Rebars	10		Average Spacing 7.3333 inches	Maximum Spacing is 18"	
Total As provided=	10.000	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)		
Min. # of Rebars Req'd in Mid Band:	7				
			As prov/As reqd	1.608	
			Reduced Ld	21.05	

Long Moment Calculations

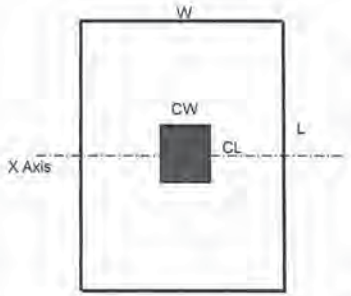
Face of Column to edge of footing	1.33	Ft	16.00	Inches	
qu at face of col:	92.36	Ksf	(ultimate soil pressure at face of column)	0.641407	Ksi
Moment Force Component 1:	738.90	K	(based on rectangular area)		
Moment Force Component 2:	0.00	K	(based on triangular area)		
Moment Arm 1:	0.67	Ft			
Moment Arm 2:	0.89	Ft			
Footing Mu Long=	**492.60**	**K-Ft**	Uses true ultimate soil pressure profile	**5911.21**	**K-In**
Required As=	2.49	Sq-Inches			
Minimum As=	6.22	Sq-Inches			
Use=	**6.22**	**Sq-Inches**			
Long Rebar used	9		Ld Reqd **33.84**	Ld Available	13.00
Number of Rebars	10		Average Spacing 7.3333 inches	Maximum Spacing is 18"	
Total As provided=	10.000	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)		
			As prov/As reqd	1.608	
			Reduced Ld	21.05	

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C3

P live load	4050	K	LL Factor	1.6	
P dead load	7730	K	DL Factor	1.2	
Mll about X axis		K-ft	WL Factor	1.6	
Mdl about X axis		K-ft	Shear Fact	0.75	
Mwl about X axis		K-ft (Moment caused by Wind load)			
CW=Width of Col.	60	Inches			
CL=Depth of Col.	72	Inches			
q allowable	120	Ksf (compare to E24)			
W = Footing Width used	10	Ft	(X direction)		
L = Footing Length used	10	Ft	(Y direction)		
f'c	10000	Psi			
fy	60	Ksi			
Est. Ftg thickness	66	Inches	(d shown below)		
Include Ftg weight	y	(Y or N)			

Bar	Ld	Area
3	9.00	0.11
4	12.00	0.2
5	15.00	0.31
6	18.00	0.44
7	26.25	0.6
8	30.00	0.79
9	33.84	1
10	38.10	1.27
11	42.30	1.57



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	79.75	K (included in qs)			
Pa=	11780.00	K without ftg weight			
Pu=	15756.00	K without ftg weight			
Mu X axis=	0	K-ft			
Actual max soil pressure qs =	**118.60**	**Ksf**	**OK**		
Actual min soil pressure qs =	118.60	Ksf includes ftg weight			
Ultimate max soil pressure qu =	158.52	Ksf without ftg weight			
Ultimate min soil pressure qu =	158.52	Ksf without ftg weight			
d =	62	inches (assume thickness-4 inches)			

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	15756	K	(same as previously calculated)
Average qu=	158.517	Ksf	
Vu=	-2240.09	K	
Vn=	-2986.78	K	
bo=	512		(Inches: perimeter around column, d/2 away)
β	1.2		
Vc=	12697.60	K	**OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	120	Inches (same as footing width)			
cs-e=	-3.17	Ft (Distance: from crit. section to edge of footing)	-38.00	Inches	
quc=	158.52	Ksf: qu at critical section (d from face of column)	1.100813	Ksi	
Vu Component 1:	-5019.705				
Vu Component 2:	0				
Vu=	-5019.71	K			
Vn=	-6692.94	K			
Vc=	1488.00	K	**OK**		

Short Moment Calculations

Face of Col to Edge of Footing:	2.50	Ft	30.00	Inches		
Footing Mu Short=	**4953.66**	**K-Ft**	Uses Average ultimate soil pressure		**59443.88**	**K-in**
Required for moment As=	17.91	Sq-Inches				
Minimum As=	14.26	Sq-Inches				
Use=	**17.91**	**Sq-Inches**				
As in Mid Band=	**17.91**	**Sq-Inches**				
Short Rebar used	10		Ld Reqd	**38.1**	Ld Available	27.00
Number of Rebars	24		Average Spacing	4.9565	inches	Maximum Spacing is 18"
Total As provided=	30.480	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
Min. # of Rebars Req'd in Mid Band:	15					
					As prov/As reqd	1.702
					Reduced Ld	22.38

Long Moment Calculations

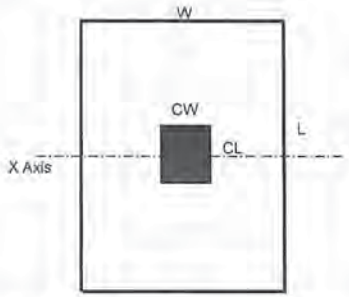
Face of Column to edge of footing	2.00	Ft	24.00	Inches		
qu at face of col:	158.52	Ksf	(ultimate soil pressure at face of column)		1.100813	Ksi
Moment Force Component 1:	3170.34	K	(based on rectangular area)			
Moment Force Component 2:	0.00	K	(based on triangular area)			
Moment Arm 1:	1.00	Ft				
Moment Arm 2:	1.33	Ft				
Footing Mu Long=	**3170.34**	**K-Ft**	Uses true ultimate soil pressure profile		**38044.08**	**K-in**
Required As=	11.43	Sq-Inches				
Minimum As=	14.26	Sq-Inches				
Use=	**14.26**	**Sq-Inches**				
Long Rebar used	10		Ld Reqd	**38.1**	Ld Available	21.00
Number of Rebars	24		Average Spacing	4.9565	inches	Maximum Spacing is 18"
Total As provided=	30.480	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
					As prov/As reqd	2.138
					Reduced Ld	17.82

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C4

P live load	3630	K	LL Factor	1.6	
P dead load	6750	K	DL Factor	1.2	
Mll about X axis		K-ft	WL Factor	1.6	
Mdl about X axis		K-ft	Shear Fact	0.75	
Mwl about X axis		K-ft (Moment caused by Wind load)			
CW=Width of Col.	60	Inches			
CL=Depth of Col.	66	Inches			
q allowable	120	Ksf (compare to E24)			
W = Footing Width used	10	Ft	(X direction)		
L = Footing Length used	10	Ft	(Y direction)		
f'c	10000	Psi			
fy	60	Ksi			
Est. Ftg thickness	66	Inches	(d shown below)		
Include Ftg weight	y	(Y or N)			

Bar	Ld	Area
3	9.00	0.11
4	12.00	0.2
5	15.00	0.31
6	18.00	0.44
7	26.25	0.6
8	30.00	0.79
9	33.84	1
10	38.10	1.27
11	42.30	1.57



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	79.75	K (included in qs)	
Pa=	10380.00	K without ftg weight	
Pu=	13908.00	K without ftg weight	
Mu X axis=	0	K-ft	
Actual max soil pressure qs =	**104.60**	**Ksf**	**OK**
Actual min soil pressure qs =	104.60	Ksf includes ftg weight	
Ultimate max soil pressure qu =	140.04	Ksf without ftg weight	
Ultimate min soil pressure qu =	140.04	Ksf without ftg weight	
d =	62	inches (assume thickness-4 inches)	

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	13908	K	(same as previously calculated)
Average qu=	140.037	Ksf	
Vu=	-1278.23	K	
Vn=	-1704.31	K	
bo=	500	(Inches: perimeter around column, d/2 away)	
β	1.1		
Vc=	12400.00	K	**OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	120	Inches (same as footing width)		
cs-e=	-2.92	Ft: (Distance: from crit. section to edge of footing)	-35.00	Inches
quc=	140.04	Ksf: qu at critical section (d from face of column)	0.972479	Ksi
Vu Component 1:	-4084.413			
Vu Component 2:	0			
Vu=	-4084.41	K		
Vn=	-5445.88	K		
Vc=	1488.00	K	**OK**	

Short Moment Calculations

Face of Col to Edge of Footing:	2.50	Ft	30.00	Inches
Footing Mu Short=	**4376.16**	**K-Ft**	Uses Average ultimate soil pressure	**52513.88 K-In**
Required for moment As=	15.80	Sq-Inches		
Minimum As=	14.26	Sq-Inches		
Use=	**15.80**	**Sq-Inches**		
As in Mid Band=	**15.80**	**Sq-Inches**		
Short Rebar used	10		Ld Reqd **38.1**	Ld Available 27.00
Number of Rebars	24		Average Spacing 4.9565 inches	Maximum Spacing is 18"
Total As provided=	30.480	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)	
Min. # of Rebars Req'd in Mid Band:	13			
			As prov/As reqd	1.929
			Reduced Ld	19.75

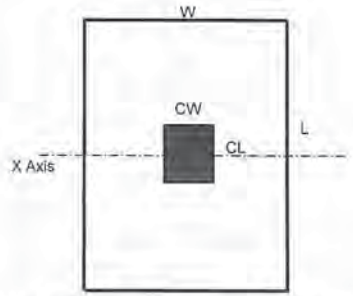
Long Moment Calculations

Face of Column to edge of footing	2.25	Ft	27.00	Inches
qu at face of col:	140.04	Ksf	(ultimate soil pressure at face of column)	0.972479 Ksi
Moment Force Component 1:	3150.63	K	(based on rectangular area)	
Moment Force Component 2:	0.00	K	(based on triangular area)	
Moment Arm 1:	1.13	Ft		
Moment Arm 2:	1.50	Ft		
Footing Mu Long=	**3544.69**	**K-Ft**	Uses true ultimate soil pressure profile	**42536.24 K-In**
Required As=	12.78	Sq-Inches		
Minimum As=	14.26	Sq-Inches		
Use=	**14.26**	**Sq-Inches**		
Long Rebar used	10		Ld Reqd **38.1**	Ld Available 24.00
Number of Rebars	24		Average Spacing 4.9565 inches	Maximum Spacing is 18"
Total As provided=	30.480	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)	
			As prov/As reqd	2.138
			Reduced Ld	17.82

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C5

P live load	2630	K	LL Factor	1.6	Bar	Ld	Area
P dead load	5430	K	DL Factor	1.2	3	9.00	0.11
Mll about X axis		K-ft	WL Factor	1.6	4	12.00	0.2
Mdl about X axis		K-ft	Shear Fact	0.75	5	15.00	0.31
Mwl about X axis		K-ft (Moment caused by Wind load)			6	18.00	0.44
CW=Width of Col.	58	Inches			7	26.25	0.6
CL=Depth of Col.	58	Inches			8	30.00	0.79
q allowable	120	Ksf (compare to E24)			9	33.84	1
W = Footing Width used	9	Ft	(X direction)		10	38.10	1.27
L = Footing Length used	9	Ft	(Y direction)		11	42.30	1.57
f'c	10000	Psi					
fy	60	Ksi					
Est. Ftg thickness	60	Inches (d shown below)					
Include Ftg weight	y	(Y or N)					



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	58.73	K (included in qs)			
Pa=	8060.00	K without ftg weight			
Pu=	10724.00	K without ftg weight			
Mu X axis=	0	K-ft			
Actual max soil pressure qs =	**100.23**	**Ksf**	**OK**		
Actual min soil pressure qs =	100.23	Ksf includes ftg weight			
Ultimate max soil pressure qu =	133.27	Ksf without ftg weight			
Ultimate min soil pressure qu =	133.27	Ksf without ftg weight			
d =	56	inches (assume thickness-4 inches)			

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	10724	K (same as previously calculated)	
Average qu=	133.265	Ksf	
Vu=	-1303.17	K	
Vn=	-1737.56	K	
bo=	456	(Inches: perimeter around column, d/2 away)	
β	1		
Vc=	10214.40	K	**OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	108	Inches (same as footing width)		
cs-e=	-2.58	Ft: (Distance: from crit. section to edge of footing)	-31.00	Inches
quc=	133.27	Ksf: qu at critical section (d from face of column)	0.925452	Ksi
Vu Component 1:	-3098.413			
Vu Component 2:	0			
Vu=	-3098.41	K		
Vn=	-4131.22	K		
Vc=	1209.60	K	**OK**	

Short Moment Calculations

Face of Col to Edge of Footing:	2.08	Ft	25.00	Inches		
Footing Mu Short=	**2602.83**	**K-Ft**	Uses Average ultimate soil pressure		**31234.00**	**K-in**
Required for moment As=	10.39	Sq-Inches				
Minimum As=	11.66	Sq-Inches				
Use=	**11.66**	**Sq-Inches**				
As in Mid Band=	**11.66**	**Sq-Inches**				
Short Rebar used	10		Ld Reqd	**38.1**	Ld Available	22.00
Number of Rebars	20		Average Spacing	5.3684	inches	Maximum Spacing is 18"
Total As provided=	25.400	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
Min. # of Rebars Req'd in Mid Band:	10					
					As prov/As reqd	2.178
					Reduced Ld	17.5

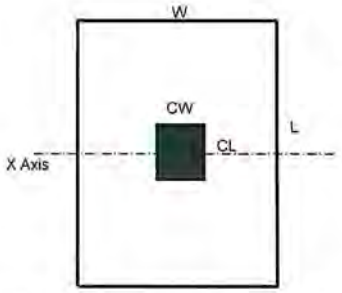
Long Moment Calculations

Face of Column to edge of footing	2.08	Ft	25.00	Inches		
qu at face of col:	133.27	Ksf (ultimate soil pressure at face of column)			0.925452	Ksi
Moment Force Component 1:	2498.72	K (based on rectangular area)				
Moment Force Component 2:	0.00	K (based on triangular area)				
Moment Arm 1:	1.04	Ft				
Moment Arm 2:	1.39	Ft				
Footing Mu Long=	**2602.83**	**K-Ft**	Uses true ultimate soil pressure profile		**31234.00**	**K-in**
Required As=	10.39	Sq-Inches				
Minimum As=	11.66	Sq-Inches				
Use=	**11.66**	**Sq-Inches**				
Long Rebar used	10		Ld Reqd	**38.1**	Ld Available	22.00
Number of Rebars	20		Average Spacing	5.3684	inches	Maximum Spacing is 18"
Total As provided=	25.400	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
					As prov/As reqd	2.178
					Reduced Ld	17.5

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C6

P live load	4440	K	LL Factor	1.6	Bar	Ld	Area
P dead load	7550	K	DL Factor	1.2	3	9.00	0.11
Mll about X axis		K-ft	WL Factor	1.6	4	12.00	0.2
Mdl about X axis		K-ft	Shear Fac	0.75	5	15.00	0.31
Mwl about X axis		K-ft (Moment caused by Wind load)			6	18.00	0.44
CW=Width of Col.	40	Inches			7	26.25	0.6
CL=Depth of Col.	40	Inches			8	30.00	0.79
q allowable	120	Ksf (compare to E24)			9	33.84	1
W = Footing Width used	10	Ft	(X direction)		10	38.10	1.27
L = Footing Length used	10	Ft	(Y direction)		11	42.30	1.57
f'c	10000	Psi					
fy	60	Ksi					
Est. Ftg thickness	66	Inches (d shown below)					
Include Ftg weight	y	(Y or N)					



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	79.75	K (included in qs)	**Footing Two Way Shear Calculation (Uses avg. ult. soil pressure**		
Pa=	11990.00	K without ftg weight	Pu=	16164	K (same as previously calculated)
Pu=	16164.00	K without ftg weight	Average qu=	162.597	Ksf
Mu X axis=	0	K-ft	Vu=	4416.37	K
Actual max soil pressure qs =	**120.70**	**Ksf RESIZE**	Vn=	5888.49	K
Actual min soil pressure qs =	120.70	Ksf includes ftg weight	bo=	408	(Inches: perimeter around column, d/2 away)
Ultimate max soil pressure qu =	162.60	Ksf without ftg weight	β	1	
Ultimate min soil pressure qu =	162.60	Ksf without ftg weight	Vc=	10118.40	K **OK**
d =	62	inches (assume thickness-4 inches)			

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	120	Inches (same as footing width)		
cs-e=	-1.83	Ft: (Distance: from crit. section to edge of footing)	-22.00	Inches
quc=	162.60	Ksf: qu at critical section (d from face of column)	1.129146	Ksi
Vu Component 1:	-2980.945			
Vu Component 2:	0			
Vu=	-2980.95	K		
Vn=	-3974.59	K		
Vc=	1488.00	K **OK**		

Short Moment Calculations

Face of Col to Edge of Footing:	3.33	Ft	40.00	Inches		
Footing Mu Short=	**9033.17**	**K-Ft**	Uses Average ultimate soil pressure		**108398.00**	**K-in**
Required for moment As=	32.89	Sq-Inches				
Minimum As=	14.26	Sq-Inches				
Use=	**32.89**	**Sq-Inches**				
As in Mid Band=	**32.89**	**Sq-Inches**				
Short Rebar used	10		Ld Reqd	**38.1**	Ld Available	37.00
Number of Rebars	24		Average Spacing	4.9565	inches	Maximum Spacing is 18"
Total As provided=	**30.480**	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
Min. # of Rebars Req'd in Mid Band:	26					
			As prov/As reqd	0.927		
			Reduced Ld	41.11		

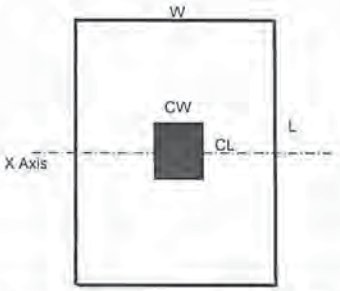
Long Moment Calculations

Face of Column to edge of footing	3.33	Ft	40.00	Inches		
qu at face of col:	162.60	Ksf	(ultimate soil pressure at face of column)		1.1291458	Ksi
Moment Force Component 1:	5419.90	K	(based on rectangular area)			
Moment Force Component 2:	0.00	K	(based on triangular area)			
Moment Arm 1:	1.67	Ft				
Moment Arm 2:	2.22	Ft				
Footing Mu Long=	**9033.17**	**K-Ft**	Uses true ultimate soil pressure profile		**108398.00**	**K-in**
Required As=	32.89	Sq-Inches				
Minimum As=	14.26	Sq-Inches				
Use=	**32.89**	**Sq-Inches**				
Long Rebar used	10		Ld Reqd	**38.1**	Ld Available	37.00
Number of Rebars	24		Average Spacing	4.9565	inches	Maximum Spacing is 18"
Total As provided=	**30.480**	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
			As prov/As reqd	0.927		
			Reduced Ld	41.11		

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C7

P live load	2060	K	LL Factor	1.6	Bar	Ld	Area
P dead load	10230	K	DL Factor	1.2	3	9.00	0.11
Mll about X axis		K-ft	WL Factor	1.6	4	12.00	0.2
Mdl about X axis		K-ft	Shear Fac	0.75	5	15.00	0.31
Mwl about X axis		K-ft (Moment caused by Wind load)			6	18.00	0.44
CW=Width of Col	46	Inches			7	26.25	0.6
CL=Depth of Col	46	Inches			8	30.00	0.79
q allowable	120	Ksf (compare to E24)			9	33.84	1
W = Footing Width used	11	Ft	(X direction)		10	38.10	1.27
L = Footing Length used	11	Ft	(Y direction)		11	42.30	1.57
f'c	10000	Psi					
fy	60	Ksi					
Est. Ftg thickness	76	Inches (d shown below)					
Include Ftg weight	y	(Y or N)					



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	111.12	K (included in qs)			
Pa=	12290.00	K without ftg weight			
Pu=	15572.00	K without ftg weight			
Mu X axis=	0	K-ft			
Actual max soil pressure qs =	**102.49**	**Ksf**	**OK**		
Actual min soil pressure qs =	102.49	Ksf includes ftg weight			
Ultimate max soil pressure qu =	129.80	Ksf without ftg weight			
Ultimate min soil pressure qu =	129.80	Ksf without ftg weight			
d =	72	inches (assume thickness-4 inches)			

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	15572	K (same as previously calculated)	
Average qu=	129.796	Ksf	
Vu=	3021.43	K	
Vn=	4028.57	K	
bo=	472	(Inches: perimeter around column, d/2 away)	
β	1		
Vc=	13593.60	K	**OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	132	Inches (same as footing width)		
cs-e=	-2.42	Ft: (Distance: from crit. section to edge of footing)	-29.00	Inches
quc=	129.80	Ksf: qu at critical section (d from face of column)	0.901363	Ksi
Vu Component 1:	-3450.416			
Vu Component 2:	0			
Vu=	-3450.42	K		
Vn=	-4600.55	K		
Vc=	1900.80	K	**OK**	

Short Moment Calculations

Face of Col to Edge of Footing:	3.58	Ft	43.00	Inches			
Footing Mu Short=	**9166.41**	**K-Ft**	Uses Average ultimate soil pressure		**109996.88**	**K-in**	
Required for moment As=	28.60	Sq-Inches					
Minimum As=	18.06	Sq-Inches					
Use=	**28.60**	**Sq-Inches**					
As in Mid Band=	**28.60**	**Sq-Inches**					
Short Rebar used	10		Ld Reqd	38.1	Ld Available	40.00	
Number of Rebars	30		Average Spacing	4.3448	inches	Maximum Spacing is 18"	
Total As provided=	38.100	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)				
Min. # of Rebars Req'd in Mid Band:	23						
					As prov/As reqd	1.332	
					Reduced Ld	28.6	

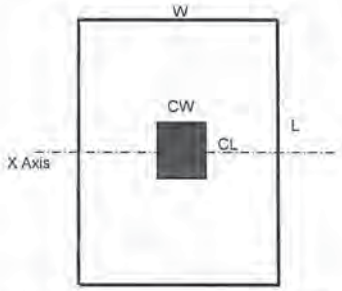
Long Moment Calculations

Face of Column to edge of footing	3.58	Ft	43.00	Inches			
qu at face of col:	129.80	Ksf	(ultimate soil pressure at face of column)		0.9013626	Ksi	
Moment Force Component 1:	5116.13	K	(based on rectangular area)				
Moment Force Component 2:	0.00	K	(based on triangular area)				
Moment Arm 1:	1.79	Ft					
Moment Arm 2:	2.39	Ft					
Footing Mu Long=	**9166.41**	**K-Ft**	Uses true ultimate soil pressure profile		**109996.88**	**K-in**	
Required As=	28.60	Sq-Inches					
Minimum As=	18.06	Sq-Inches					
Use=	**28.60**	**Sq-Inches**					
Long Rebar used	10		Ld Reqd	38.1	Ld Available	40.00	
Number of Rebars	30		Average Spacing	4.3448	inches	Maximum Spacing is 18"	
Total As provided=	38.100	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)				
					As prov/As reqd	1.332	
					Reduced Ld	28.6	

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C8

P live load	3190	K	LL Factor	1.6	Bar	Ld	Area
P dead load	13240	K	DL Factor	1.2	3	9.00	0.11
Mll about X axis		K-ft	WL Factor	1.6	4	12.00	0.2
Mdl about X axis		K-ft	Shear Fac	0.75	5	15.00	0.31
Mwl about X axis		K-ft (Moment caused by Wind load)			6	18.00	0.44
CW=Width of Col.	52	Inches			7	26.25	0.6
CL=Depth of Col.	52	Inches			8	30.00	0.79
q allowable	120	Ksf (compare to E24)			9	33.84	1
W = Footing Width used	13	Ft	(X direction)		10	38.10	1.27
L = Footing Length used	13	Ft	(Y direction)		11	42.30	1.57
f'c	10000	Psi					
fy	60	Ksi					
Est. Ftg thickness	96	Inches (d shown below)					
Include Ftg weight	y	(Y or N)					



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	196.04	K (included in qs)			
Pa=	16430.00	K without ftg weight			
Pu=	20992.00	K without ftg weight			
Mu X axis=	0	K-ft			
Actual max soil pressure qs =	**98.38**	**Ksf**	**OK**		
Actual min soil pressure qs =	98.38	Ksf includes ftg weight			
Ultimate max soil pressure qu =	125.61	Ksf without ftg weight			
Ultimate min soil pressure qu =	125.61	Ksf without ftg weight			
d =	92	inches (assume thickness-4 inches)			

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	20992	K (same as previously calculated)	
Average qu=	125.605	Ksf	
Vu=	2904.88	K	
Vn=	3873.17	K	
bo=	576	(Inches: perimeter around column, d/2 away)	
β	1		
Vc=	21196.80	K	**OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	156	Inches (same as footing width)		
cs-e=	-3.33	Ft: (Distance: from crit. section to edge of footing)	-40.00	Inches
quc=	125.61	Ksf: qu at critical section (d from face of column)	0.872257	Ksi
Vu Component 1:	-5442.884			
Vu Component 2:	0			
Vu=	-5442.88	K		
Vn=	-7257.18	K.		
Vc=	2870.40	K	**OK**	

Short Moment Calculations

Face of Col to Edge of Footing:	4.33	Ft	52.00	Inches		
Footing Mu Short=	**15330.79**	**K-Ft**	Uses Average ultimate soil pressure		**183969.48**	**K-in**
Required for moment As=	37.37	Sq-Inches				
Minimum As=	26.96	Sq-Inches				
Use=	**37.37**	**Sq-Inches**				
As in Mid Band=	**37.37**	**Sq-Inches**				
Short Rebar used	10		Ld Reqd	38.1	Ld Available	49.00
Number of Rebars	38		Average Spacing	4.0541	inches	Maximum Spacing is 18"
Total As provided=	48.260	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
Min. # of Rebars Req'd in Mid Band:	30					
					As prov/As reqd	1.291
					Reduced Ld	29.51

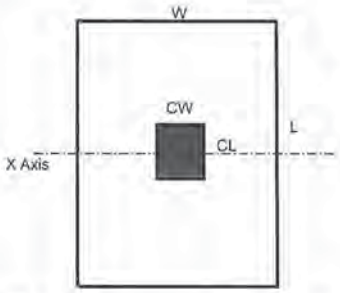
Long Moment Calculations

Face of Column to edge of footing	4.33	Ft	52.00	Inches		
qu at face of col:	125.61	Ksf	(ultimate soil pressure at face of column)		0.8722571	Ksi
Moment Force Component 1:	7075.75	K	(based on rectangular area)			
Moment Force Component 2:	0.00	K	(based on triangular area)			
Moment Arm 1:	2.17	Ft				
Moment Arm 2:	2.89	Ft				
Footing Mu Long=	**15330.79**	**K-Ft**	Uses true ultimate soil pressure profile		**183969.48**	**K-in**
Required As=	37.37	Sq-Inches				
Minimum As=	26.96	Sq-Inches				
Use=	**37.37**	**Sq-Inches**				
Long Rebar used	10		Ld Reqd	38.1	Ld Available	49.00
Number of Rebars	38		Average Spacing	4.0541	inches	Maximum Spacing is 18"
Total As provided=	48.260	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
					As prov/As reqd	1.291
					Reduced Ld	29.51

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C9

P live load	8070	K	LL Factor	1.6	Bar	Ld	Area
P dead load	13100	K	DL Factor	1.2	3	9.00	0.11
Mll about X axis		K-ft	WL Factor	1.6	4	12.00	0.2
Mdl about X axis		K-ft	Shear Fac	0.75	5	15.00	0.31
Mwl about X axis		K-ft (Moment caused by Wind load)			6	18.00	0.44
CW=Width of Col.	84	Inches			7	26.25	0.6
CL=Depth of Col.	84	Inches			8	30.00	0.79
q allowable	120	Ksf (compare to E24)			9	33.84	1
W = Footing Width used	13	Ft	(X direction)		10	38.10	1.27
L = Footing Length used	13	Ft	(Y direction)		11	42.30	1.57
f'c	10000	Psi					
fy	60	Ksi					
Est. Ftg thickness	96	Inches (d shown below)					
Include Ftg weight	y	(Y or N)					



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	196.04	K (included in qs)			
Pa=	21170.00	K without ftg weight			
Pu=	28632.00	K without ftg weight			
Mu X axis=	0	K-ft			
Actual max soil pressure qs =	126.43	Ksf RESIZE			
Actual min soil pressure qs =	126.43	Ksf includes ftg weight			
Ultimate max soil pressure qu =	170.81	Ksf without ftg weight			
Ultimate min soil pressure qu =	170.81	Ksf without ftg weight			
d =	92	inches (assume thickness-4 inches)			

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	28632	K (same as previously calculated)
Average qu=	170.812	Ksf
Vu=	-8111.58	K
Vn=	-10815.45	K
bo=	704	(Inches: perimeter around column, d/2 away)
β	1	
Vc=	25907.20	K **OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	156	Inches (same as footing width)
cs-e=	-4.67	Ft: (Distance: from crit. section to edge of footing) -56.00 Inches
quc=	170.81	Ksf: qu at critical section (d from face of column) 1.186195 Ksi
Vu Component 1:	-10362.6	
Vu Component 2:	0	
Vu=	-10362.60	K
Vn=	-13816.80	K
Vc=	2870.40	K **OK**

Short Moment Calculations

Face of Col to Edge of Footing:	3.00	Ft	36.00	Inches	
Footing Mu Short=	**9992.51**	**K-Ft**	Uses Average ultimate soil pressure		**119910.11 K-in**
Required for moment As=	24.28	Sq-Inches			
Minimum As=	26.96	Sq-Inches			
Use=	**26.96**	**Sq-Inches**			
As in Mid Band=	**26.96**	**Sq-Inches**			
Short Rebar used	10		Ld Reqd **38.1**	Ld Available	33.00
Number of Rebars	38		Average Spacing 4.0541 inches		Maximum Spacing is 18"
Total As provided=	48.260	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)		
Min. # of Rebars Req'd in Mid Band:	22				
				As prov/As reqd	1.79
				Reduced Ld	21.28

Long Moment Calculations

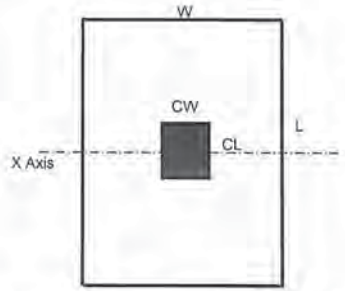
Face of Column to edge of footing	3.00	Ft	36.00	Inches	
qu at face of col:	170.81	Ksf (ultimate soil pressure at face of column)			1.1861953 Ksi
Moment Force Component 1:	6661.67	K (based on rectangular area)			
Moment Force Component 2:	0.00	K (based on triangular area)			
Moment Arm 1:	1.50	Ft			
Moment Arm 2:	2.00	Ft			
Footing Mu Long=	**9992.51**	**K-Ft**	Uses true ultimate soil pressure profile		**119910.11 K-in**
Required As=	24.28	Sq-Inches			
Minimum As=	26.96	Sq-Inches			
Use=	**26.96**	**Sq-Inches**			
Long Rebar used	10		Ld Reqd **38.1**	Ld Available	33.00
Number of Rebars	38		Average Spacing 4.0541 inches		Maximum Spacing is 18"
Total As provided=	48.260	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)		
				As prov/As reqd	1.79
				Reduced Ld	21.28

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C10

P live load	6245	K	LL Factor	1.6	
P dead load	11770	K	DL Factor	1.2	
Mll about X axis		K-ft	WL Factor	1.6	
Mdl about X axis		K-ft	Shear Fac	0.75	
Mwl about X axis		K-ft (Moment caused by Wind load)			
CW=Width of Col.	52	Inches			
CL=Depth of Col.	52	Inches			
q allowable	120	Ksf (compare to E24)			
W = Footing Width used	13	Ft	(X direction)		
L = Footing Length used	13	Ft	(Y direction)		
f'c	10000	Psi			
fy	60	Ksi			
Est. Ftg thickness	96	Inches (d shown below)			
Include Ftg weight	y	(Y or N)			

Bar	Ld	Area
3	9.00	0.11
4	12.00	0.2
5	15.00	0.31
6	18.00	0.44
7	26.25	0.6
8	30.00	0.79
9	33.84	1
10	38.10	1.27
11	42.30	1.57



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	196.04	K (included in qs)			
Pa=	18015.00	K without ftg weight			
Pu=	24116.00	K without ftg weight			
Mu X axis=	0	K-ft			
Actual max soil pressure qs =	**107.76**	**Ksf**	**OK**		
Actual min soil pressure qs =	107.76	Ksf includes ftg weight			
Ultimate max soil pressure qu =	144.09	Ksf without ftg weight			
Ultimate min soil pressure qu =	144.09	Ksf without ftg weight			
d =	92	inches (assume thickness-4 inches)			

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	24116	K (same as previously calculated)
Average qu=	144.090	Ksf
Vu=	3367.01	K
Vn=	4489.34	K
bo=	576	(Inches: perimeter around column, d/2 away)
β	1	
Vc=	21196.80	K **OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	156	Inches (same as footing width)		
cs-e=	-3.33	Ft: (Distance: from crit. section to edge of footing)	-40.00	Inches
quc=	144.09	Ksf: qu at critical section (d from face of column)	1.000627	Ksi
Vu Component 1:	-6243.91			
Vu Component 2:	0			
Vu=	-6243.91	K		
Vn=	-8325.21	K		
Vc=	2870.40	K **OK**		

Short Moment Calculations

Face of Col to Edge of Footing:	4.33	Ft	52.00	Inches	
Footing Mu Short=	**17587.01**	**K-Ft**	Uses Average ultimate soil pressure	**211044.15**	**K-in**
Required for moment As=	42.93	Sq-Inches			
Minimum As=	26.96	Sq-Inches			
Use=	**42.93**	**Sq-Inches**			
As in Mid Band=	**42.93**	**Sq-Inches**			
Short Rebar used	10		Ld Reqd 38.1	Ld Available 49.00	
Number of Rebars	38		Average Spacing 4.0541 inches	Maximum Spacing is 18"	
Total As provided=	48.260	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)		
Min. # of Rebars Req'd in Mid Band:	34				
			As prov/As reqd	1.124	
			Reduced Ld	33.9	

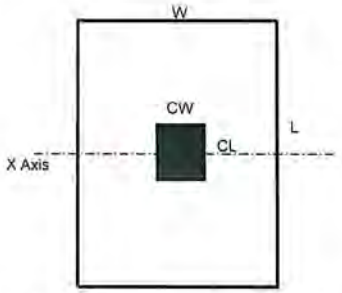
Long Moment Calculations

Face of Column to edge of footing	4.33	Ft	52.00	Inches	
qu at face of col:	144.09	Ksf (ultimate soil pressure at face of column)		1.0006266	Ksi
Moment Force Component 1:	8117.08	K (based on rectangular area)			
Moment Force Component 2:	0.00	K (based on triangular area)			
Moment Arm 1:	2.17	Ft			
Moment Arm 2:	2.89	Ft			
Footing Mu Long=	**17587.01**	**K-Ft**	Uses true ultimate soil pressure	**211044.15**	**K-in**
Required As=	42.93	Sq-Inches			
Minimum As=	26.96	Sq-Inches			
Use=	**42.93**	**Sq-Inches**			
Long Rebar used	10		Ld Reqd 38.1	Ld Available 49.00	
Number of Rebars	38		Average Spacing 4.0541 inches	Maximum Spacing is 18"	
Total As provided=	48.260	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)		
			As prov/As reqd	1.124	
			Reduced Ld	33.9	

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C12

P live load	7750	K	LL Factor	1.6	Bar	Ld	Area
P dead load	7800	K	DL Factor	1.2	3	9.00	0.11
Mll about X axis		K-ft	WL Factor	1.6	4	12.00	0.2
Mdl about X axis		K-ft	Shear Fac	0.75	5	15.00	0.31
Mwl about X axis		K-ft (Moment caused by Wind load)			6	18.00	0.44
CW=Width of Col.	50	Inches			7	26.25	0.6
CL=Depth of Col.	50	Inches			8	30.00	0.79
q allowable	120	Ksf (compare to E24)			9	33.84	1
W = Footing Width used	11	Ft	(X direction)		10	38.10	1.27
L = Footing Length used	11	Ft	(Y direction)		11	42.30	1.57
f'c	10000	Psi					
fy	60	Ksi					
Est. Ftg thickness	76	Inches (d shown below)					
Include Ftg weight	y	(Y or N)					



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	111.12	K (included in qs)			
Pa=	15550.00	K without ftg weight			
Pu=	21760.00	K without ftg weight			
Mu X axis=	0	K-ft			
Actual max soil pressure qs =	129.43	Ksf	RESIZE		
Actual min soil pressure qs =	129.43	Ksf includes ftg weight			
Ultimate max soil pressure qu =	180.94	Ksf without ftg weight			
Ultimate min soil pressure qu =	180.94	Ksf without ftg weight			
d =	72	inches (assume thickness-4 inches)			

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	21760	K (same as previously calculated)
Average qu=	180.937	Ksf
Vu=	3058.18	K
Vn=	4077.57	K
bo=	488	(Inches: perimeter around column, d/2 away)
β	1	
Vc=	14054.40	K OK

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	132	Inches (same as footing width)		
cs-e=	-2.58	Ft: (Distance: from crit. section to edge of footing)	-31.00	Inches
quc=	180.94	Ksf: qu at critical section (d from face of column)	1.256505	Ksi
Vu Component 1:	-5141.618			
Vu Component 2:	0			
Vu=	-5141.62	K		
Vn=	-6855.49	K		
Vc=	1900.80	K OK		

Short Moment Calculations

Face of Col to Edge of Footing:	3.42	Ft	41.00	Inches		
Footing Mu Short=	**11617.02**	**K-Ft**	Uses Average ultimate soil pressure		**139404.20**	**K-in**
Required for moment As=	36.35	Sq-Inches				
Minimum As=	18.06	Sq-Inches				
Use=	**36.35**	**Sq-Inches**				
As in Mid Band=	**36.35**	**Sq-Inches**				
Short Rebar used	10		Ld Reqd	**38.1**	Ld Available	38.00
Number of Rebars	30		Average Spacing	4.3448	inches	Maximum Spacing is 18"
Total As provided=	38.100	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
Min. # of Rebars Req'd in Mid Band:	29					
					As prov/As reqd	1.048
					Reduced Ld	36.35

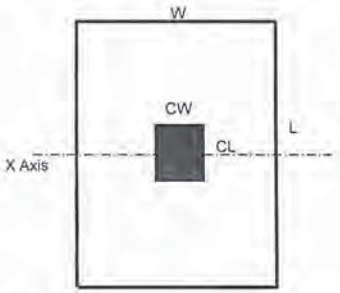
Long Moment Calculations

Face of Column to edge of footing	3.42	Ft	41.00	Inches		
qu at face of col:	180.94	Ksf	(ultimate soil pressure at face of column)		1.2565049	Ksi
Moment Force Component 1:	6800.20	K	(based on rectangular area)			
Moment Force Component 2:	0.00	K	(based on triangular area)			
Moment Arm 1:	1.71	Ft				
Moment Arm 2:	2.28	Ft				
Footing Mu Long=	**11617.02**	**K-Ft**	Uses true ultimate soil pressure profile		**139404.20**	**K-in**
Required As=	36.35	Sq-Inches				
Minimum As=	18.06	Sq-Inches				
Use=	**36.35**	**Sq-Inches**				
Long Rebar used	10		Ld Reqd	**38.1**	Ld Available	38.00
Number of Rebars	30		Average Spacing	4.3448	inches	Maximum Spacing is 18"
Total As provided=	38.100	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
					As prov/As reqd	1.048
					Reduced Ld	36.35

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C16

P live load	6190	K	LL Factor	1.6	Bar	Ld	Area
P dead load	8040	K	DL Factor	1.2	3	9.00	0.11
Mll about X axis		K-ft	WL Factor	1.6	4	12.00	0.2
Mdl about X axis		K-ft	Shear Fac	0.75	5	15.00	0.31
Mwl about X axis		K-ft (Moment caused by Wind load)			6	18.00	0.44
CW=Width of Col.	44	Inches			7	26.25	0.6
CL=Depth of Col.	44	Inches			8	30.00	0.79
q allowable	120	Ksf (compare to E24)			9	33.84	1
W = Footing Width used	11	Ft	(X direction)		10	38.10	1.27
L = Footing Length used	11	Ft	(Y direction)		11	42.30	1.57
f'c	10000	Psi					
fy	60	Ksi					
Est. Ftg thickness	76	Inches (d shown below)					
Include Ftg weight	y	(Y or N)					



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	111.12	K (included in qs)					
Pa=	14230.00	K without ftg weight					
Pu=	19552.00	K without ftg weight					
Mu X axis=	0	K-ft					
Actual max soil pressure qs =	**118.52**	**Ksf**	**OK**				
Actual min soil pressure qs =	118.52	Ksf includes ftg weight					
Ultimate max soil pressure qu =	162.69	Ksf without ftg weight					
Ultimate min soil pressure qu =	162.69	Ksf without ftg weight					
d =	72	inches (assume thickness-4 inches)					

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	19552	K (same as previously calculated)
Average qu=	162.689	Ksf
Vu=	4349.64	K
Vn=	5799.52	K
bo=	464	(Inches; perimeter around column, d/2 away)
β	1	
Vc=	13363.20	K **OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	132	Inches (same as footing width)	
cs-e=	-2.33	Ft. (Distance: from crit. section to edge of footing)	-28.00 Inches
quc=	162.69	Ksf. qu at critical section (d from face of column)	1.129783 Ksi
Vu Component 1:	-4175.679		
Vu Component 2:	0		
Vu=	-4175.68	K	
Vn=	-5567.57	K.	
Vc=	1900.80	K **OK**	

Short Moment Calculations

Face of Col to Edge of Footing:	3.67	Ft	44.00	Inches	
Footing Mu Short=	**12029.93**	**K-Ft**	Uses Average ultimate soil pressure		**144359.17 K-in**
Required for moment As=	37.66	Sq-Inches			
Minimum As=	18.06	Sq-Inches			
Use=	**37.66**	**Sq-Inches**			
As in Mid Band=	**37.66**	**Sq-Inches**			
Short Rebar used	10		Ld Reqd 38.1	Ld Available 41.00	
Number of Rebars	30		Average Spacing 4.3448 inches	Maximum Spacing is 18"	
Total As provided=	38.100	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)		
Min. # of Rebars Req'd in Mid Band:	30				
				As prov/As reqd	1.012
				Reduced Ld	37.66

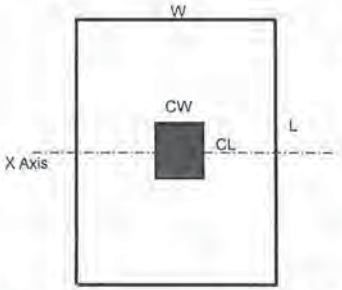
Long Moment Calculations

Face of Column to edge of footing	3.67	Ft	44.00	Inches	
qu at face of col:	162.69	Ksf (ultimate soil pressure at face of column)			1.1297832 Ksi
Moment Force Component 1:	5561.78	K (based on rectangular area)			
Moment Force Component 2:	0.00	K (based on triangular area)			
Moment Arm 1:	1.83	Ft			
Moment Arm 2:	2.44	Ft			
Footing Mu Long=	**12029.93**	**K-Ft**	Uses true ultimate soil pressure profile		**144359.17 K-in**
Required As=	37.66	Sq-Inches			
Minimum As=	18.06	Sq-Inches			
Use=	**37.66**	**Sq-Inches**			
Long Rebar used	10		Ld Reqd 38.1	Ld Available 41.00	
Number of Rebars	30		Average Spacing 4.3448 inches	Maximum Spacing is 18"	
Total As provided=	38.100	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)		
				As prov/As reqd	1.012
				Reduced Ld	37.66

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C17

P live load	1380	K	LL Factor	1.6	Bar	Ld	Area
P dead load	5920	K	DL Factor	1.2	3	9.00	0.11
Mll about X axis		K-ft	WL Factor	1.6	4	12.00	0.2
Mdl about X axis		K-ft	Shear Fac	0.75	5	15.00	0.31
Mwl about X axis		K-ft (Moment caused by Wind load)			6	18.00	0.44
CW=Width of Col.	34	Inches			7	26.25	0.6
CL=Depth of Col.	34	Inches			8	30.00	0.79
q allowable	120	Ksf (compare to E24)			9	33.84	1
W = Footing Width used	9	Ft	(X direction)		10	38.10	1.27
L = Footing Length used	9	Ft	(Y direction)		11	42.30	1.57
f'c	10000	Psi					
fy	60	Ksi					
Est. Ftg thickness	60	Inches (d shown below)					
Include Ftg weight	y	(Y or N)					



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	58.73	K (included in qs)			
Pa=	7300.00	K without ftg weight			
Pu=	9312.00	K without ftg weight			
Mu X axis=	0	K-ft			
Actual max soil pressure qs =	**90.85**	**Ksf**	**OK**		
Actual min soil pressure qs =	90.85	Ksf includes ftg weight			
Ultimate max soil pressure qu =	115.83	Ksf without ftg weight			
Ultimate min soil pressure qu =	115.83	Ksf without ftg weight			
d =	56	inches (assume thickness-4 inches)			

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	9312	K (same as previously calculated)	
Average qu=	115.833	Ksf	
Vu=	2796.40	K	
Vn=	3728.53	K	
bo=	360	(Inches: perimeter around column, d/2 away)	
β	1		
Vc=	8064.00	K	**OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	108	Inches (same as footing width)		
cs-e=	-1.58	Ft: (Distance: from crit. section to edge of footing)	-19.00	Inches
quc=	115.83	Ksf: qu at critical section (d from face of column)	0.804396	Ksi
Vu Component 1:	-1650.62			
Vu Component 2:	0			
Vu=	-1650.62	K		
Vn=	-2200.83	K		
Vc=	1209.60	K	**OK**	

Short Moment Calculations

Face of Col to Edge of Footing:	3.08	Ft	37.00	Inches		
Footing Mu Short=	**4955.48**	**K-Ft**	Uses Average ultimate soil pressure		**59465.75**	**K-in**
Required for moment As=	19.90	Sq-Inches				
Minimum As=	11.66	Sq-Inches				
Use=	**19.90**	**Sq-Inches**				
As in Mid Band=	**19.90**	**Sq-Inches**				
Short Rebar used	10		Ld Reqd	**38.1**	Ld Available	34.00
Number of Rebars	20		Average Spacing	5.3684	inches	Maximum Spacing is 18"
Total As provided=	25.400	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
Min. # of Rebars Req'd in Mid Band:	16					
					As prov/As reqd	1.277
					Reduced Ld	29.84

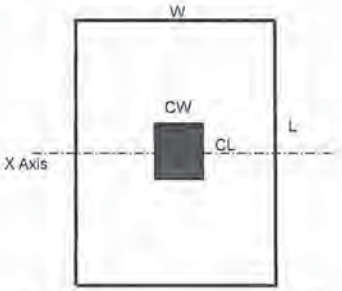
Long Moment Calculations

Face of Column to edge of footing	3.08	Ft	37.00	Inches		
qu at face of col:	115.83	Ksf	(ultimate soil pressure at face of column)		0.8043956	Ksi
Moment Force Component 1:	3214.36	K	(based on rectangular area)			
Moment Force Component 2:	0.00	K	(based on triangular area)			
Moment Arm 1:	1.54	Ft				
Moment Arm 2:	2.06	Ft				
Footing Mu Long=	**4955.48**	**K-Ft**	Uses true ultimate soil pressure profile		**59465.75**	**K-in**
Required As=	19.90	Sq-Inches				
Minimum As=	11.66	Sq-Inches				
Use=	**19.90**	**Sq-Inches**				
Long Rebar used	10		Ld Reqd	**38.1**	Ld Available	34.00
Number of Rebars	20		Average Spacing	5.3684	inches	Maximum Spacing is 18"
Total As provided=	25.400	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
					As prov/As reqd	1.277
					Reduced Ld	29.84

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C18

P live load	670	K	LL Factor	1.6	Bar	Ld	Area
P dead load	2040	K	DL Factor	1.2	3	9.00	0.11
Mll about X axis		K-ft	WL Factor	1.6	4	12.00	0.2
Mdl about X axis		K-ft	Shear Fac	0.75	5	15.00	0.31
Mwl about X axis		K-ft (Moment caused by Wind load)			6	18.00	0.44
CW=Width of Col	26	Inches			7	26.25	0.6
CL=Depth of Col.	30	Inches			8	30.00	0.79
q allowable	120	Ksf (compare to E24)			9	33.84	1
W = Footing Width used	5	Ft	(X direction)		10	38.10	1.27
L = Footing Length used	5	Ft	(Y direction)		11	42.30	1.57
f'c	10000	Psi					
fy	60	Ksi					
Est. Ftg thickness	42	Inches (d shown below)					
Include Ftg weight	y	(Y or N)					



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	12.69	K (included in qs)			
Pa=	2710.00	K without ftg weight			
Pu=	3520.00	K without ftg weight			
Mu X axis=	0	K-ft			
Actual max soil pressure qs =	**108.91**	**Ksf**	**OK**		
Actual min soil pressure qs =	108.91	Ksf includes ftg weight			
Ultimate max soil pressure qu =	141.41	Ksf without ftg weight			
Ultimate min soil pressure qu =	141.41	Ksf without ftg weight			
d =	38	inches (assume thickness-4 inches)			

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	3520	K	(same as previously calculated)
Average qu=	141.409	Ksf	
Vu=	-753.69	K	
Vn=	-1004.93	K	
bo=	264		(Inches: perimeter around column, d/2 away)
β	1.15384615		
Vc=	4012.80	K	**OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	60	Inches (same as footing width)		
cs-e=	-1.92	Ft; (Distance: from crit. section to edge of footing)	-23.00	Inches
quc=	141.41	Ksf: qu at critical section (d from face of column)	0.982007	Ksi
Vu Component 1:	-1355.17			
Vu Component 2:	0			
Vu=	-1355.17	K		
Vn=	-1806.89	K		
Vc=	456.00	K	**OK**	

Short Moment Calculations

Face of Col to Edge of Footing	1.42	Ft	17.00	Inches		
Footing Mu Short=	**709.50**	**K-Ft**	Uses Average ultimate soil pressure		**8514.00**	**K-in**
Required for moment As=	4.18	Sq-Inches				
Minimum As=	4.54	Sq-Inches				
Use=	**4.54**	**Sq-Inches**				
As in Mid Band=	**4.54**	**Sq-Inches**				
Short Rebar used	9		Ld Reqd	**33.84**	Ld Available	14.00
Number of Rebars	8		Average Spacing	7.7143	inches	Maximum Spacing is 18"
Total As provided=	8.000	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
Min. # of Rebars Req'd in Mid Band:	5					
					As prov/As reqd	1.764
					Reduced Ld	19.19

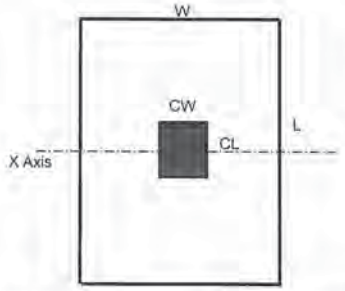
Long Moment Calculations

Face of Column to edge of footing	1.25	Ft	15.00	Inches		
qu at face of col:	141.41	Ksf	(ultimate soil pressure at face of column)		0.9820069	Ksi
Moment Force Component 1:	883.81	K	(based on rectangular area)			
Moment Force Component 2:	0.00	K	(based on triangular area)			
Moment Arm 1:	0.63	Ft				
Moment Arm 2:	0.83	Ft				
Footing Mu Long=	**552.38**	**K-Ft**	Uses true ultimate soil pressure profile		**6628.55**	**K-in**
Required As=	3.25	Sq-Inches				
Minimum As=	4.54	Sq-Inches				
Use=	**4.54**	**Sq-Inches**				
Long Rebar used	9		Ld Reqd	**33.84**	Ld Available	12.00
Number of Rebars	8		Average Spacing	7.7143	inches	Maximum Spacing is 18"
Total As provided=	8.000	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
					As prov/As reqd	1.764
					Reduced Ld	19.19

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C19

P live load	3720	K	LL Factor	1.6	Bar	Ld	Area
P dead load	5970	K	DL Factor	1.2	3	9.00	0.11
Mll about X axis		K-ft	WL Factor	1.6	4	12.00	0.2
Mdl about X axis		K-ft	Shear Fac	0.75	5	15.00	0.31
Mwl about X axis		K-ft (Moment caused by Wind load)			6	18.00	0.44
CW=Width of Col.	44	Inches			7	26.25	0.6
CL=Depth of Col.	44	Inches			8	30.00	0.79
q allowable	120	Ksf (compare to E24)			9	33.84	1
W = Footing Width used	9	Ft	(X direction)		10	38.10	1.27
L = Footing Length used	9	Ft	(Y direction)		11	42.30	1.57
f'c	10000	Psi					
fy	60	Ksi					
Est. Ftg thickness	60	Inches (d shown below)					
Include Ftg weight	y	(Y or N)					



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	58.73	K (included in qs)			
Pa=	9690.00	K without ftg weight			
Pu=	13116.00	K without ftg weight			
Mu X axis=	0	K-ft			
Actual max soil pressure qs =	**120.35**	**Ksf**	**RESIZE**	✔	
Actual min soil pressure qs =	120.35	Ksf includes ftg weight			
Ultimate max soil pressure qu =	162.80	Ksf without ftg weight			
Ultimate min soil pressure qu =	162.80	Ksf without ftg weight			
d =	56	inches (assume thickness-4 inches)			

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	13116	K (same as previously calculated)	
Average qu=	162.796	Ksf	
Vu=	1810.73	K	
Vn=	2414.30	K	
bo=	400	(Inches: perimeter around column, d/2 away)	
β	1		
Vc=	8960.00	K	**OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	108	Inches (same as footing width)		
cs-e=	-2.00	Ft: (Distance: from cnt. section to edge of footing)	-24.00	Inches
quc=	162.80	Ksf: qu at critical section (d from face of column)	1.130527	Ksi
Vu Component 1:	-2930.327			
Vu Component 2:	0			
Vu=	-2930.33	K		
Vn=	-3907.10	K		
Vc=	1209.60	K	**OK**	

Short Moment Calculations

Face of Col to Edge of Footing:	2.67	Ft	32.00	Inches		
Footing Mu Short=	**5209.47**	**K-Ft**	Uses Average ultimate soil pressure		**62513.64**	**K-in**
Required for moment As=	20.93	Sq-Inches				
Minimum As=	11.66	Sq-Inches				
Use=	**20.93**	**Sq-Inches**				
As in Mid Band=	**20.93**	**Sq-Inches**				
Short Rebar used	10		Ld Reqd	38.1	Ld Available	29.00
Number of Rebars	20		Average Spacing	5.3684	inches	Maximum Spacing is 18"
Total As provided=	25.400	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
Min. # of Rebars Req'd in Mid Band:	17					
					As prov/As reqd	1.214
					Reduced Ld	31.39

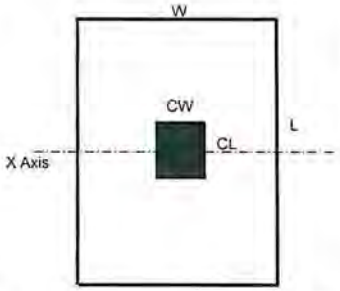
Long Moment Calculations

Face of Column to edge of footing	2.67	Ft	32.00	Inches		
qu at face of col:	162.80	Ksf (ultimate soil pressure at face of column)			1.1305273	Ksi
Moment Force Component 1:	3907.10	K (based on rectangular area)				
Moment Force Component 2:	0.00	K (based on triangular area)				
Moment Arm 1:	1.33	Ft				
Moment Arm 2:	1.78	Ft				
Footing Mu Long=	**5209.47**	**K-Ft**	Uses true ultimate soil pressure profile		**62513.64**	**K-in**
Required As=	20.93	Sq-Inches				
Minimum As=	11.66	Sq-Inches				
Use=	**20.93**	**Sq-Inches**				
Long Rebar used	10		Ld Reqd	38.1	Ld Available	29.00
Number of Rebars	20		Average Spacing	5.3684	inches	Maximum Spacing is 18"
Total As provided=	25.400	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
					As prov/As reqd	1.214
					Reduced Ld	31.39

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C20

P live load	4440	K	LL Factor	1.6	Bar	Ld	Area
P dead load	7760	K	DL Factor	1.2	3	9.00	0.11
Mll about X axis		K-ft	WL Factor	1.6	4	12.00	0.2
Mdl about X axis		K-ft	Shear Fac	0.75	5	15.00	0.31
Mwl about X axis		K-ft (Moment caused by Wind load)			6	18.00	0.44
CW=Width of Col.	42	Inches			7	26.25	0.6
CL=Depth of Col.	42	Inches			8	30.00	0.79
q allowable	120	Ksf (compare to E24)			9	33.84	1
W = Footing Width used	10	Ft	(X direction)		10	38.10	1.27
L = Footing Length used	10	Ft	(Y direction)		11	42.30	1.57
f'c	10000	Psi					
fy	60	Ksi					
Est. Ftg thickness	66	Inches (d shown below)					
Include Ftg weight	y	(Y or N)					



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	79.75	K (included in qs)	**Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)**		
Pa=	12200.00	K without ftg weight	Pu=	16416	K (same as previously calculated)
Pu=	16416.00	K without ftg weight	Average qu=	165.117	Ksf
Mu X axis=	0	K-ft	Vu=	4013.88	K
Actual max soil pressure qs =	**122.80**	**Ksf RESIZE**	Vn=	5351.84	K
Actual min soil pressure qs =	122.80	Ksf includes ftg weight	bo=	416	(Inches: perimeter around column, d/2 away)
Ultimate max soil pressure qu =	165.12	Ksf without ftg weight	β	1	
Ultimate min soil pressure qu =	165.12	Ksf without ftg weight	Vc=	10316.80	K **OK**
d =	62	inches (assume thickness-4 inches)			

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	120	Inches (same as footing width)		
cs-e=	-1.92	Ft (Distance: from crit. section to edge of footing)	-23.00	Inches
quc=	165.12	Ksf: qu at critical section (d from face of column)	1.146646	Ksi
Vu Component 1:	-3164.743			
Vu Component 2:	0			
Vu=	-3164.74	K		
Vn=	-4219.66	K		
Vc=	1488.00	K **OK**		

Short Moment Calculations

Face of Col to Edge of Footing:	3.25	Ft	39.00	Inches		
Footing Mu Short=	**8720.24**	**K-Ft**	Uses Average ultimate soil pressure		**104642.90**	**K-in**
Required for moment As=	31.73	Sq-Inches				
Minimum As=	14.26	Sq-Inches				
Use=	**31.73**	**Sq-Inches**				
As in Mid Band=	**31.73**	**Sq-Inches**				
Short Rebar used	10		Ld Reqd	**38.1**	Ld Available	36.00
Number of Rebars	24		Average Spacing	4.9565	inches	Maximum Spacing is 18"
Total As provided=	**30.480**	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
Min. # of Rebars Req'd in Mid Band:	25					
			As prov/As reqd	0.961		
			Reduced Ld	39.67		

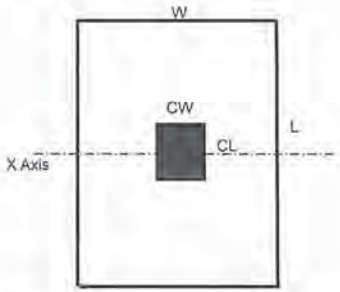
Long Moment Calculations

Face of Column to edge of footing	3.25	Ft	39.00	Inches		
qu at face of col:	165.12	Ksf	(ultimate soil pressure at face of column)		1.1466458	Ksi
Moment Force Component 1:	5366.30	K	(based on rectangular area)			
Moment Force Component 2:	0.00	K	(based on triangular area)			
Moment Arm 1:	1.63	Ft				
Moment Arm 2:	2.17	Ft				
Footing Mu Long=	**8720.24**	**K-Ft**	Uses true ultimate soil pressure profile		**104642.90**	**K-in**
Required As=	31.73	Sq-Inches				
Minimum As=	14.26	Sq-Inches				
Use=	**31.73**	**Sq-Inches**				
Long Rebar used	10		Ld Reqd	**38.1**	Ld Available	36.00
Number of Rebars	24		Average Spacing	4.9565	inches	Maximum Spacing is 18"
Total As provided=	**30.480**	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
			As prov/As reqd	0.961		
			Reduced Ld	39.67		

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C21

P live load	4270	K	LL Factor	1.6	Bar	Ld	Area
P dead load	6210	K	DL Factor	1.2	3	9.00	0.11
Mll about X axis		K-ft	WL Factor	1.6	4	12.00	0.2
Mdl about X axis		K-ft	Shear Fac	0.75	5	15.00	0.31
Mwl about X axis		K-ft (Moment caused by Wind load)			6	18.00	0.44
CW=Width of Col.	38	Inches			7	26.25	0.6
CL=Depth of Col.	38	Inches			8	30.00	0.79
q allowable	120	Ksf (compare to E24)			9	33.84	1
W = Footing Width used	10	Ft	(X direction)		10	38.10	1.27
L = Footing Length used	10	Ft	(Y direction)		11	42.30	1.57
f'c	10000	Psi					
fy	60	Ksi					
Est. Ftg thickness	66	Inches (d shown below)					
Include Ftg weight	y	(Y or N)					



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	79.75	K (included in qs)	**Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)**				
Pa=	10480.00	K without ftg weight	Pu=	14284	K (same as previously calculated)		
Pu=	14284.00	K without ftg weight	Average qu=	143.797	Ksf		
Mu X axis=	0	K-ft	Vu=	4298.10	K		
Actual max soil pressure qs =	**105.60**	**Ksf OK**	Vn=	5730.80	K		
Actual min soil pressure qs =	105.60	Ksf includes ftg weight	bo=	400	(Inches: perimeter around column, d/2 away)		
Ultimate max soil pressure qu =	143.80	Ksf without ftg weight	β	1			
Ultimate min soil pressure qu =	143.80	Ksf without ftg weight	Vc=	9920.00	K **OK**		
d =	62	inches (assume thickness-4 inches)					

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)							
b=	120	Inches (same as footing width)					
cs-e=	-1.75	Ft: (Distance: from crit. section to edge of footing)	-21.00	Inches			
quc=	143.80	Ksf: qu at critical section (d from face of column)	0.99859	Ksi			
Vu Component 1:	-2516.448						
Vu Component 2:	0						
Vu=	-2516.45	K					
Vn=	-3355.26	K					
Vc=	1488.00	K **OK**					

Short Moment Calculations

Face of Col to Edge of Footing:	3.42	Ft	41.00	Inches			
Footing Mu Short=	**8393.15**	**K-Ft**	Uses Average ultimate soil pressure		**100717.82**	**K-in**	
Required for moment As=	30.52	Sq-Inches					
Minimum As=	14.26	Sq-Inches					
Use=	**30.52**	**Sq-Inches**					
As in Mid Band=	**30.52**	**Sq-Inches**					
Short Rebar used	10		Ld Reqd	**38.1**	Ld Available	38.00	
Number of Rebars	24		Average Spacing	4.9565	inches	Maximum Spacing is 18"	
Total As provided=	30.480	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)				
Min. # of Rebars Req'd in Mid Band:	25						
					As prov/As reqd	0.999	
					Reduced Ld	38.16	

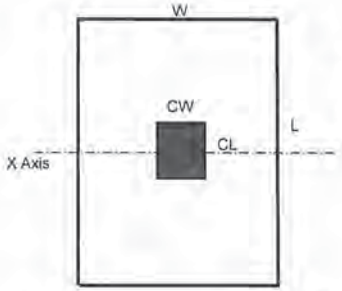
Long Moment Calculations

Face of Column to edge of footing	3.42	Ft	41.00	Inches			
qu at face of col:	143.80	Ksf	(ultimate soil pressure at face of column)		0.9985903	Ksi	
Moment Force Component 1:	4913.06	K	(based on rectangular area)				
Moment Force Component 2:	0.00	K	(based on triangular area)				
Moment Arm 1:	1.71	Ft					
Moment Arm 2:	2.28	Ft					
Footing Mu Long=	**8393.15**	**K-Ft**	Uses true ultimate soil pressure profile		**100717.82**	**K-in**	
Required As=	30.52	Sq-Inches					
Minimum As=	14.26	Sq-Inches					
Use=	**30.52**	**Sq-Inches**					
Long Rebar used	10		Ld Reqd	**38.1**	Ld Available	38.00	
Number of Rebars	24		Average Spacing	4.9565	inches	Maximum Spacing is 18"	
Total As provided=	30.480	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)				
					As prov/As reqd	0.999	
					Reduced Ld	38.16	

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C22

P live load	2020	K	LL Factor	1.6	Bar	Ld	Area
P dead load	8100	K	DL Factor	1.2	3	9.00	0.11
Mll about X axis		K-ft	WL Factor	1.6	4	12.00	0.2
Mdl about X axis		K-ft	Shear Fac	0.75	5	15.00	0.31
Mwl about X axis		K-ft (Moment caused by Wind load)			6	18.00	0.44
CW=Width of Col.	42	Inches			7	26.25	0.6
CL=Depth of Col.	42	Inches			8	30.00	0.79
q allowable	120	Ksf (compare to E24)			9	33.84	1
W = Footing Width used	10	Ft	(X direction)		10	38.10	1.27
L = Footing Length used	10	Ft	(Y direction)		11	42.30	1.57
f'c	10000	Psi					
fy	60	Ksi					
Est. Ftg thickness	66	Inches (d shown below)					
Include Ftg weight	y	(Y or N)					



Short Rebars run along the Width and carry the short moment

Long Rebars run along the length and carry the long moment.

Ftg Weight=	79.75	K (included in qs)			
Pa=	10120.00	K without ftg weight			
Pu=	12952.00	K without ftg weight			
Mu X axis=	0	K-ft			
Actual max soil pressure qs =	**102.00**	**Ksf**	**OK**		
Actual min soil pressure qs =	102.00	Ksf includes ftg weight			
Ultimate max soil pressure qu =	130.48	Ksf without ftg weight			
Ultimate min soil pressure qu =	130.48	Ksf without ftg weight			
d =	62	inches (assume thickness-4 inches)			

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	12952	K (same as previously calculated)	
Average qu=	130.477	Ksf	
Vu=	3151.73	K	
Vn=	4202.30	K	
bo=	416	(Inches: perimeter around column, d/2 away)	
β	1		
Vc=	10316.80	K	**OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	120	Inches (same as footing width)		
cs-e=	-1.92	Ft: (Distance: from crit. section to edge of footing)	-23.00	Inches
quc=	130.48	Ksf: qu at critical section (d from face of column)	0.90609	Ksi
Vu Component 1:	-2500.809			
Vu Component 2:	0			
Vu=	-2500.81	K		
Vn=	-3334.41	K		
Vc=	1488.00	K	**OK**	

Short Moment Calculations

Face of Col to Edge of Footing	3.25	Ft	39.00	Inches		
Footing Mu Short=	**6890.82**	**K-Ft**	Uses Average ultimate soil pressure		**82689.80**	**K-in**
Required for moment As=	24.99	Sq-Inches				
Minimum As=	14.26	Sq-Inches				
Use=	**24.99**	**Sq-Inches**				
As in Mid Band=	**24.99**	**Sq-Inches**				
Short Rebar used	10		Ld Reqd	**38.1**	Ld Available	36.00
Number of Rebars	24		Average Spacing	4.9565	inches	Maximum Spacing is 18"
Total As provided=	30.480	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
Min. # of Rebars Req'd in Mid Band:	20					
					As prov/As reqd	1.219
					Reduced Ld	31.24

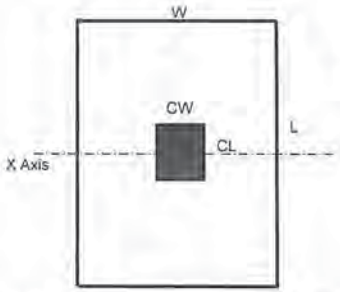
Long Moment Calculations

Face of Column to edge of footing	3.25	Ft	39.00	Inches		
qu at face of col:	130.48	Ksf (ultimate soil pressure at face of column)			0.9060903	Ksi
Moment Force Component 1:	4240.50	K (based on rectangular area)				
Moment Force Component 2:	0.00	K (based on triangular area)				
Moment Arm 1:	1.63	Ft				
Moment Arm 2:	2.17	Ft				
Footing Mu Long=	**6890.82**	**K-Ft**	Uses true ultimate soil pressure profile		**82689.80**	**K-in**
Required As=	24.99	Sq-Inches				
Minimum As=	14.26	Sq-Inches				
Use=	**24.99**	**Sq-Inches**				
Long Rebar used	10		Ld Reqd	**38.1**	Ld Available	36.00
Number of Rebars	24		Average Spacing	4.9565	inches	Maximum Spacing is 18"
Total As provided=	30.480	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
					As prov/As reqd	1.219
					Reduced Ld	31.24

Footing Size and Thickness Calculation based on Shear Considerations and true soil pressure... Enter Yellow Values

C23

P live load	980	K	LL Factor	1.6	Bar	Ld	Area	
P dead load	2520	K	DL Factor	1.2	3	9.00	0.11	
Mll about X axis		K-ft	WL Factor	1.6	4	12.00	0.2	
Mdl about X axis		K-ft	Shear Fac	0.75	5	15.00	0.31	
Mwl about X axis		K-ft (Moment caused by Wind load)			6	18.00	0.44	
CW=Width of Col.	42	Inches			7	26.25	0.6	
CL=Depth of Col	42	Inches			8	30.00	0.79	
q allowable	120	Ksf (compare to E24)			9	33.84	1	
W = Footing Width used	6	Ft	(X direction)		10	38.10	1.27	
L = Footing Length used	6	Ft	(Y direction)		11	42.30	1.57	
f'c	10000	Psi						
fy	60	Ksi						
Est. Ftg thickness	48	Inches (d shown below)						
Include Ftg weight	y	(Y or N)						



Short Rebars run along the Width and carry the short moment.

Long Rebars run along the length and carry the long moment.

Ftg Weight=	20.88	K (included in qs)				
Pa=	3500.00	K without ftg weight				
Pu=	4592.00	K without ftg weight				
Mu X axis=	0	K-ft				
Actual max soil pressure qs =	**97.80**	**Ksf**	**OK**			
Actual min soil pressure qs =	97.80	Ksf includes ftg weight				
Ultimate max soil pressure qu =	128.25	Ksf without ftg weight				
Ultimate min soil pressure qu =	128.25	Ksf without ftg weight				
d =	44	inches (assume thickness-4 inches)				

Footing Two Way Shear Calculation (Uses avg. ult. soil pressure)

Pu=	4592	K (same as previously calculated)	
Average qu=	128.252	Ksf	
Vu=	-1995.14	K	
Vn=	-2660.19	K	
bo=	344	(Inches: perimeter around column, d/2 away)	
β	1		
Vc=	6054.40	K	**OK**

Footing One Way Shear Calc - Long Direction-(Uses true ult. soil pressure profile)

b=	72	Inches (same as footing width)		
cs-e=	-2.42	Ft: (Distance: from crit. section to edge of footing)	-29.00	Inches
quc=	126.25	Ksf: qu at critical section (d from face of column)	0.890636	Ksi
Vu Component 1:	-1859.648			
Vu Component 2:	0			
Vu=	-1859.65	K		
Vn=	-2479.53	K		
Vc=	633.60	K	**OK**	

Short Moment Calculations

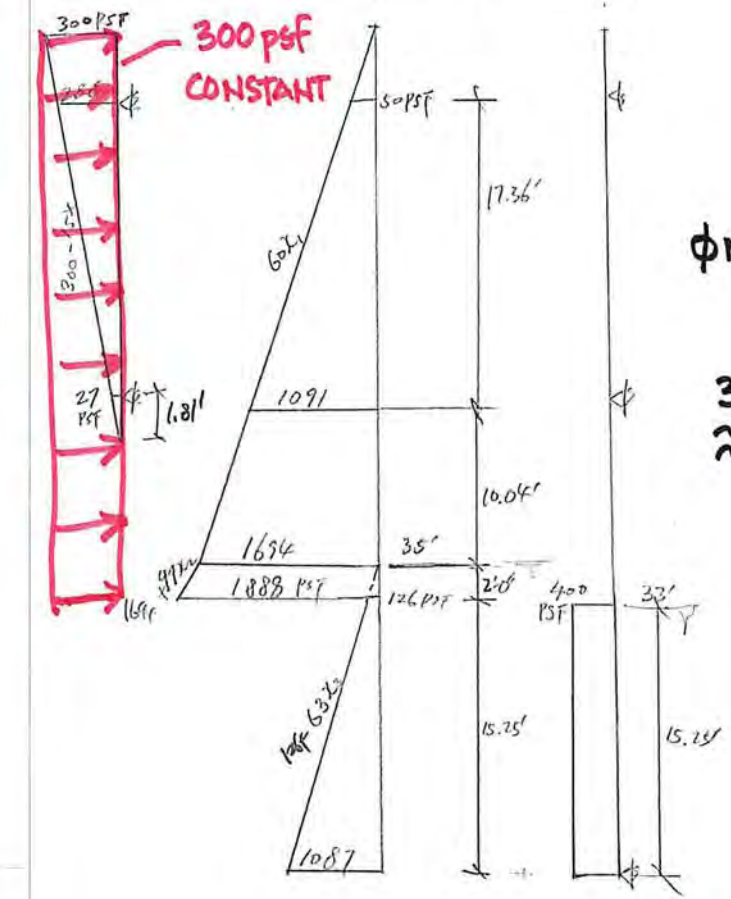
Face of Col to Edge of Footing:	1.25	Ft	15.00	Inches		
Footing Mu Short=	**601.18**	**K-Ft**	Uses Average ultimate soil pressure		**7214.15**	**K-In**
Required for moment As=	3.05	Sq-Inches				
Minimum As=	6.22	Sq-Inches				
Use=	**6.22**	**Sq-Inches**				
As in Mid Band=	**6.22**	**Sq-Inches**				
Short Rebar used	9		Ld Reqd	**33.84**	Ld Available	12.00
Number of Rebars	10		Average Spacing	7.3333	inches	Maximum Spacing is 18"
Total As provided=	10.000	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
Min. # of Rebars Req'd in Mid Band:	7					
					As prov/As reqd	1.608
					Reduced Ld	21.05

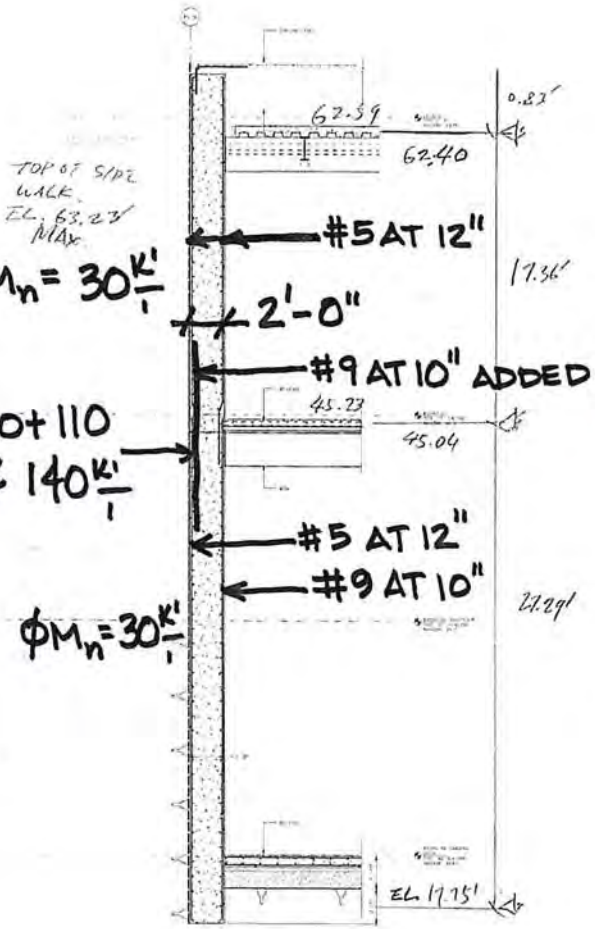
Long Moment Calculations

Face of Column to edge of footing	1.25	Ft	15.00	Inches		
qu at face of col:	128.25	Ksf	(ultimate soil pressure at face of column)		0.8906358	Ksi
Moment Force Component 1:	961.89	K	(based on rectangular area)			
Moment Force Component 2:	0.00	K	(based on triangular area)			
Moment Arm 1:	0.63	Ft				
Moment Arm 2:	0.83	Ft				
Footing Mu Long=	**601.18**	**K-Ft**	Uses true ultimate soil pressure profile		**7214.15**	**K-In**
Required As=	3.05	Sq-Inches				
Minimum As=	6.22	Sq-Inches				
Use=	**6.22**	**Sq-Inches**				
Long Rebar used	9		Ld Reqd	**33.84**	Ld Available	12.00
Number of Rebars	10		Average Spacing	7.3333	inches	Maximum Spacing is 18"
Total As provided=	10.000	Sq-Inches	This can be used to reduce Ld by the ratio of (As prov/As Reqd)			
					As prov/As reqd	1.608
					Reduced Ld	21.05

SOUTH WALL

SURCHARGE + SOIL & HYDROSTATIC + ROCK





$\phi M_n = 30^{K'}/_{1}$

$30 + 110 \approx 140^{K'}/_{1}$

$\phi M_n = 30^{K'}/_{1}$

$\phi M_n = 32^{K'}/_{1}$

$\phi V_n = 40^{K}/_{1}$

CASE 1

$\phi M_n = 115^{K'}/_{1}$

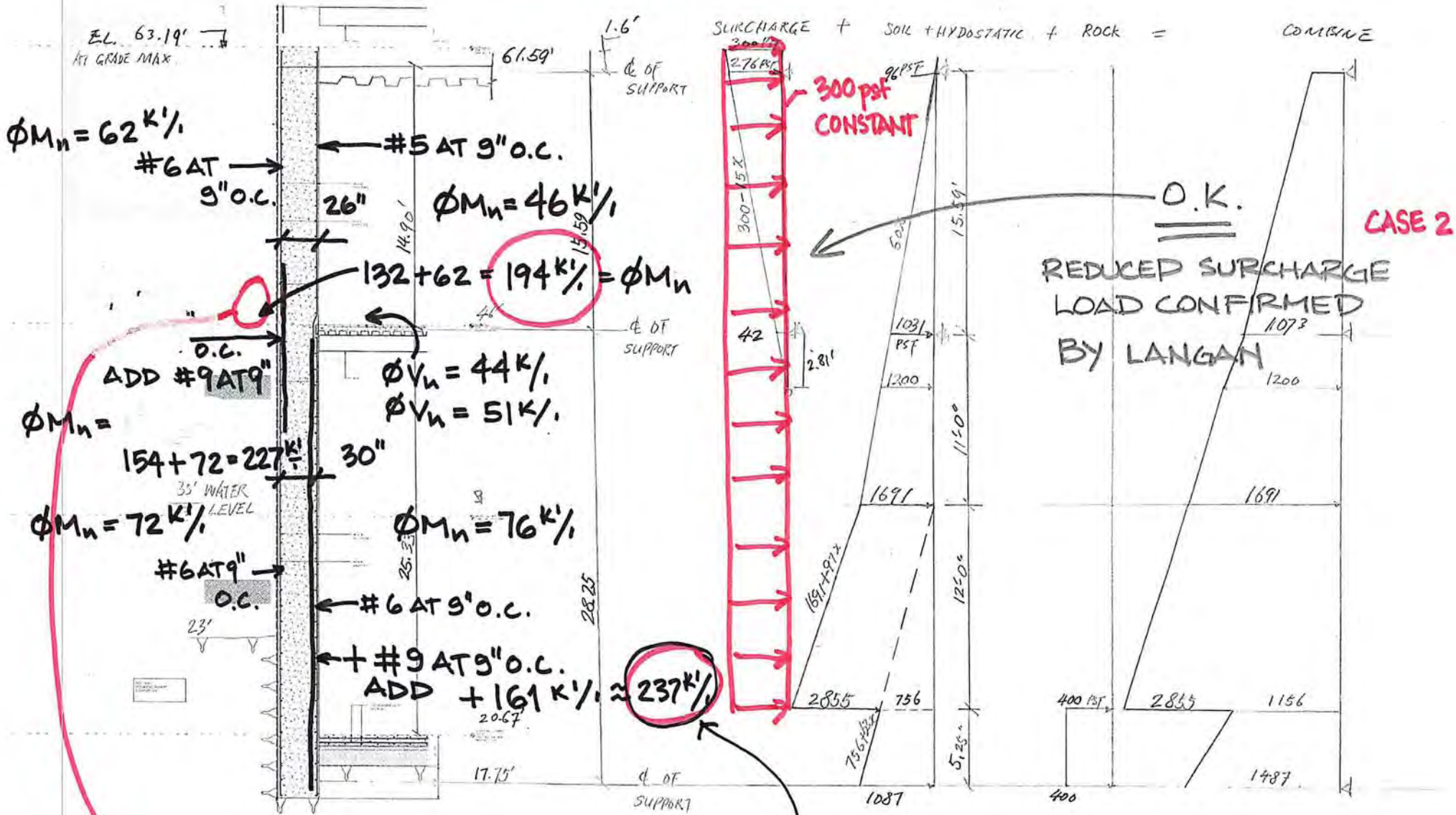
$\phi V_n = 40^{K}/_{1}$

F11/F0209
SOUTH WALL

OLD REF.
NOW F2/FO-204

CASE1 OK.

WEST WALL

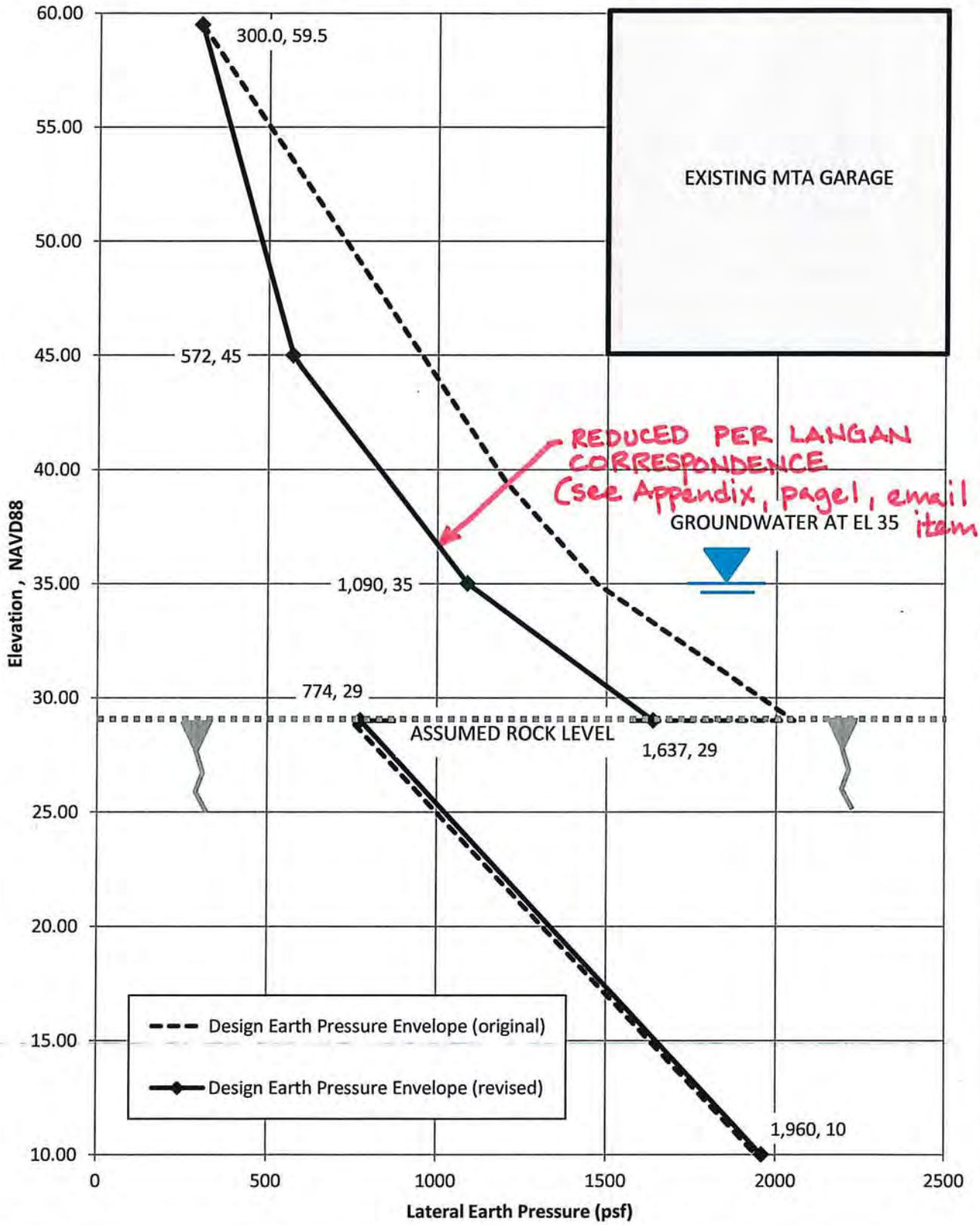


F1/F0-201 ✓
WEST WALL
CASE 2

OVERSTRESSED $\frac{224}{194} = 1.15$ ← SEE DIAG

OVERSTRESSED $\frac{254}{237} = 1.07$ ← SEE DIAG.

Lateral Earth Pressures
(317 Madison at East 43rd Street)



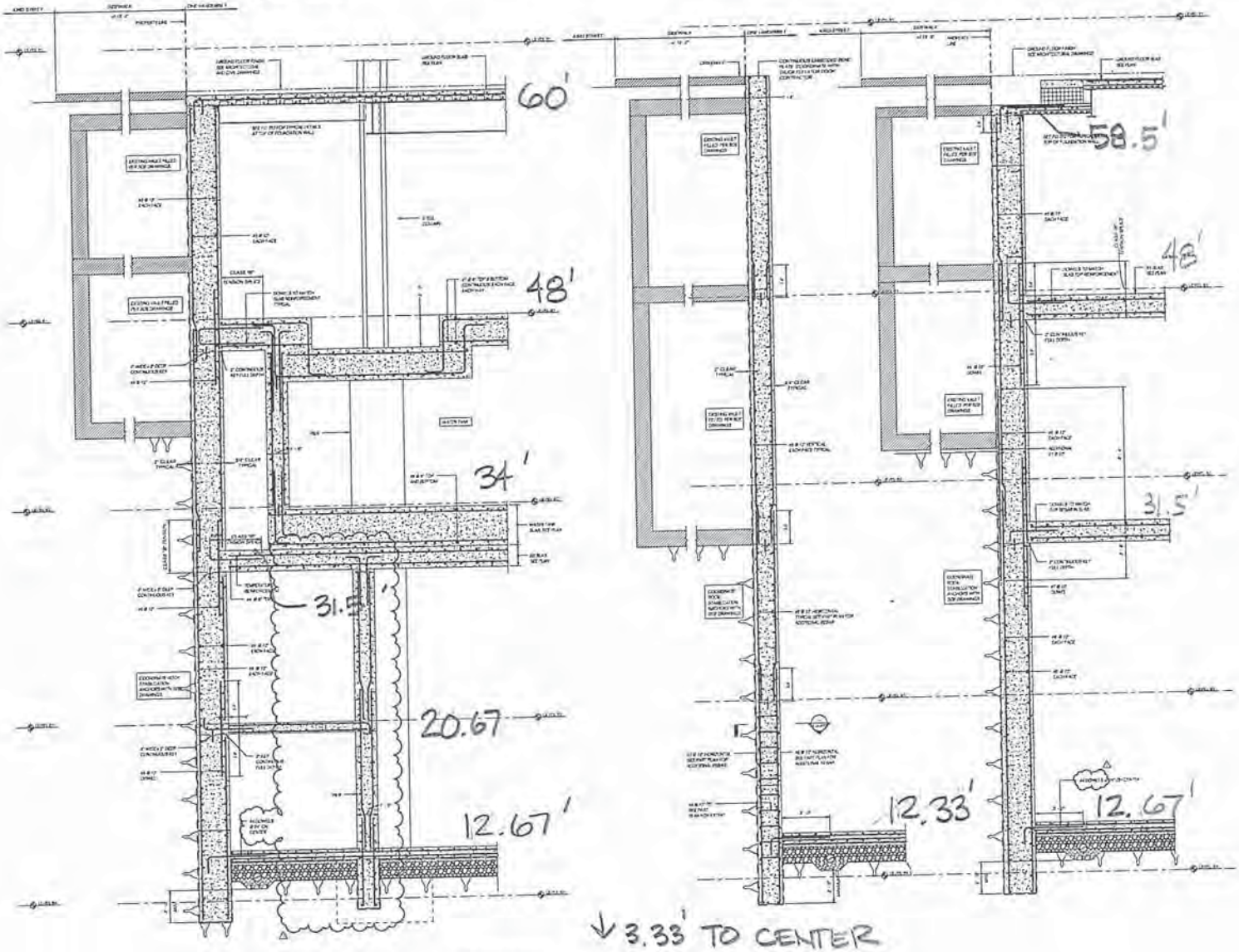
Thornton Tomasetti

PROJECT ONE VANDERBILT | PROJECT NO. | DATE 2/8/16

BY JRY | SHEET of

SUBJECT FOUNDATION PEER REVIEW | CHECKED BY | DRAWING NO.

NORTH WALL

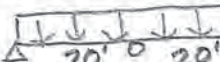


$M_u = 28^{K'}/_{'} < 30^{K'}/_{'}$ O.K.

$V_u = 14.8^{K}/_{'} < 40^{K}/_{'}$

O.K.

HORIZONTAL SPAN



w/o STIRRUPS #5 AT 12"

$\phi M_n = 21.8^{K}/_{'}$

$\phi V_c = 28.9^{K}/_{'}$

$M_u^- = 83.8^{K}/_{'}$

$M_u^+ = 75.8^{K}/_{'}$

$V_u = 24.7^{K}/_{'}$

$\phi M_n^+ = 99.6^{K}/_{'}$ O.K

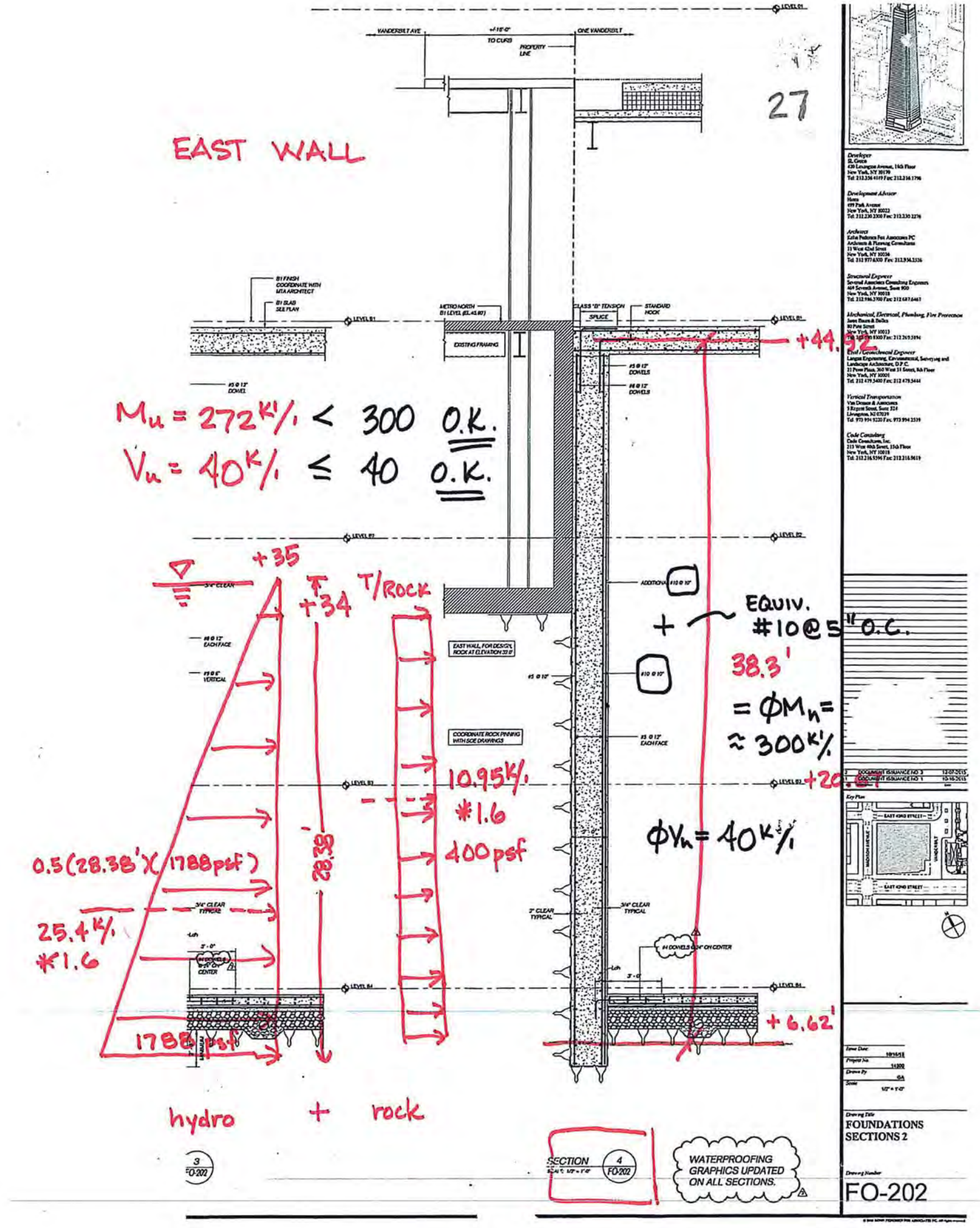
$\phi M_n^- = 94.0^{K}/_{'}$ O.K

$\phi V_n = 40^{K} > 24.7^{K}$ O.K

w/o shear reinf. $28.9^{K} \geq w_u(20') \Rightarrow w_u \leq 2890^{plf}$

$\Rightarrow w_s \leq 1806^{plf} \approx 1906^{plf}$ ∴ 2 stirrups B4→B3

total moment O.K. assuming fixity @ walls


EAST WALL
27
VANDERBILT AVE
+15'-0" TO CURB
PROPERTY LINE
ONE VANDERBILT
B1 FINISH COORDINATE WITH MTA ARCHITECT
B1 SLAB SEE PLAN
METRO NORTH B1 LEVEL (EL.43.92')
EXISTING FRAMING
CLASS "B" TENSION SPLICE
STANDARD HOOK
+44.92
#5 @ 12" DOWELS
#6 @ 12" DOWELS
$M_u = 272^{K'}/_{'} < 300$ O.K.
$V_u = 40^{K}/_{'} \leq 40$ O.K.
LEVEL B1
LEVEL B2
LEVEL B3
LEVEL B4
+35
+34
T/ROCK
3" CLEAR
#6 @ 12" EACH FACE
#18 @ VERTICAL
EAST WALL, FOR DESIGN, ROCK AT ELEVATION 33.0'
#5 @ 12"
COORDINATE ROCK PINNING WITH SOE DRAWINGS
ADDITIONAL #10 @ 10"
#10 @ 10"
#5 @ 12" EACH FACE
EQUIV. #10@5" O.C.
38.3'
$= \phi M_n =$
$\approx 300^{K'}/_{'}$
+20
10.95K/'
#1.6
400psf
$\phi V_n = 40^{K}/_{'}$
28.38'
0.5(28.38')(1788psf)
25.4K/'
#1.6
3/4" CLEAR TYPICAL
3" CLEAR TYPICAL
#4 DOWELS @ 24" ON CENTER
3'-0"
1788psf
+6.62'
hydro + rock
3 FO-202
SECTION 4 FO-202
WATERPROOFING GRAPHICS UPDATED ON ALL SECTIONS.
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SL Green
420 Lexington Avenue, 15th Floor
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Tel: 212.336.4119 Fax: 212.216.1796
Development Advisor
Hines
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New York, NY 10022
Tel: 212.230.3300 Fax: 212.230.2276
Architect
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Architects & Planning Consultants
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Severud Associates Consulting Engineers
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Livingston, NJ 07039
Tel: 973 994 9220 Fax: 973 994 2539
Code Consultant
Code Consultants, Inc.
215 West 40th Street, 15th Floor
New York, NY 10018
Tel: 212.216.9396 Fax: 212.216.9619
2 DOCUMENT ISSUANCE NO 3 12-07-2015
1 DOCUMENT ISSUANCE NO 1 10-16-2015
Key Plan
EAST 42ND STREET
MADISON AVENUE
VANDERBILT
EAST 42ND STREET
Issue Date: 10/16/15
Project No. 14300
Drawn By: GA
Scale: 1/2" = 1'-0"
Drawing Title
FOUNDATIONS SECTIONS 2
Drawing Number
FO-202

Table: Nodal Reactions – (48) 250 TON ROCK ANCHORS (K= 10,250 K/IN)

Nodal Reactions, Part 1 of 2

Node	Point	OutputCase	CaseType	Fx	Fy	Fz	Mx
2	2	2	2	1	1	1	1
154	154	SERV ENV	Combination	-4.461E-006	-3.588E-006	-467.142	0.0000
155	155	SERV ENV	Combination	-3.745E-006	-3.083E-006	-457.967	0.0000
156	156	SERV ENV	Combination	-3.850E-006	-3.458E-006	-447.112	0.0000
157	157	SERV ENV	Combination	-3.804E-006	-3.122E-006	-401.771	0.0000
166	166	SERV ENV	Combination	-8.443E-008	-1.081E-006	-379.617	0.0000
171	171	SERV ENV	Combination	1.084E-007	-9.894E-007	-372.641	0.0000
167	167	SERV ENV	Combination	-1.948E-009	-5.549E-007	-370.179	0.0000
165	165	SERV ENV	Combination	-2.146E-007	-1.427E-006	-369.272	0.0000
170	170	SERV ENV	Combination	1.835E-007	-5.103E-007	-361.899	0.0000
164	164	SERV ENV	Combination	-1.155E-007	-6.912E-007	-358.714	0.0000
146	146	SERV ENV	Combination	-4.877E-006	-8.231E-007	-352.621	0.0000
158	158	SERV ENV	Combination	-4.544E-006	-2.881E-006	-351.334	0.0000
162	162	SERV ENV	Combination	-1.151E-006	-1.782E-006	-342.832	0.0000
159	159	SERV ENV	Combination	-4.515E-006	-3.280E-006	-328.502	0.0000
161	161	SERV ENV	Combination	-4.822E-007	-6.366E-007	-321.310	0.0000
182	182	SERV ENV	Combination	4.581E-007	-1.470E-006	-319.278	0.0000
178	178	SERV ENV	Combination	3.108E-007	-6.762E-007	-308.848	0.0000
144	144	SERV ENV	Combination	-4.199E-006	-6.112E-007	-290.637	0.0000
168	168	SERV ENV	Combination	-3.538E-008	-7.417E-007	-288.536	0.0000
169	169	SERV ENV	Combination	4.098E-007	-6.395E-007	-281.760	0.0000
179	179	SERV ENV	Combination	3.001E-007	-6.620E-007	-278.693	0.0000
163	163	SERV ENV	Combination	-5.328E-007	-8.817E-007	-276.765	0.0000
176	176	SERV ENV	Combination	5.548E-007	-1.423E-006	-261.245	0.0000
173	173	SERV ENV	Combination	5.023E-007	-8.288E-007	-252.716	0.0000
160	160	SERV ENV	Combination	-1.435E-006	-1.281E-006	-246.889	0.0000
183	183	SERV ENV	Combination	2.538E-007	-1.556E-006	-237.410	0.0000
180	180	SERV ENV	Combination	3.203E-007	-7.948E-007	-236.509	0.0000
174	174	SERV ENV	Combination	4.921E-007	-8.419E-007	-235.642	0.0000
175	175	SERV ENV	Combination	5.266E-007	-1.029E-006	-235.285	0.0000
177	177	SERV ENV	Combination	5.918E-007	-1.365E-006	-226.890	0.0000
172	172	SERV ENV	Combination	4.879E-007	-5.942E-007	-216.747	0.0000
153	153	SERV ENV	Combination	4.714E-007	-1.360E-007	-205.414	0.0000
181	181	SERV ENV	Combination	2.952E-007	-9.817E-007	-200.840	0.0000
184	184	SERV ENV	Combination	2.083E-007	-1.490E-006	-182.174	0.0000
151	151	SERV ENV	Combination	4.520E-007	-1.988E-007	-172.407	0.0000
147	147	SERV ENV	Combination	-5.209E-006	-6.802E-007	-170.088	0.0000
185	185	SERV ENV	Combination	2.390E-007	-1.699E-006	-156.825	0.0000
186	186	SERV ENV	Combination	-4.809E-007	-1.776E-006	-146.196	0.0000
149	149	SERV ENV	Combination	5.800E-007	-3.276E-007	-137.520	0.0000
145	145	SERV ENV	Combination	-6.151E-006	-5.886E-007	-107.567	0.0000
143	143	SERV ENV	Combination	-4.533E-006	-8.068E-007	-70.659	0.0000
152	152	SERV ENV	Combination	3.864E-007	-3.880E-008	-70.448	0.0000
187	187	SERV ENV	Combination	-4.459E-007	-1.937E-006	-23.968	0.0000
150	150	SERV ENV	Combination	5.108E-007	-1.093E-007	-22.408	0.0000
142	142	SERV ENV	Combination	-3.738E-006	-6.814E-007	-9.358	0.0000
148	148	SERV ENV	Combination	5.124E-007	-2.002E-007	1.733	0.0000
141	141	SERV ENV	Combination	3.983E-007	-6.016E-007	7.009	0.0000
140	140	SERV ENV	Combination	5.305E-007	-2.412E-007	16.407	0.0000

Table: Nodal Reactions

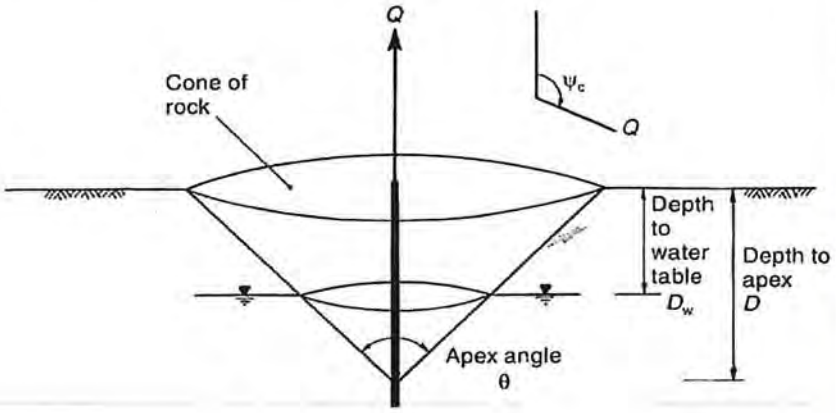
Nodal Reactions, Part 2 of 2

Node	Point	OutputCase	My	Mz
2	2	2	1	1
154	154	SERV ENV	0.0000	0.0000
155	155	SERV ENV	0.0000	0.0000
156	156	SERV ENV	0.0000	0.0000
157	157	SERV ENV	0.0000	0.0000
166	166	SERV ENV	0.0000	0.0000
171	171	SERV ENV	0.0000	0.0000

CAPACITY OF ANCHOR LOADED IN TENSION

Project: 1 Vanderbilt Ave
Project No.: 170140801
Location:
1 Vanderbilt Avenue, New York, NY
Date:
By: S Martin

Anchor No: NA
Tension Load: 500 kips
OK? OK



$$Q = \frac{(f_{(r)} + W_c \cos \Psi_c)}{FS}$$

Where:
Q = Tension Capacity
$f_{(r)}$ = rock strength on the surface of the cone
W_c = weight of rock in the cone
ψ_c = angle between vertical and load direction 0 degrees
FS = factor of safety = 2 0 radians

Input:

D = Depth to apex =	22	feet
D_w = Depth to water =	0	feet
Unit Weight of Rock =	160	pcf
Unit Weight of Water =	62.4	pcf
Apex Angle, θ =	70	degrees
Apex Angle, θ =	1.222	radians

Q = 2809 kips

1. Bouyant Weight of the Cone:

W_c = 533581 lbs
W_c = 534 kips

$$W_c = \frac{\pi}{3}\tan^2\left(\frac{\theta}{2}\right)[D^3\gamma_r - (D - D_w)^3\gamma_w]$$

2. Tensile Strength of Fractured Rock:

$\sigma_{u(r)}$ = 6800 psi unconfined compressive strength of rock
$\sigma_{u(r)}$ = 979200 psf
m = 5.31 from Hoek and Brown, 1988
s = 0.04 from Hoek and Brown, 1988
FS = 2 *2 for massive rock to 4 for closely fractured rock
σ_t = -3912 psf tensile strength of rock
σ_t = -27 psi

$$\sigma_t = \frac{\sigma_{u(r)}}{2}\left[m - (m^2 + 4s)^{1/2}\right]\frac{1}{FS}$$

3. Rock Strength on the Surface of the Cone:

absolute value
$f_{(r)}$ = 5085214 lbs
$f_{(r)}$ = 5085 kips

$$f_{(r)} = \frac{\sigma_t \pi D^2 \tan(\theta/2)}{\cos(0/2)}$$

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www.langan.com
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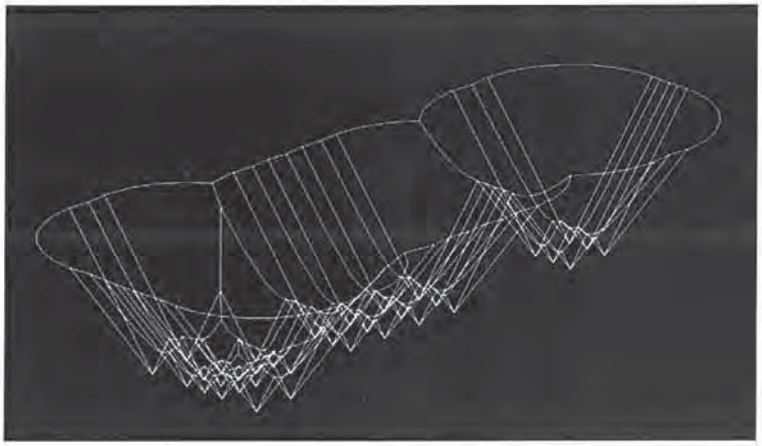
Project	Drawing Title	Project No.	Drawing No.
1 Vanderbilt Ave	CAPACITY OF ANCHOR LOADED IN TENSION	170140801	1
Manhattan New York		Date 4/7/2014	
		Scale n/a	
		Drawn By S Martin	Sheet 1 of 1



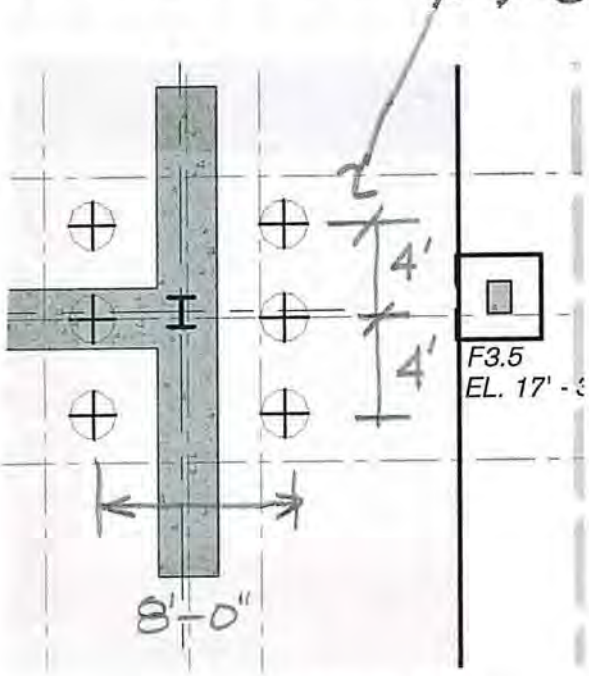
Trough Surface Area:	8326	ft^2	1198944 in^2
Cones Volume:	49927	ft^3	
Unit Weight	97.6	pcf	
Total Weight	4872875	lbs	
	4873	kips	
Tensile Strength	-27.170	psi	
	32575277		
	32575	kips	
FS	2		
TOTAL resistance	18724	kips	
TOTAL load	17000	kips	
CHECK	OK		

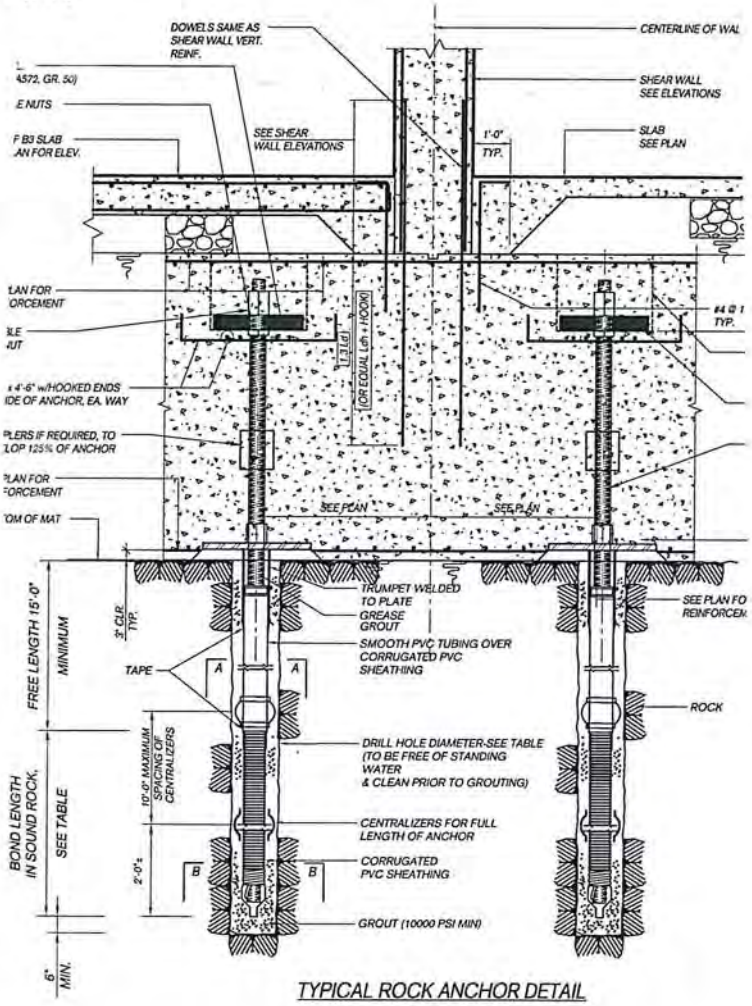
Thornton Tomasetti

PROJECT	ONE VANDERBILT	PROJECT NO.	DATE 2/5/16
		BY JRX	SHEET of
SUBJECT	FOUNDATION PEER REVIEW	CHECKED BY	DRAWING NO.

Grid
C-C / C-3
Shear Wall

CHECK ROCK ANCHOR PULL-OUT OF CONCRETE MAT





TYPICAL ROCK ANCHOR DETAIL

$$\phi N_{cbg} = \phi \psi_3 16 \sqrt{f'_c}\, h_{ef}^{5/3} \frac{A_N}{A_{No}}$$

$\phi = 0.70$ $f_c = 10000\,psi$

$\psi_3 = 1.0$ $h_{ef} = 90''$

$$A_{No} = 9(90'')^2 = 72900\,in^2$$

$$\phi N_{cb} = 0.7(1.0)16\frac{\sqrt{10000}}{1000}(90)^{1.67}\frac{(135(2)+96)^2}{72900}$$

$$= \frac{377.6^K}{6\ ANCHORS} = \frac{62.9^K}{47.0^K} \approx 1.34\ L.F.$$ ASSUMING ALL ANCHORS STRESSED

MAX CALC. TO MAX ∴ O.K.

DRAWING LIST SERVING AS A BASIS FOR PEER REVIEW

STRUCTURAL DRAWING LIST		
SHEET NUMBER	DRAWING TITLE	FOUNDATION PERMIT 09-01-2015
FO-100.00	FOUNDATION AND B4 LEVEL PLAN	■
FO-101.00	B3 LEVEL PLAN	■
FO-201.00	FOUNDATION SECTIONS 1	■
FO-202.00	FOUNDATION SECTIONS 2	■
FO-203.00	FOUNDATION SECTIONS 3	■
FO-204.00	FOUNDATION SECTIONS 4	■
FO-205.00	FOUNDATION SECTIONS 5	■
FO-206.00	FOUNDATION SECTIONS 6	■
FO-207.00	FOUNDATION SECTIONS 7	■
FO-251.00	FOUNDATION TYPICAL DETAILS 1	■
FO-252.00	FOUNDATION TYPICAL DETAILS 2	■
S-010.00	COLUMN COORDINATE PLAN	■
S-099.00	B2 FLOOR FRAMING PLAN	■
S-100.00	B1 FLOOR FRAMING PLAN	■
S-101.00	GROUND FLOOR FRAMING PLAN	■
S-601.00	COLUMN SCHEDULE 1	■
S-651.00	COLUMN DETAILS 1	■
S-701.00	GENERAL NOTES	■
S-702.00	LOADING SCHEDULE	■
S-703.00	TYPICAL FLOOR CONSTRUCTION DETAILS	■

Attachment A
STRUCTURAL PEER REVIEW STATEMENT

This structural peer review and report is complete for the whole building, or
For phase 1 **of** 2 **phased submissions**

Structural peer reviewer name: MICHAEL SQUARZINI

Structural peer reviewer address: 51 MADISON AVE. NEW YORK, NY 10010

Project address: ONE VANDERBILT AVE. NEW YORK, NY 10017

Department application number for structural work: 121189828

Structural Peer Reviewer Statement

I (insert name) MICHAEL SQUARZINI ***am a qualified and independent NYS licensed and registered engineer in accordance with BC Section 1617.4, and I have reviewed the structural plans, specifications, and supplemental reports for (Insert address and DOB application # for structural work)*** 1 VANDERBILT AV. NEW YORK, NY APPLICATION # 121189828 ***and found that the structural design shown on the plans and specifications generally conforms to the foundation and structural requirements of Title 28 of the Administrative Code and the NYC Construction Codes. The Structural Peer Review Report is attached.***

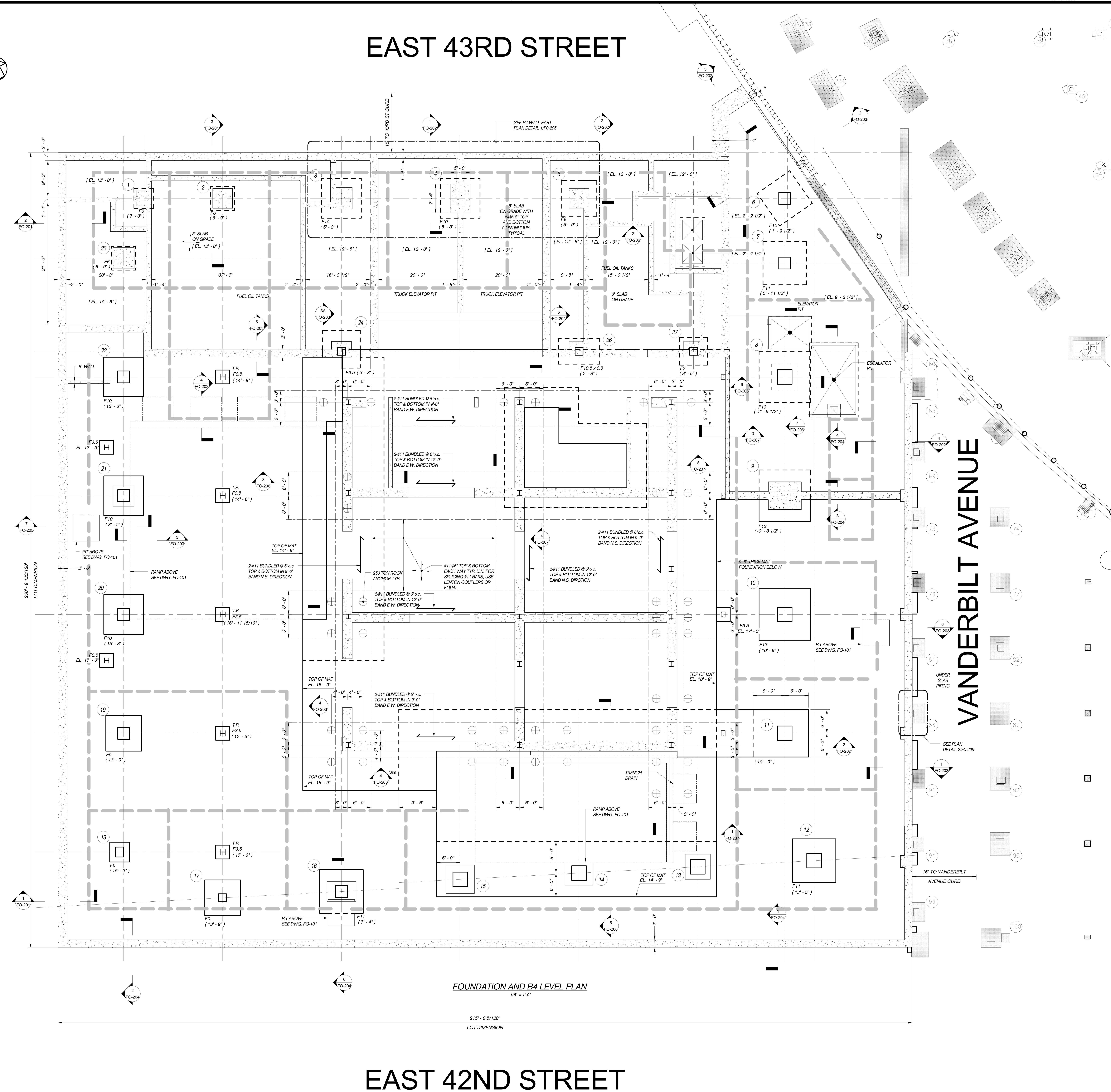
New York State Registered Design Professional
(for Structural Peer Review only)

Name (please print) Michael Squarzini

Signature _____ Date 02/10/16

PE/RA Seal (apply seal, then sign and date over seal)

cc: Project Owner
Project Registered Design Professional



LEVEL B4 AND FOUNDATION PLAN

1. REFERENCE FOR ALL ELEVATIONS IS LEVEL NAVD88 EL. 0'-0"
2. TOP OF FOUNDATION MAT IS AT ELEVATION 18'-9" UNLESS OTHERWISE NOTED.
3. BOTTOM OF FOOTING ELEVATION IS NOTED THUS (±...), RELATIVE TO REFERENCE ELEVATION.
4. INVERT ELEVATION IS NOTED THUS <±...>, RELATIVE TO REFERENCE ELEVATION.
5. SYMBOLS:

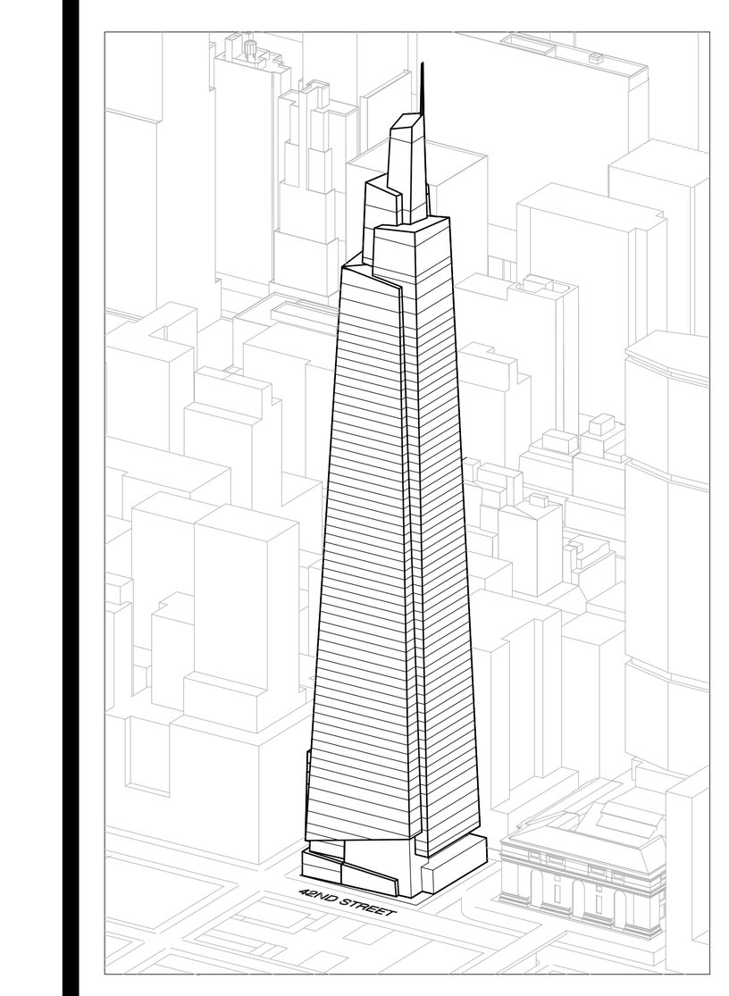
   8" SLAB ON GRADE — INDICATES 8" CONC. SLAB ON GRADE WITH #4 @ 12" T. & B. EA. WAY.

   INDICATES ROCK ANCHOR. SEE PLAN FOR LOCATION AND CAPACITY.
6. FOOTINGS SHALL BEAR ON UNDISTURBED ROCK HAVING A SAFE MINIMUM BEARING CAPACITY OF SIXTY (60) TONS PER SQ. FT. (CLASS 1a IN ACCORDANCE WITH THE NEW YORK CITY BUILDING CODE).
7. BOTTOM OF FOOTING ELEVATION SHOWN IS HIGHEST POSSIBLE FOR 60 TSF ROCK. ACTUAL ELEVATION MAY CHANGE DEPENDING ON CONDITION OF BEARING SURFACE REVEALED BY EXCAVATION.
8. ALL BEARING SURFACES SHALL BE EXAMINED BY THE ARCHITECT (OR ARCHITECT'S REPRESENTATIVE) PRIOR TO PLACING FOOTINGS OR REINFORCEMENT.
9. FOOTINGS SHALL BE CONCENTRIC WITH COLUMN OR BUTTRESS ABOVE UNLESS OTHERWISE NOTED. FOR COORDINATES OF CENTERLINES SEE DWG. S-010.
10. SLOPE BETWEEN BOTTOM OF ADJACENT FOOTINGS, ELEVATOR PIT SLABS, SUMP PITS, ETC. SHALL BE NO STEEPER THAN ONE VERTICAL TO ONE HORIZONTAL.
11. ALL CONCRETE FOR FOUNDATION SHALL BE NORMAL WEIGHT SEE DWG. S-701 FOR REQUIRED STRENGTHS.
12. FOUNDATION WALLS SHALL BE PLACED IN ALTERNATE PANELS NOT TO EXCEED 60 FEET IN LENGTH. CONSTRUCTION JOINTS SHALL BE PLACED AT POINTS OF MINIMUM SHEAR, GENERALLY AT MID-SPAN AND THREE FEET MINIMUM FROM EDGE OF BUTTRESS. ALLOW 7 DAYS MINIMUM BETWEEN PLACING OF ADJACENT PANELS. HORIZONTAL JOINTS WILL BE PERMITTED ONLY AS SHOWN ON SECTIONS AND DETAILS.
13. FOUNDATION WALLS SHALL BE TEMPORARILY BRACED AGAINST EARTH PRESSURE, WIND AND OTHER FORCES UNTIL SLABS, METAL DECK, BEAMS OR COLUMNS DESIGNED TO BRACE THE FINISHED STRUCTURE HAVE BEEN INSTALLED AND HAVE ATTAINED THEIR REQUIRED STRENGTH.
14. SEE DWGS. FO-201 THRU FO-207 FOR FOUNDATION SECTIONS AND DETAILS.
15. SEE DWGS. S301 THRU S308 FOR LATERAL FRAME AND SHEAR WALL ELEVATIONS AND DETAILS.
16. SEE DWGS. S-251 AND S-252 FOR TYPICAL FOUNDATION DETAILS.
17. SEE DWGS. S601 THRU S603 FOR COLUMN SCHEDULE.
18. SEE DWGS. S701 FOR GENERAL NOTES.
19. SEE DWGS. S702 THRU S703 FOR LOADING SCHEDULE AND FLOOR CONSTRUCTION DETAILS.
20. COORDINATE SIZE, LOCATION AND INVERT ELEVATION OF WALL SLEEVES WITH MECHANICAL AND TELECOMMUNICATIONS DRAWINGS. SEE DWG. S-252 FOR TYPICAL SLEEVE DETAIL.
21. COORDINATE CON ED VAULTS WITH CON ED DWGS.
22. COORDINATE ELEVATOR PIT BEAM LOCATIONS WITH ELEVATOR CONTRACTOR.
23. COORDINATE NYCT/MTA SUBWAY PASSAGE WITH NYCT DWGS.
24. NO TEMPORARY OR PERMANENT ATTACHMENTS OR PENETRATIONS SHALL BE MADE TO NYCT/MTA STRUCTURES.
25. SEE TEMPORARY SUPPORT OF EXCAVATION SUPPORT DWGS PREPARED BY LANGAN CONSULTING ENGINEERS. FOR NYCT/MTA GENERAL NOTES AND STANDARD INSURANCE CLAUSES SEE FO-301.
26. SEE SPECIFICATIONS AND CIVIL DRAWINGS FOR UNDERSLAB DRAINAGE SYSTEM.
27. SEE DWGS. S401 THRU S404 FOR CONCRETE CORE PLANS AND DETAILS.
28. SEE ELECTRICAL DRAWINGS FOR UNDERSLAB LIGHTNING PROTECTION GROUNDING PLATES.
29. COORDINATE WATERPROOFING WITH CIVIL DRAWINGS.

FOOTING SCHEDULE
(ALLOWABLE ROCK BEARING = 60 TONS/SQ. FT.)

MARK	SIZE	DEPTH (INCHES)	BOTTOM REINF. EACH WAY (U.O.N.)	REMARKS
F3.5	3'-6" x 3'-6"	18	4 - #5	-
F5	5'-0" x 5'-0"	42	8 - #9	-
F6	6'-0" x 6'-0"	48	10 - #9	-
F7	7'-0" x 7'-0"	50	16 - #9	-
F8	8'-0" x 8'-0"	54	18 - #10	-
F9	9'-0" x 9'-0"	60	20 - #10	-
F9.5	9'-6" x 9'-6"	66	22 - #10	-
F10	10'-0" x 10'-0"	66	24 - #10	-
F10.5 x 6.5	10'-6" x 6'-6"	60	-	7-#10 LONG WAY 11-#10 SHORT WAY
F11	11'-0" x 11'-0"	76	30 - #10	-
F12	12'-0" x 12'-0"	88	36 - #10	-
F13	13'-0" x 13'-0"	96	38 - #10	-

ONE VANDERBILT



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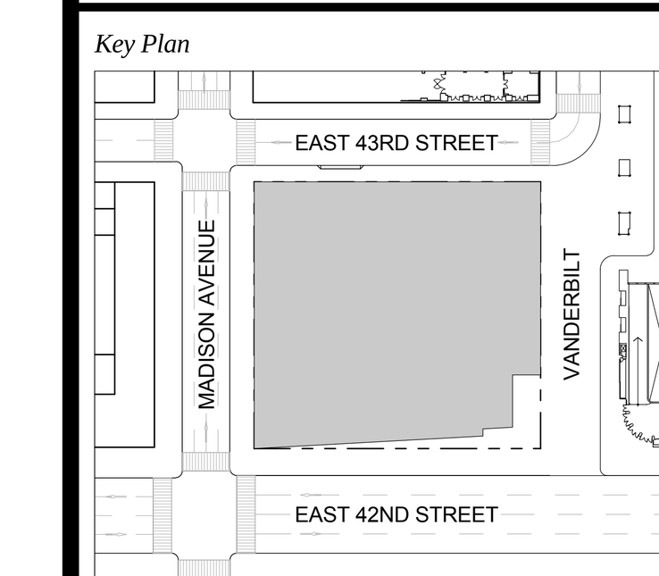
No.	Description	Date
1	D.O.B. FOUNDATION PERMIT FILING	09-01-2015

Key Plan

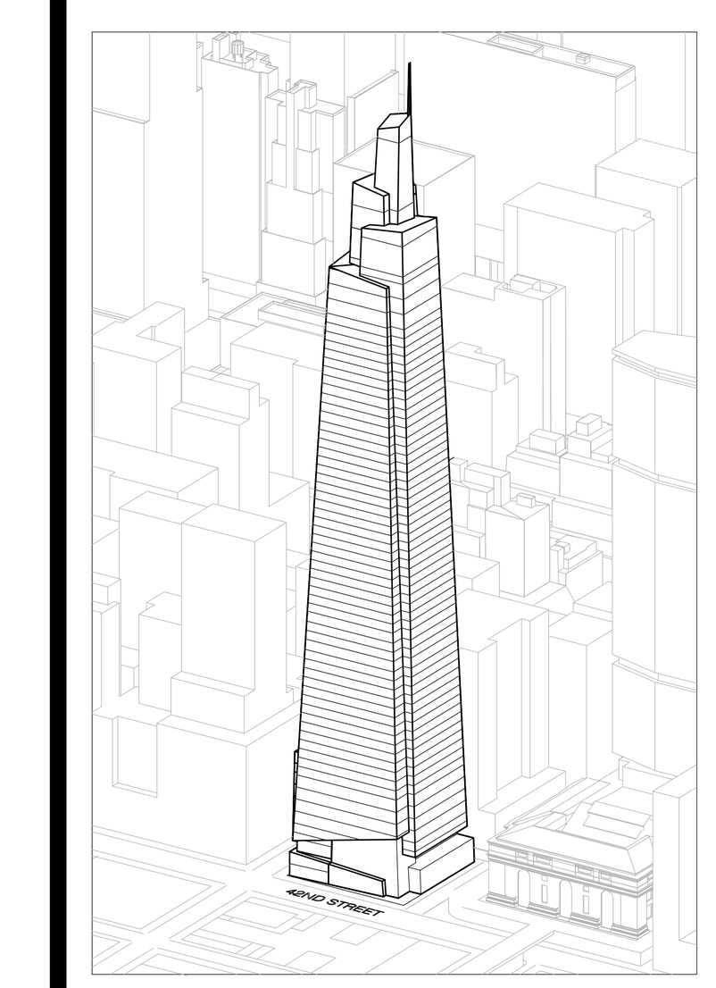


Issue Date: 09-01-2015
Project No. 14500
Drawn By
Scale As indicated

Drawing Title
FOUNDATION AND B4 LEVEL PLAN

Drawing Number
FO-100.00
SHEET 1 OF 11

ONE VANDERBILT



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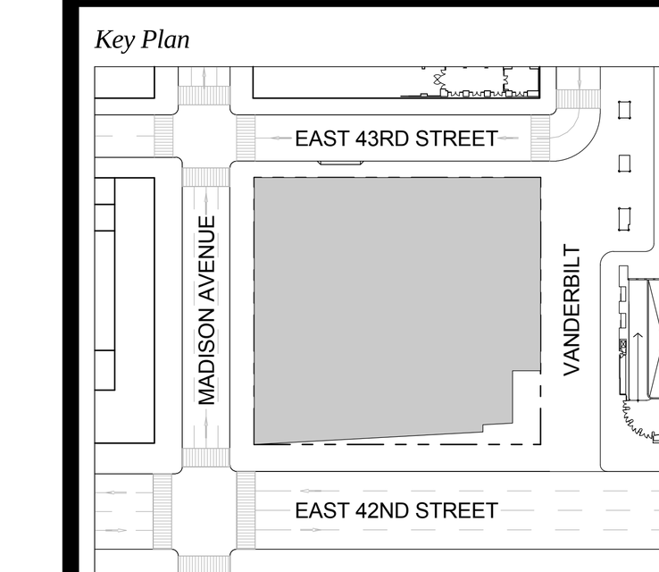
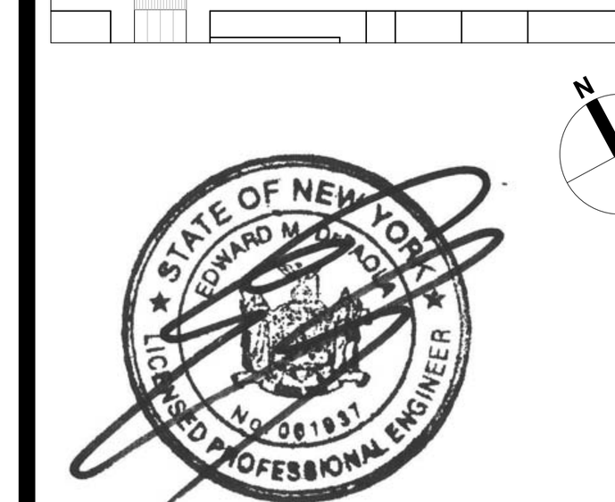
No.	Description	Date
1	D.O.B. FOUNDATION PERMIT FILING	09-01-2015

Key Plan



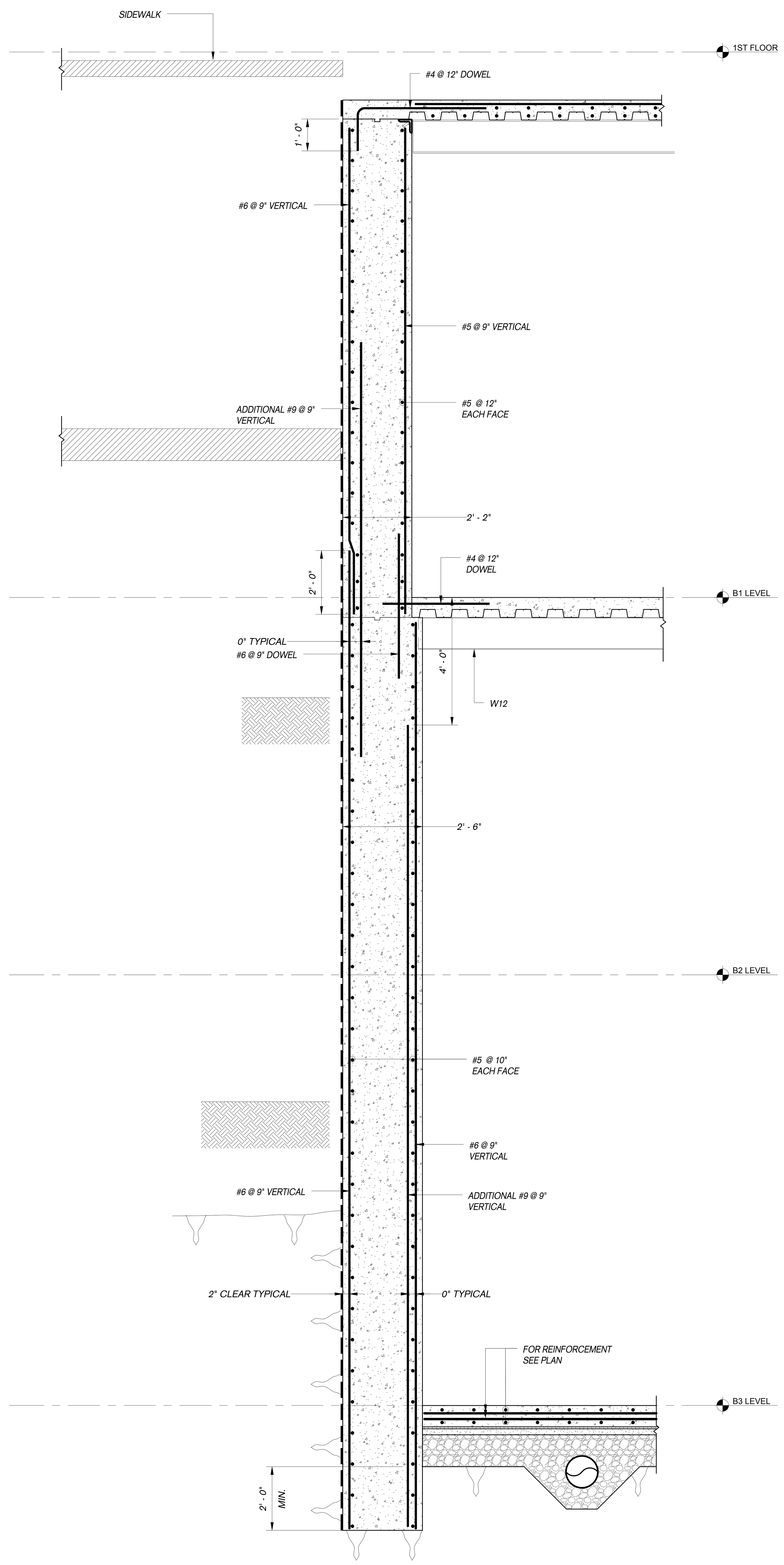


Issue Date: 09-01-2015
Project No. 14500
Drawn By
Scale 1/8" = 1'-0"

Drawing Title
B3 LEVEL PLAN

Drawing Number
FO-101.00
SHEET 2 OF 11

SECTION 1
SCALE: 1/2" = 1'-0"
FO-201



SECTION 2
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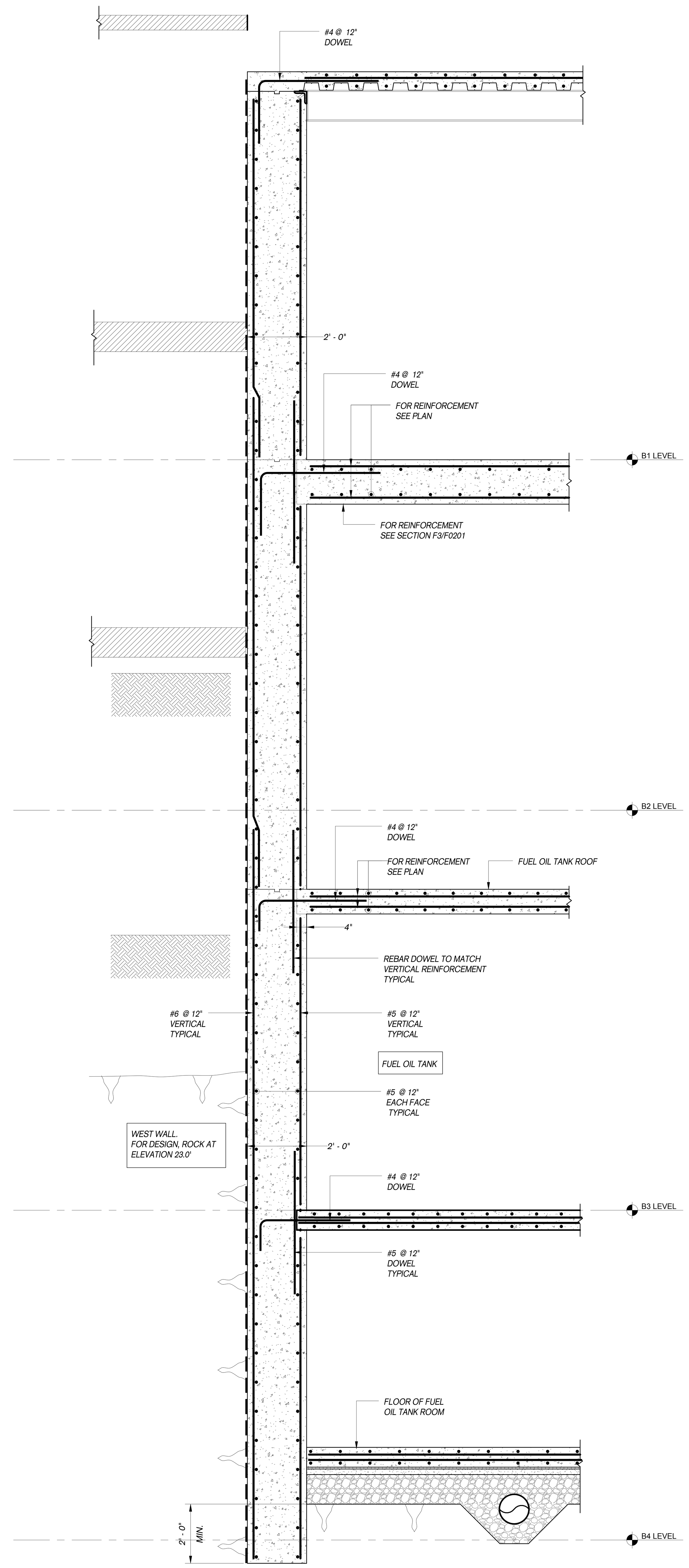
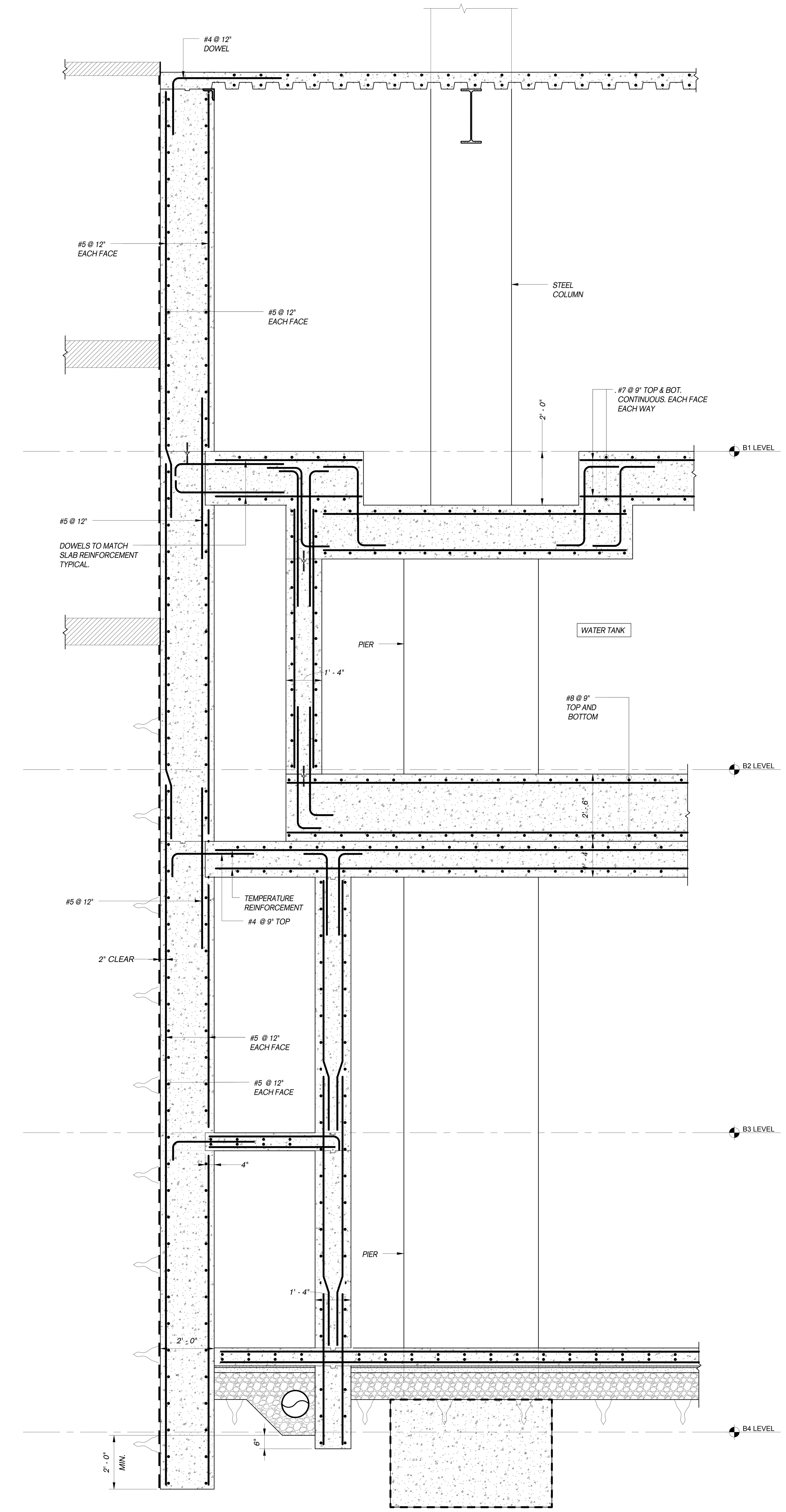
FO-201



SECTION 3
SCALE: 1/2" = 1'-0"
FO-201



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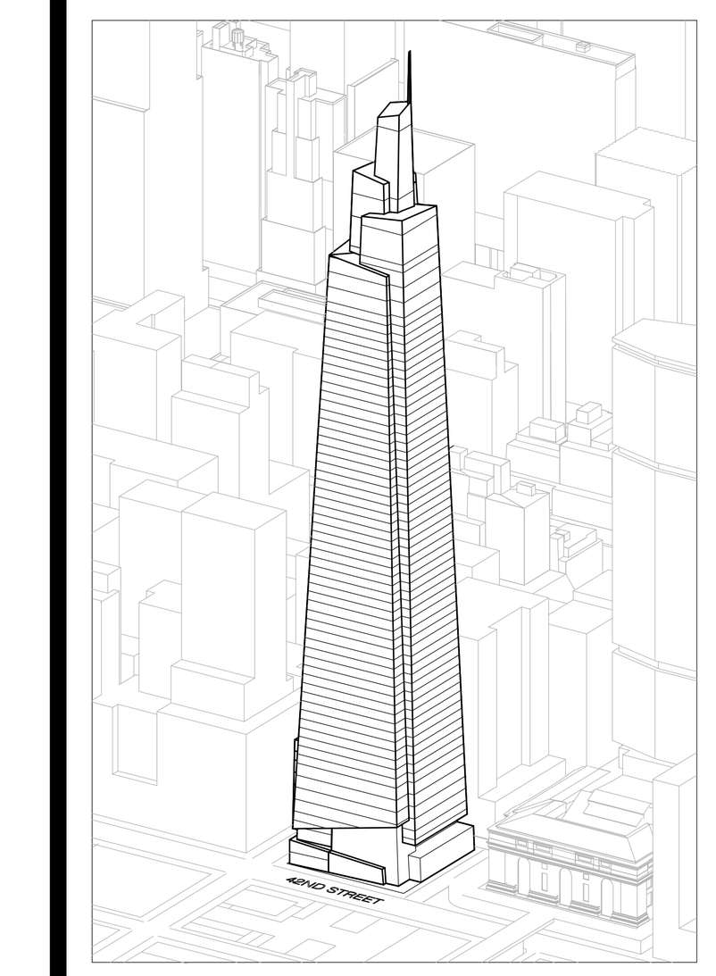

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No.	Description	Date
1	D.O.B. FOUNDATION PERMIT FILING	09-01-2015

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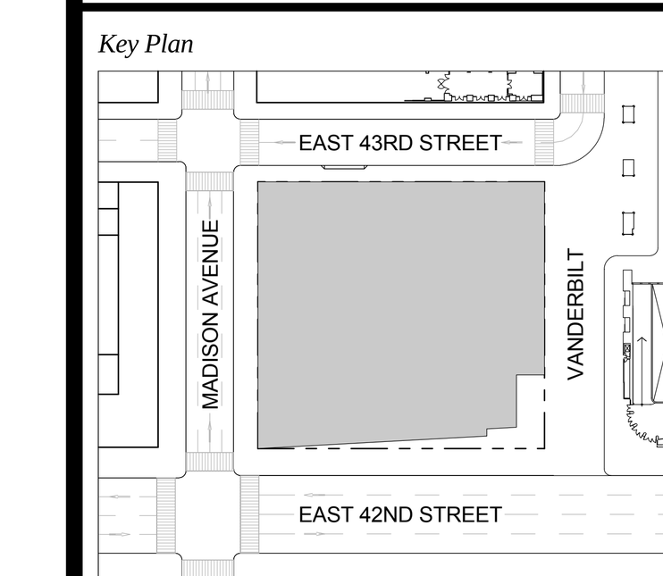
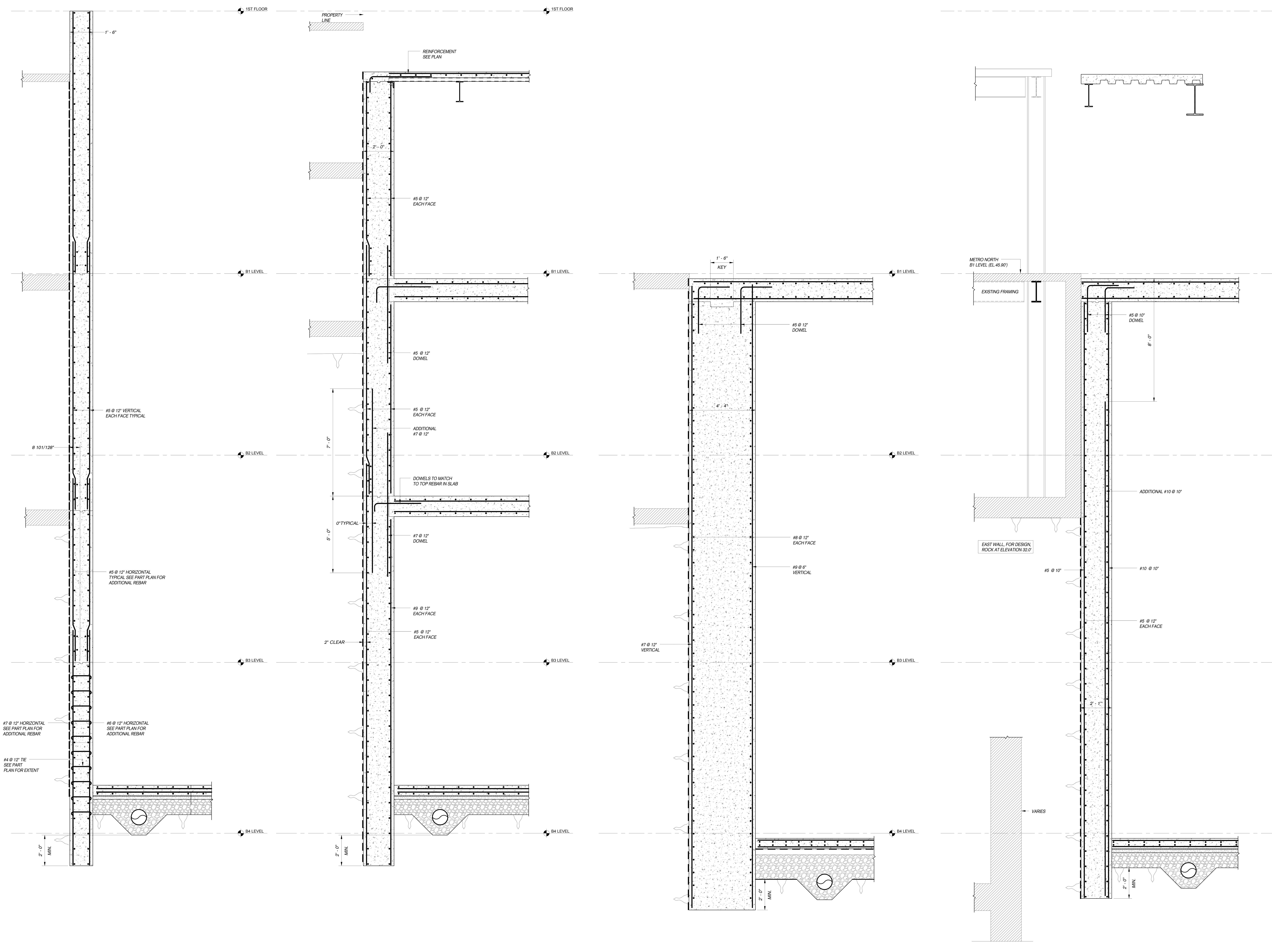


Issue Date: 09-01-2015
Project No. 14500
Drawn By
Scale 1/2" = 1'-0"

Drawing Title
FOUNDATIONS SECTIONS 1

Drawing Number
FO-201.00
SHEET 3 OF 11



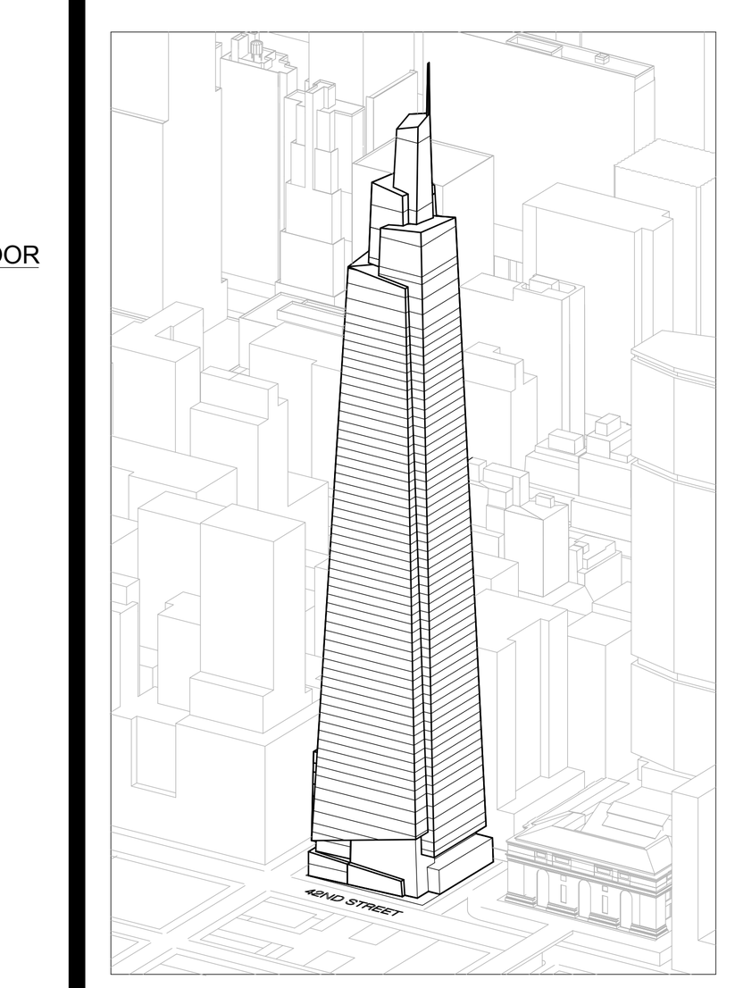
SECTION 1 FO-202
SCALE: 1/2" = 1'-0"

SECTION 2 FO-202
SCALE: 1/2" = 1'-0"

SECTION 3 FO-202
SCALE: 1/2" = 1'-0"

SECTION 4 FO-202
SCALE: 1/2" = 1'-0"

ONE VANDERBILT



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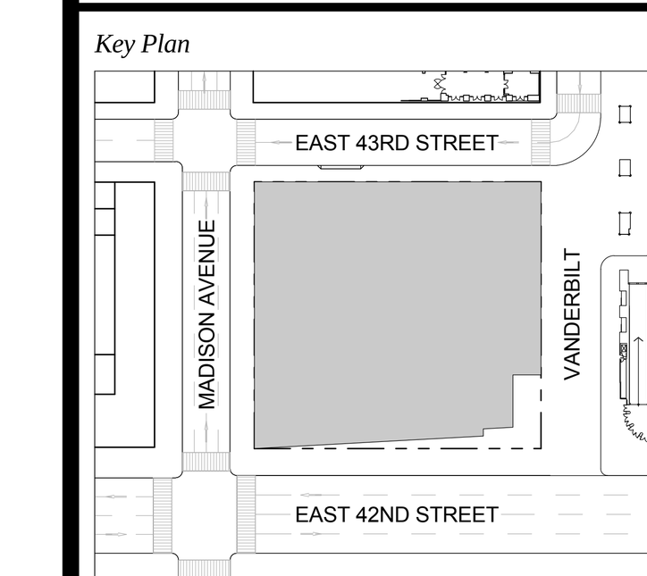
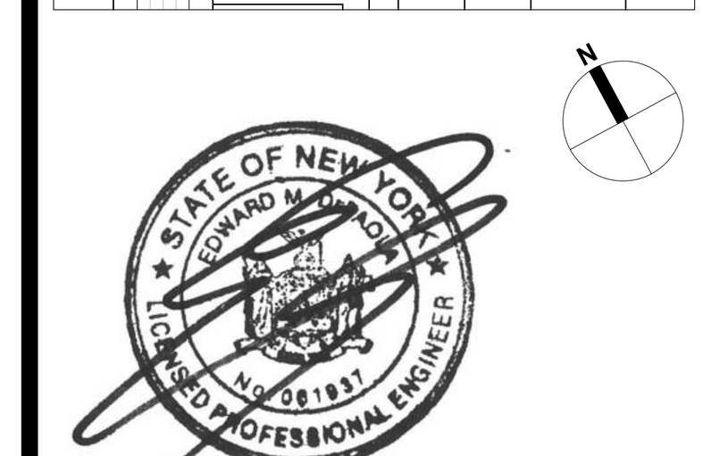
No.	Description	Date
1	D.O.B. FOUNDATION PERMIT FILING	09-01-2015

Key Plan

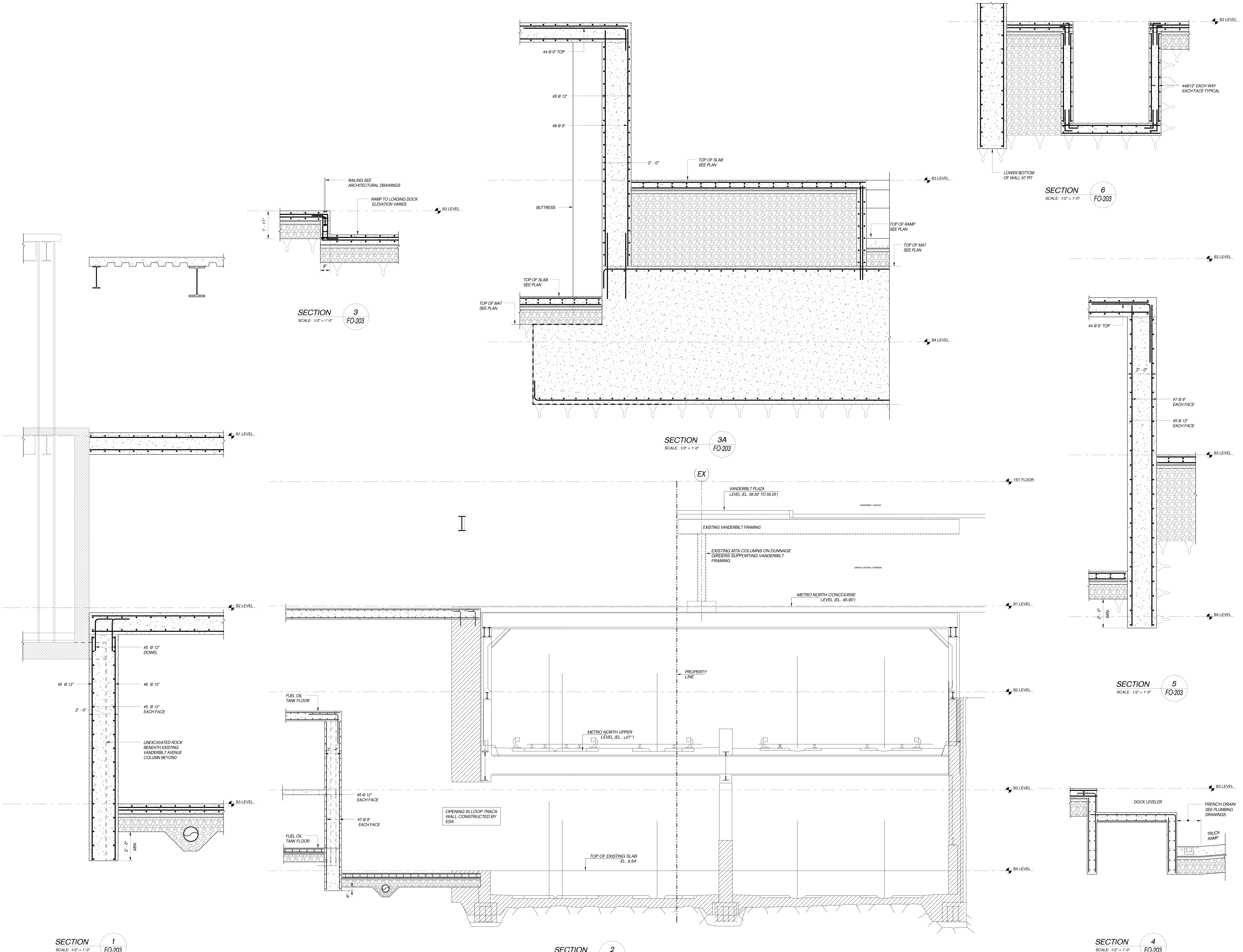




Issue Date: 09-01-2015
Project No. 14500
Drawn By
Scale 1/2" = 1'-0"

Drawing Title
FOUNDATIONS SECTIONS 2

Drawing Number
FO-202.00
SHEET 4 OF 11



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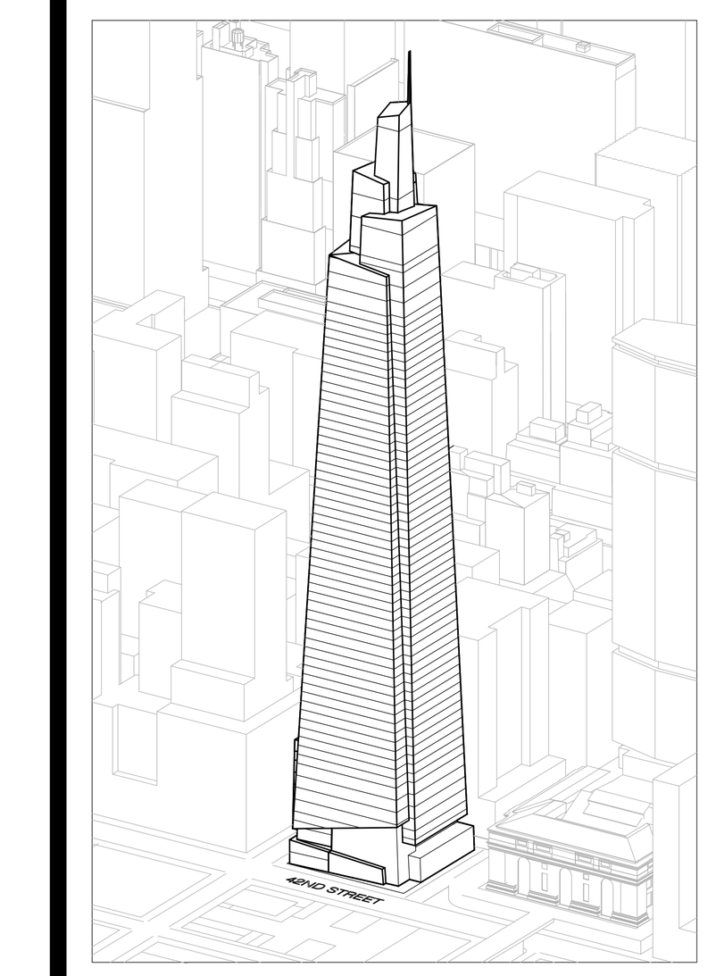

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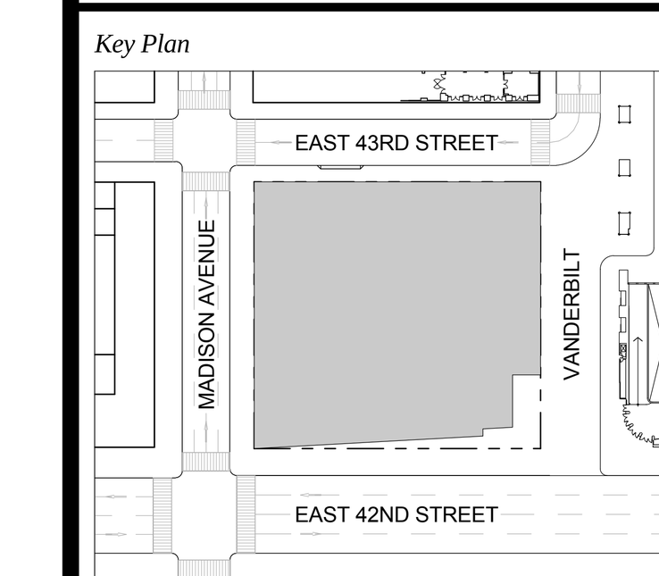
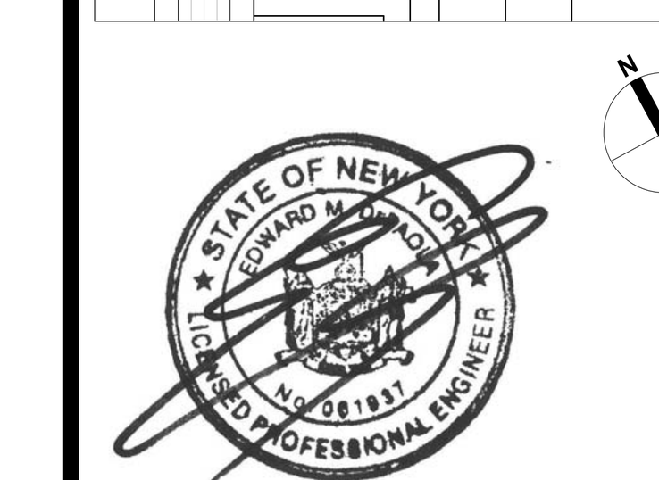
No.	Description	Date
1	D.O.B. FOUNDATION PERMIT FILING	09-01-2015

Key Plan

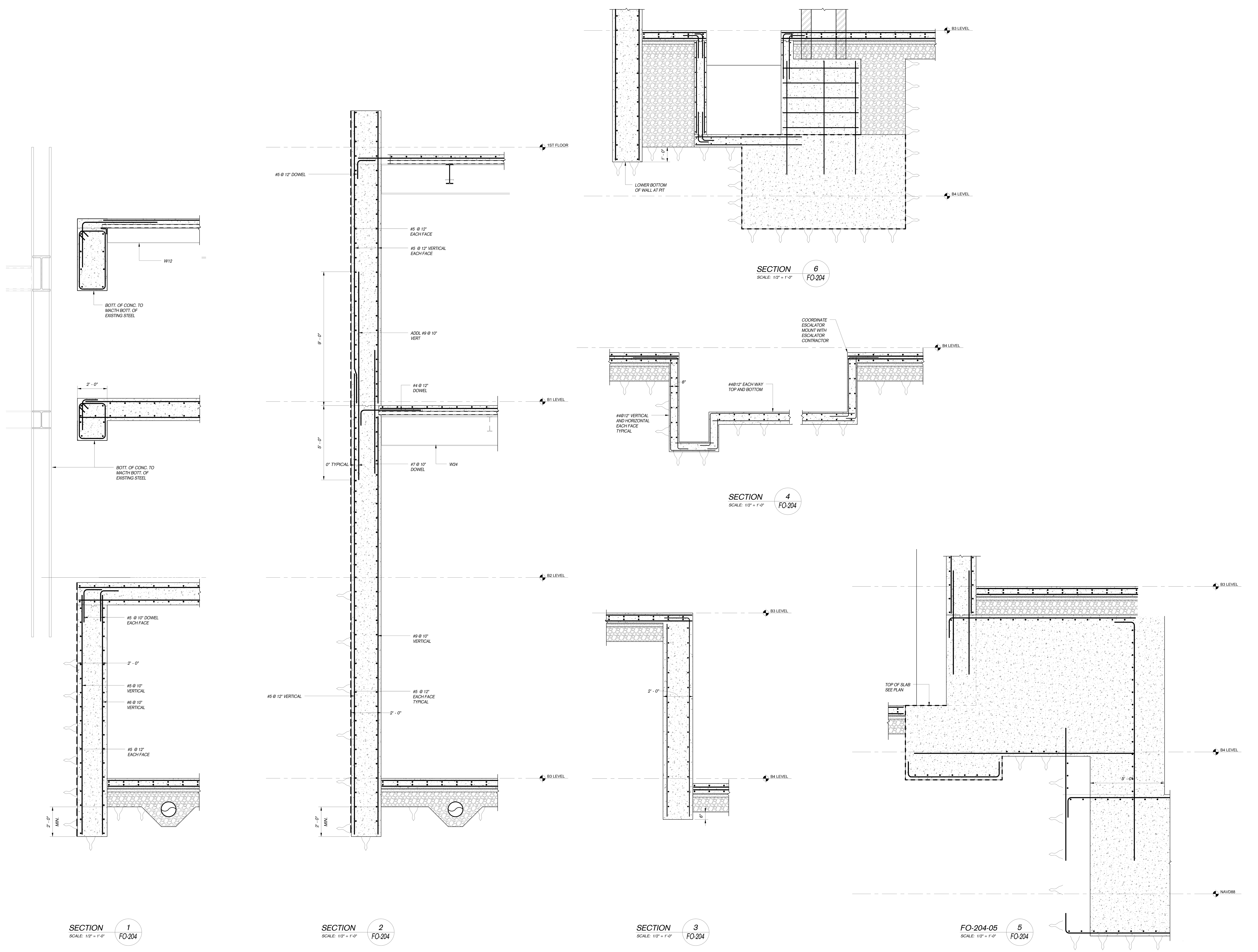




Issue Date: 09-01-2015
Project No. 14500
Drawn By
Scale As indicated

Drawing Title
FOUNDATIONS SECTIONS 3

Drawing Number
FO-203.00
SHEET 5 OF 11



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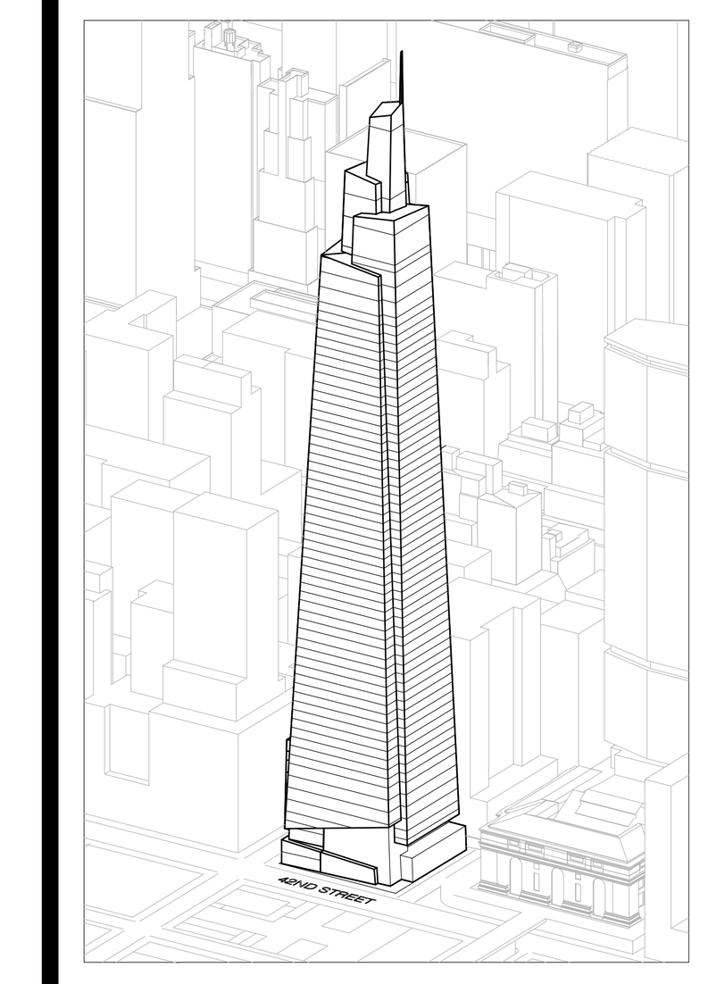

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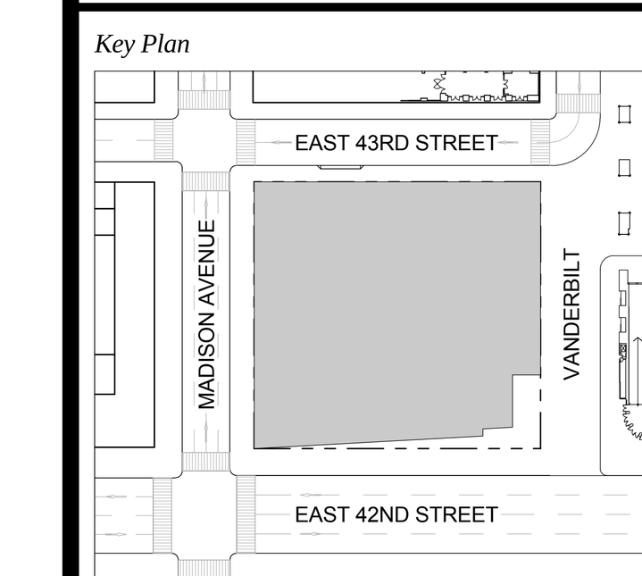
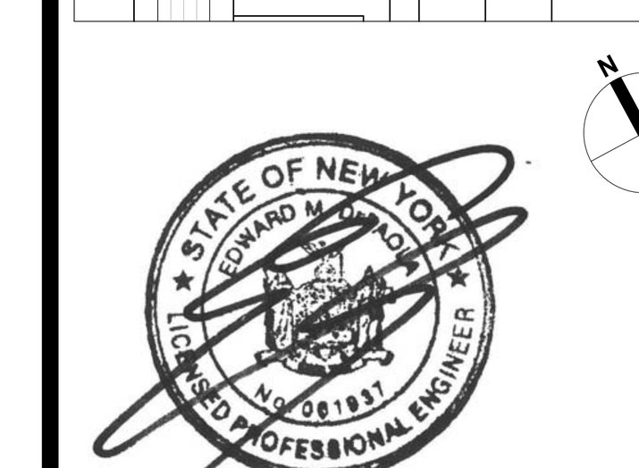
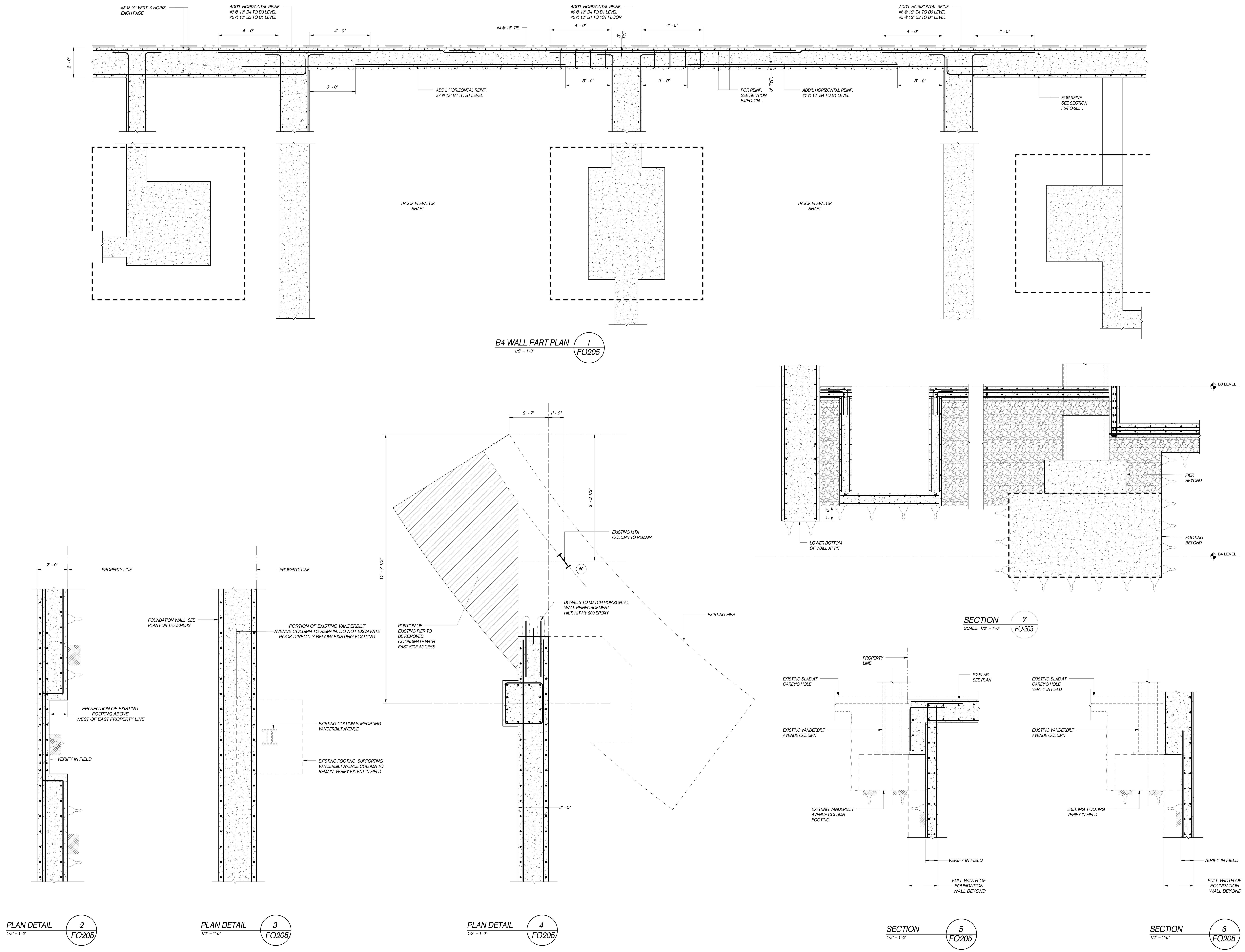




Issue Date: 09-01-2015
Project No. 14500
Drawn By
Scale 1/2" = 1'-0"

Drawing Title
FOUNDATIONS SECTIONS 4

Drawing Number
FO-204.00
SHEET 6 OF 11



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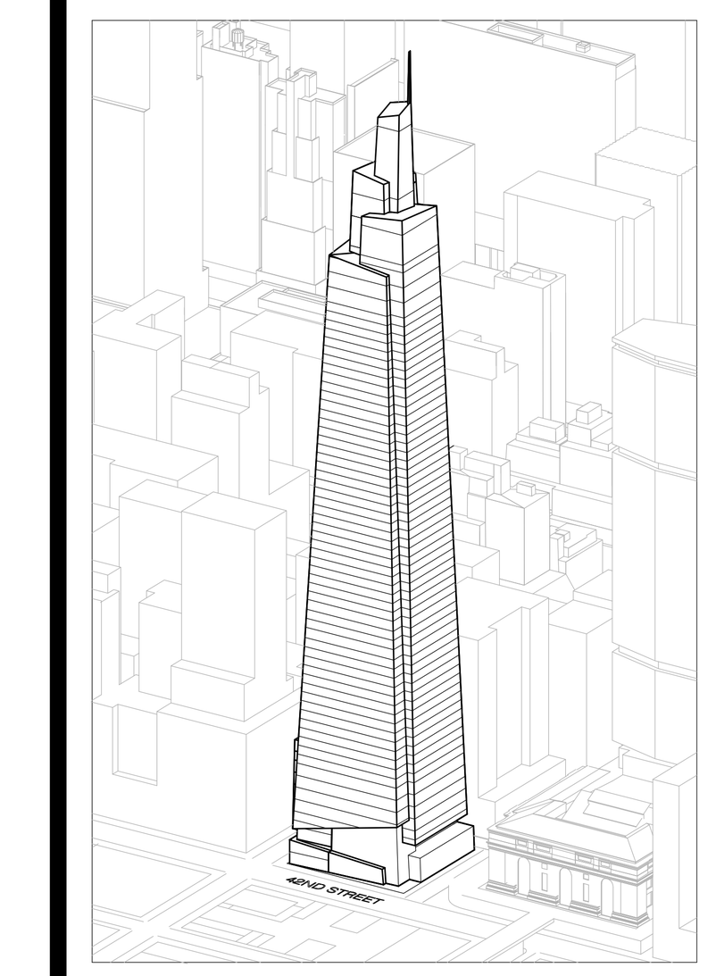

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No.	Description	Date
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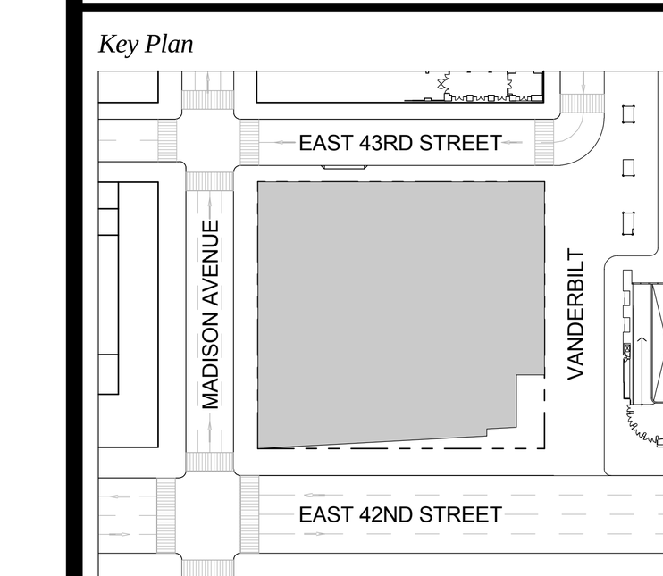
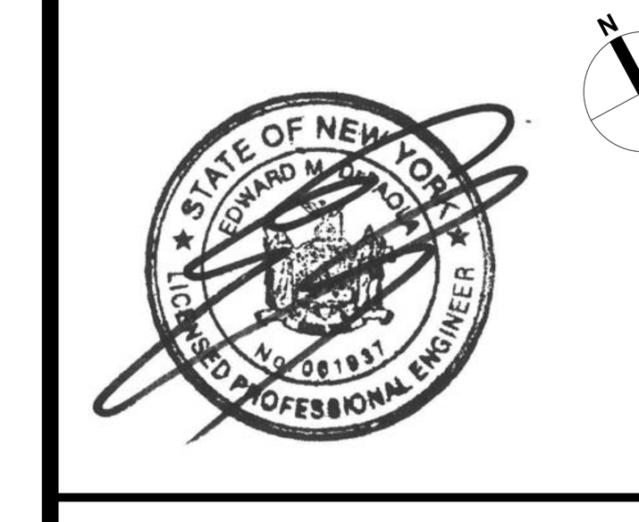
Key Plan

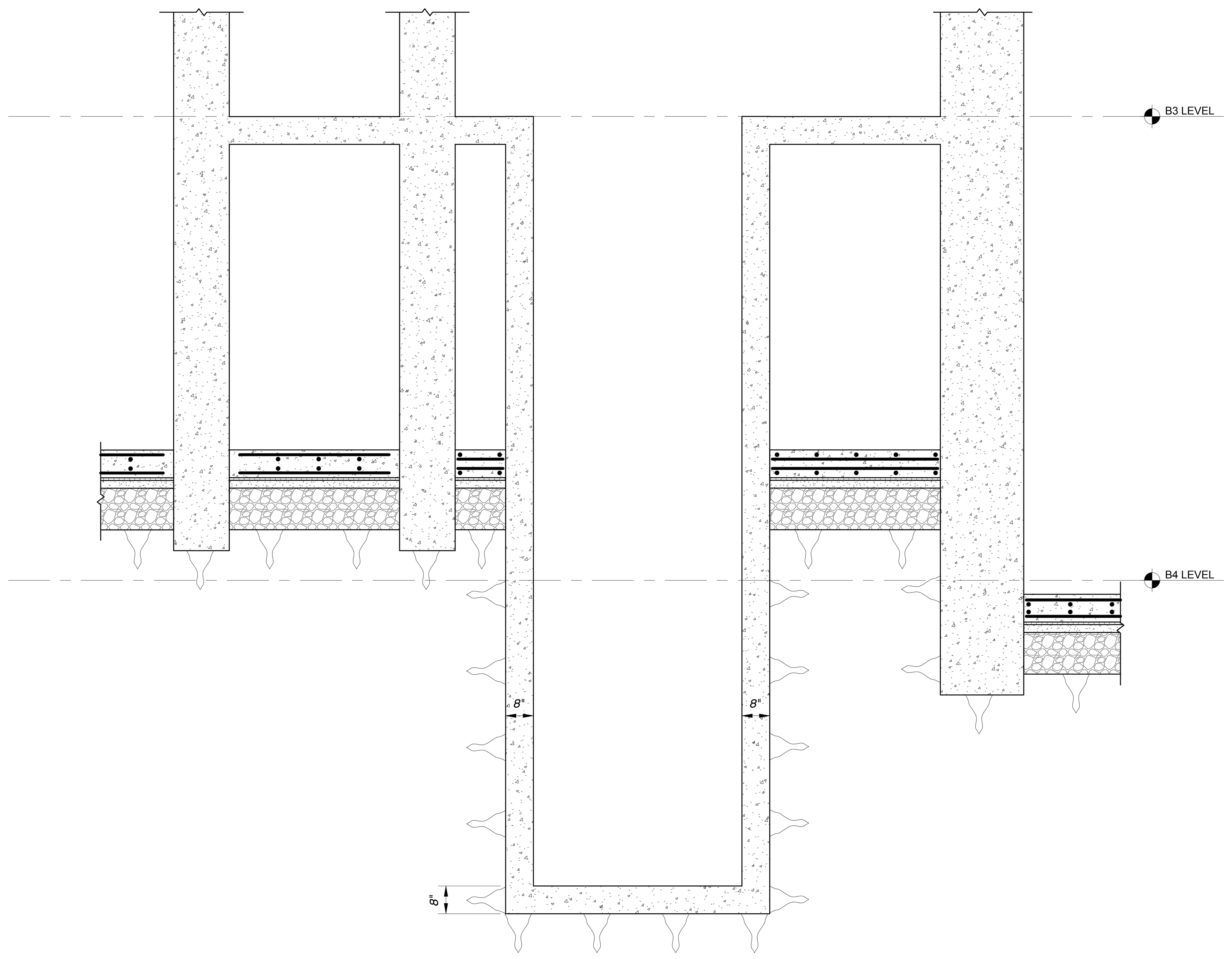




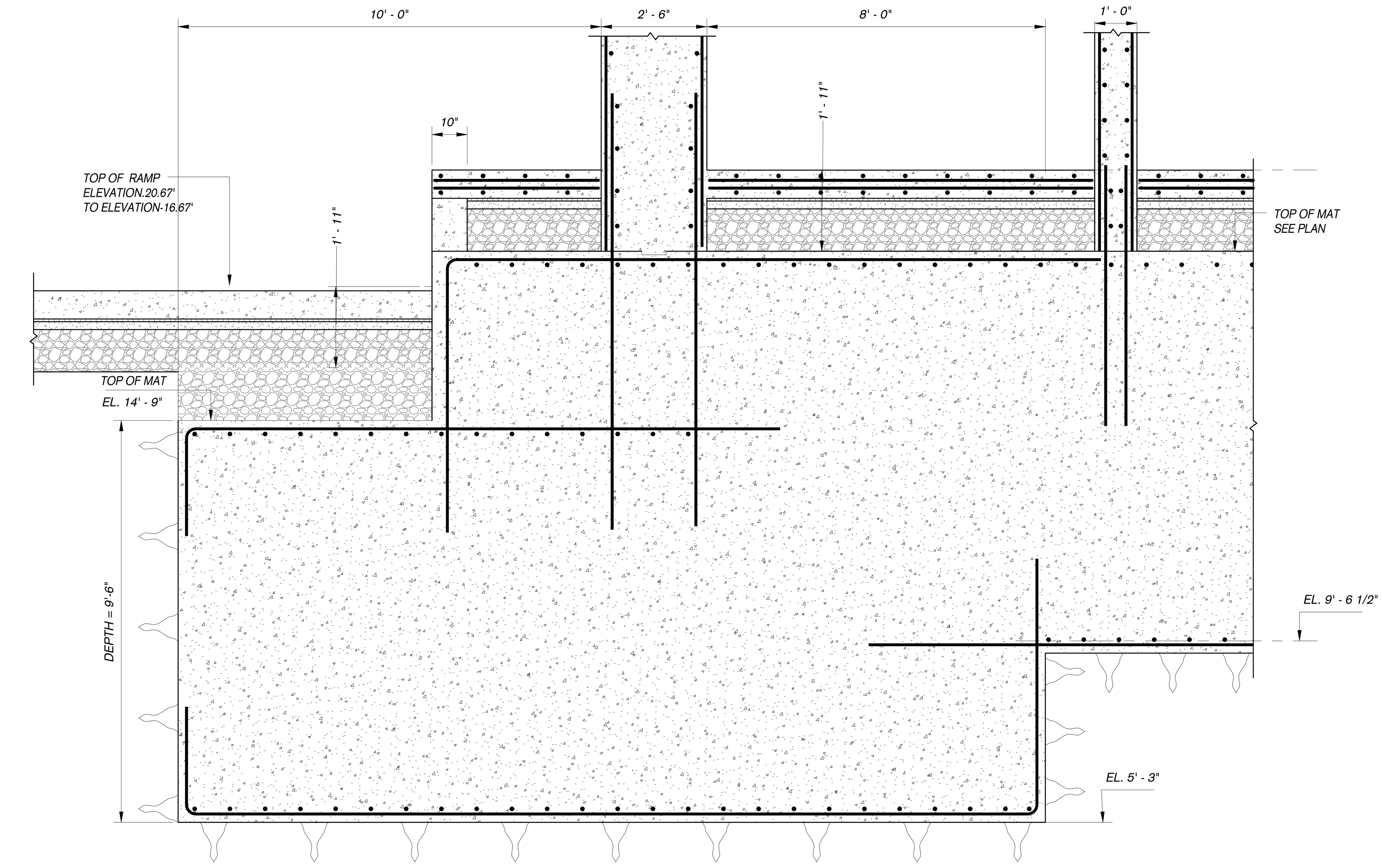
Issue Date: 09-01-2015
Project No. 14500
Drawn By
Scale 1/2" = 1'-0"

Drawing Title
FOUNDATIONS SECTIONS 5

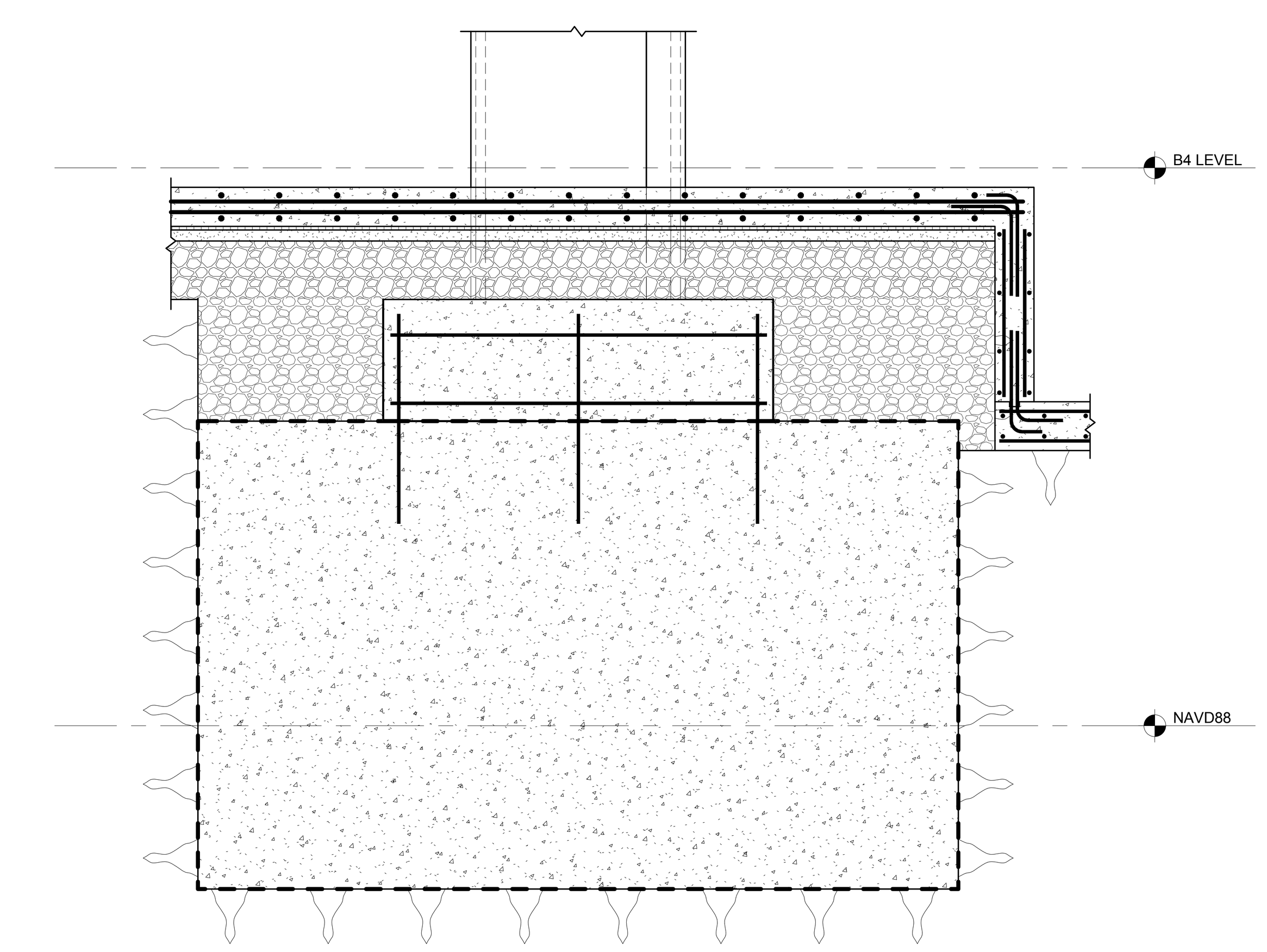
Drawing Number
FO-205.00
SHEET 7 OF 11



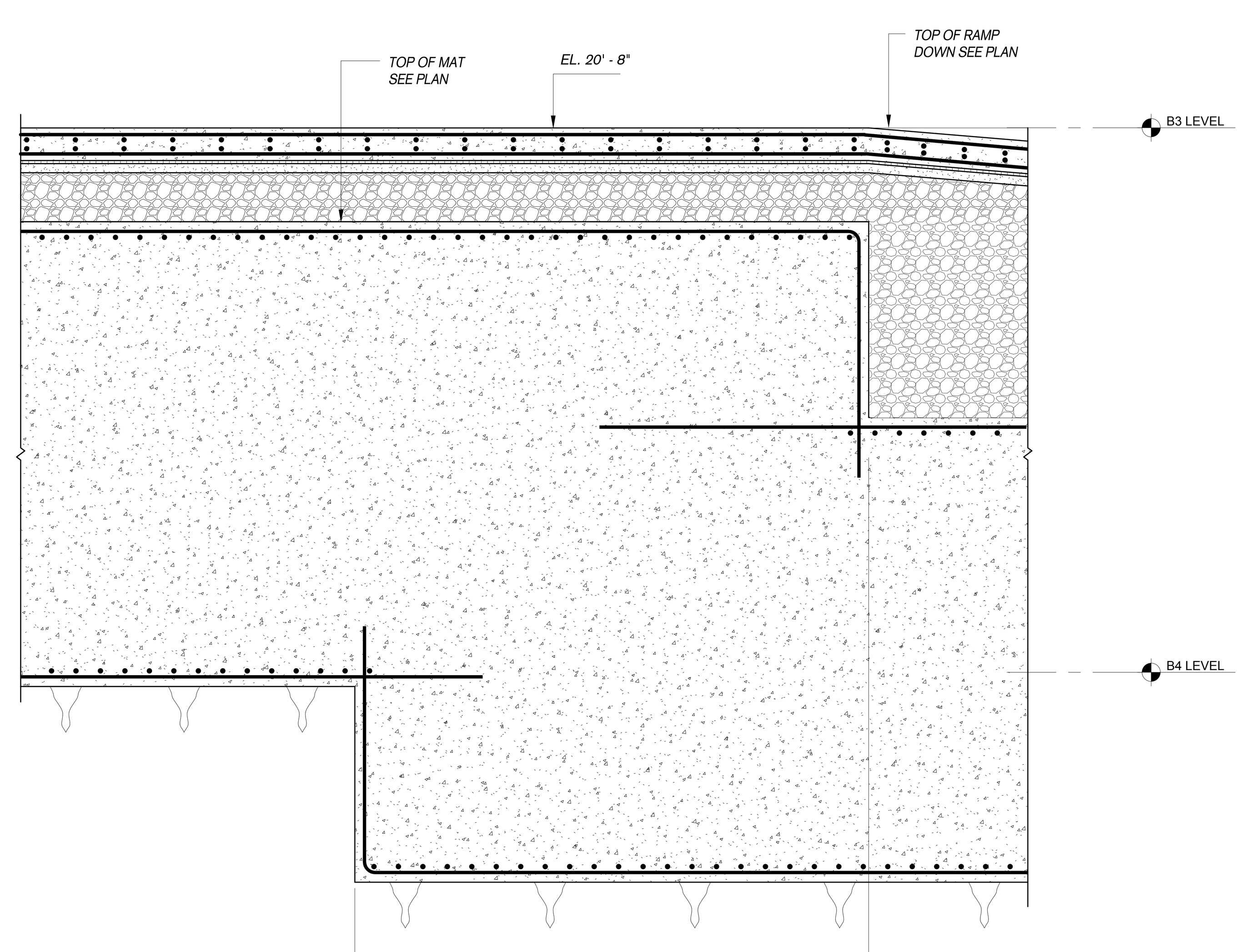
SECTION 2
SCALE: 1/2" = 1'-0"
FO-206



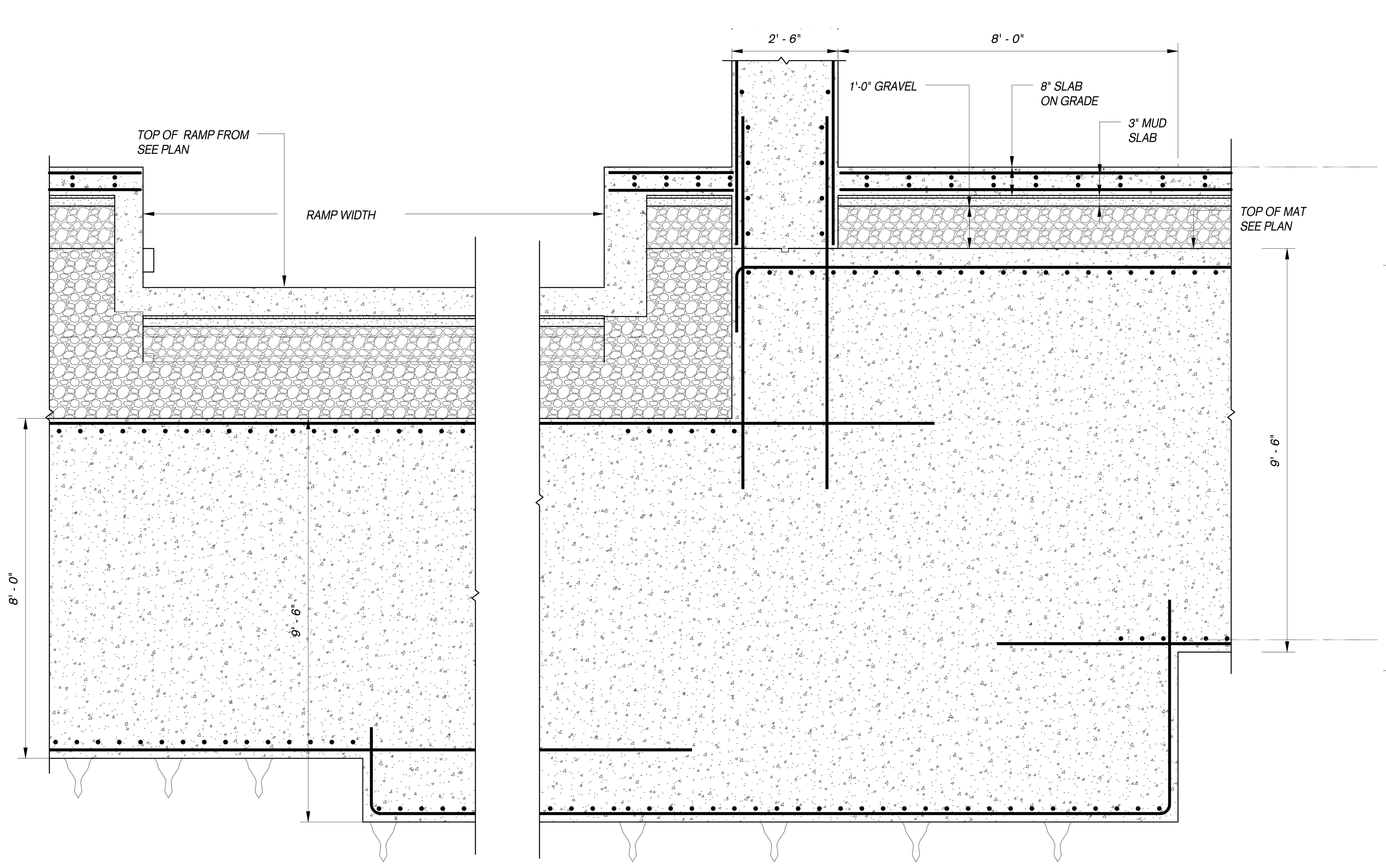
SECTION 3
SCALE: 1/2" = 1'-0"
FO-206



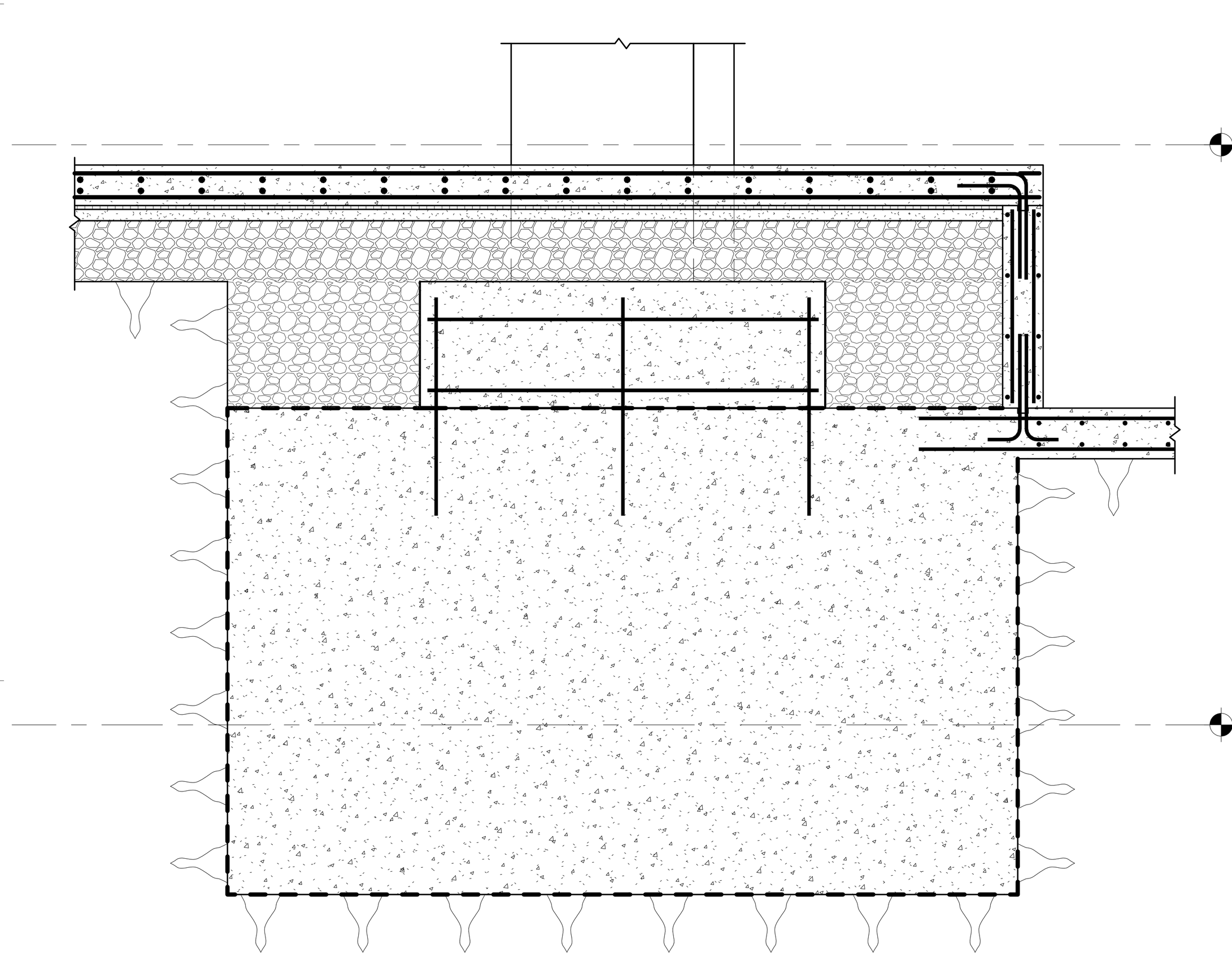
SECTION 7
SCALE: 1/2" = 1'-0"
FO-206



SECTION 4
SCALE: 1/2" = 1'-0"
FO-206

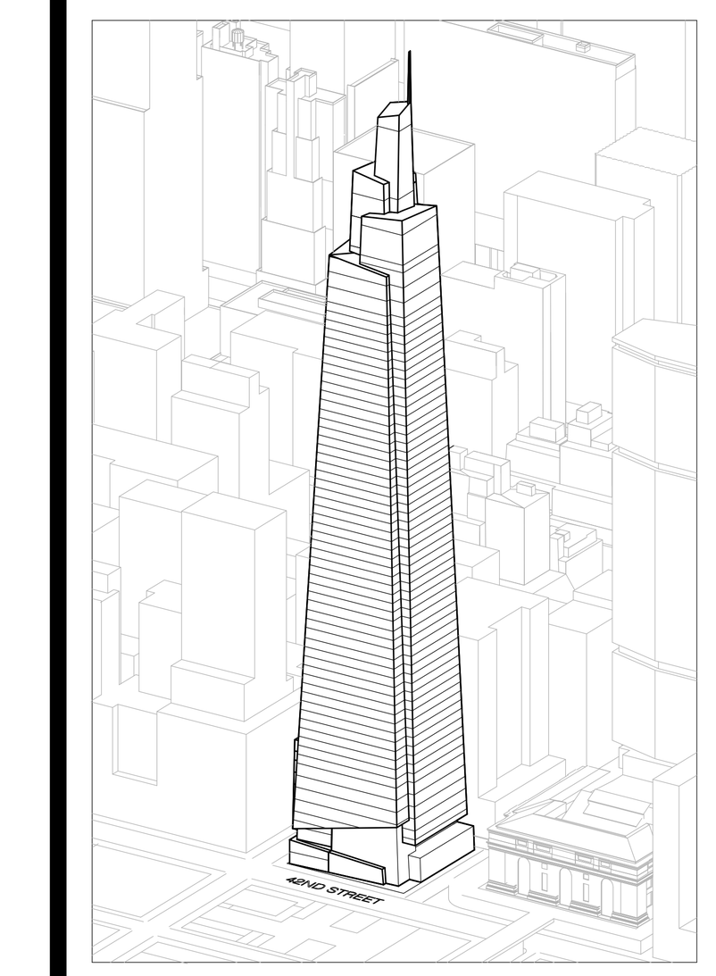


SECTION 5
SCALE: 1/2" = 1'-0"
FO-206



SECTION 6
SCALE: 1/2" = 1'-0"
FO-206

ONE VANDERBILT



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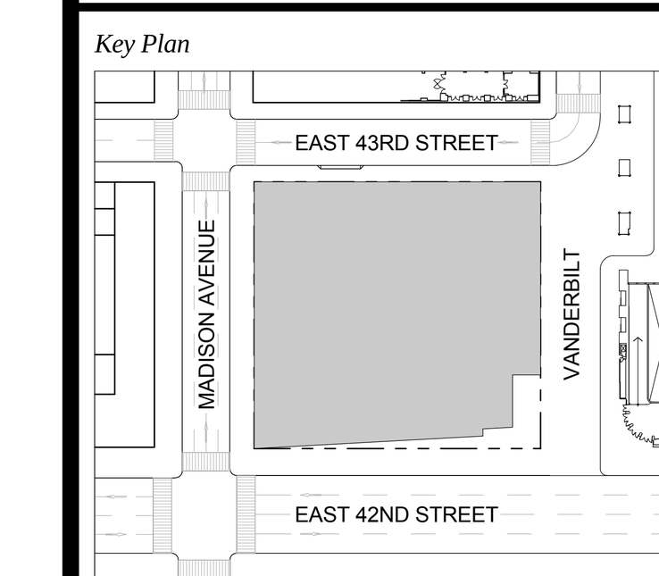
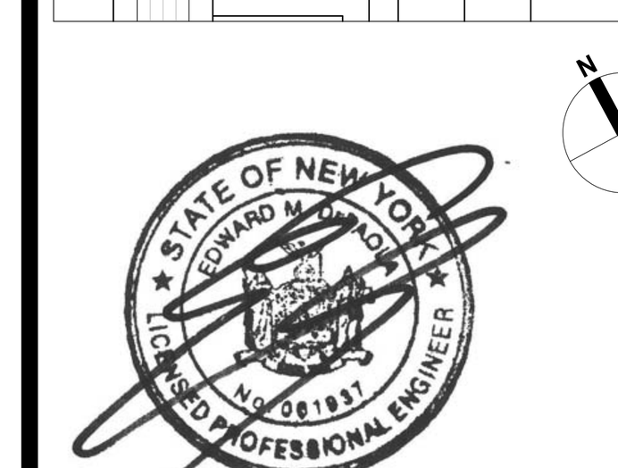
1	D.O.B. FOUNDATION PERMIT FILING	09-01-2015

Key Plan





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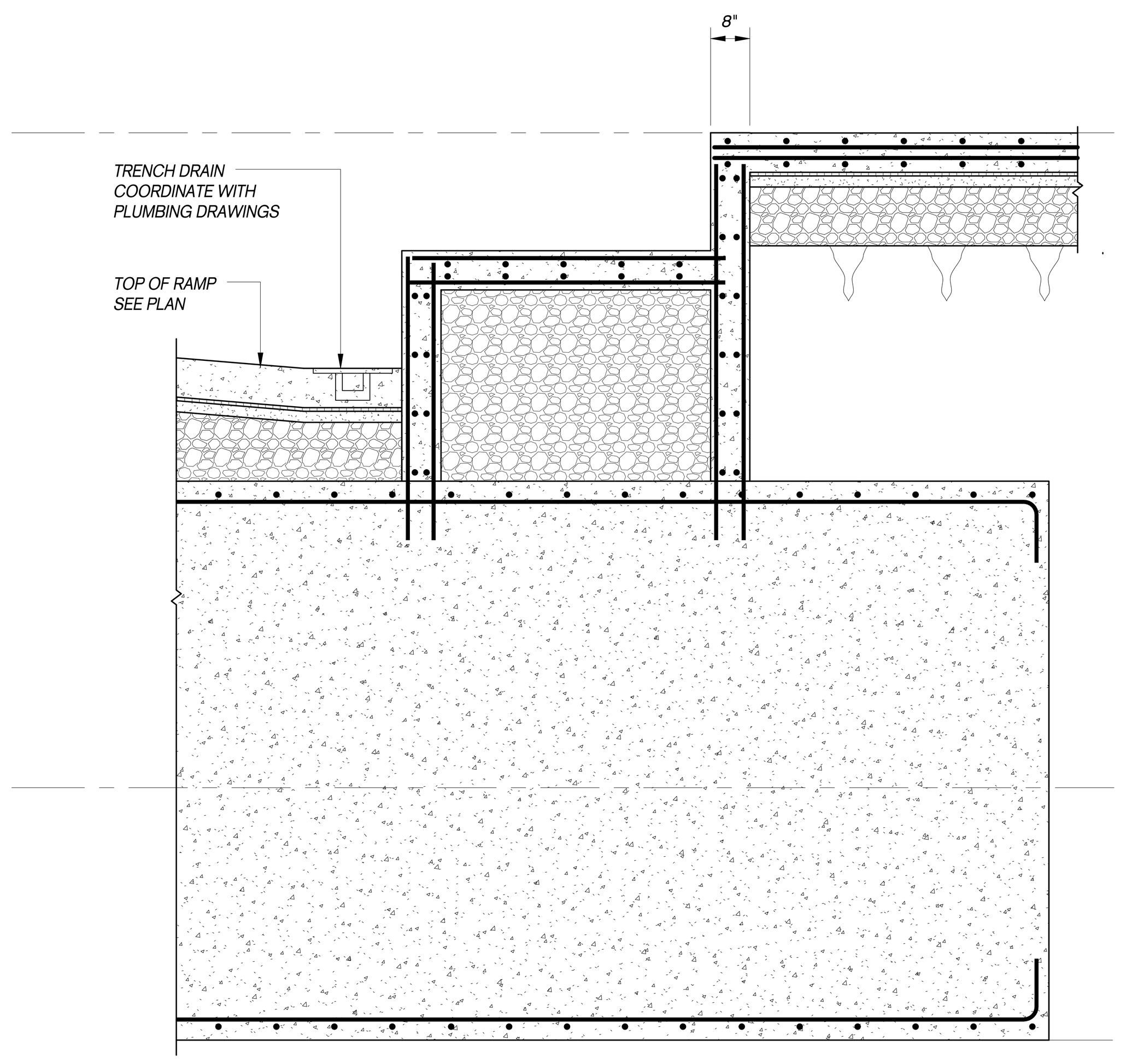
Project No. 14500
Drawn By
Scale 1/2" = 1'-0"

Drawing Title
FOUNDATIONS SECTIONS 6

Drawing Number
FO-206.00
SHEET 8 OF 11



SECTION 1
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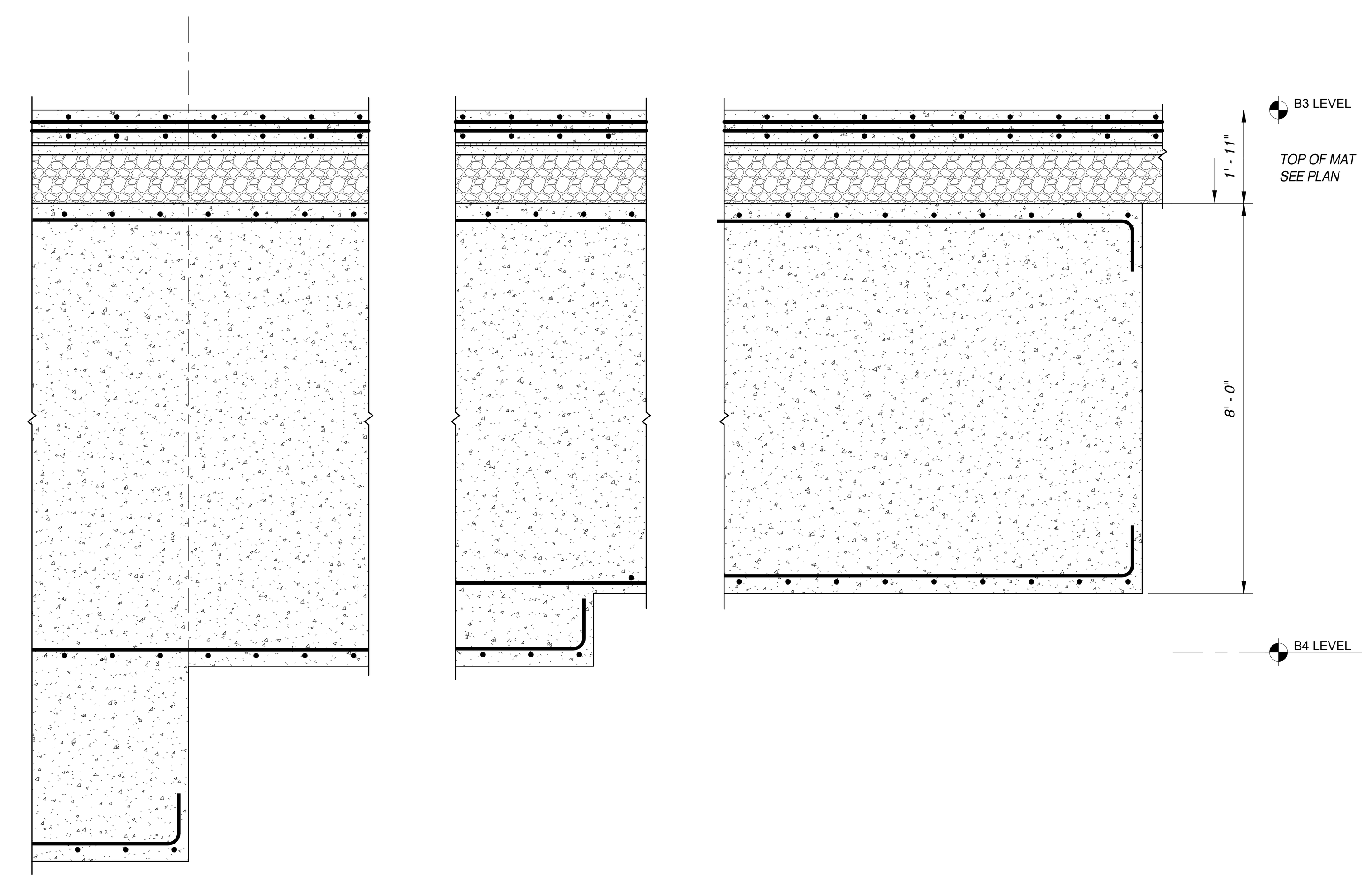
FO-207



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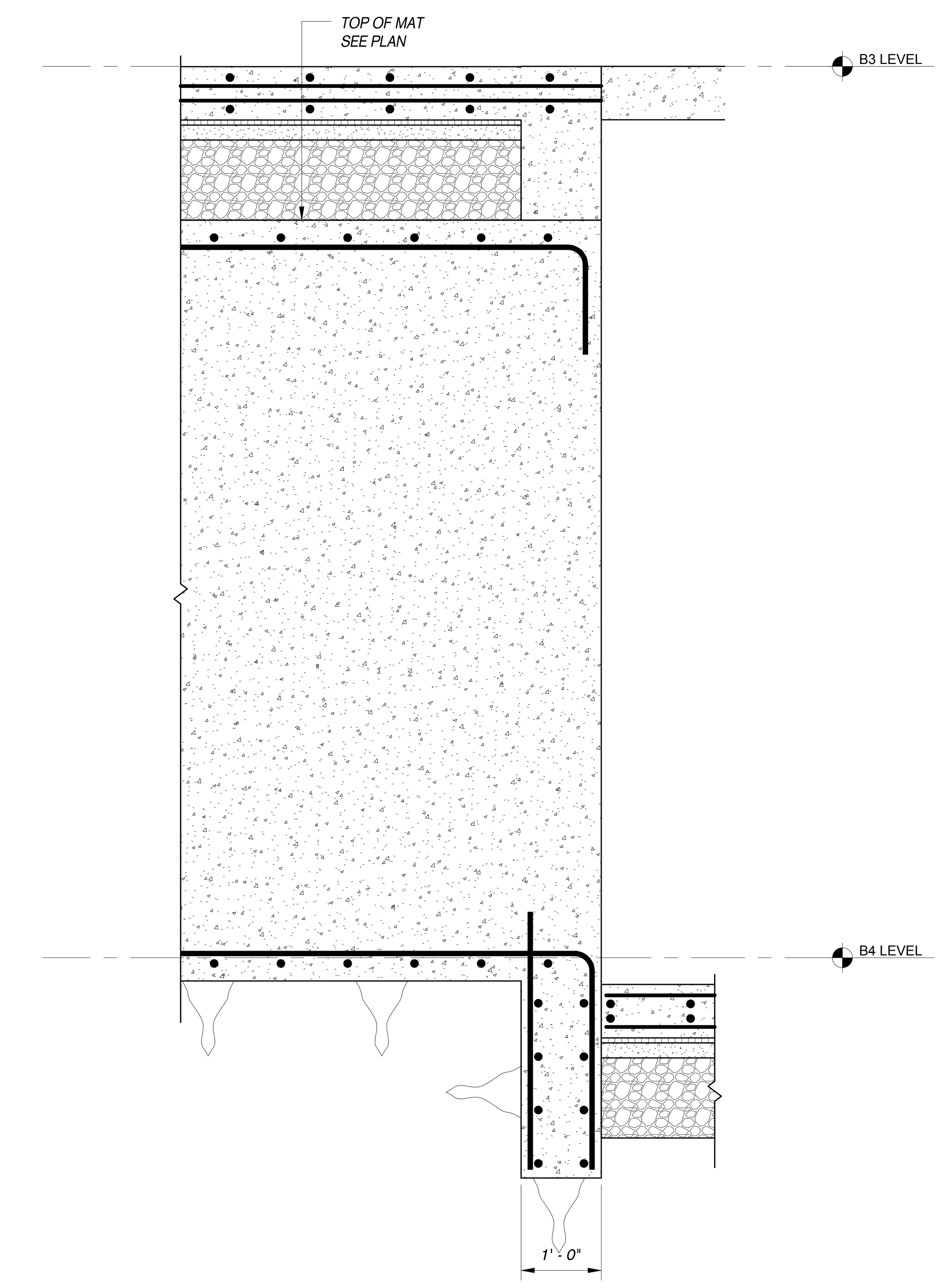

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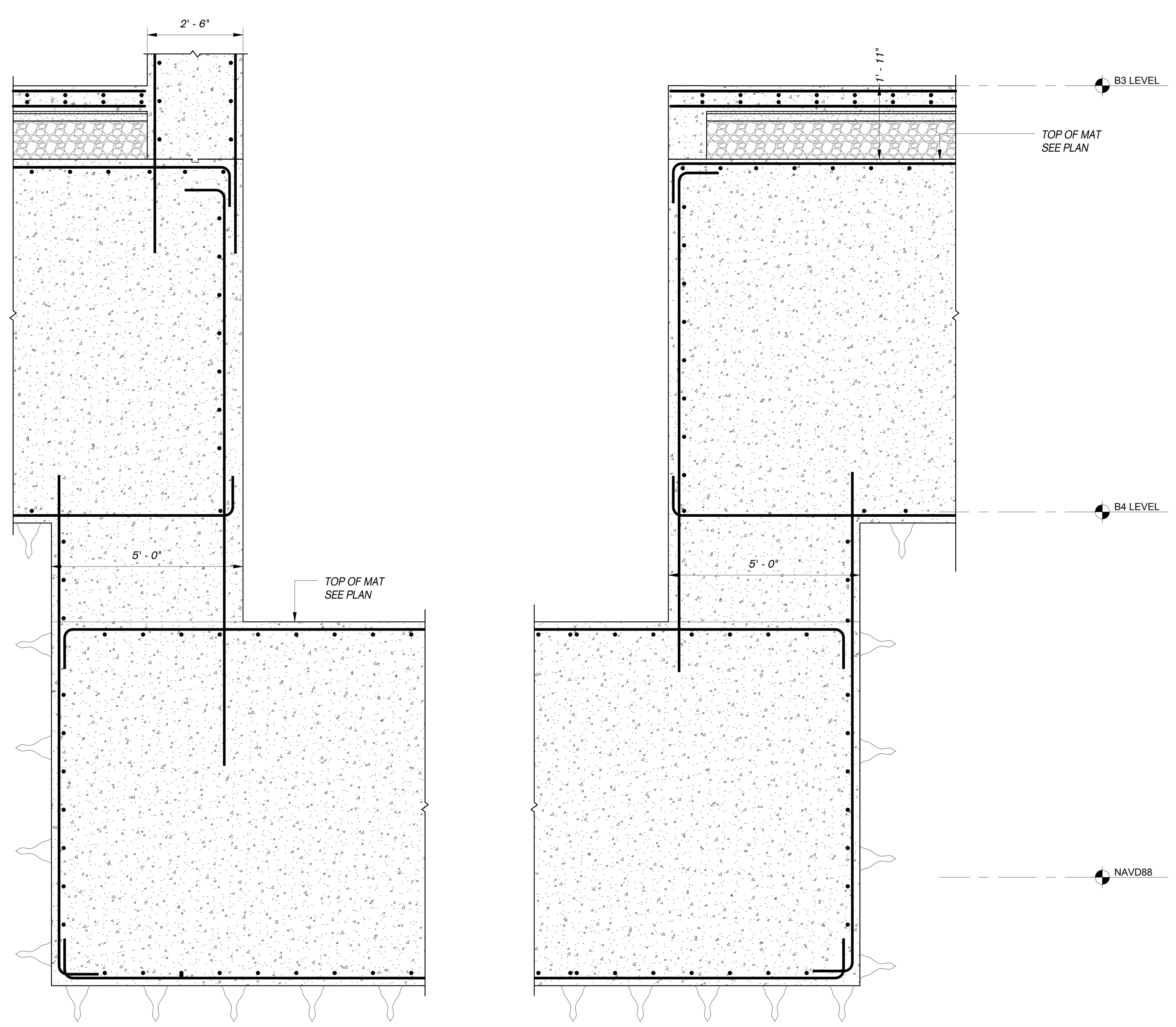

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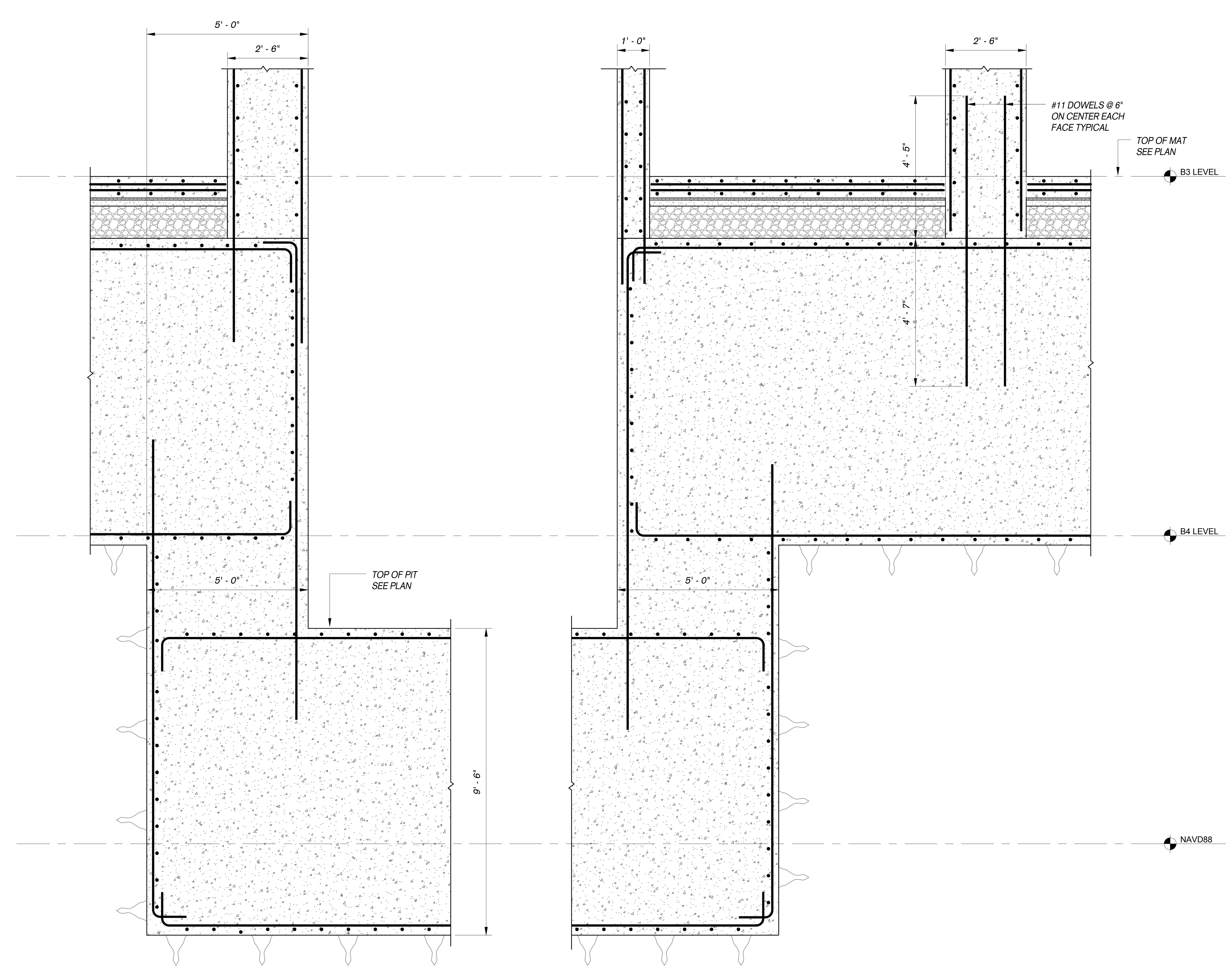
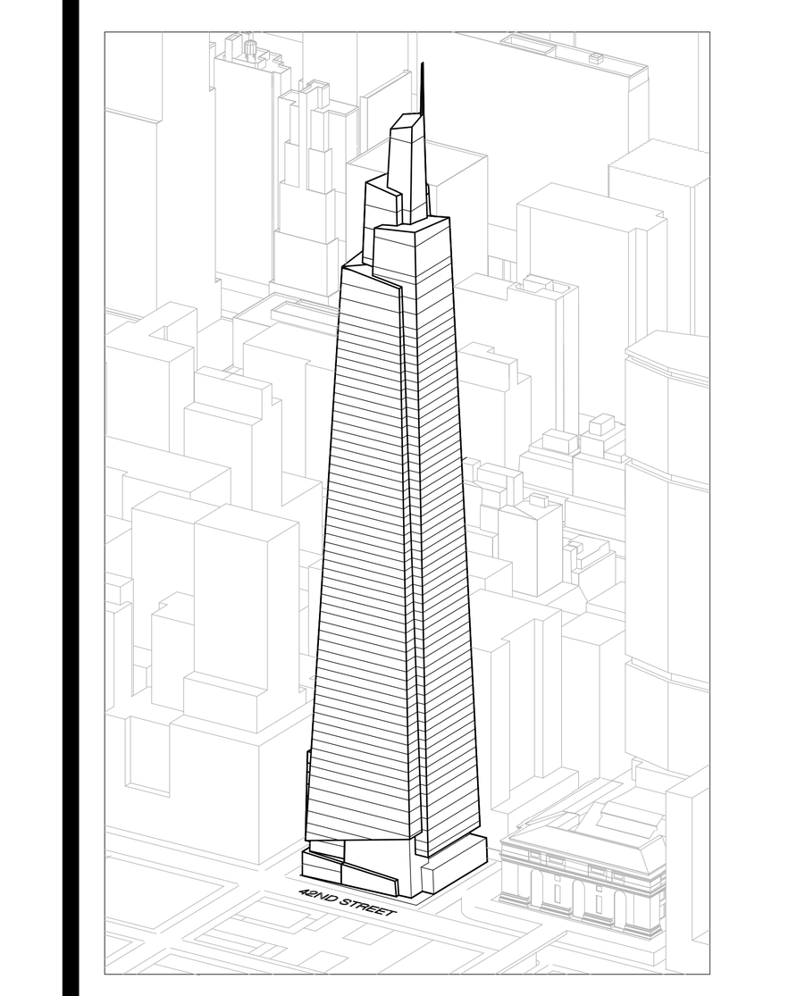


SECTION 5
SCALE: 1/2" = 1'-0"
FO-207

ONE VANDERBILT



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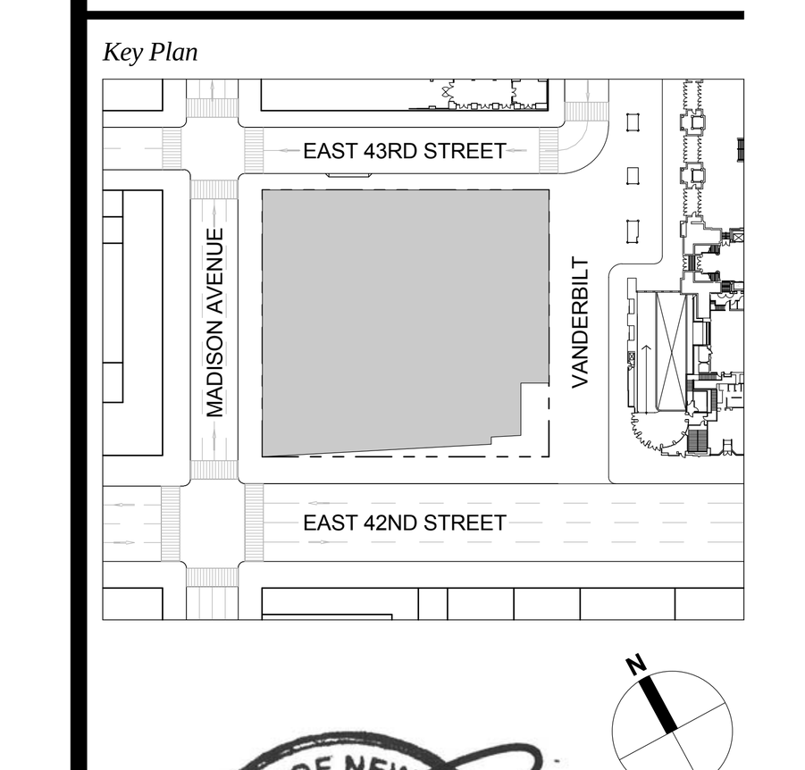

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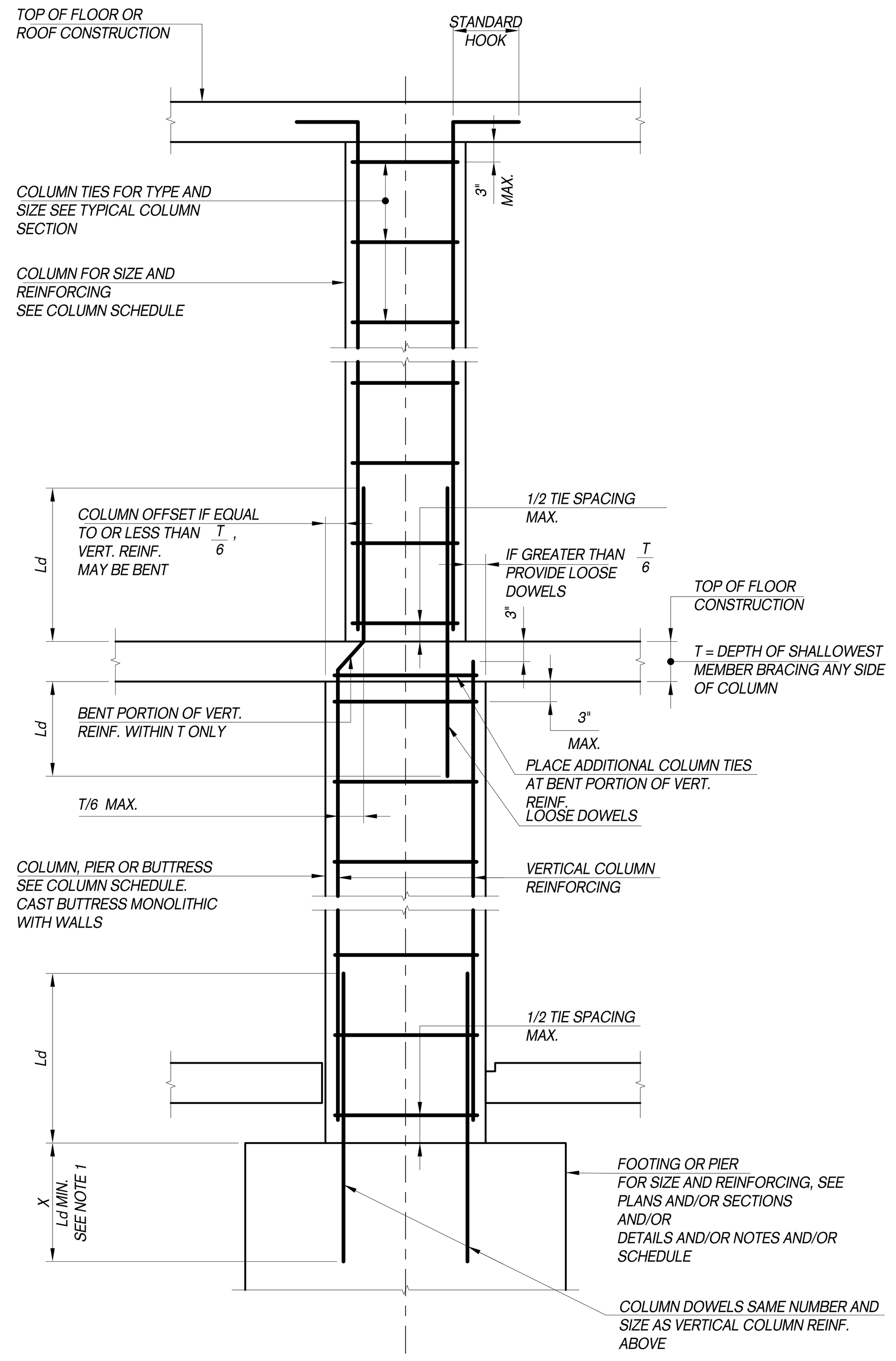
Issue Date: 09-01-2015
Project No. 14500
Drawn By
Scale As indicated

Drawing Title
FOUNDATIONS SECTIONS 7

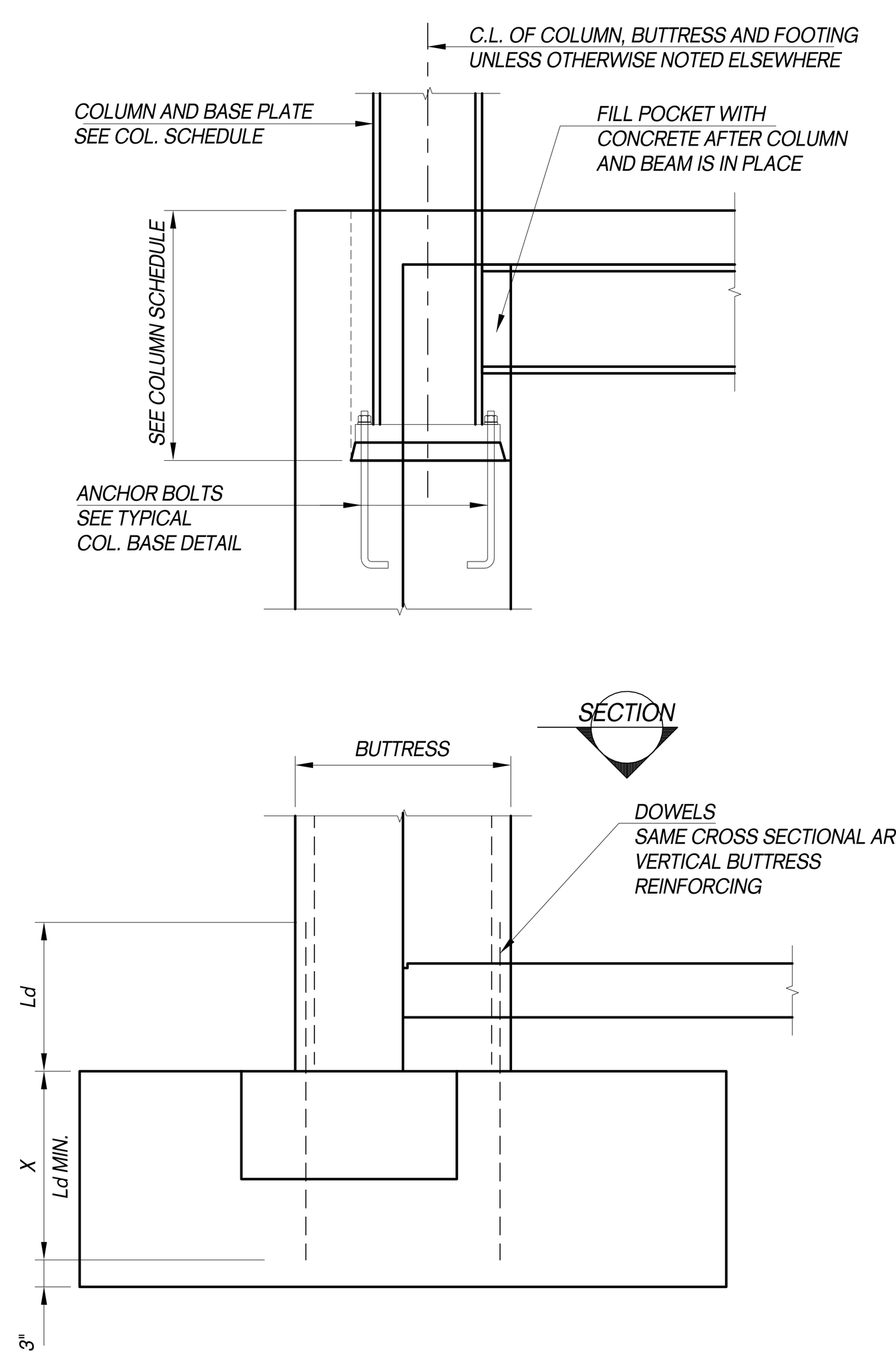
Drawing Number
FO-207.00
SHEET 9 OF 11



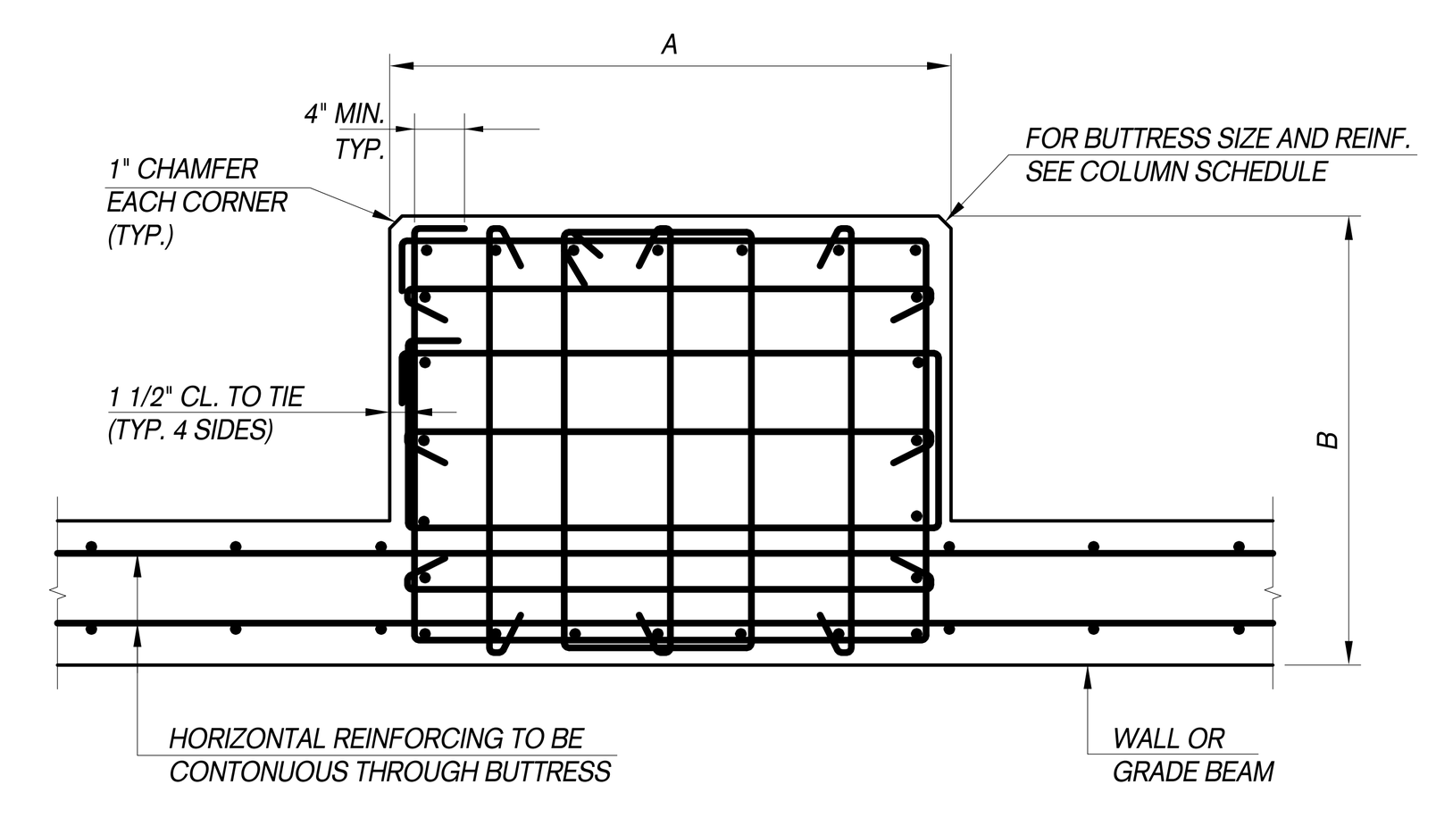
NOTES:

1. IF X IS LESS THAN Ld INCREASE TOTAL AREA OF DOWELS BY Ld/X.
2. DEVELOPMENT LENGTH Ld TO BE DETERMINED IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318, CHAPTER 12.

TYPICAL COLUMN DETAIL



VERTICAL BAR DIAMETER	TIES	
	BAR SIZE	SPACING
#5	#3	10"
#6	#3	12"
#7	#3	14"
#8	#3	16"
#9	#3	18"
#10	#3	18"
#11 OR LARGER	#4	18"

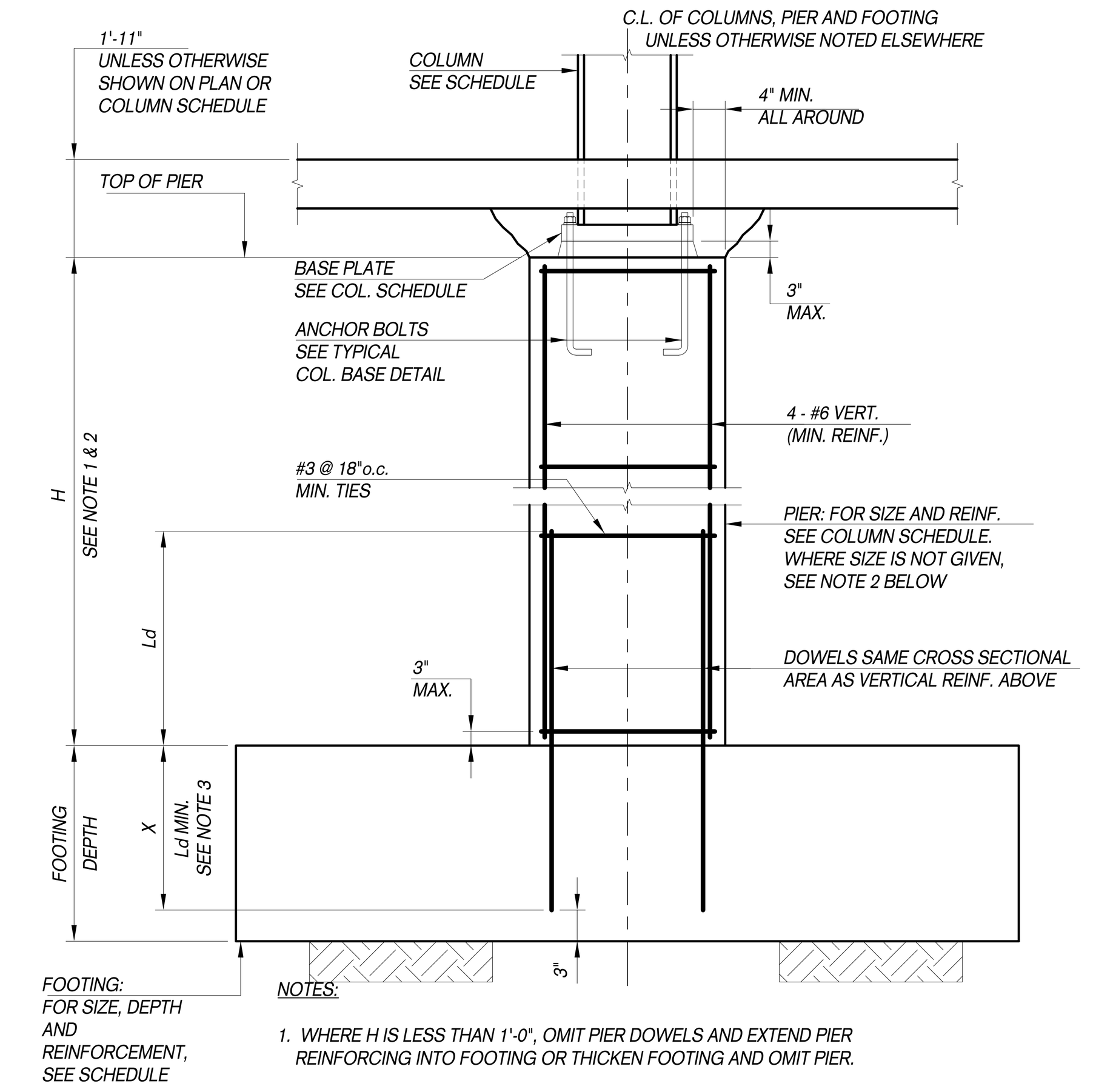


SECTION

NOTES:

1. TIES SHALL BE ARRANGED SUCH THAT EVERY CORNER AND ALTERNATE LONGITUDINAL BAR SHALL HAVE LATERAL SUPPORT PROVIDED BY THE CORNER OF A TIE WITH AN INCLUDED ANGLE OF NOT MORE THAN 135 DEGREES. IF ANY BAR SHALL BE FARTHER THAN 6 INCHES CLEAR ON EACH SIDE ALONG THE TIE FROM A LATERALLY SUPPORTED BAR, LATERAL SUPPORT (SHOWN DOTTED) SHALL BE PROVIDED FOR THESE BARS
2. IF THE DIMENSION A OR B IS LESS THAN THE TIE SPACING SHOWN, THE SPACING SHALL BE DECREASED TO EQUAL A OR B WHICHEVER IS SMALLER
3. IF X IS LESS THAN Ld, INCREASE AREA OF DOWELS BY $\frac{Ld}{X}$.
4. DEVELOPMENT LENGTH Ld TO BE DETERMINED IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318, CHAPTER 12.

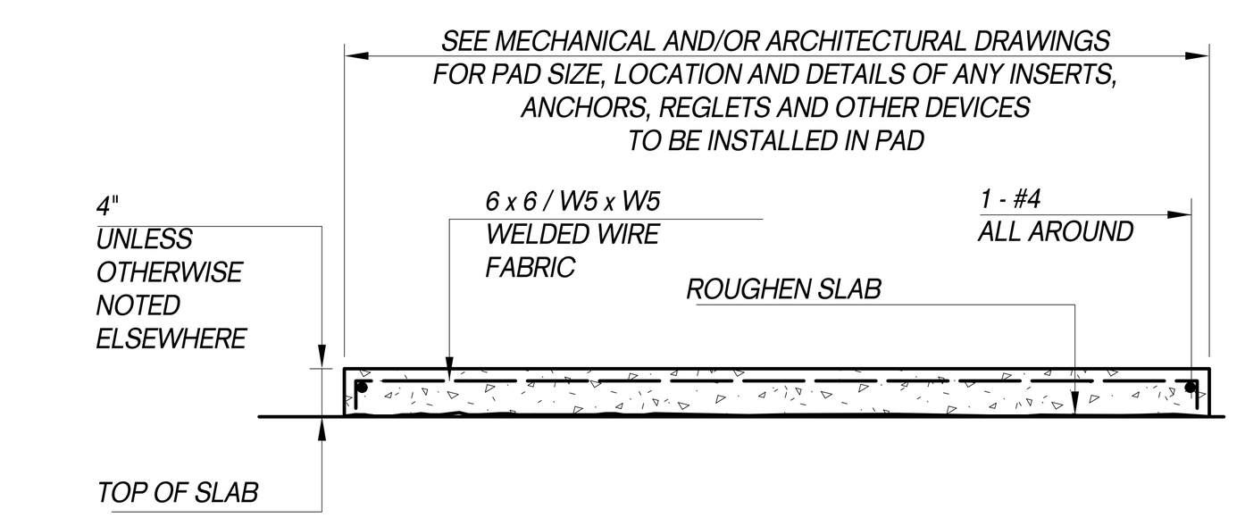
TYPICAL STEEL COLUMN SUPPORTED ON BUTTRESS DETAIL



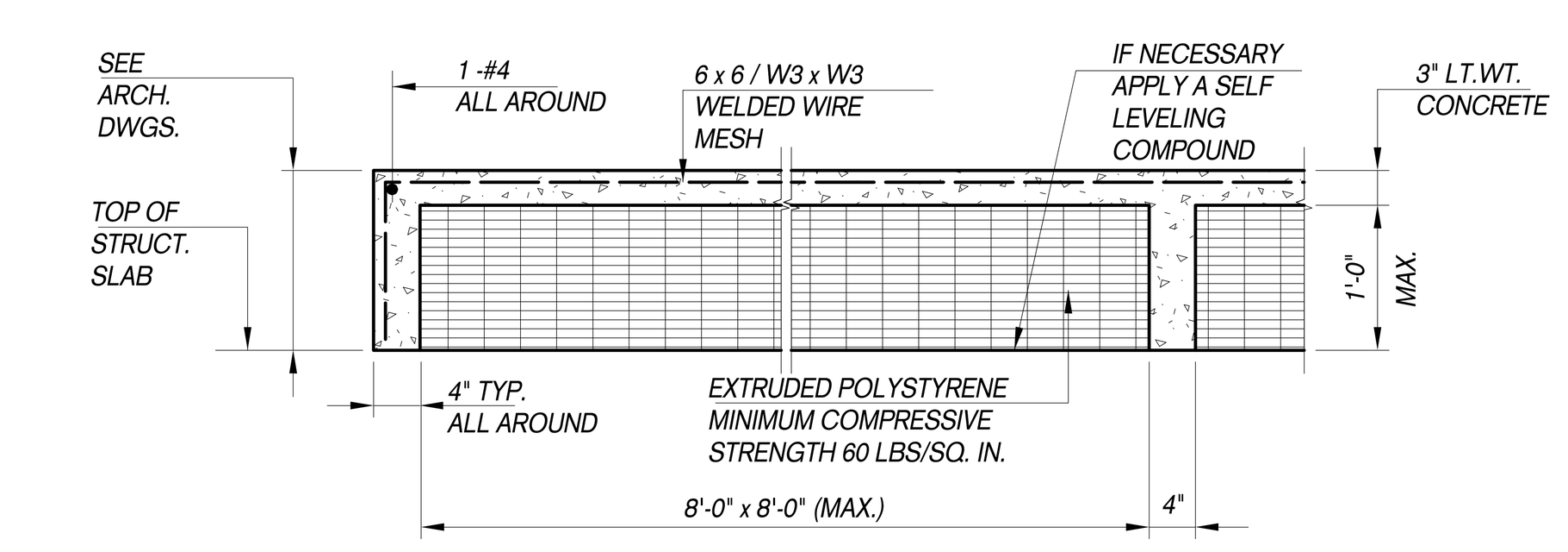
NOTES:

1. WHERE H IS LESS THAN 1'-0", OMIT PIER DOWELS AND EXTEND PIER REINFORCING INTO FOOTING OR THICKEN FOOTING AND OMIT PIER.
2. THE PIER WIDTH SHALL BE NO LESS THAN H/3, OR AS NECESSARY TO FIT BASE PLATE AND CONCRETE PROTECTION
3. IF X IS LESS THAN Ld INCREASE TOTAL AREA OF DOWELS BY $\frac{Ld}{X}$
4. DEVELOPMENT LENGTH Ld TO BE DETERMINED IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318, CHAPTER 12.

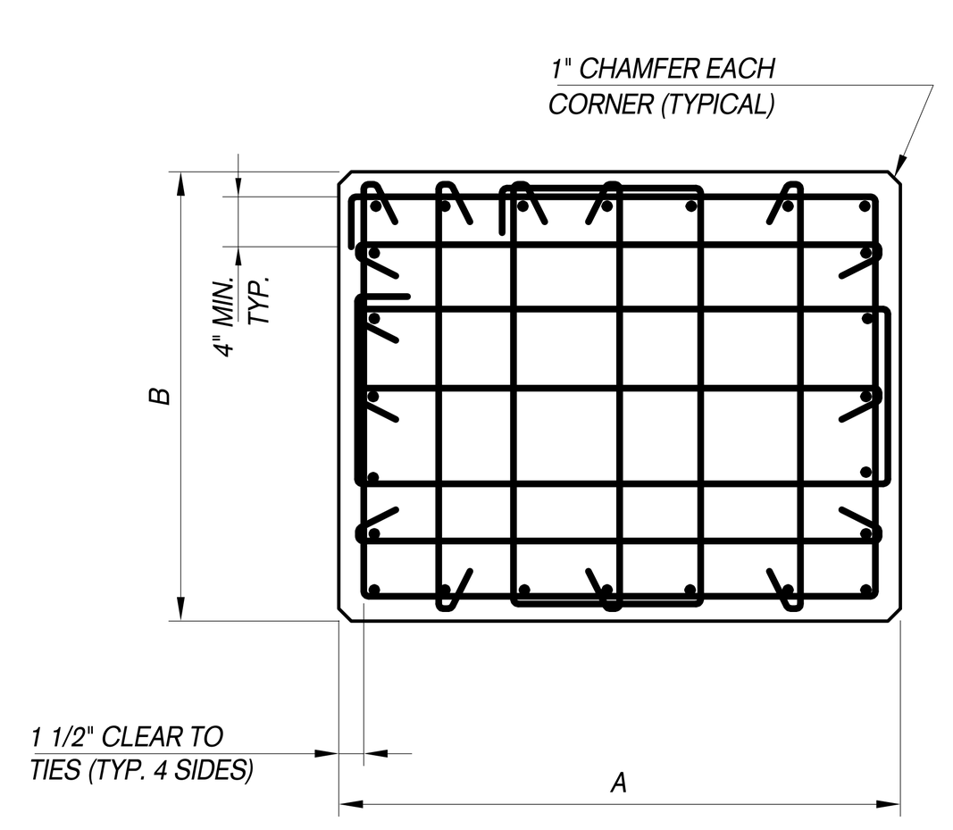
TYPICAL INTERIOR STEEL COLUMN SUPPORTED ON PIER DETAIL



TYPICAL MECHANICAL PAD DETAIL



TYPICAL "RAISED SLAB" DETAIL

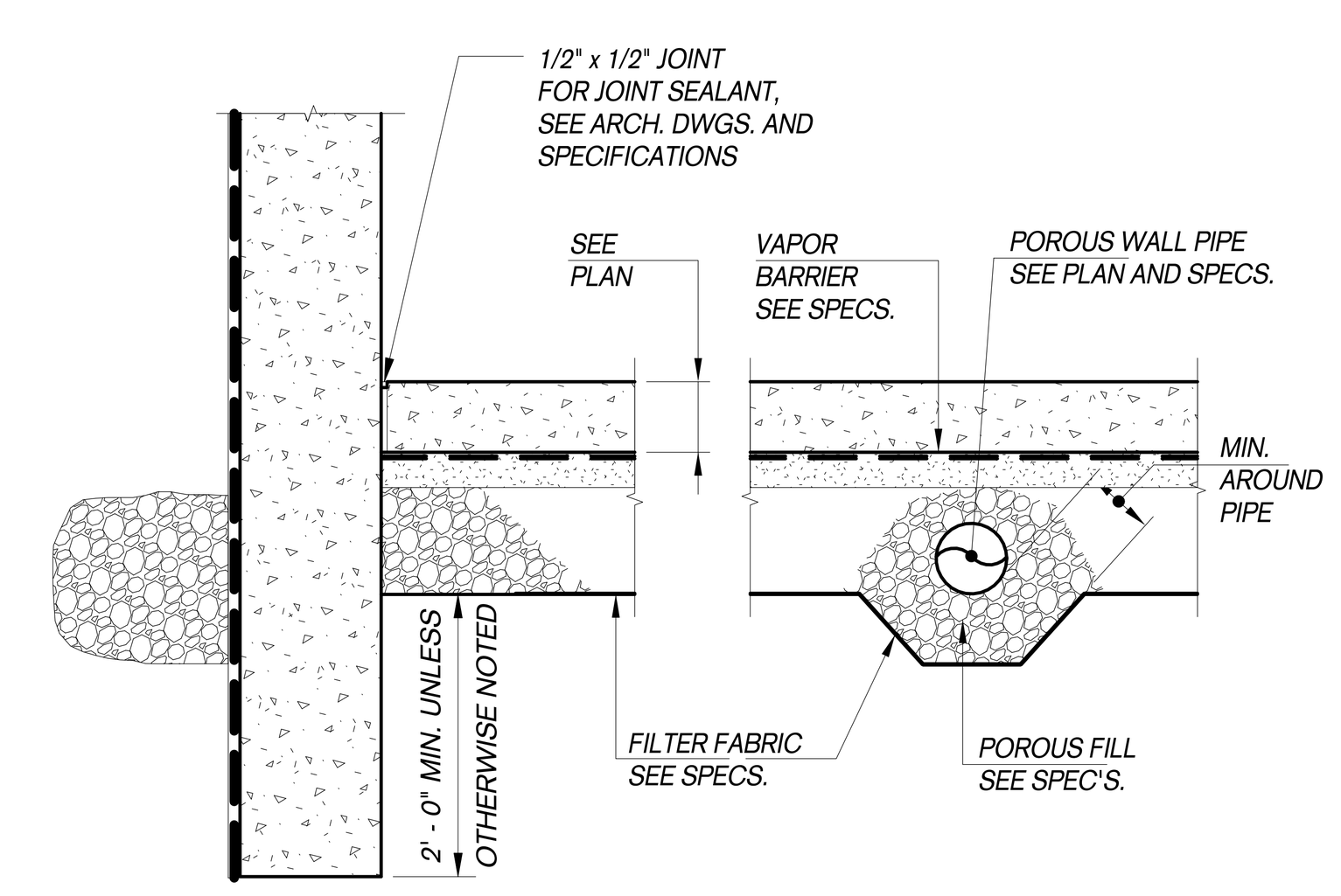


VERTICAL BAR DIAMETER	TIES	
	BAR SIZE	SPACING
#5	#3	10"
#6	#3	12"
#7	#3	14"
#8	#3	16"
#9	#3	18"
#10	#3	18"
#11 OR LARGER	#4	18"

NOTES:

1. TIES SHALL BE ARRANGED SUCH THAT EVERY CORNER AND ALTERNATE LONGITUDINAL BAR SHALL HAVE LATERAL SUPPORT PROVIDED BY THE CORNER OF A TIE WITH AN INCLUDED ANGLE OF NOT MORE THAN 135 DEGREES. IF ANY BAR SHALL BE FARTHER THAN 6 INCHES CLEAR ON EACH SIDE ALONG THE TIE FROM A LATERALLY SUPPORTED BAR. LATERAL SUPPORT (SHOWN DOTTED) SHALL BE PROVIDED FOR THESE BARS
2. IF THE DIMENSION A OR B IS LESS THAN THE TIE SPACING SHOWN, THE SPACING SHALL BE DECREASED TO EQUAL A OR B WHICHEVER IS SMALLER.

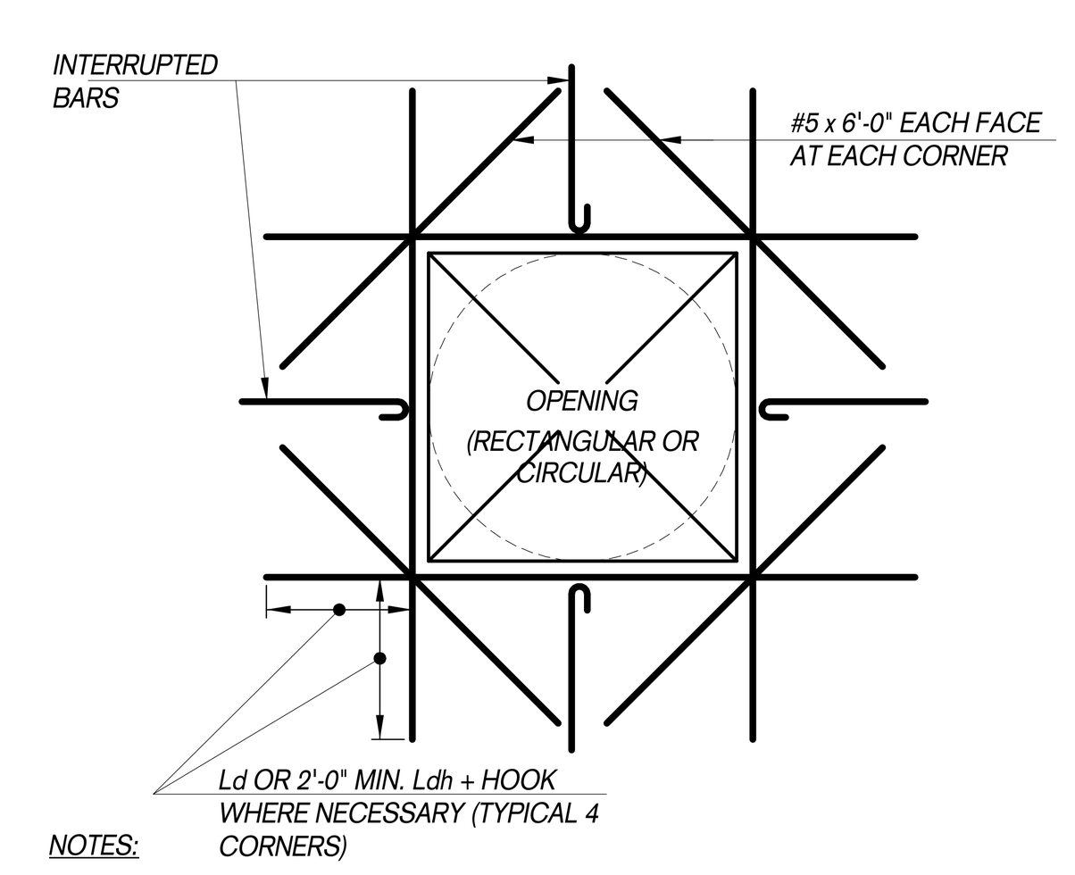
TYPICAL COLUMN SECTION



NOTE:

1. THESE DETAILS SHALL BE USED IN CONJUNCTION WITH ARCHITECTURAL AND PLUMBING DRAWINGS

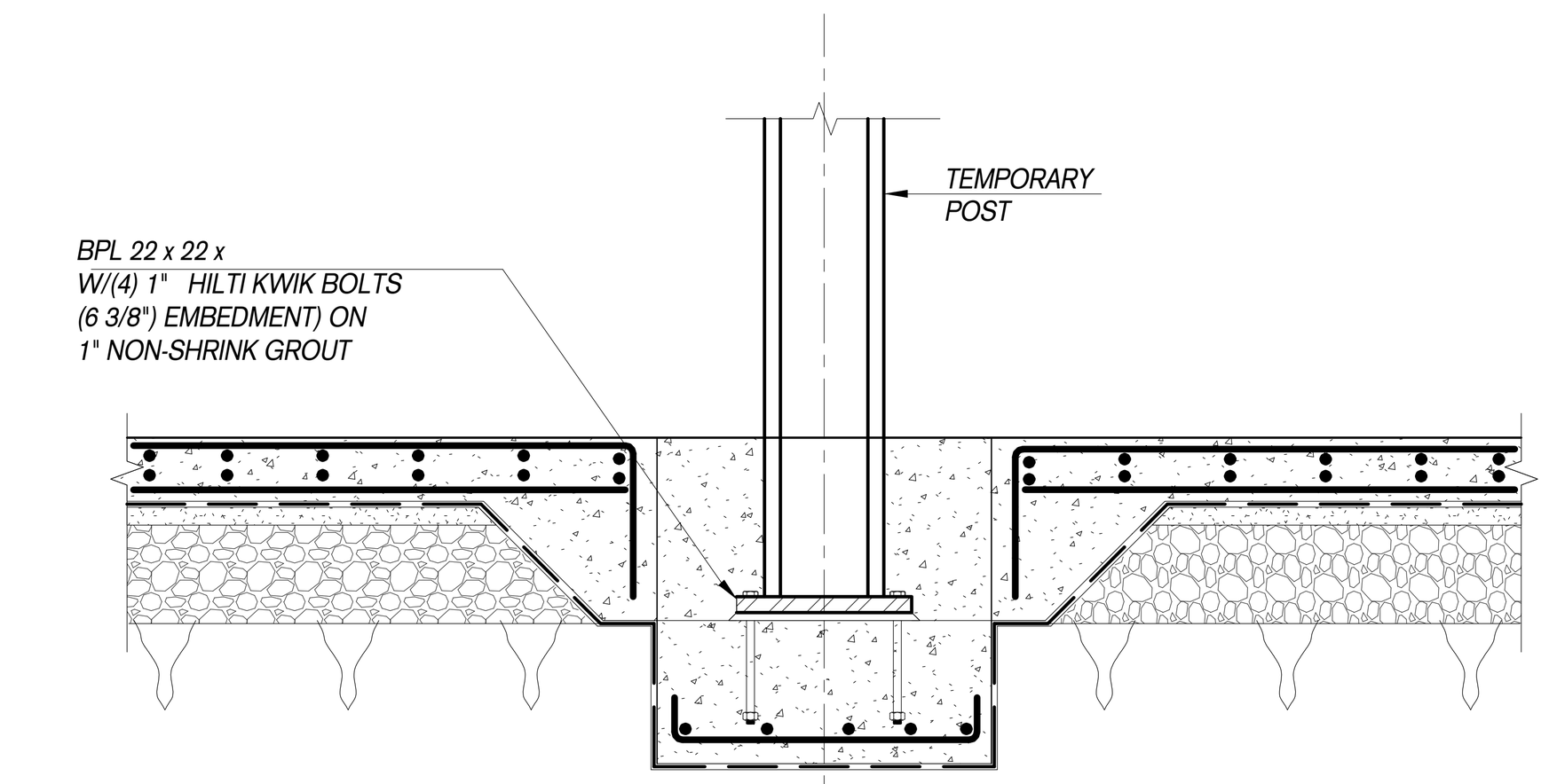
TYPICAL UNDERFLOOR DRAINAGE DETAILS



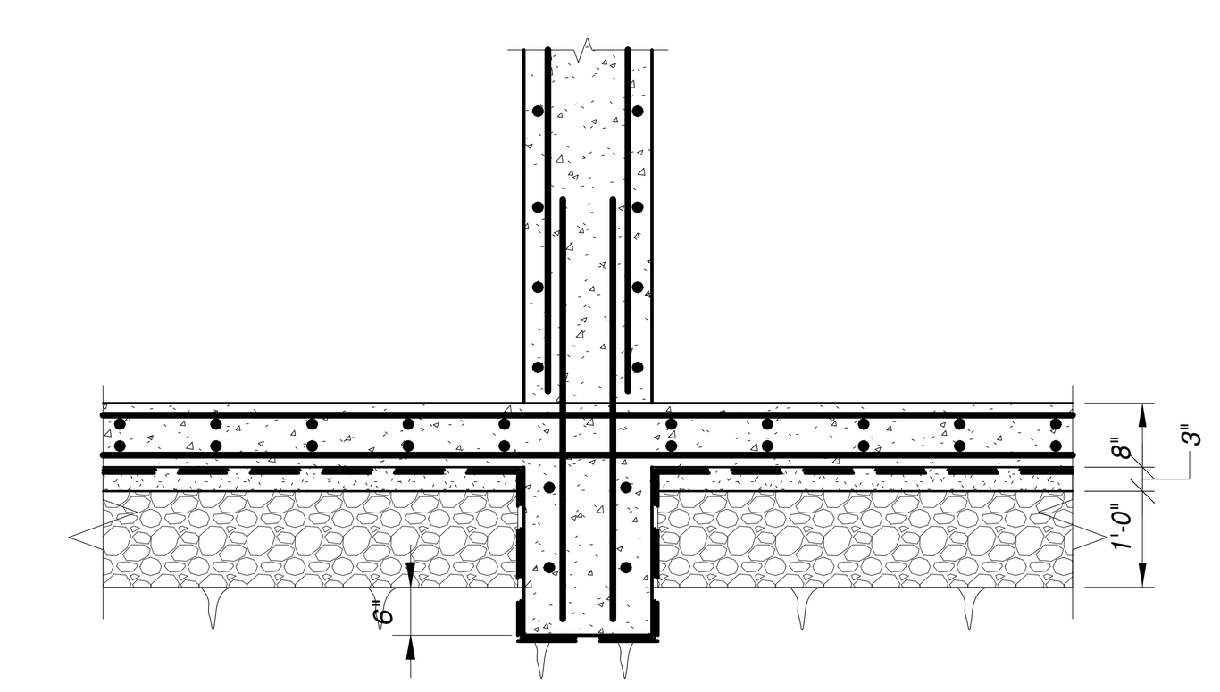
NOTES:

1. HOOK ALL INTERRUPTED BARS.
2. FOR EACH FACE 50% OF REINFORCING BAR AREA INTERRUPTED BY OPENING SHALL BE PROVIDED EACH SIDE OF OPENING #5 MIN. EACH SIDE IN EACH FACE.
3. DEVELOPMENT LENGTH Ld OR Ldh TO BE DETERMINED IN ACCORDANCE WITH THE REQUIREMENTS OF ACI318 CHAPTER 12.

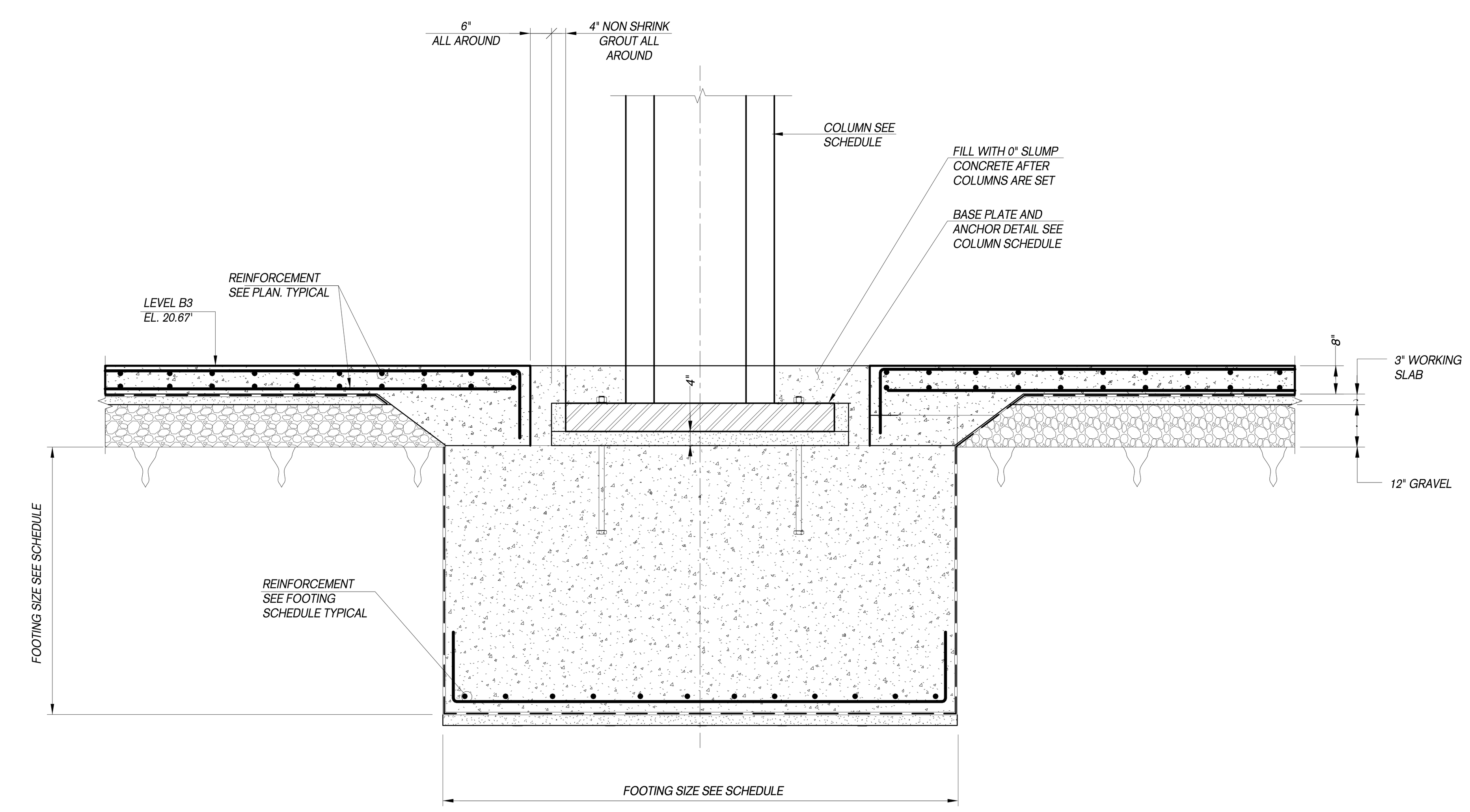
TYPICAL DETAIL OF OPENING IN CONCRETE WALLS



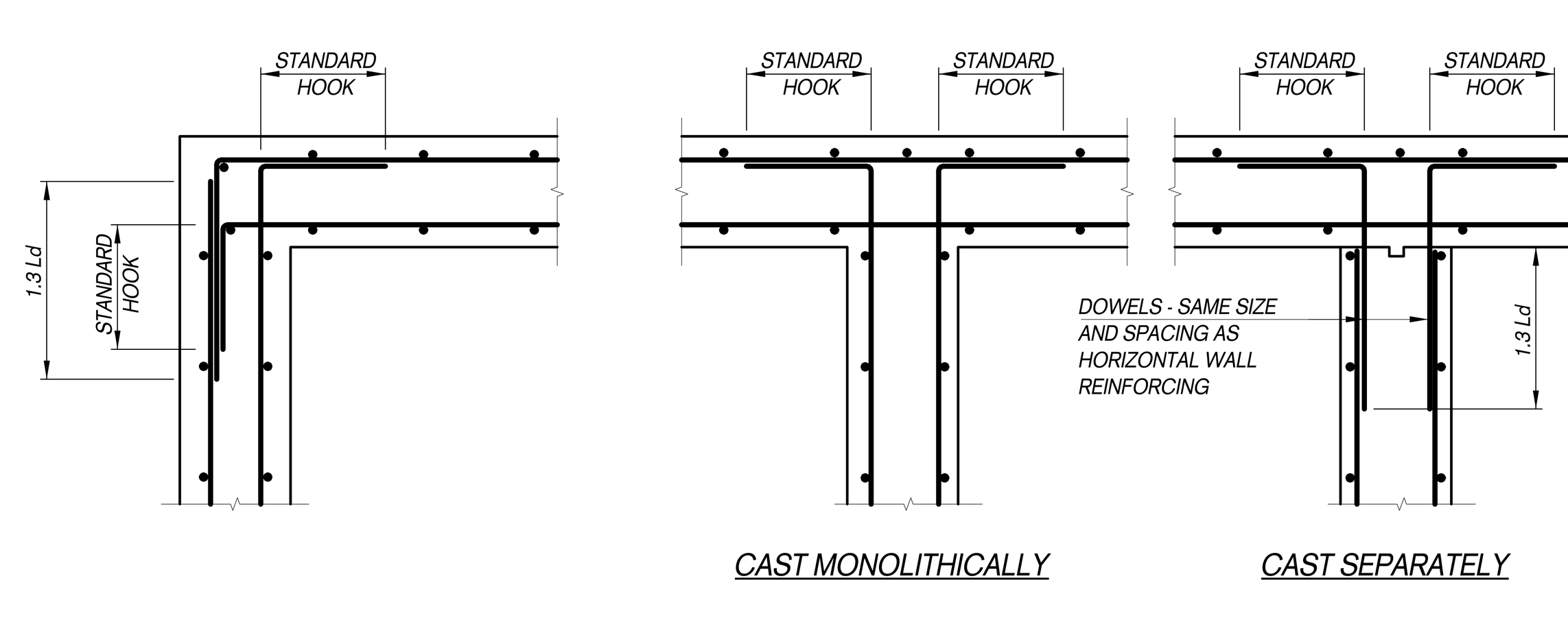
TYPICAL TEMPORARY POST BASE DETAIL



TYPICAL WALL...



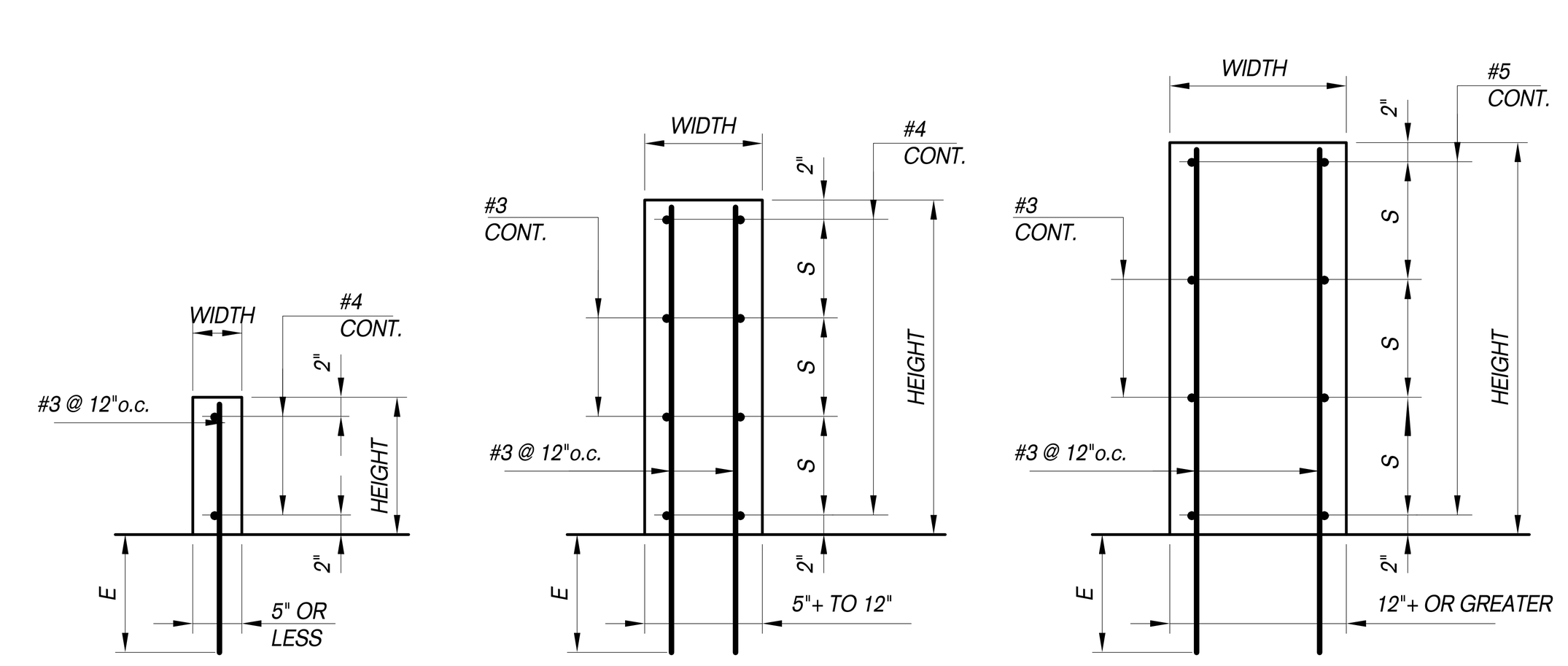
TYPICAL COLUMN BASE DETAIL



NOTE:

1. DEVELOPMENT LENGTH Ld TO BE DETERMINED IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318, CHAPTER 12.

TYPICAL CONCRETE WALL CORNER AND INTERSECTION DETAILS

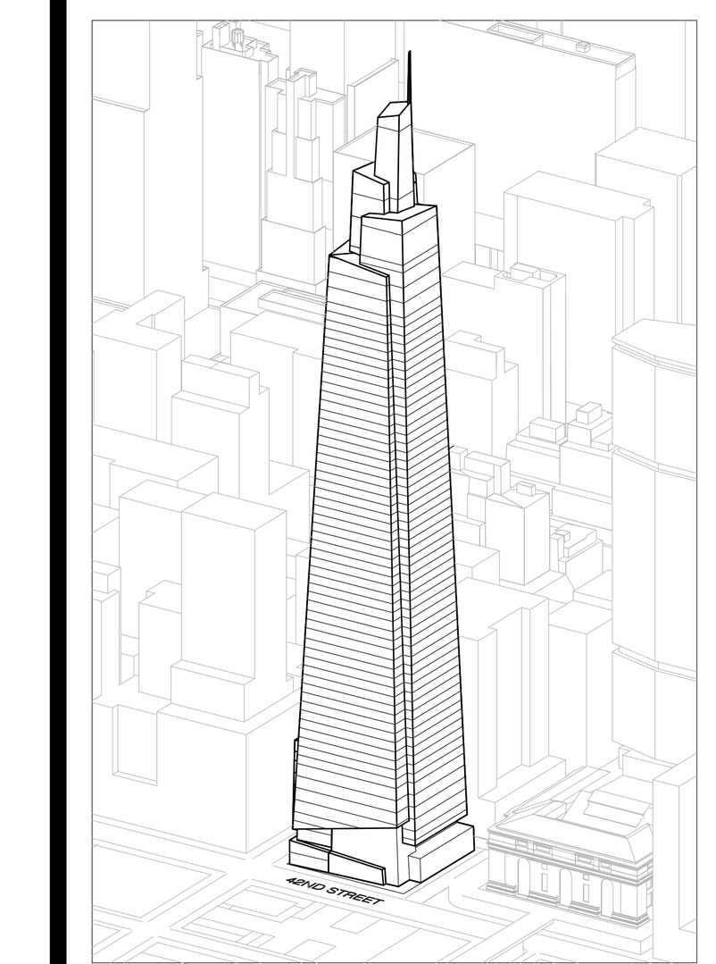


NOTES:

1. S SHALL BE NOT GREATER THAN 12".
2. THE HEIGHT OF CURBS SHALL NOT BE GREATER THAN 3 TIMES THE CURB WIDTH.
3. E SHALL BE 1'-0" MIN. OR HOOK.
4. FOR CURB SIZE AND LOCATIONS, SEE ARCHITECTURAL DRAWINGS AND/OR MECHANICAL AND/OR OTHER CONTRACT DOCUMENTS.

TYPICAL CONCRETE CURB DETAIL

ONE VANDERBILT



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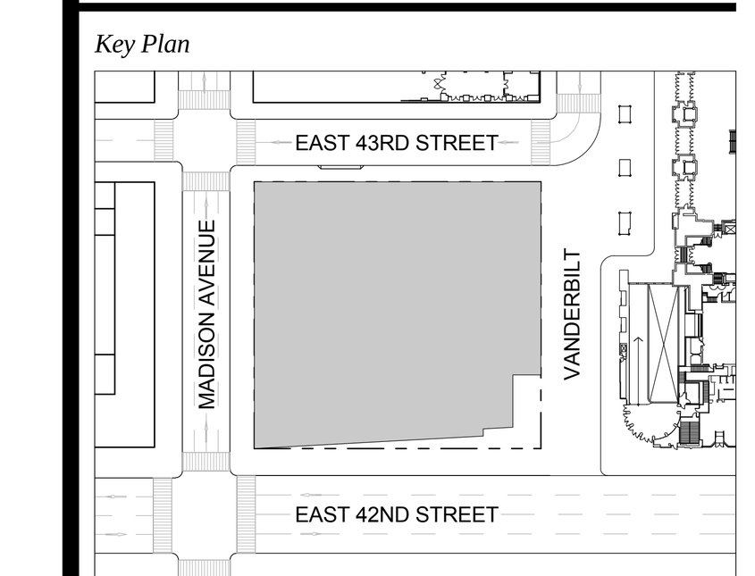
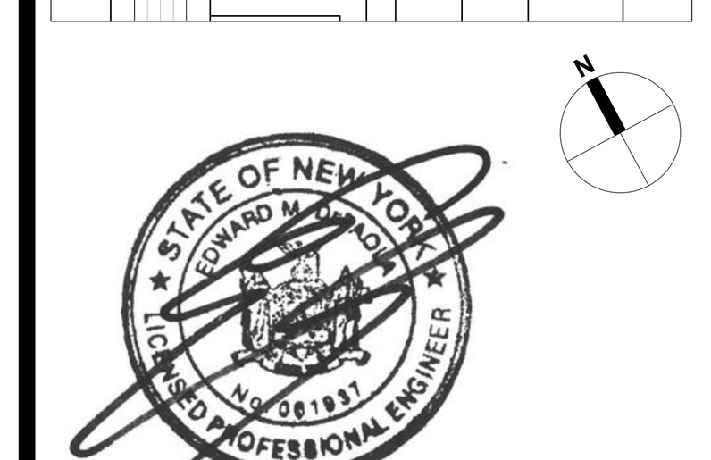
Key Plan





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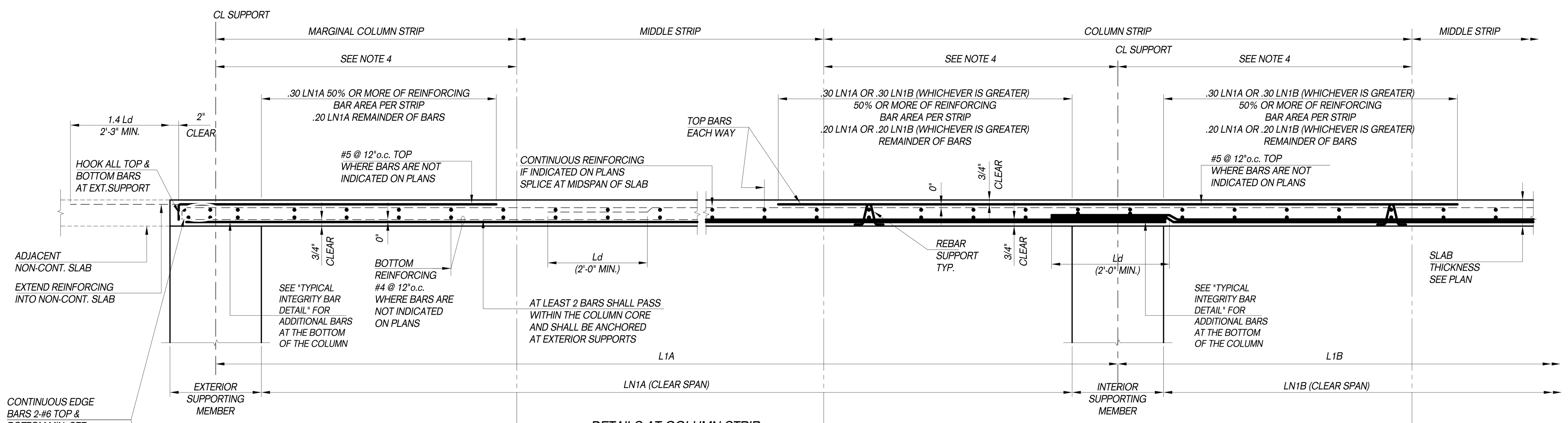
Drawn By
Scale As indicated

Drawing Title
FOUNDATION TYPICAL DETAILS 1

Drawing Number
FO-251.00
SHEET 10 OF 11

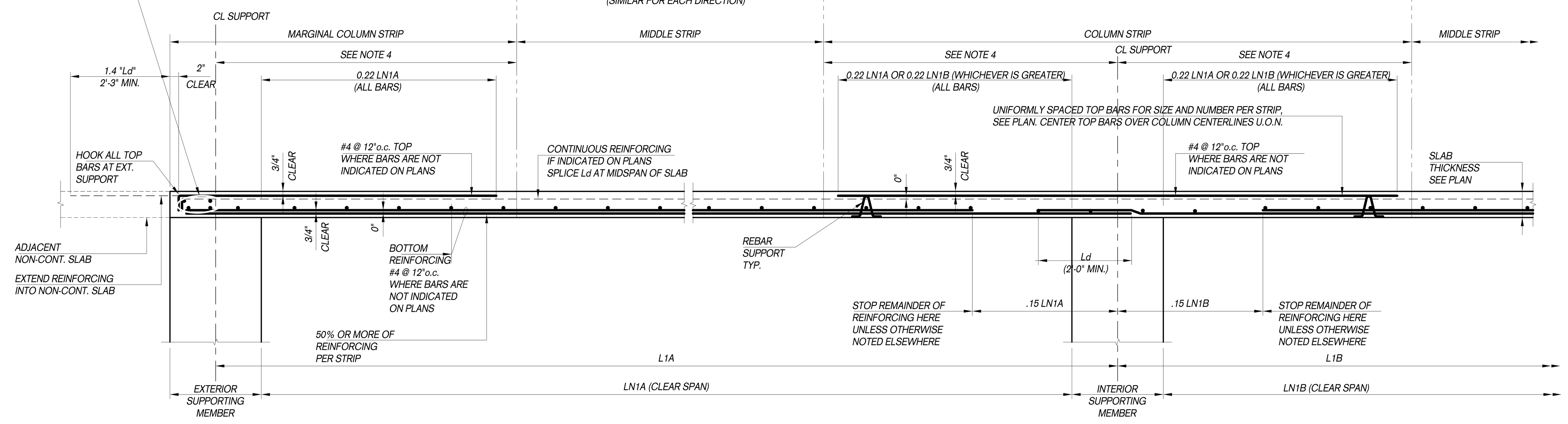


NON-CONTINUOUS END

DETAILS AT COLUMN STRIP

(SIMILAR FOR EACH DIRECTION)

CONTINUOUS END



NON-CONTINUOUS END

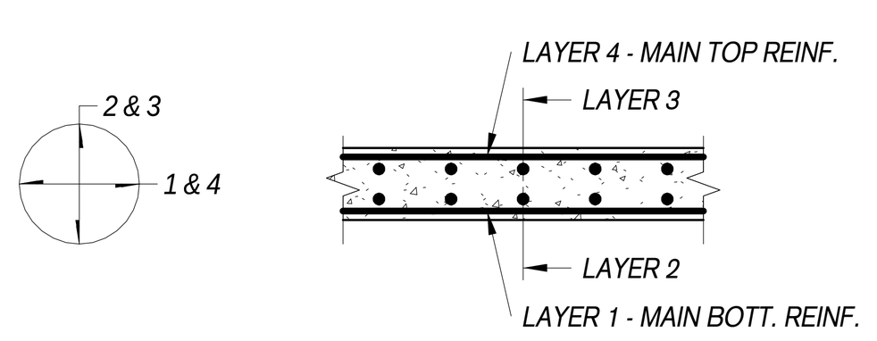
CONTINUOUS END

DETAILS AT MIDDLE STRIP

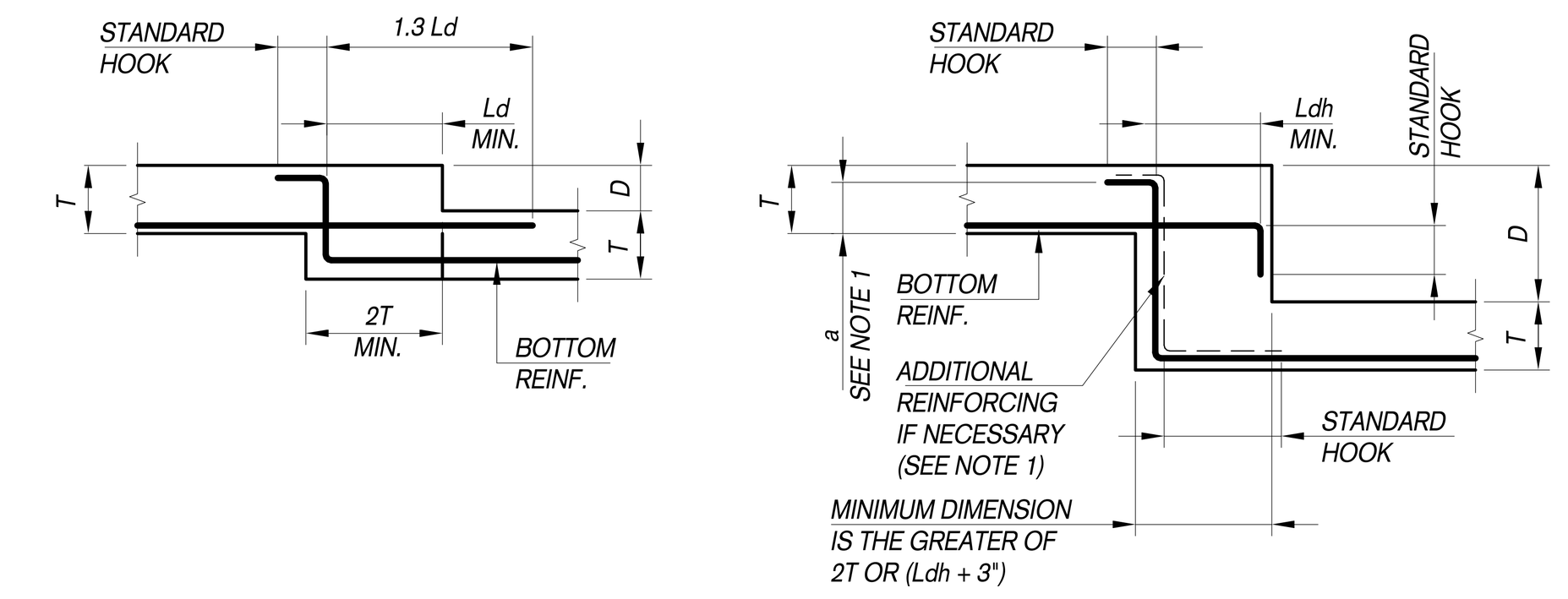
NOTES:

1. FOR SIZE AND NUMBER OF ALL TOP AND BOTTOM BARS, SEE PLANS AND/OR SCHEDULES.
2. DEVELOPMENT LENGTH Ld TO BE DETERMINED IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318, CHAPTER 12.
3. AT INTERIOR SUPPORTS LN1A AND LN1B IS THE CLEAR SLAB SPAN TO THE LEFT AND RIGHT OF SUPPORT.
4. COLUMN STRIP DIMENSIONS TO BE DETERMINED IN ACCORDANCE WITH THE REQUIREMENT OF ACI 318, CHAPTER 13 UNLESS NOTED OTHERWISE ON PLANS.
5. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR PROVIDING THE TYPE, SIZE, LOCATION AND FREQUENCY OF REBAR SUPPORTS AND THE MEANS AND METHODS TO ASSURE THAT THE REINFORCEMENT IS ACCURATELY PLACED AND IS ADEQUATELY SUPPORTED BEFORE CONCRETE IS PLACED, AND ADEQUATELY SECURED AGAINST DISPLACEMENT BY CONCRETE PLACEMENT OR CONSTRUCTION PERSONNEL.

TYPICAL FLAT SLAB DETAILS



FLAT SLAB BAR PLACING ORDER



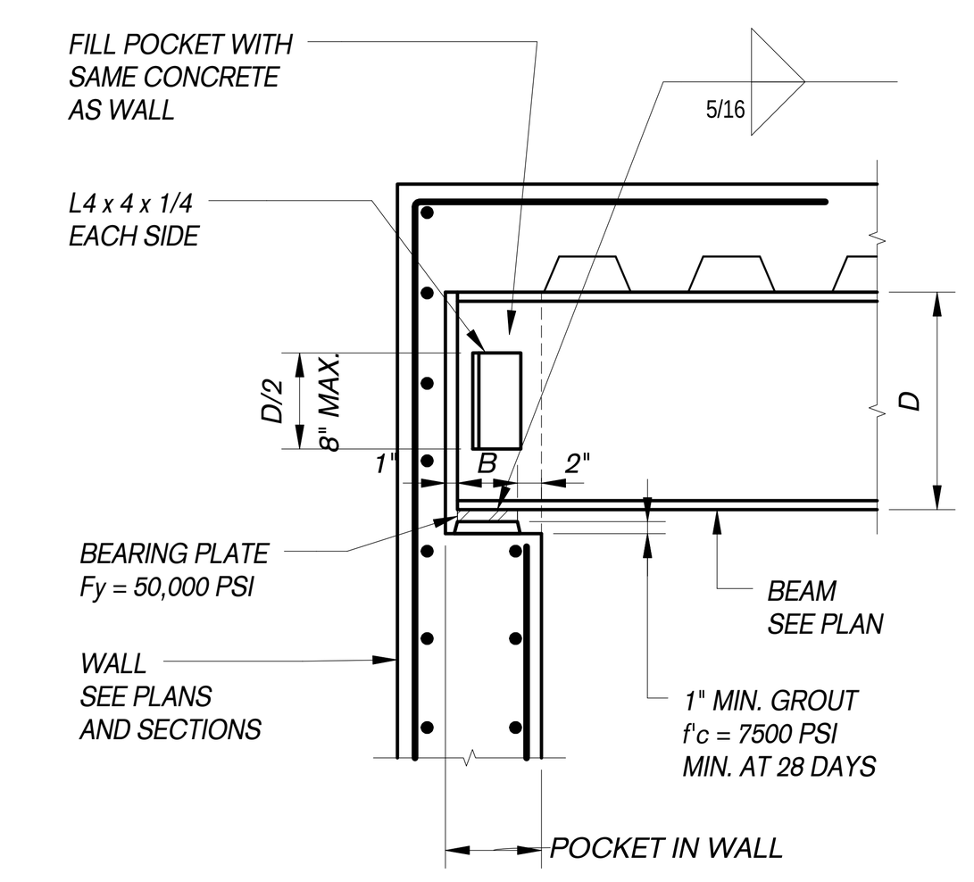
D LESS THAN OR EQUAL TO T - 3"

D GREATER THAN OR EQUAL TO T - 3"

NOTES:

1. IF DIMENSION "a" IS LESS THAN Ldh, PROVIDE ADDITIONAL REINFORCING OF SAME SIZE SUCH THAT THE TOTAL AMOUNT OF REINFORCING IS INCREASED BY THE FACTOR (Ldh/a).
2. DEVELOPMENT LENGTH Ld AND Ldh TO BE DETERMINED IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318, CHAPTER 12.
3. WHERE TOP REINFORCING OCCURS, PROVIDE SIMILAR DETAIL.

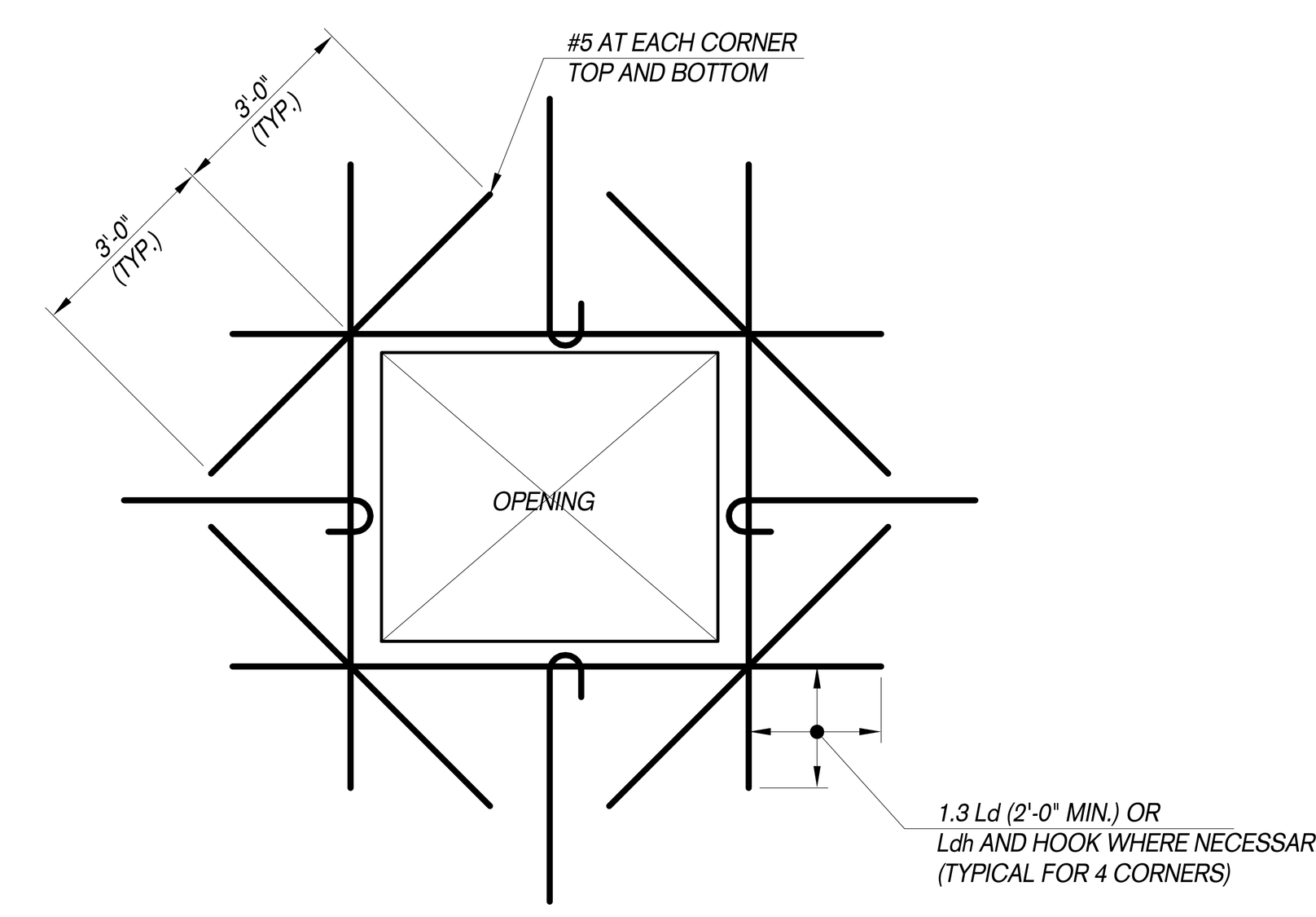
TYPICAL CHANGE IN SLAB ELEVATION DETAIL



BEARING PLATE SCHEDULE

BEAM SIZE	B	THICKNESS	LENGTH
W8 THRU W12	4"	3/4"	0'-8"
W14 & W16	4"	1"	0'-10"
W18	4"	1 1/4"	0'-10"
W21	5"	1 1/4"	0'-10"
W24	6"	1 1/4"	0'-11"
W27 AND W30	7"	1 1/2"	1'-0"
LARGER THAN W30	8"	1 3/4"	1'-2"

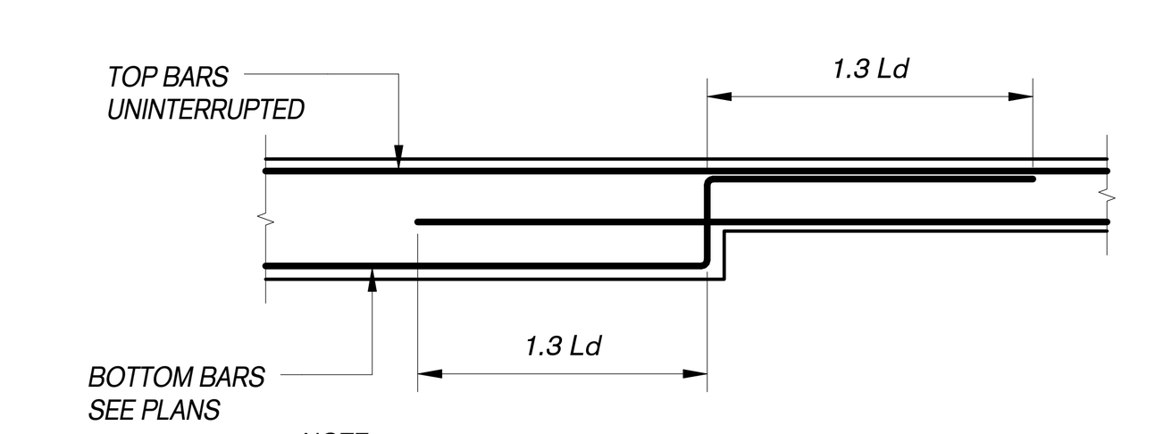
TYPICAL BEAM BEARING PLATE DETAIL



NOTES:

1. HOOK ALL TOP BARS INTERRUPTED BY OPENING.
2. ONE HALF OF REINFORCING BARS INTERRUPTED BY OPENING SHALL BE PROVIDED EACH SIDE OF OPENING (SAME NUMBER AND SIZE) MINIMUM 1 - #5 TOP AND BOTTOM.
3. SLAB REINFORCING MAY BE SPREAD TO MISS OPENINGS BUT SPACING BETWEEN SLAB REINFORCING BARS SHALL NOT EXCEED 3 TIMES SLAB THICKNESS NOR 18".
4. DEVELOPMENT LENGTH Ld AND Ldh TO BE DETERMINED IN ACCORDANCE WITH THE REQUIREMENT OF ACI 318, CHAPTER 12.
5. DO NOT CONSTRUCT OPENINGS THROUGH FLAT SLABS. IN AREAS COMMON TO TWO COLUMN STRIPS UNLESS OPENINGS ARE DIMENSIONED AND SPECIFICALLY DETAILED ON FRAMING PLANS.
6. SUBMIT SIZE AND LOCATION OF ALL PROPOSED OPENINGS NOT SHOWN ON FRAMING PLANS.

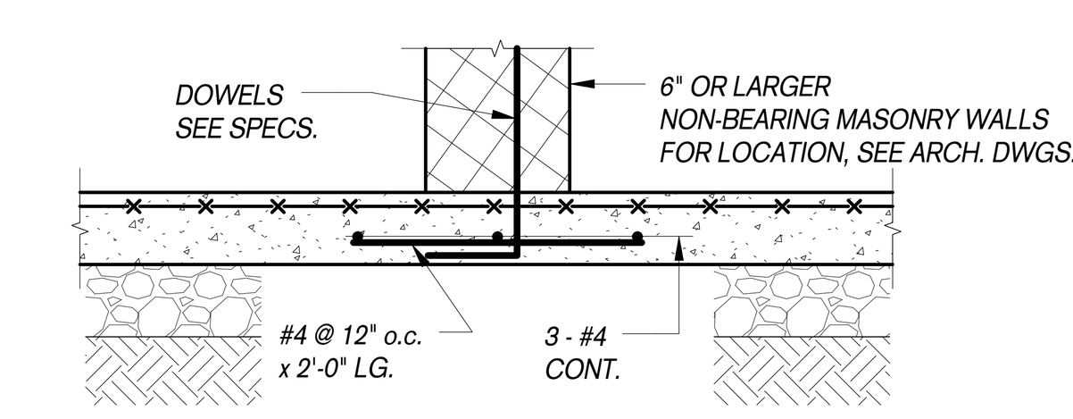
TYPICAL CONCRETE SLAB OPENING DETAIL



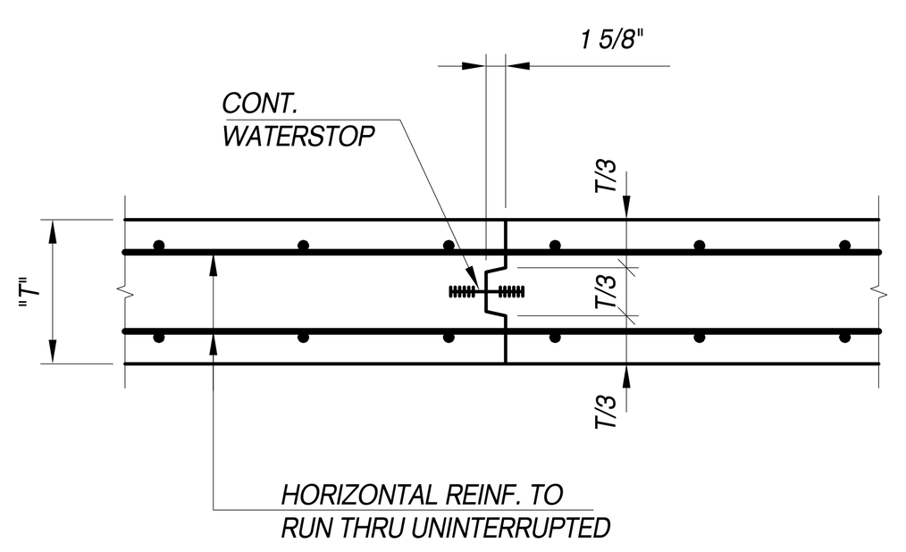
NOTE:

1. DEVELOPMENT LENGTH Ld TO BE DETERMINED IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318, CHAPTER 12.

TYPICAL CHANGE IN SLAB DEPTH DETAIL



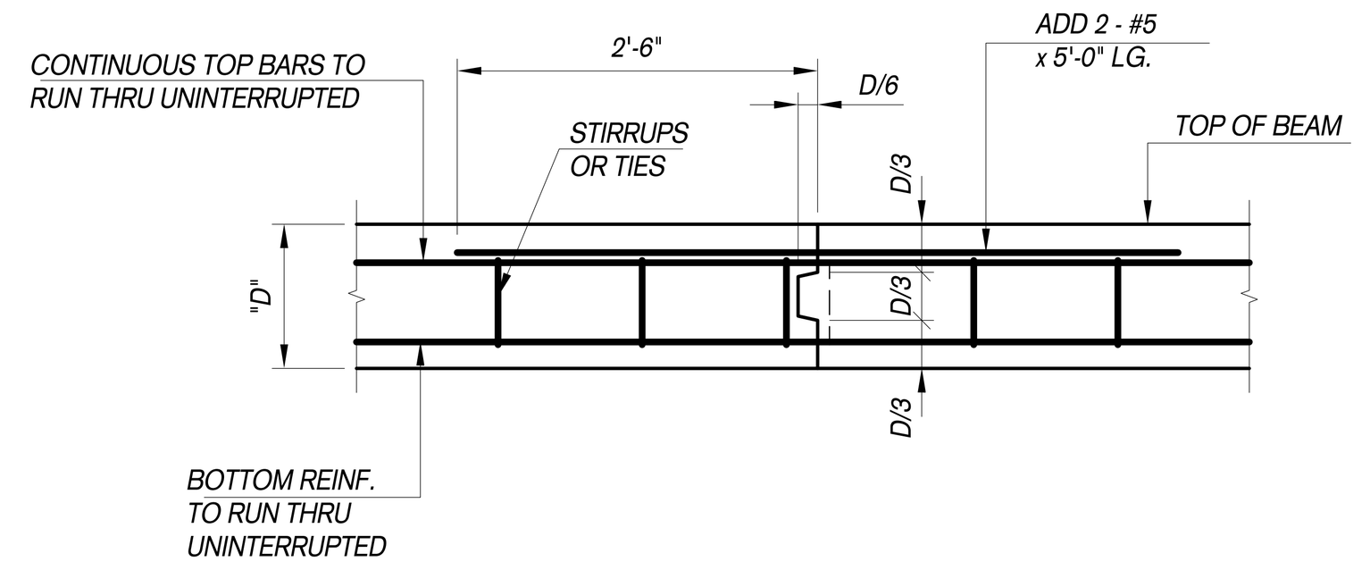
TYPICAL DETAIL AT NON BEARING MASONRY WALLS BEARING ON SLAB ON GRADE



NOTES:

1. UNLESS OTHERWISE NOTED ELSEWHERE, LOCATE JOINTS MIDWAY BETWEEN COLUMN CENTERLINES.
2. UNLESS OTHERWISE NOTED ELSEWHERE, SPACING OF JOINTS SHALL NOT EXCEED 60'-0".
3. ALLOW 7 (SEVEN) DAYS MINIMUM BETWEEN PLACING CONCRETE ADJACENT TO PREVIOUSLY CAST CONCRETE.

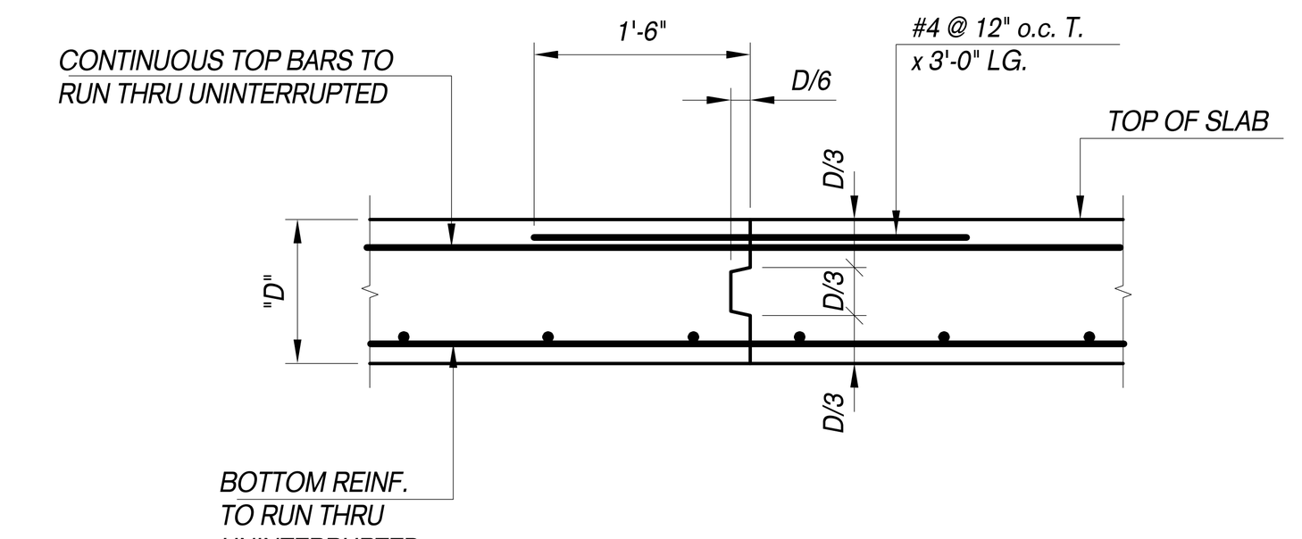
TYPICAL CONCRETE WALL CONSTRUCTION JOINT DETAIL



NOTES:

1. UNLESS OTHERWISE NOTED ELSEWHERE, LOCATE JOINTS MIDWAY BETWEEN COLUMN CENTERLINES.
2. UNLESS OTHERWISE NOTED ELSEWHERE, SPACING OF JOINTS SHALL NOT EXCEED 75'-0".
3. ALLOW 7 (SEVEN) DAYS MINIMUM BETWEEN PLACING CONCRETE ADJACENT TO PREVIOUSLY CAST CONCRETE.
4. CONCRETE BEAMS ARE NOT SELF SUPPORTING UNTILL BOTH SIDES OF JOINT HAVE BEEN PLACED

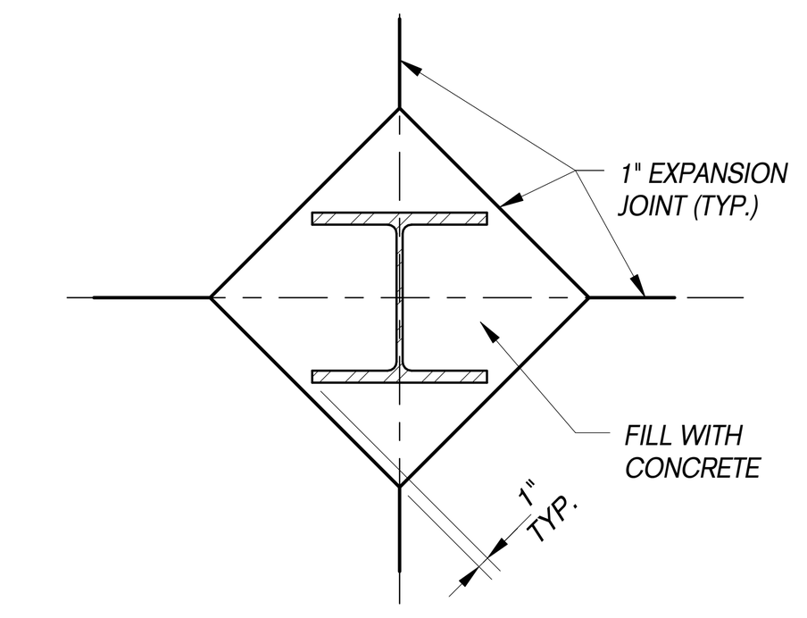
TYPICAL CONCRETE BEAM CONSTRUCTION JOINT DETAIL



NOTES:

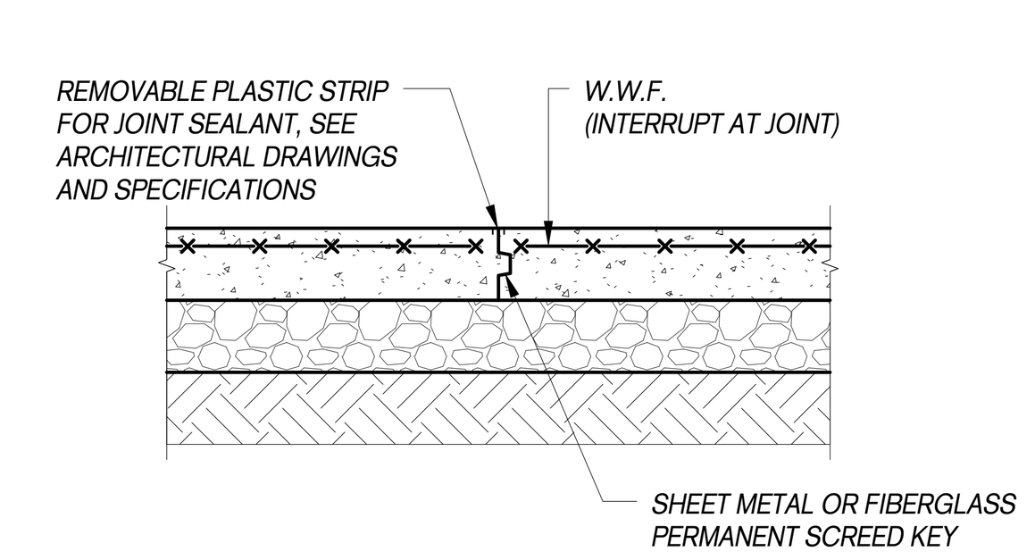
1. UNLESS OTHERWISE NOTED ELSEWHERE, LOCATE JOINTS MIDWAY BETWEEN COLUMN CENTERLINES.
2. UNLESS OTHERWISE NOTED ELSEWHERE, SPACING OF JOINTS SHALL NOT EXCEED 75'-0".
3. ALLOW 7 (SEVEN) DAYS MINIMUM BETWEEN PLACING CONCRETE ADJACENT TO PREVIOUSLY CAST CONCRETE.
4. CONCRETE SLABS ARE NOT SELF SUPPORTING UNTILL BOTH SIDES OF JOINT HAVE BEEN PLACED

TYPICAL FRAMED CONCRETE SLAB CONSTRUCTION JOINT DETAIL



CONSTRUCTION JOINT IN BOTH DIRECTION

PLANS AT COLUMNS

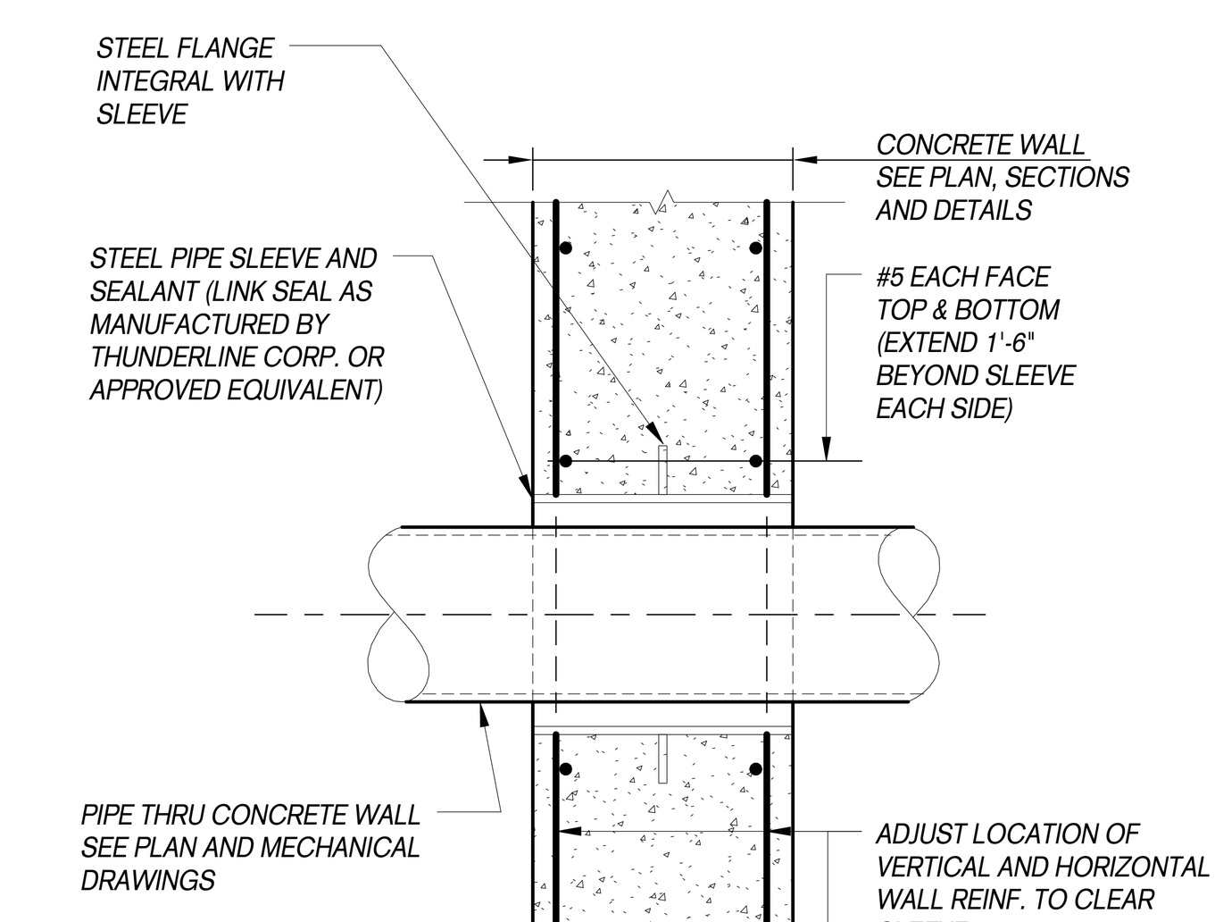


CONSTRUCTION JOINT

NOTES:

1. LOCATE SCREED KEYS ON COLUMN CENTERLINES IN EACH DIRECTION UNLESS OTHERWISE NOTED ELSEWHERE.
2. THE CONTRACTOR SHALL SUBMIT A DRAWING FOR THE ARCHITECTS REVIEW INDICATING THE LOCATION OF JOINTS AND THE SEQUENCE OF CASTINGS.

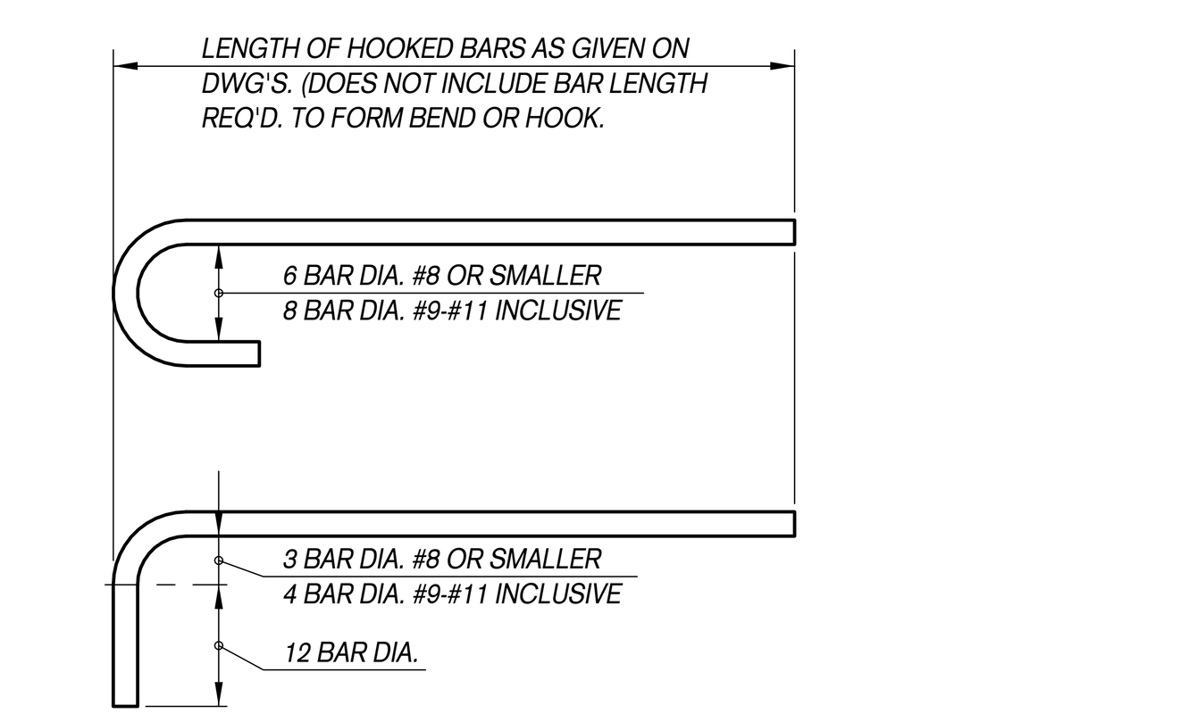
TYPICAL SLAB ON GRADE JOINT DETAILS



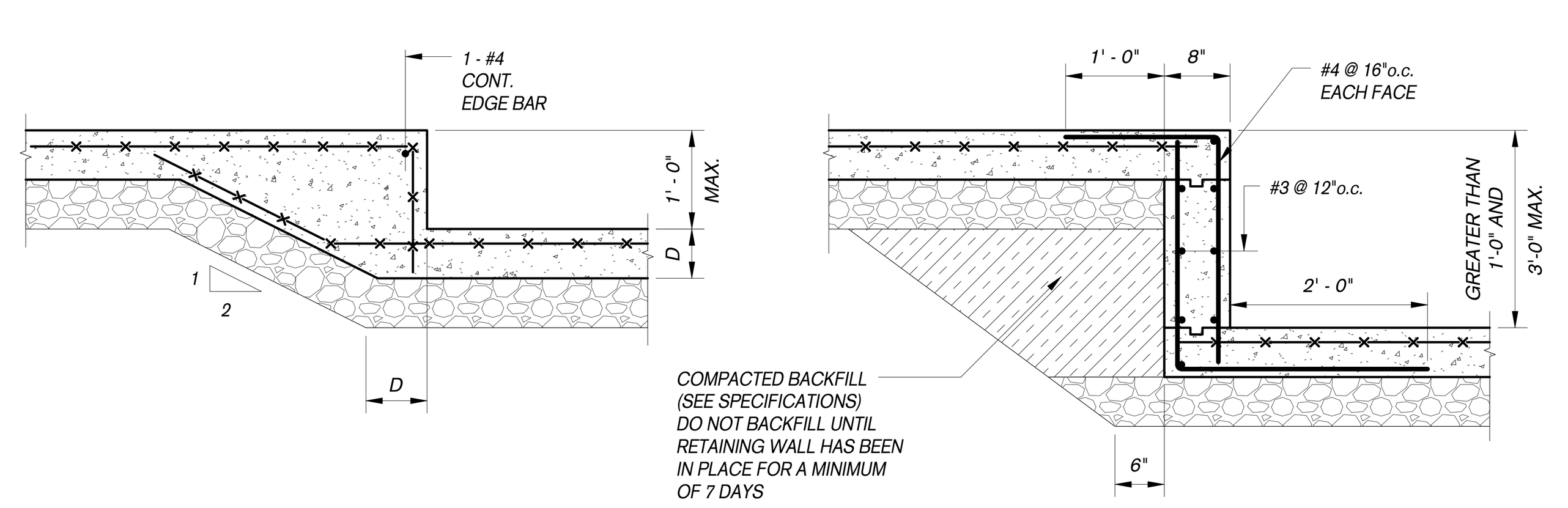
NOTES: 1. COORDINATE SIZE, NUMBER AND LOCATION OF ALL PIPES AND SLEEVES WITH MECHINCAL DRAWINGS.

2. DETAIL SHOWN IS FOR INDIVIDUAL SLEEVES. WHERE SLEEVES OCCUR IN GROUPS, STEEL FLANGES MAY BE COMBINED INTO SINGLE PIECE.

TYPICAL WALL SLEEVE DETAIL

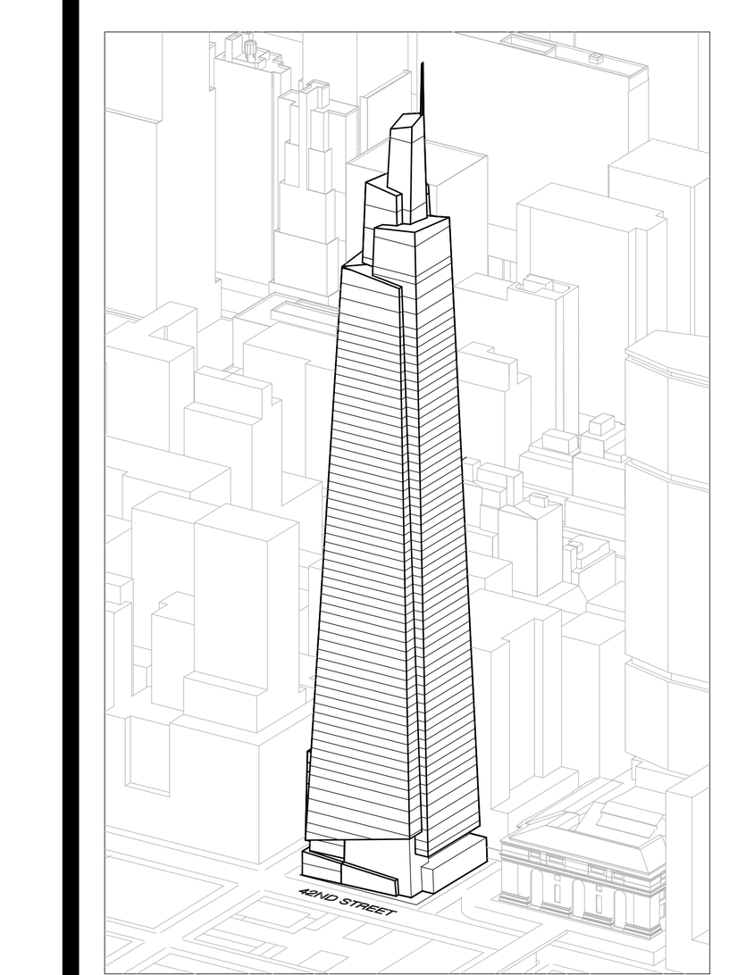


TYPICAL HOOK DETAILS



TYPICAL SLAB ON GRADE DEPRESSION DETAILS

ONE VANDERBILT



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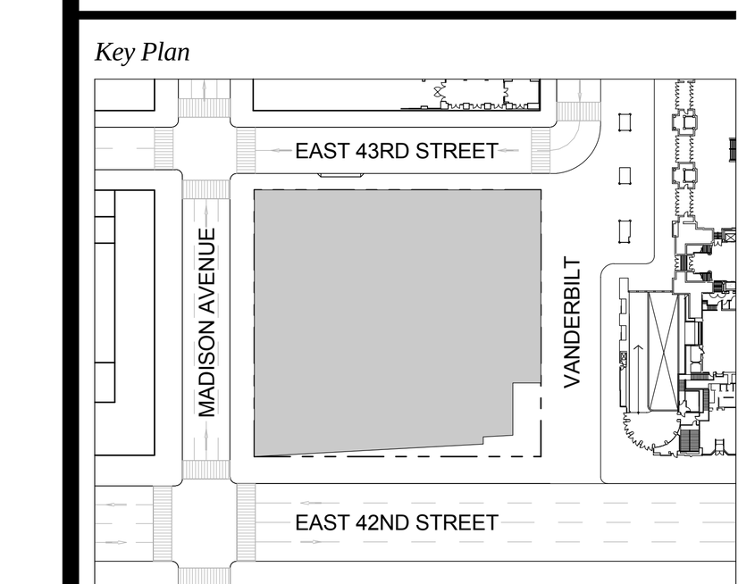
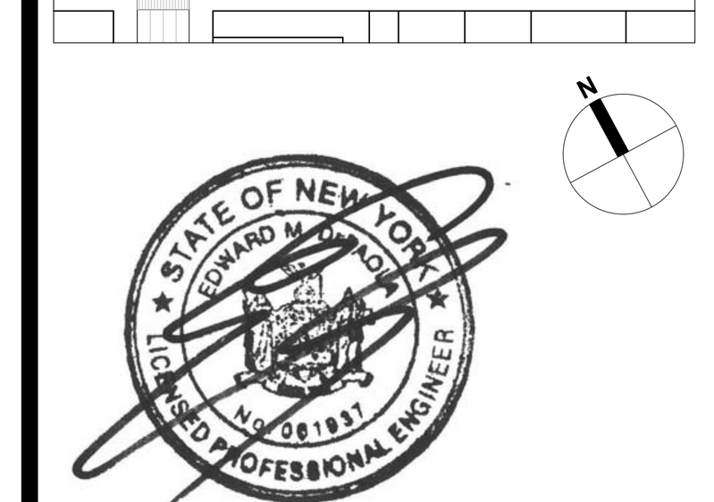
Key Plan

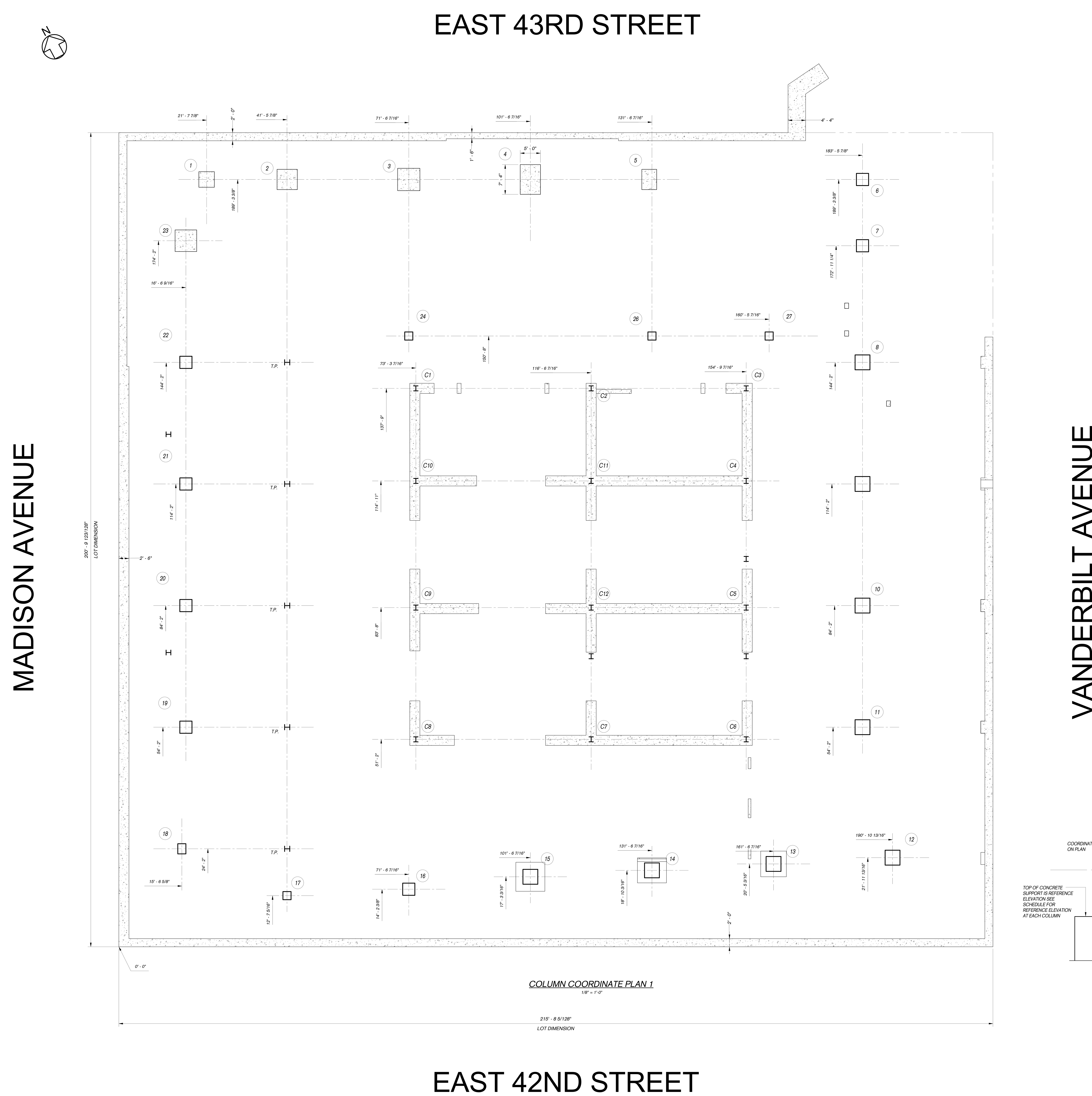




Issue Date: 09-01-2015
Project No. 14500
Drawn By
Scale 3/4" = 1'-0"

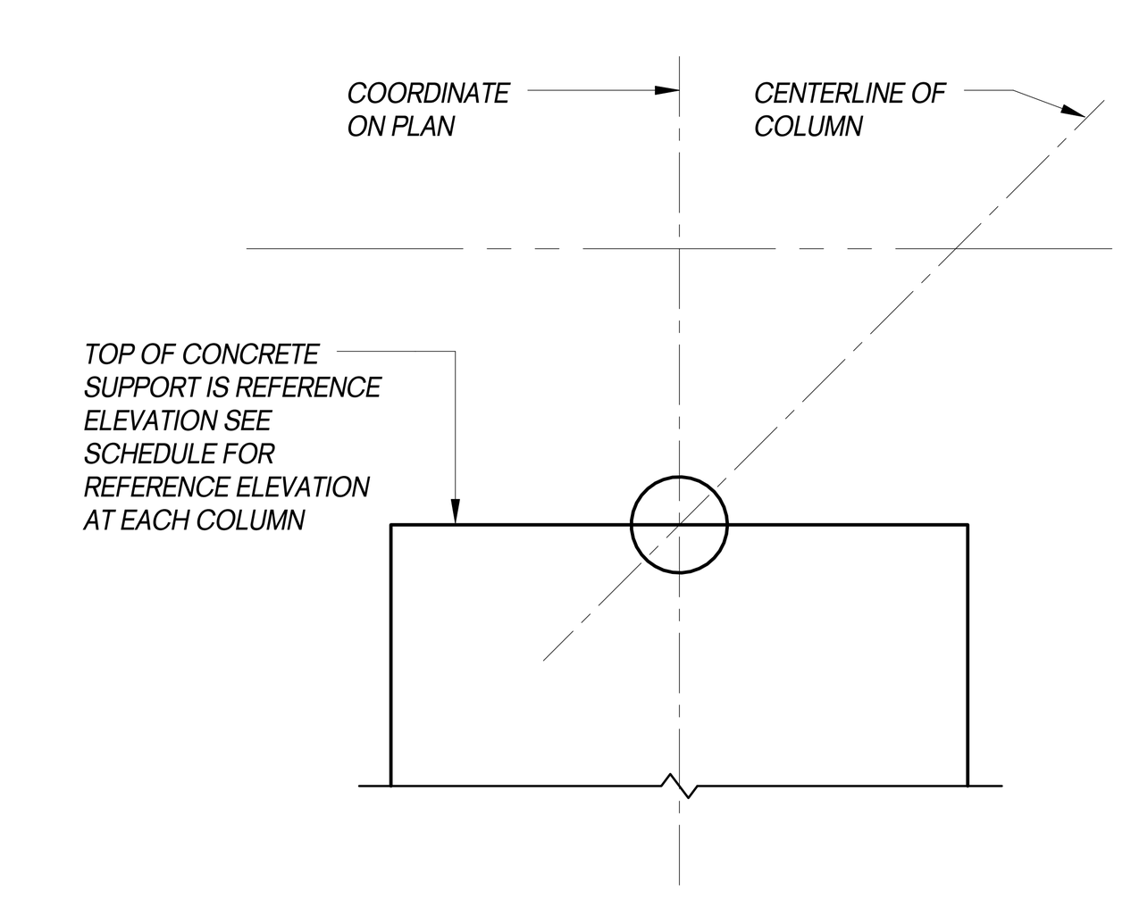
Drawing Title
FOUNDATION TYPICAL DETAILS 2

Drawing Number
FO-252.00

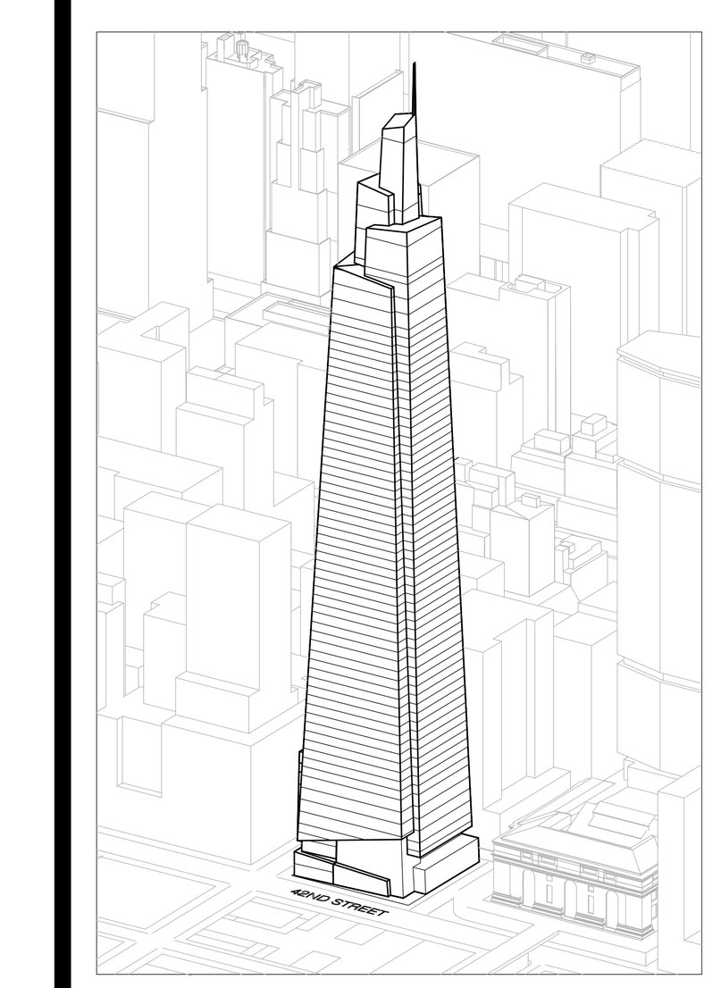


COLUMN COORDINATE PLAN 1
1/8" = 1'-0"

COLUMN NUMBER	REFERENCE ELEVATION
1	10'-9"
2	10'-9"
3	10'-9"
4	10'-9"
5	10'-9"
6	7'-3 1/2"
7	7'-3 1/2"
8	7'-3 1/2"
9	18'-9"
10	18'-9"
11	18'-9"
12	18'-9"
13	18'-9"
14	18'-9"
15	18'-9"
16	18'-9"
17	18'-9"
18	18'-9"
19	18'-9"
20	18'-9"
21	18'-9"
22	18'-9"
23	18'-9"
24	18'-9"
26	18'-9"
27	18'-9"



ONE VANDERBILT



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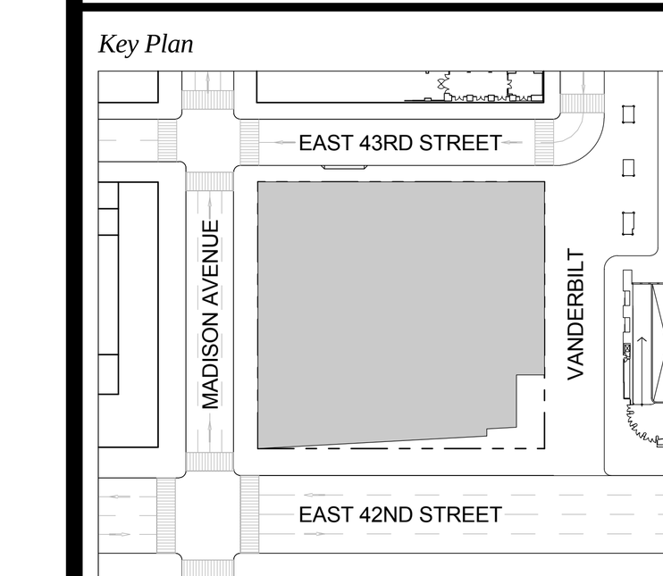

Issue Date: 09-01-2015
Project No. 14500
Drawn By
Scale As indicated

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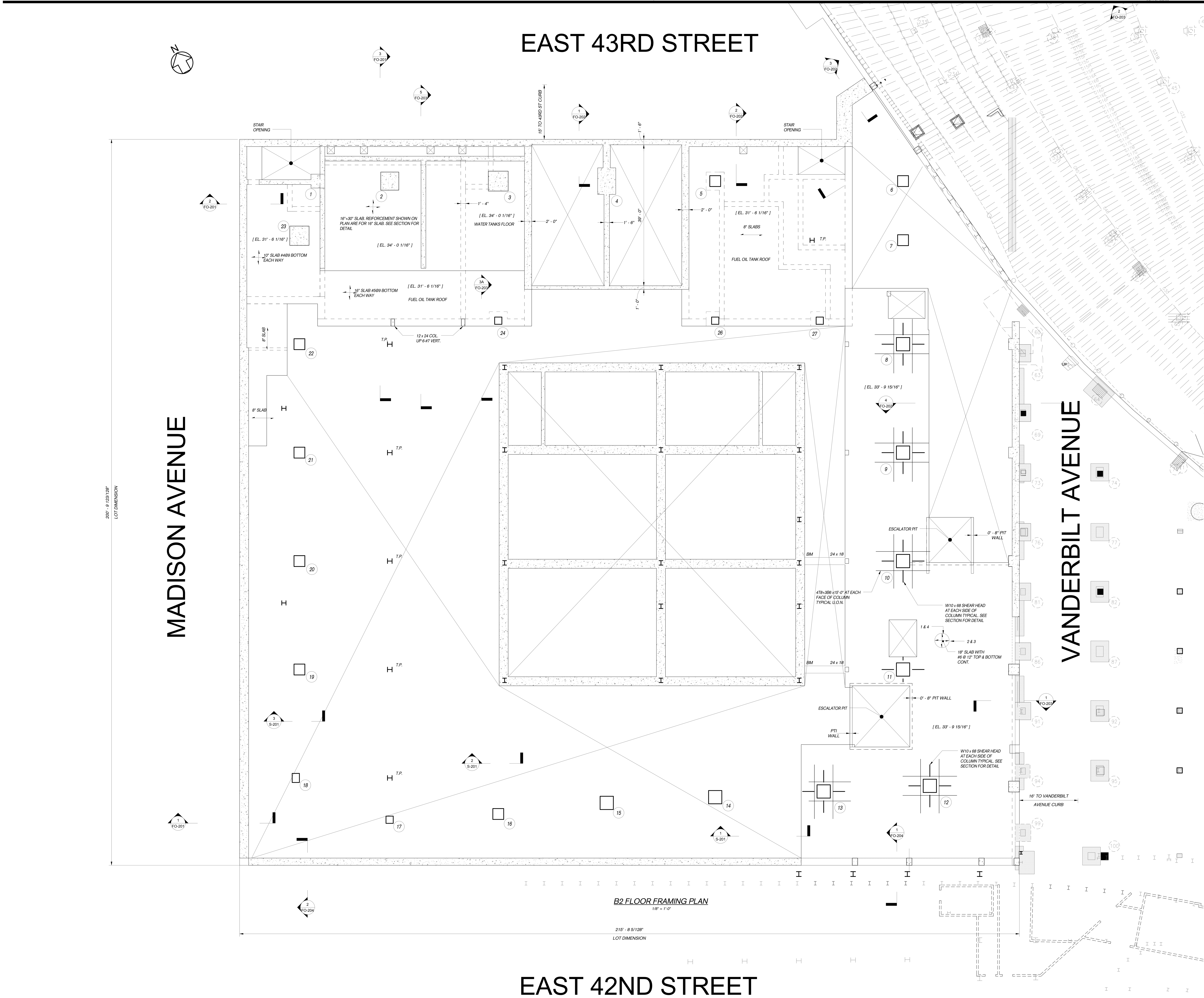
Drawing Title
COLUMN COORDINATE PLAN 1

Drawing Number
S-010
SHEET 1 OF 9



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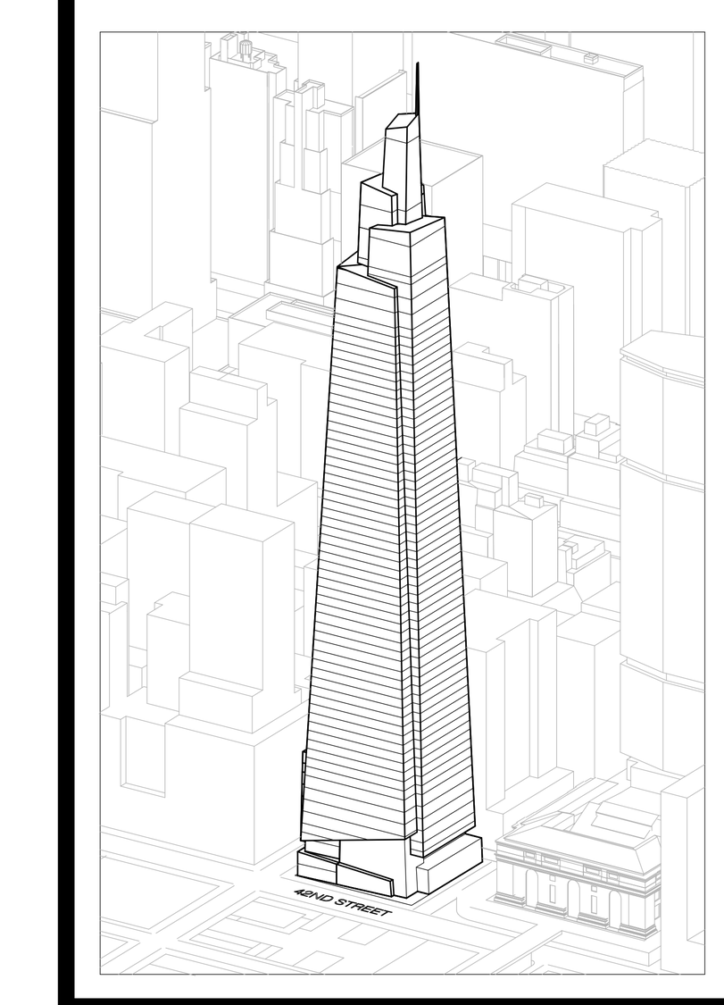

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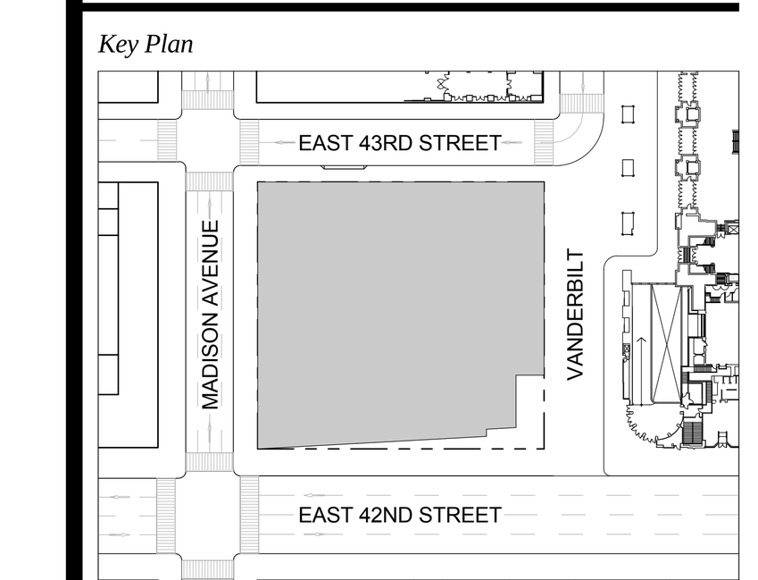


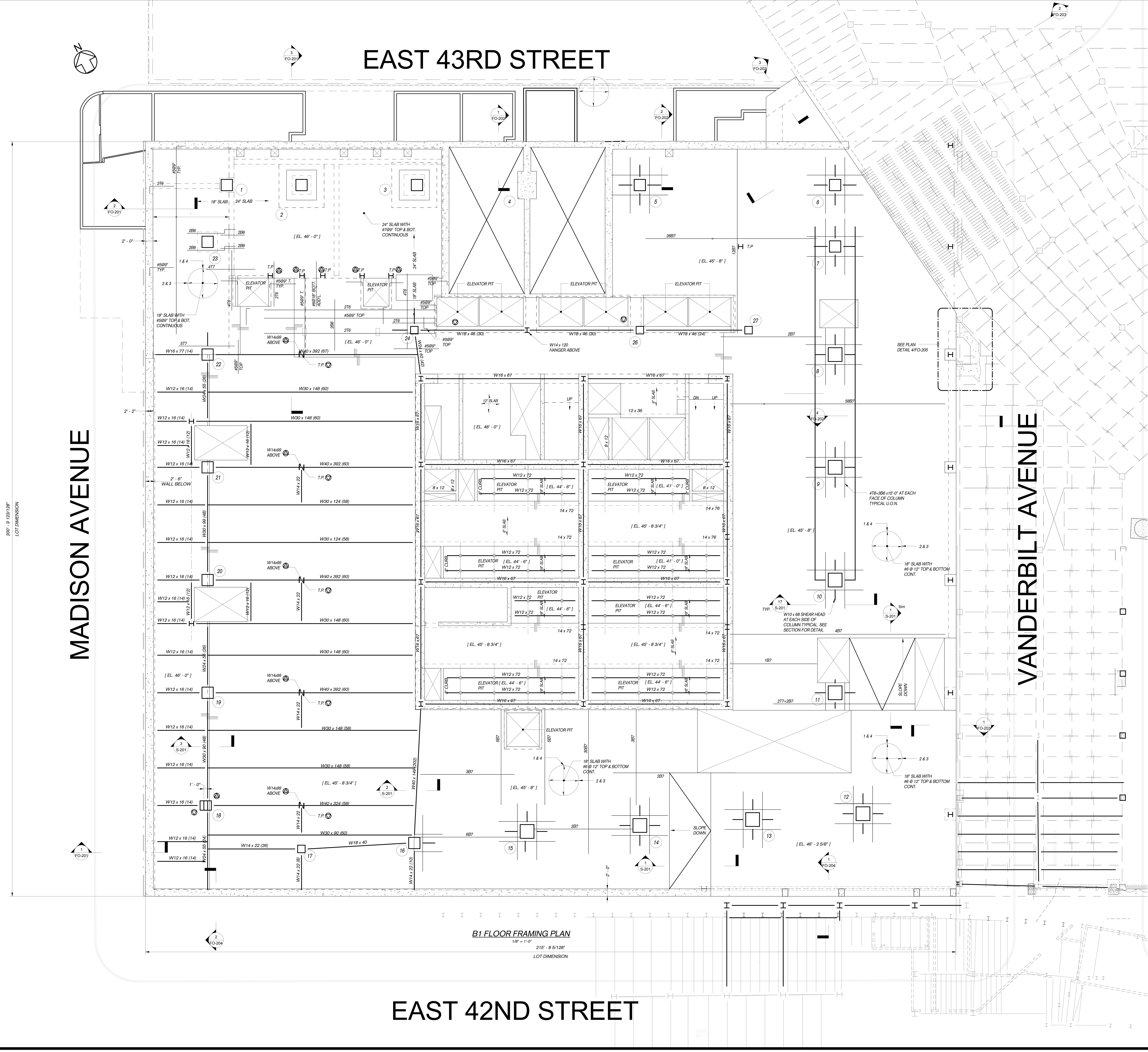
STATE OF NEW YORK · EDWARD M. DEPAOLA · No. 061937 · LICENSED PROFESSIONAL ENGINEER

Issue Date: 09-01-2015
Project No. 14500
Drawn By
Scale 1/8" = 1'-0"

FOR REFERENCE ONLY

Drawing Title
B2 FLOOR FRAMING PLAN

Drawing Number
S-099.00
SHEET 2 OF 9



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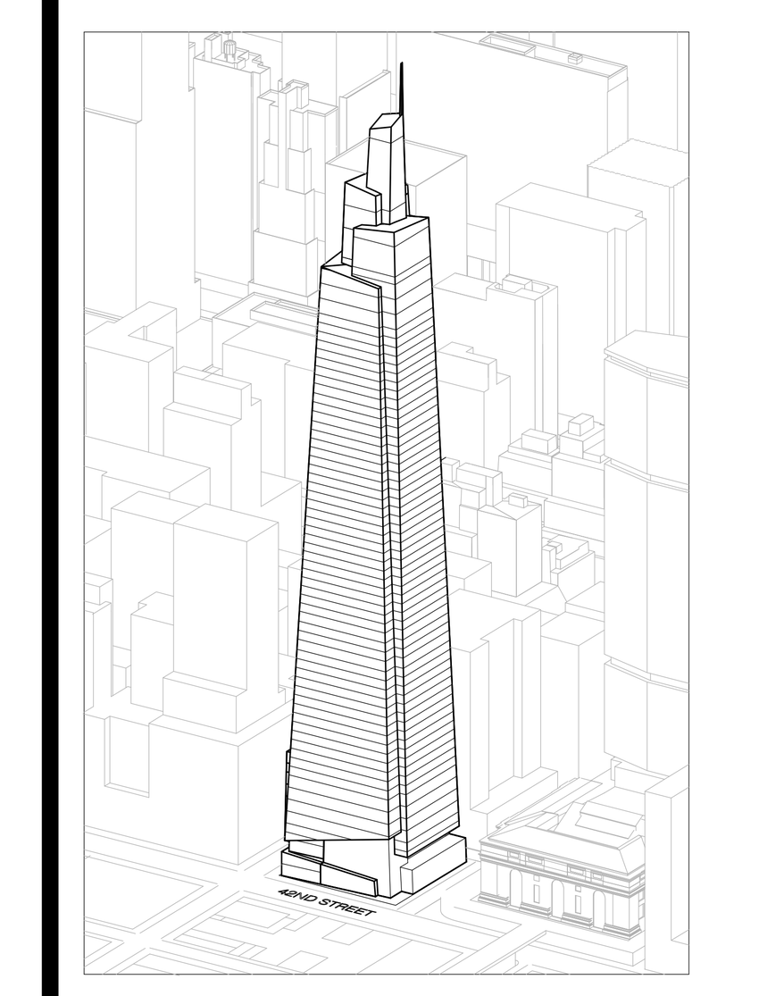

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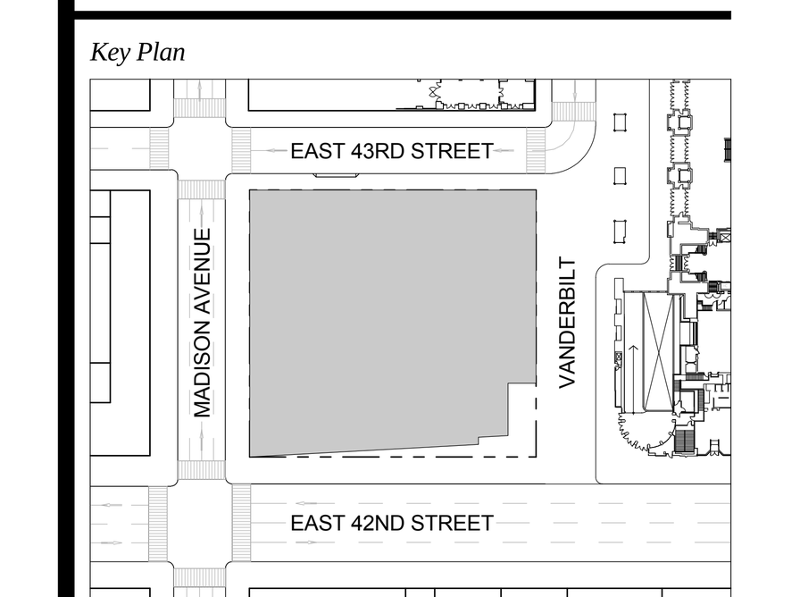

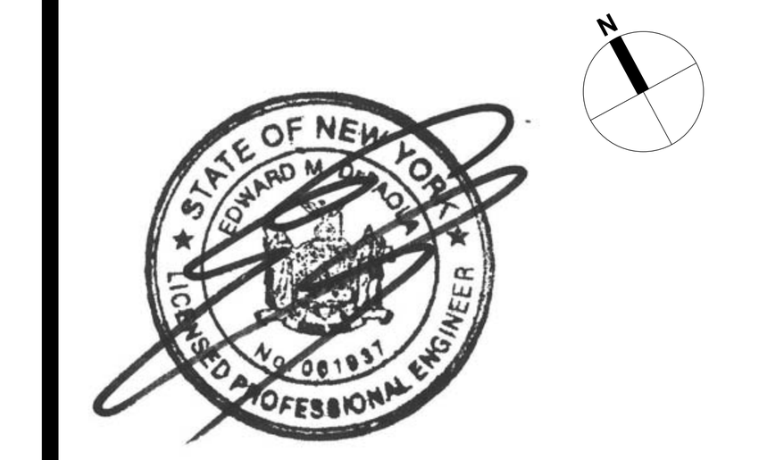

Issue Date: 09-01-2015
Project No. 14500
Drawn By
Scale 1/8" = 1'-0"

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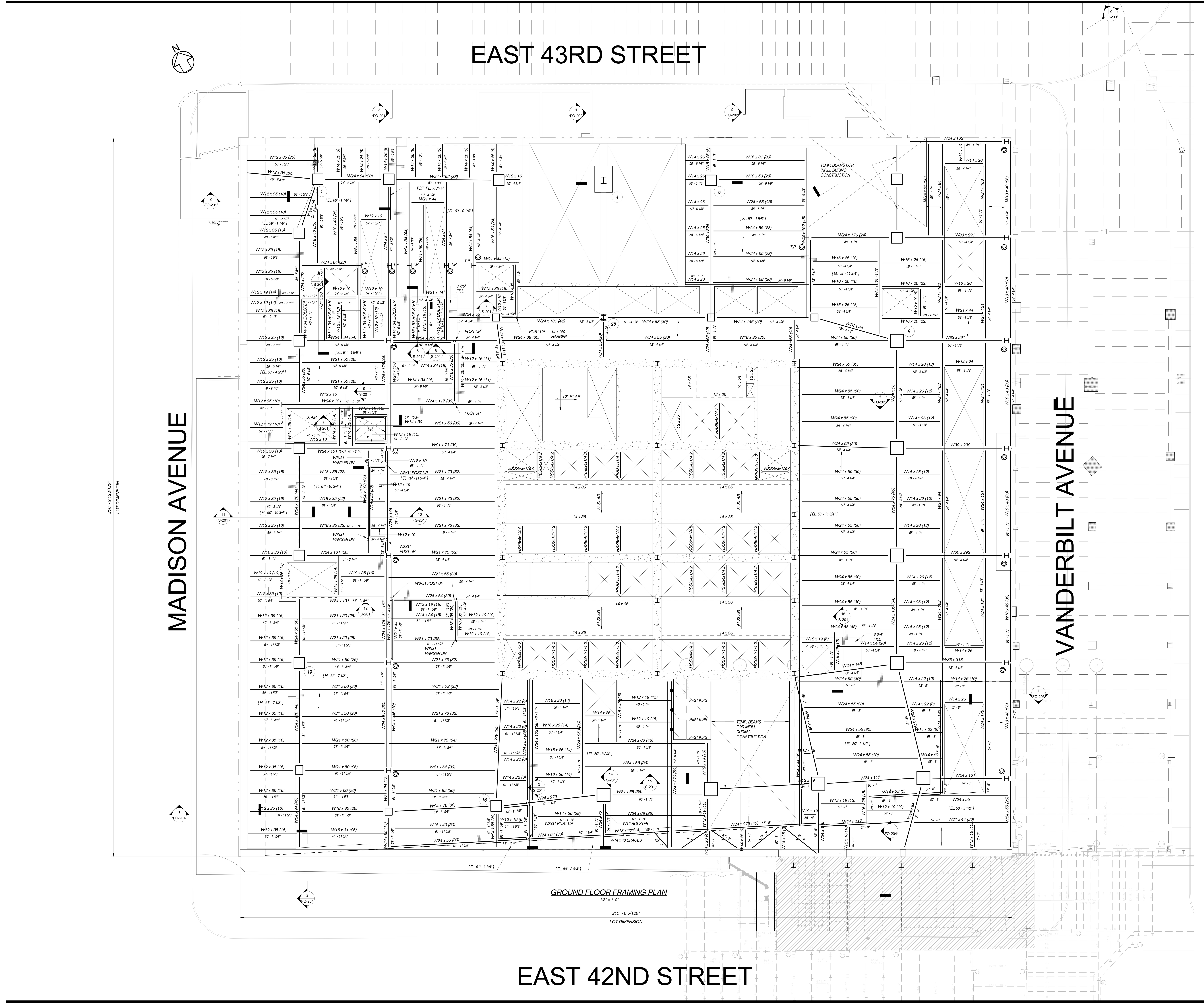
Drawing Title
B1 FLOOR FRAMING PLAN

Drawing Number
S-100.00
SHEET 3 OF 9



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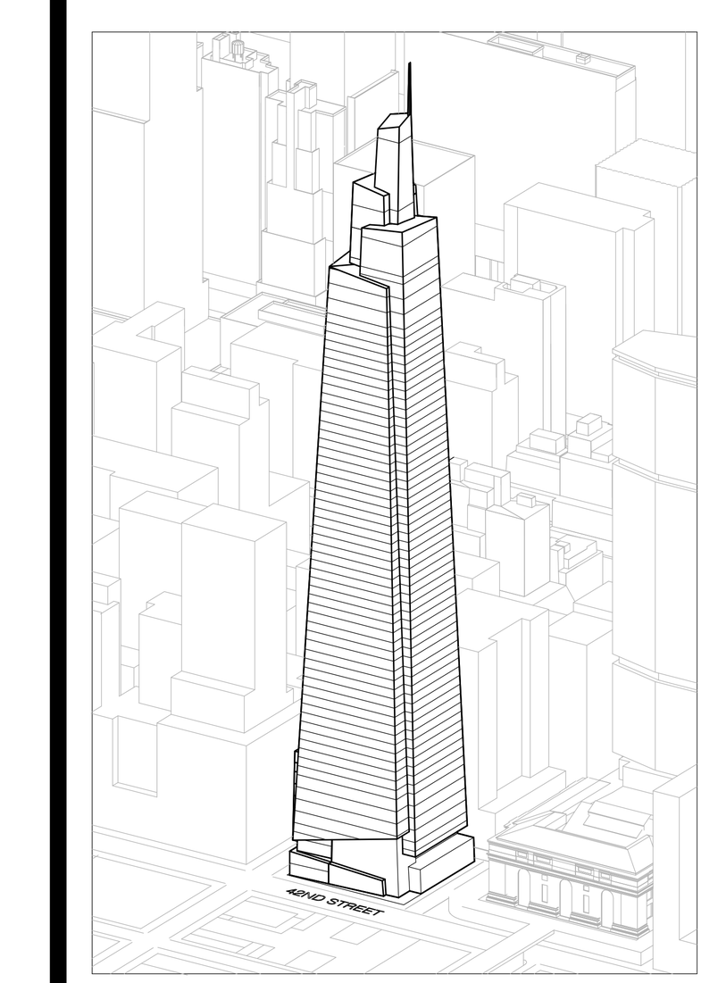

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1	D.O.B. FOUNDATION PERMIT FILING	09-01-2015

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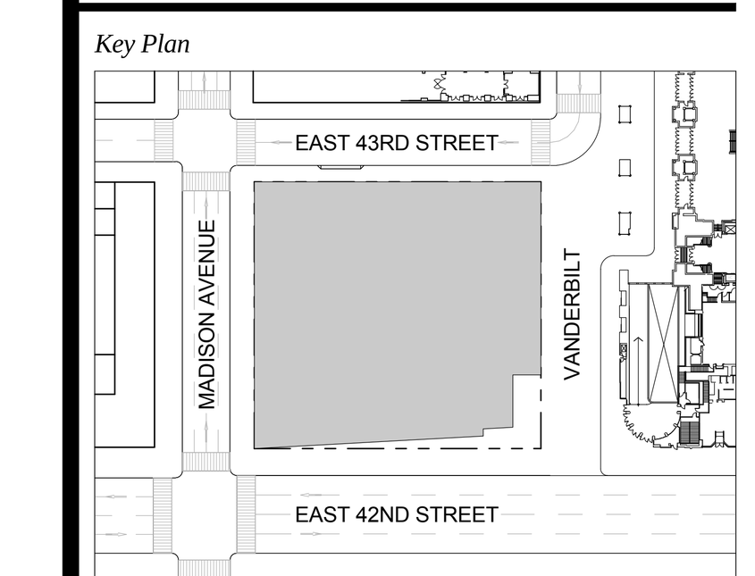

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Issue Date: 09-01-2015
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Scale 1/8" = 1'-0"

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Drawing Title

GROUND FLOOR FRAMING PLAN

Drawing Number

S-101.00

SHEET 4 OF 9

COLUMN SCHEDULE

FLOOR	EL.	Height
9TH FLOOR	EL. +233.10'	20'-0"
8TH FLOOR	EL. +213.10'	20'-0"
7TH FLOOR	EL. +193.10'	20'-0"
6TH FLOOR	EL. +173.10'	24'-0"
5TH FLOOR	EL.+149.10'	24'-0"
4TH FLOOR	EL. +125.10'	20'-0"
3RD FLOOR	EL. +105.10'	24'-0"
2ND FLOOR	EL. +81.10'	18'-0"
GROUND FLOOR	EL. +63.10'	14'-0"
FLOOR B1	EL. +46.00'	11'-10"
FLOOR B2	EL. +34.17'	13'-6"
FLOOR B3	EL. +20.67'	11'-1 1/2"
FLOOR B4	EL. +9.54'	

COLUMN	1	2	3	4	5	6	7	8	9	10	11	12	13	14
GROUND FLOOR – FLOOR B1	W14 x 398	W14 x 426	34" x 34" x 6"	34" x 34" x 7"	24" x 24" x 4"	38" x 38" x 6"	32" x 32" x 4"	42" x 42" x 4"	44" x 44" x 8"	42" x 42" x 8"	44" x 44" x 8"	42" x 42" x 7 1/2"	32" x 32" x 6 1/2"	44" x 44" x 8"
FLOOR B2 – FLOOR B3	B	P	P	B	B									
FLOOR B3 – FLOOR B4									B					
BASE PLATE (B x t x N)	30" x 5 1/2" x 30"	32" x 6" x 32"	52" x 8" x 64" DET BP3	52" x 7 1/2" x 58"	50" x 8" x 50" DET C4 SIM	40" x 2" x 40"	46" x 6 1/2" x 46"	52" x 5" x 52"	76" x 8" x 76" DET C4 SIM	52" x 5" x 52"	52" x 4" x 52"	50" x 4" x 50"	40" x 4" x 40"	50" x 3" x 50"
PIER OR BUTTRESS	38" x 38" 12 #10	40" x 40" 14 #10	60" x 72" 36 #10	60" x 66" 32 #10	58" x 58" 28 #10	-	-	80" x 80" 52 #10	84" x 84" 56 #10	-	-	-	76" x 76" 46 #10	86" x 74" 52 #10
LOAD TO FOOTING	2772	3289	11363	10307	8459	11198	13563	17512	19800	17952	18150	12848	8712	16368

COLUMN	15	16	17	18	19	20	21	22	23	24	26	27
GROUND FLOOR – FLOOR B1	42" x 42" x 7 1/2"	34" x 34" x 8"	24" x 24" x 3 1/2"	W14 x 665	36" x 36" x 2 1/2"	36" x 36" x 6"	36" x 36" x 6"	34" x 34" x 3"	W14 x 605	34" x 20" x 8"	26" x 20" x 8"	20" x 20" x 3"
FLOOR B2 – FLOOR B3											B	B
FLOOR B3 – FLOOR B4									P	B		
BASE PLATE (B x t x N)	50" x 4" x 50"	44" x 5" x 44"	34" x 5" x 34"	30" x 6" x 26"	44" x 4" x 44"	42" x 3" x 42"	38" x 2" x 38"	42" x 4" x 42"	34" x 6 1/2" x 34"	50" x 8" x 68" DET C4 SIM	40" x 8" x 60" DET C4 SIM	40" x 6 1/2" x 40"
PIER OR BUTTRESS	86" x 86" 60 #10	80" x 68" 44 #10	-	-	-	-	64" x 64" 34 #10	-	42" x 42" 16 #10	-	72" x 48" 28 #10	48" x 48" 20 #10
LOAD TO FOOTING	14335	12804	8085	2981	9581	11979	10021	11121	3850	11726	8888	5258

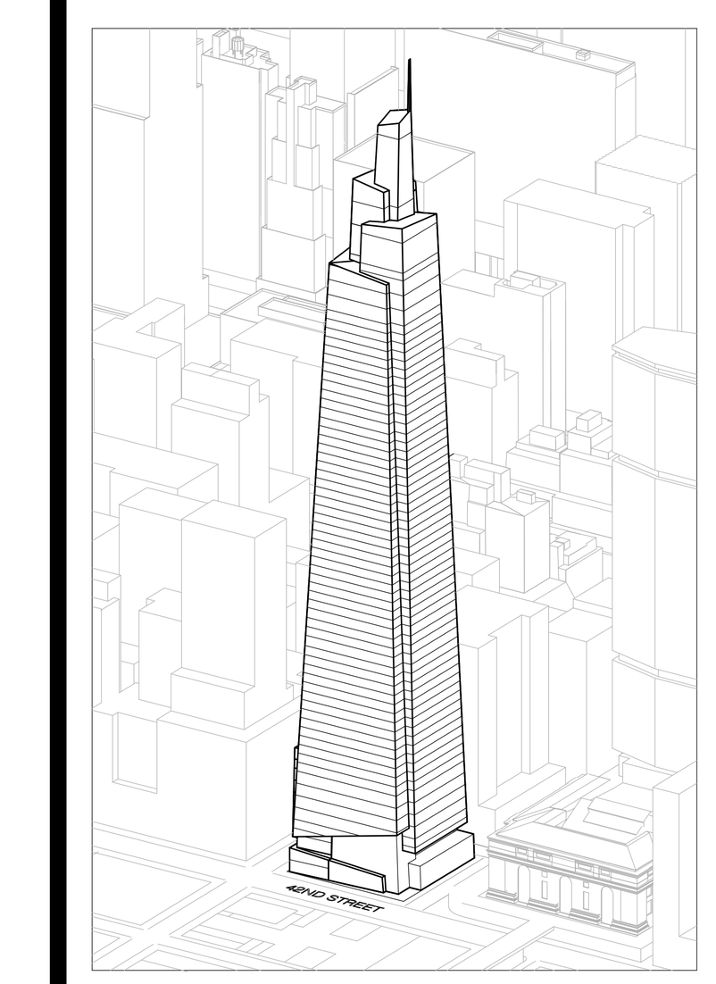
BASE PLATE: B x t x N
t = THICKNESS
Fy = 36 ksi. u.o.n

COLUMN SCHEDULE

FLOOR	EL.	Height
23RD FLOOR	EL. +479.60'	14'-6"
22ND FLOOR	EL. +465.10'	14'-6"
21ST FLOOR	EL. +450.60'	14'-6"
20TH FLOOR	EL. +436.10'	14'-6"
19TH FLOOR	EL. +421.60'	14'-6"
18TH FLOOR	EL. +407.10'	14'-6"
17TH FLOOR	EL. +392.60'	14'-6"
16TH FLOOR	EL. +378.10'	14'-6"
15TH FLOOR	EL. +363.60'	16'-6"
14TH FLOOR	EL. +347.10'	27'-0"
13TH FLOOR	EL. +320.10'	27'-0"
12TH FLOOR	EL. +293.10'	20'-0"
11TH FLOOR	EL. +273.10'	20'-0"
10TH FLOOR	EL. +253.10'	20'-0"
9TH FLOOR	EL. +233.10'	

COLUMN: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

ONE VANDERBILT



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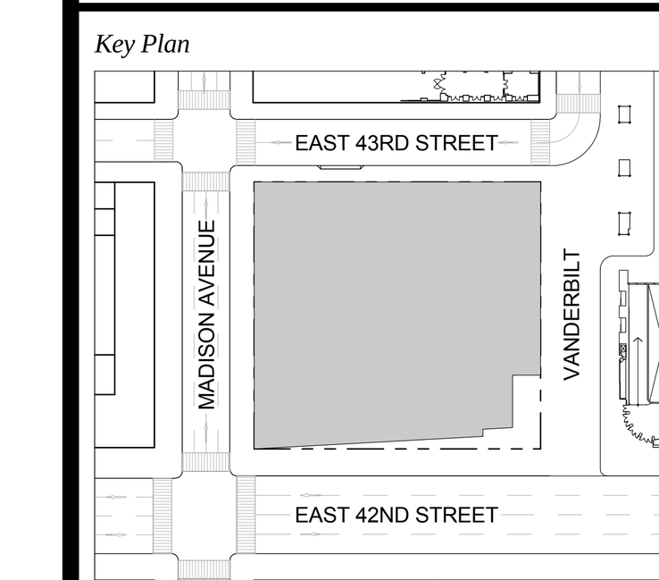
1	D.O.B. FOUNDATION PERMIT FILING	09-01-2015

Key Plan



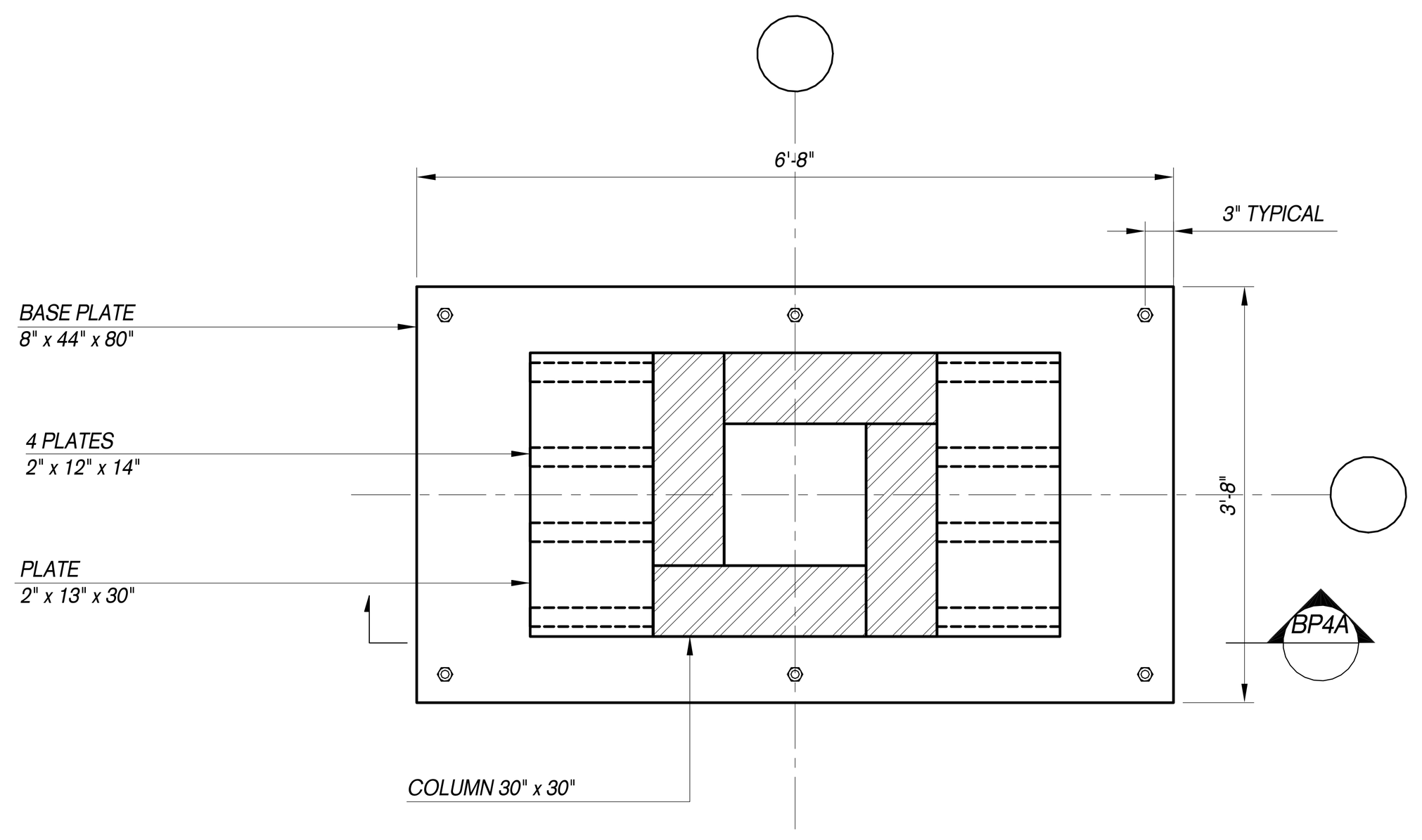
STATE OF NEW YORK
LICENSED PROFESSIONAL ENGINEER
No. 061937

FOR REFERENCE ONLY

Issue Date: 09-01-2015
Project No. 14500
Drawn By
Scale 1/8" = 1'-0"

Drawing Title
COLUMN SCHEDULE 1

Drawing Number
S-601.00
SHEET 5 OF 9



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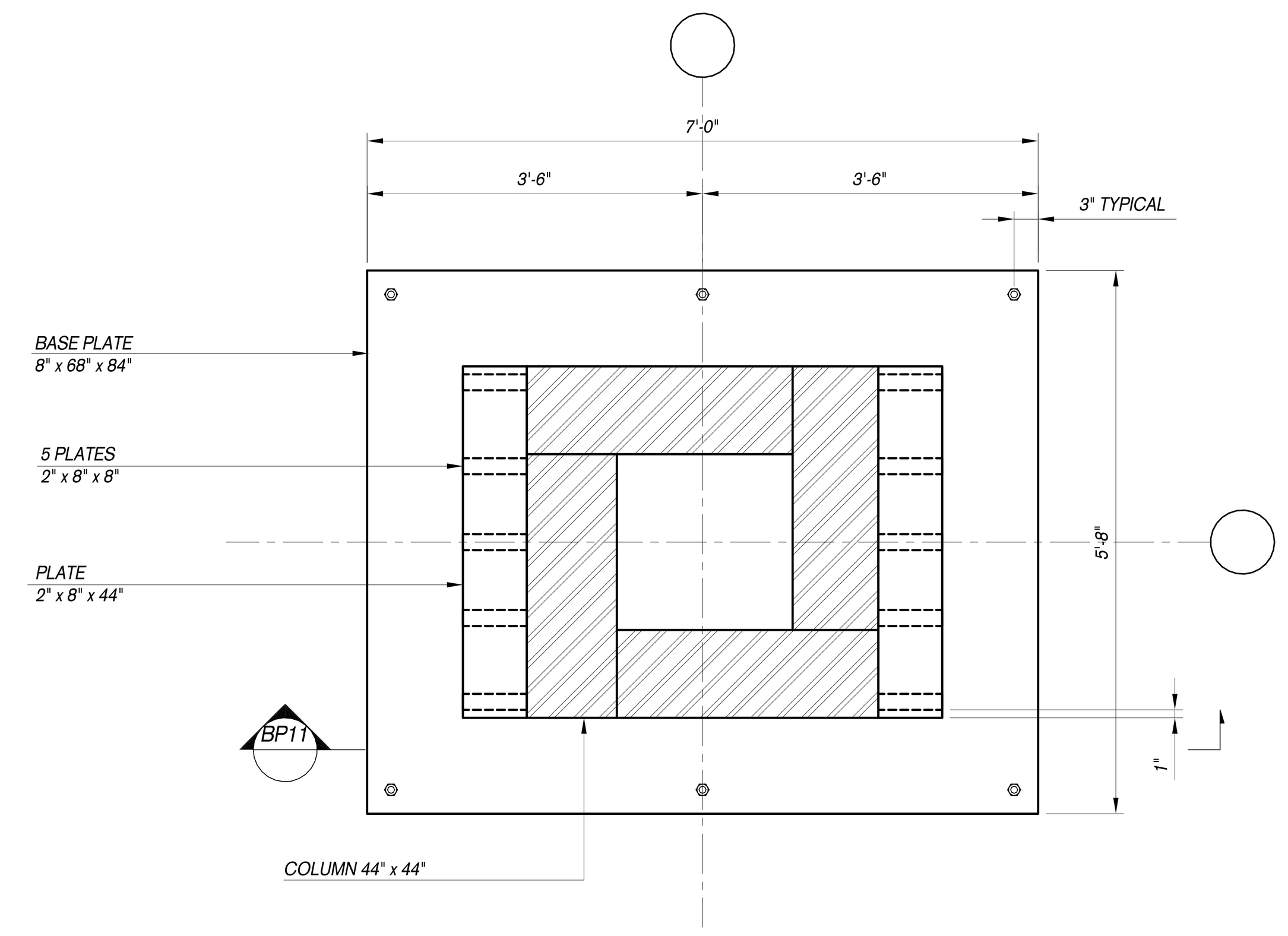

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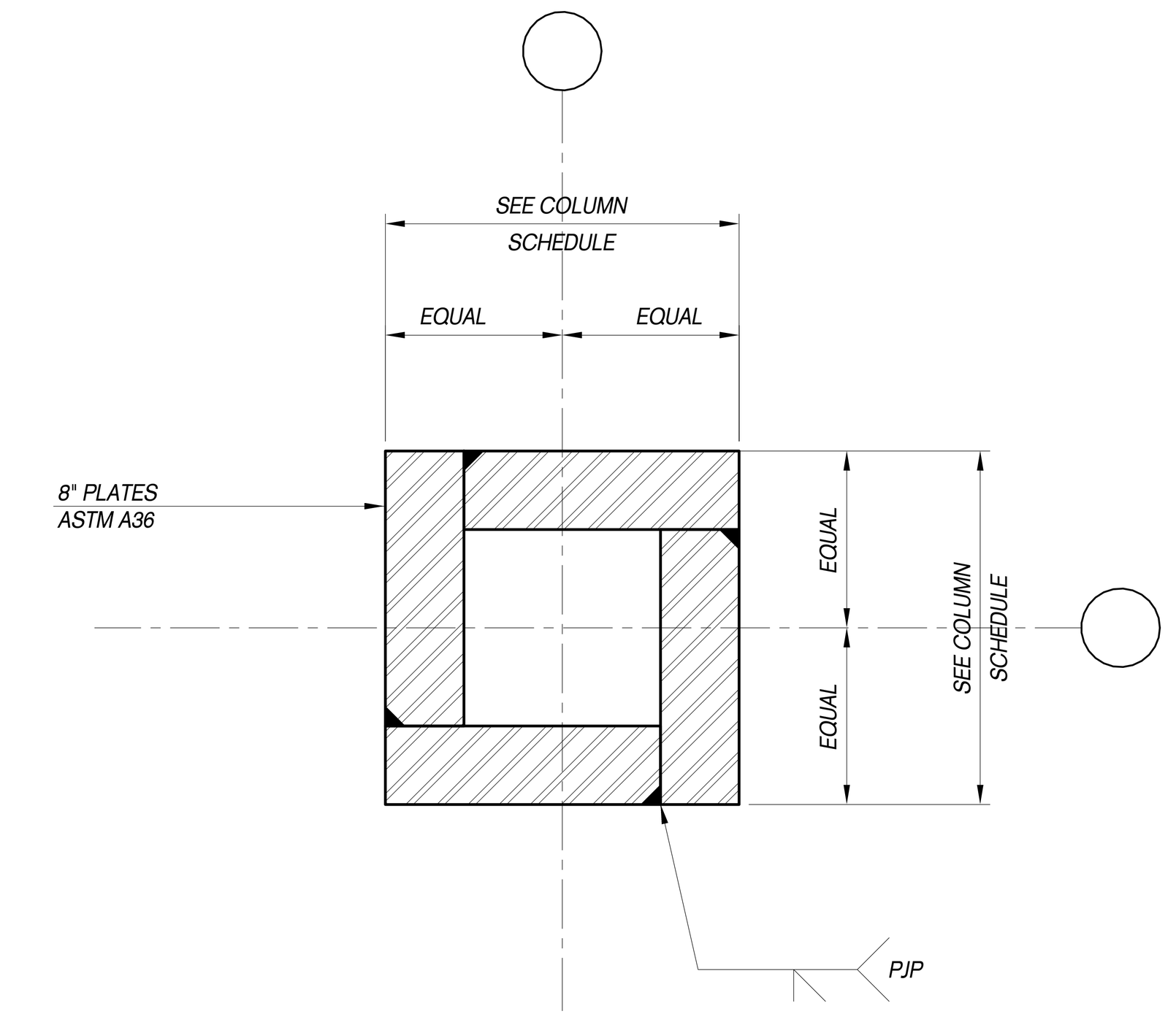
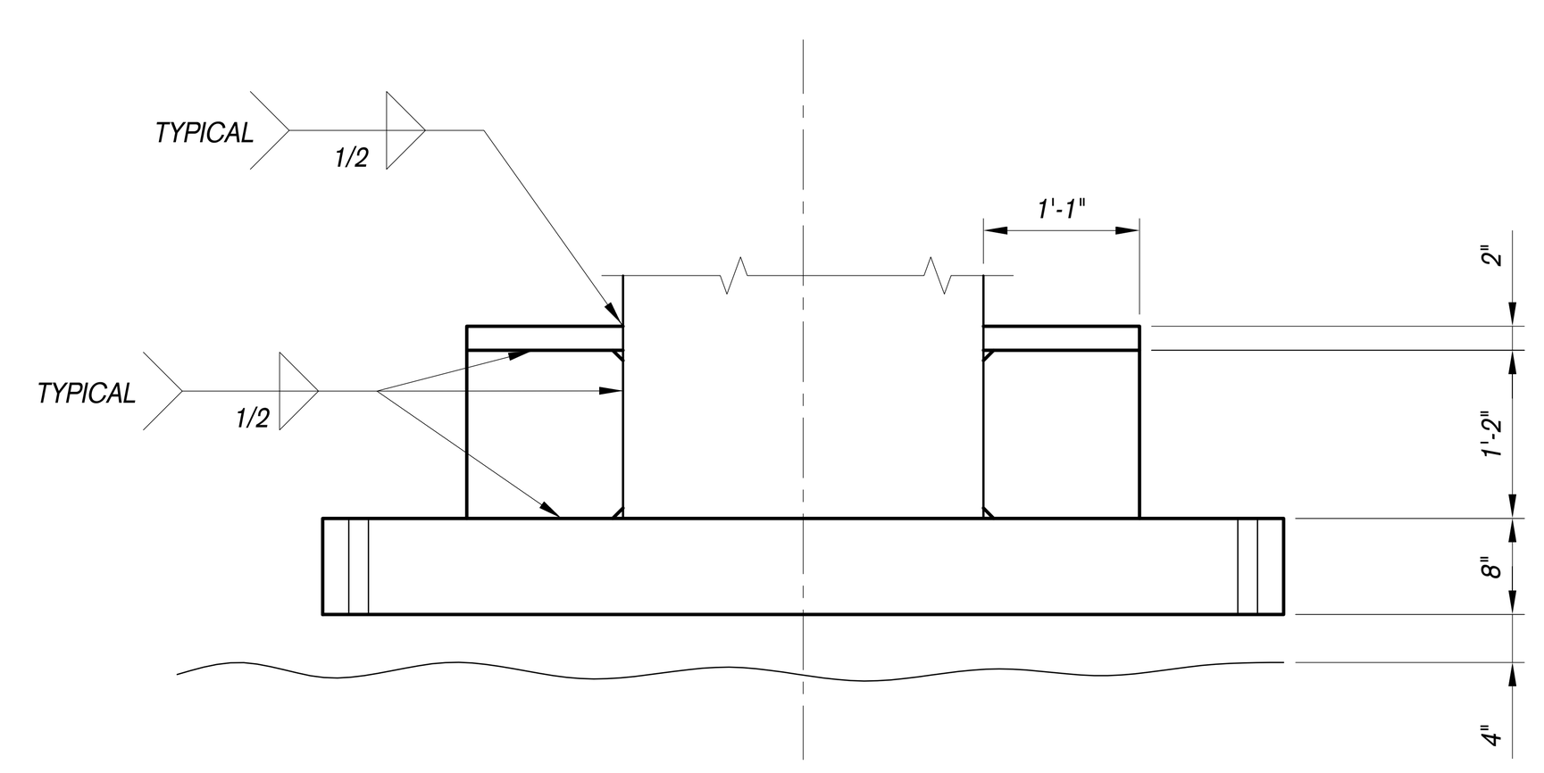


TYPICAL BOX COLUMN 1
N.T.S



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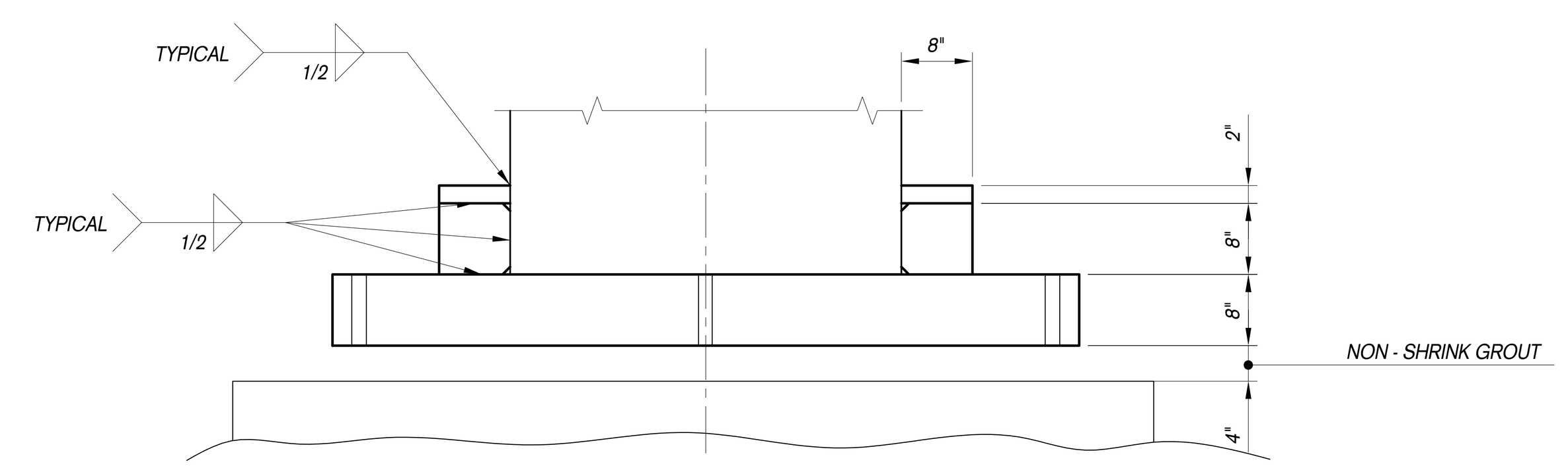

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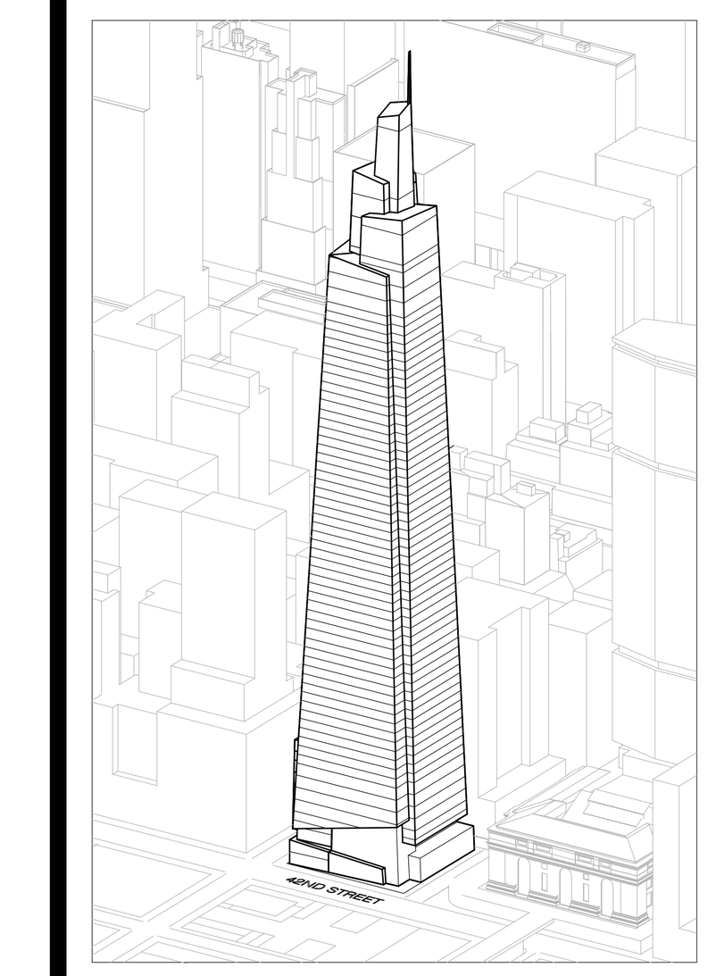

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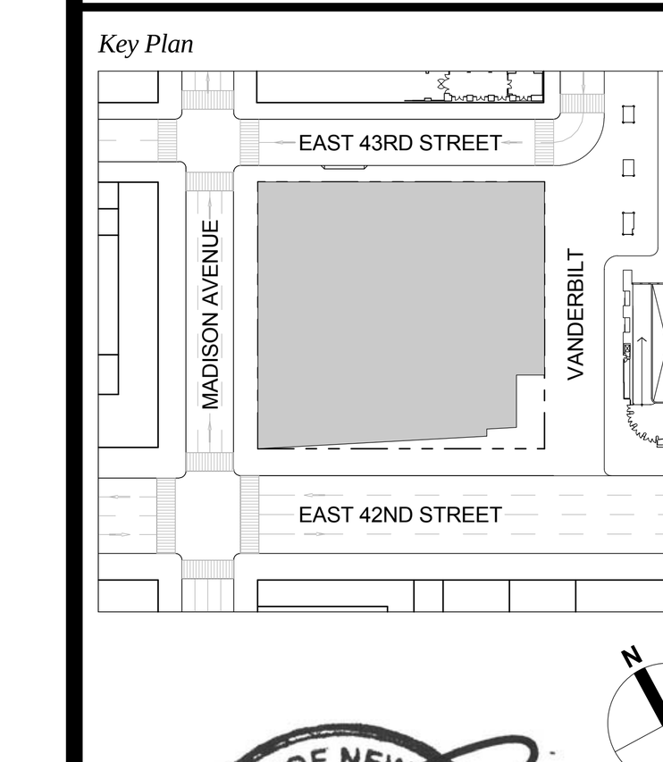
No.	Description	Date
1	D.O.B. FOUNDATION PERMIT FILING	09-01-2015

Key Plan



Issue Date: 09-01-2015
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Drawn By
Scale 3/4" = 1'-0"

FOR REFERENCE ONLY

Drawing Title
COLUMN DETAILS 1

Drawing Number
S-651.00
SHEET 6 OF 9

G GENERAL

G.1 ALL WORK SHALL COMPLY WITH THE 2014 NEW YORK CITY BUILDING CODE.

G.2 THE STRUCTURAL CONSTRUCTION DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE SPECIFICATIONS AND THE ARCHITECTURAL AND MECHANICAL CONSTRUCTION DRAWINGS.

G.3 BEFORE PROCEEDING WITH ANY WORK, THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER SHALL VERIFY THAT ALL MAJOR DIMENSIONS (LOCATIONS OF GRID LINES, COLUMNS, SLAB EDGES, ETC.) SHOWN ON STRUCTURAL DRAWINGS ARE THE SAME AS SHOWN ON ARCHITECTURAL DRAWINGS AND THAT EXISTING CONDITIONS ARE AS INDICATED. ANY VARIANCES SHALL BE BROUGHT TO THE ARCHITECT'S ATTENTION IN WRITING.

G.4 THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER SHALL COORDINATE THE LOCATION OF FRAMING AROUND ELEVATORS, STAIRS AND SHAFTS WITH THE ELEVATOR, STAIR, MECHANICAL, ELECTRICAL AND PLUMBING CONTRACTORS.

G.5 THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER SHALL BE SOLELY RESPONSIBLE FOR COORDINATION BETWEEN TRADES INCLUDING BUT NOT LIMITED TO THE LOCATION OF SLOTS, TRENCHES AND SLEEVES AS REQUIRED FOR THE MECHANICAL OR OTHER TRADES AND THE PROVISION AND/OR INSTALLATION OF ANCHORS, INSERTS, HANGERS, ETC. AS REQUIRED FOR THE VARIOUS TRADES.

G.6 CONTROL OVER OR CHARGE OF AND RESPONSIBILITY FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, OR FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK OF THE PROJECT ARE SOLELY THE GENERAL CONTRACTOR'S OR CONSTRUCTION MANAGER'S RESPONSIBILITY.

G.7 THE CONSTRUCTION MANAGER OR GENERAL CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ACTS OR OMISSIONS OF CONTRACTORS OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE FAILURE OF ANY OF THEM TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONSTRUCTION CONTRACT.

G.8 THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER SHALL BE SOLELY AND FULLY RESPONSIBLE FOR THE SAFETY AND STABILITY OF EXISTING ADJACENT STRUCTURES INCLUDING BUT NOT LIMITED TO BUILDINGS, SIDEWALKS, ROADWAYS AND UTILITIES AND FOR ANY METHODS REQUIRED TO ENSURE THAT SAFETY AND STABILITY.

G.9 THE DESIGN, CONSTRUCTION, INSPECTION AND MAINTENANCE OF TEMPORARY STRUCTURES OR PROCEDURES INCLUDING BUT NOT LIMITED TO SUPPORT FOR AND STABILITY OF CRANES OR HOISTS OR LIFTS OR OTHER SIMILAR EQUIPMENT, TEMPORARY GUYING OR BRACING, SCAFFOLDING, FORMWORK OR SHORING, DEWATERING, SHEETING OR UNDERPINNING, CONSTRUCTION STORAGE OR STAGING AREAS, SIDEWALK BRIDGES OR CONSTRUCTION FENCES, TEMPORARY ENCLOSURES AT OPENINGS, AT THE BUILDING'S PERIMETER, OR ELSEWHERE, ETC., ARE SOLELY THE RESPONSIBILITY OF THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER AND/OR CONTRACTORS AND/OR CONSULTANTS RETAINED BY THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER.

G.10 THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER SHALL MAKE NO DEVIATION FROM CONTRACT DOCUMENTS WITHOUT THE PRIOR WRITTEN APPROVAL OF THE ARCHITECT.

G.11 THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER SHALL REPORT TO THE ARCHITECT, IN WRITING, ANY DISCREPANCIES, AMBIGUITIES OR CONTRADICTIONS IN THE CONSTRUCTION DOCUMENTS.

G.12 THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER SHALL BE RESPONSIBLE FOR NOTIFYING THE ENGINEER RESPONSIBLE FOR CONTROLLED OR SPECIAL INSPECTIONS, IN A TIMELY MANNER, WHEN WORK IS READY FOR INSPECTION.

SI STRUCTURAL INSPECTIONS

SI.1 ALL PROGRESS INSPECTIONS SHALL CONFORM TO CHAPTER 1 OF THE NEW YORK CITY BUILDING CODE. ALL SPECIAL INSPECTIONS SHALL CONFORM TO CHAPTER 17 OF THE NEW YORK CITY BUILDING CODE.

SI.2 THE FOLLOWING PROGRESS INSPECTIONS ARE REQUIRED:

A. FOOTING AND FOUNDATION

SI.3 THE FOLLOWING SPECIAL INSPECTIONS ARE REQUIRED:

A. STRUCTURAL STEEL - WELDING
B. STRUCTURAL STEEL - DETAILS
C. STRUCTURAL STEEL - HIGH STRENGTH BOLTING
D. CONCRETE - CAST-IN-PLACE
E. CONCRETE SAMPLING AND TESTING, TR-2
F. CONCRETE DESIGN MIX, TR-3
G. MASONRY
H. SUBGRADE INSPECTION
I. SUBSURFACE CONDITIONS - FILL PLACEMENT AND IN - PLACE DENSITY
J. EXCAVATIONS - SHEETING, SHORING AND BRACING

SI.4 SPECIAL INSPECTIONS SHALL BE CONTINUOUS EXCEPT WHERE PERIODIC SPECIAL INSPECTIONS ARE SPECIFICALLY PERMITTED BY THE BUILDING CODE.

SI.5 ALL SPECIAL INSPECTIONS SHALL BE PERFORMED BY SPECIAL INSPECTORS AND AGENCIES QUALIFIED BY THE CITY OF NEW YORK AND ACCEPTABLE TO THE ENGINEER OF RECORD.

SI.6 ALL WORK FOR WHICH SPECIAL INSPECTION IS REQUIRED SHALL REMAIN ACCESSIBLE AND EXPOSED UNTIL APPROVED BY THE SPECIAL INSPECTOR.

SI.7 ALL SPECIAL INSPECTORS SHALL BRING ANY DISCREPANCIES TO THE ATTENTION OF THE OWNER AND ENGINEER OF RECORD.

SI.8 ALL SPECIAL INSPECTORS SHALL FURNISH INSPECTION REPORTS TO THE OWNER AND TO THE ENGINEER OF RECORD.

C CAST-IN-PLACE CONCRETE

C.1 ALL CONCRETE WORK SHALL CONFORM TO THE ACI BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE (ACI 318) AND THE 2014 NEW YORK CITY BUILDING CODE.

C.2 CONCRETE

A. ALL CONCRETE MIXES SHALL BE AS FOLLOWS:

MAX "A" CONCRETE SHALL BE NORMAL WEIGHT CONCRETE HAVING A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS. THE MIX SHALL HAVE A WATER-CEMENT RATIO NO GREATER THAN 0.40.

MAX "B" CONCRETE SHALL BE NORMAL WEIGHT CONCRETE HAVING A MINIMUM COMPRESSIVE STRENGTH OF 6000 PSI AT 28 DAYS. THE MIX SHALL HAVE A WATER-CEMENT RATIO NO GREATER THAN 0.40.

MAX "C" CONCRETE SHALL BE NORMAL WEIGHT CONCRETE HAVING A MINIMUM COMPRESSIVE STRENGTH OF 8000 PSI AT 28 DAYS. THE MIX SHALL HAVE A WATER-CEMENT RATIO NO GREATER THAN 0.40.

MAX "D" CONCRETE SHALL BE NORMAL WEIGHT CONCRETE HAVING A MINIMUM COMPRESSIVE STRENGTH OF 10000 PSI AT 28 DAYS. THE MIX SHALL HAVE A WATER-CEMENT RATIO NO GREATER THAN 0.40.

MAX "E" CONCRETE SHALL BE NORMAL WEIGHT CONCRETE HAVING A MINIMUM COMPRESSIVE STRENGTH OF 12000 PSI AT 28 DAYS. THE MIX SHALL HAVE A WATER-CEMENT RATIO NO GREATER THAN 0.40.

MAX "F" CONCRETE SHALL BE NORMAL WEIGHT CONCRETE HAVING A MINIMUM COMPRESSIVE STRENGTH OF 14000 PSI AT 28 DAYS. THE MIX SHALL HAVE A WATER-CEMENT RATIO NO GREATER THAN 0.40.

B. CONCRETE MIXES LISTED ABOVE SHALL BE USED AS FOLLOWS:

FOOTINGS FOUNDATION MAT	MIX "D"
PIERS AND BUTTRESSES	MIX "D"
FOUNDATION WALLS	MIX "D"
SLAB ON GRADE	MIX "A"
EXTERIOR TOPPING SLABS (OTHER THAN SIDEWALKS)	MIX "A"
SHEAR WALLS (FOUNDATION TO 13TH FLOOR	MIX "F"
SHEAR WALLS (13TH TO 26TH FLOOR)	MIX "E"
SHEAR WALLS (26TH TO 39TH FLOOR)	MIX "D"
SHEAR WALLS (39TH TO 51ST FLOOR)	MIX "C"
SHEAR WALLS (AVOVE 51ST FLOOR)	MIX "B"
RAISED SLAB	MIX "A"
CONCRETE ON METAL DECKING	MIX "A"
ALL CONCRETE NOT LISTED ABOVE	MIX "B"

C.3 REINFORCING

A. BAR REINFORCING SHALL BE DEFORMED BARS OF NEW BILLET STEEL CONFORMING TO ASTM A 615, GRADE 60.

B. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A 82 AND A 185.

C. ALL REINFORCING IN LEVEL B3 SLAB ON GRADE SHALL BE EPOXY-COATED (IN ACCORDANCE WITH ASTM A 775).

C.4 ADMIXTURES

A. ALL CONCRETE EXPOSED TO THE WEATHER IN THE FINISHED BUILDING AND ALL LIGHTWEIGHT CONCRETE SHALL BE AIR-ENTRAINED.

B. ALL STONE CONCRETE FOR SLABS ON GRADE AND LIGHTWEIGHT CONCRETE ON METAL DECK SHALL CONTAIN A HIGH RANGE WATER REDUCING ADMIXTURE (SUPERPLASTICIZER).

C. ALL CONCRETE FOR LEVEL B3 SLAB ON GRADE SHALL CONTAIN A CALCIUM NITRATE BASED CORROSION INHIBITOR SUCH AS D.C.I., AS MANUFACTURED BY W.R. GRACE, IN THE AMOUNT OF 3.6 GALLONS PER CUBIC YARD OF CONCRETE, OR APPROVED EQUIVALENT.

D. ALL CONCRETE MIXES SHALL CONTAIN 45% BLAST FURNACE SLAG (BASED ON CEMENT CONTENT).

C.5 DEVELOPMENT LENGTHS OF REINFORCING (Ld, Ldh or Ldc) SHALL BE DETERMINED IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318, CHAPTER 12.

C.6 ALL HORIZONTAL BARS IN WALLS (NOT INCLUDING SHEAR WALLS) AND BEAMS, AND BARS MARKED CONT. (CONTINUOUS) SHALL BE LAPPED A DISTANCE ld AT SPLICES AND AT CORNERS UNLESS OTHERWISE NOTED. LAP CONTINUOUS TOP BARS AT CENTER BETWEEN SUPPORTS AND BOTTOM BARS AT SUPPORTS. HOOK ALL TOP BARS AT NON-CONTINUOUS ENDS.

C.7 ALL LENGTHS OF HOOKED BARS INDICATED ON DRAWINGS DO NOT INCLUDE EXTENSION FOR HOOK.

C.8 ALL DETAILS OF BENDS AND HOOKS SHALL BE DETERMINED IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318, CHAPTER 7.

C.9 ALL REINFORCING SHALL BE HELD RIGIDLY AND ACCURATELY IN PLACE, AND PROTECTED AGAINST DISPLACEMENT BEFORE AND DURING CASTING. IF NECESSARY, ADDITIONAL BARS AND/OR STIRRUPS SHALL BE PROVIDED TO FURNISH SUPPORT FOR ALL REINFORCING.

C.10 PROVIDE CLEARANCES FROM FACES OF CONCRETE TO REINFORCEMENT IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318, CHAPTER 7. IN THE FIRST PARAGRAPH OF 7.7.1, THE WORD "MINIMUM" SHALL BE REPLACED WITH THE WORD "CLEAR".

C.11 PROVIDE SHRINKAGE AND TEMPERATURE REINFORCEMENT FOR ALL STRUCTURAL SLABS WHERE THE FLEXURAL REINFORCING EXTENDS IN ONE DIRECTION ONLY, IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318, CHAPTER 7.

C.12 PRIOR TO THE START OF WORK, THE CONCRETE CONTRACTOR SHALL COORDINATE ANDDETERMINE WITH THE GENERAL CONTRACTOR OR THE CONSTRUCTION MANAGER ALL DIMENSIONS AND LOCATIONS OF SLAB DEPRESSIONS, FLOOR DRAINS, OPENINGS, SLEEVES, CONCRETE CURBS, PADS AND EQUIPMENT BASES AND OTHER SIMILAR ITEMS. THE PROVISION OF THESE ITEMS SHALL BE PART OF THE CONCRETE CONSTRUCTION WORK.

C.13 THE CONCRETE CONTRACTOR SHALL INSTALL IN THE FORMS ALL SLOTS, SLEEVES, WATERTIGHT SLEEVES, INSERTS, ANCHOR BOLTS, HANGERS, MASONRY ANCHORS, ETC., REQUIRED BY OTHER TRADES AND SHALL COORDINATE WITH THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER FOR COMPLETENESS AND LOCATION BEFORE CONCRETE IS CAST.

C.14 IF PIPES OR CONDUITS ARE TO BE PLACED IN SLABS, THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER, PRIOR TO THE START OF WORK, SHALL SUBMIT TO THE ARCHITECT FOR APPROVAL DRAWINGS SHOWING THE SIZE, LOCATION (VERTICALLY AND HORIZONTALLY) AND SPACING OF PIPES AND/OR CONDUITS.

C.15 GENERALLY, PIPES OR CONDUITS PLACED IN SLABS SHOULD NOT BE LARGER THAN 1/3 THE SLAB THICKNESS AND SHOULD NOT BE SPACED CLOSER THAN 3 DIAMETERS ON CENTER AND SHOULD NOT BE PLACED IN THE INTERSECTION OF COLUMN STRIPS FOR FLAT SLABS.

C.16 ALUMINUM CONDUITS OR PIPES SHALL NOT BE PLACED IN CONCRETE.

C.17 ALL BEAMS AND SLABS SHALL BE CAST MONOLITHICALLY, AND THE SLABS FINISHED AS REQUIRED BY THE SPECIFICATIONS.

C.18 VERTICAL CONSTRUCTION JOINTS USING APPROVED BULKHEADS MAY BE MADE AT MID-SPAN OF BEAM OR SLAB SPANS WHERE A STOP IN CONCRETE WORK IS NECESSARY. FOR ADDITIONAL REINFORCING AT CONSTRUCTION JOINTS, SEE TYPICAL DETAILS.

C.19 HORIZONTAL CONSTRUCTION JOINTS SHALL BE PERMITTED IN SLABS BEAMS, JOISTS AND WALLS ONLY IF AND AS SHOWN.

C.20 STEEL BEAMS SUPPORTING METAL DECK AND CONCRETE FILL ARE CAPABLE OF SUPPORTING THE WET WEIGHT OF CONCRETE FILL WITHOUT THE USE OF TEMPORARY SHORES AFTER THE METAL DECK IS WELDED TO THE BEAMS TO PROVIDE LATERAL BRACING. HOWEVER, UNSHORED BEAMS AND DECK WILL DEFLECT WHILE CONCRETE IS BEING CAST. IF CONCRETE IS CAST WITHOUT BEAM AND DECK SHORING, PROVIDE ADDITIONAL CONCRETE AS REQUIRED TO MAINTAIN PROPER FINISHED ELEVATIONS. IF SHORES ARE USED, CAMBER SLABS UPWARD TO COMPENSATE FOR DEFLECTION WHEN SHORES ARE REMOVED.

C.21 ALL PLUMBING SLOTS AROUND SLEEVES SHALL BE FILLED WITH CONCRETE TO THE SAME DEPTH AS FLOOR SLAB AFTER PIPING IS INSTALLED.

C.22 SLABS ON GROUND SHALL BE CAST OVER A 6" LAYER OF COMPACTED POROUS FILL, UNLESS OTHERWISE SHOWN. THE THICKNESS OF THE SLAB IS SHOWN ON PLANS. PROVIDE 6" X 6"-W5 X W5 WELDED FABRIC PLACED 1" FROM TOP OF SLAB IN ALL SLABS ON GROUND UNLESS OTHERWISE NOTED ELSEWHERE. SLABS SHALL BE CAST IN ALTERNATE PANELS NOT EXCEEDING 40 FEET IN ANY LENGTH OR WIDTH.

C.23 ALL CONCRETE TOPPINGS, FILLS AND PROTECTION SLABS SHALL BE REINFORCED WITH 6" X 6"-W3 X W3 WELDED WIRE FABRIC PLACED 1" BELOW THE TOP OF FINISHED CONCRETE.

C.24 CONCRETE PADS AND EQUIPMENT BASES SHALL BE REINFORCED WITH 6" X 6"-W5 X W5 WELDED WIRE FABRIC PLACED 1" FROM THE TOP OF PAD, UNLESS OTHERWISE NOTED ELSEWHERE. FOR LOCATIONS, SIZES AND THICKNESSES, SEE ARCHITECTURAL, AND/OR STRUCTURAL AND/OR MECHANICAL DRAWINGS.

C.25 FOR TREATMENT OF EXPOSED CONCRETE, SEE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS.

C.26 CHAMFER EDGES OF EXPOSED CONCRETE COLUMNS AND BEAMS. PROVIDE REGLETS AND DRIPS AS SHOWN ON THE ARCHITECTURAL DRAWINGS AND IN THE SPECIFICATIONS.

C.27 CURING OF CONCRETE SHALL START AS SOON AS THE FINISH WILL NOT BE MARRED THEREBY. IT SHALL NOT BE PERMISSIBLE TO DELAY THE CURING UNTIL THE MORNING AFTER THE CONCRETE IS CAST.

DESIGN CRITERIA SCHEDULE

STRUCTURAL OCCUPANCY / RISK CATEGORY	II
ROOF SNOW LOAD:	
GROUND SNOW LOAD $(P)_g$	40 psf
FLAT-ROOF SNOW LOAD $(P)_f$	37 psf
SNOW EXPOSURE FACTOR $(C)_e$	1.2
SNOW LOAD IMPORTANCE FACTOR $(I)_s$	1.0
THERMAL FACTOR $(C)_t$	1.0
WIND LOADS:	
BASIC WIND SPEED $(V)_{3s}$	100 mph
WIND IMPORTANCE FACTOR $(I)_w$	1.00
WIND EXPOSURE	C
INTERNAL PRESSURE COEFFICIENT $(GC)_{pi}$	±0.18
COMPONENT/CLADDING DESIGN WIND PRESSURE	75 psf
SEISMIC LOADS:	
SEISMIC IMPORTANCE FACTOR $(I)_E$	1.00
MAPPED SPECTRAL RESPONSE ACCELERATIONS	
SHORT PERIOD $(S)_S$	0.281g
1-SECOND PERIOD $(S)_1$	0.073g
SEISMIC SITE CLASS	B
DESIGN SPECTRAL RESPONSE ACCELERATIONS	
SHORT PERIOD $(S)_{DS}$	0.187g
1-SECOND PERIOD $(S)_{D1}$	0.049g
SEISMIC DESIGN CATEGORY	B
RESPONSE MODIFICATION FACTOR (R)	
ORDINARY REINFORCED CONCRETE SHEAR WALLS	4
SYSTEM OVER-STRENGTH FACTOR $( )\Omega_O$	
ORDINARY REINFORCED CONCRETE SHEAR WALLS	2 1/2
DEFLECTION AMPLIFICATION FACTOR $(C)_d$	
ORDINARY REINFORCED CONCRETE SHEAR WALLS	4
DESIGN BASE SHEAR	—
SEISMIC RESPONSE COEFFICIENT $(C)_s$	—
ANALYSIS PROCEDURE	EQUIV. LAT. FORCE

SD SHOP DRAWINGS - STRUCTURAL

SD.1 THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER SHALL SUBMIT STRUCTURAL SHOP DRAWINGS TO THE ARCHITECT AFTER THE GC OR CM HAS REVIEWED AND NOTED ON THESE SUBMITTALS THAT THEY ARE IN CONFORMANCE WITH CONTRACT REQUIREMENTS. THE STRUCTURAL ENGINEER, UPON RECEIPT OF THESE SUBMITTALS FROM THE ARCHITECT, WILL REVIEW AND APPROVE OR TAKE OTHER APPROPRIATE ACTION UPON AND RETURN TO THE ARCHITECT FOR FINAL DISPOSITION.

SD.2 CHANGES OR NON-CONFORMANCE TO CONTRACT REQUIREMENTS SHALL BE FLAGGED ON SUBMITTALS.

SD.3 SUBMITTALS SHALL NOT BE USED AS A SUBSTITUTE FOR REQUESTS FOR, OR APPROVALS OF SUBSTITUTIONS OR OTHER CHANGES OR PROCEDURES REQUIRED BY THE CONSTRUCTION CONTRACT.

SD.4 PRIOR TO SUBMITTING SHOP DRAWINGS, THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER SHALL SUBMIT A SHOP DRAWING SUBMITTAL SCHEDULE FOR THE APPROVAL OF THE STRUCTURAL ENGINEER AND THE ARCHITECT. THE SCHEDULE SHALL INCLUDE THE DATES WHEN DRAWINGS ARE TO BE SUBMITTED TO THE ARCHITECT AND THE NUMBER OF DRAWINGS AND TYPE OF DETAILS (PLANS, SCHEDULES, BEAMS, COLUMNS, ETC.) THAT WILL BE SUBMITTED ON EACH SUBMISSION DATE.

SD.5 THE STRUCTURAL ENGINEER'S REVIEW OF, APPROVAL OF, OR OTHER ACTION UPON THE SHOP DRAWINGS IS ONLY FOR THE LIMITED PURPOSE OF CHECKING FOR CONFORMANCE WITH THE DESIGN INTENT AND INFORMATION EXPRESSED IN CONTRACT DOCUMENTS PREPARED BY THE STRUCTURAL ENGINEER.

SD.6 THE STRUCTURAL ENGINEER'S REVIEWS SHALL NOT INCLUDE THE ACCURACY OR COMPLETENESS OF DETAILS SUCH AS WEIGHTS, GAUGES, FABRICATION OR ERECTION PROCESS, CONSTRUCTION MEANS OR METHODS, COORDINATION OF THE WORK WITH OTHER TRADES OR CONSTRUCTION SAFETY PRECAUTIONS, ALL OF WHICH ARE THE SOLE RESPONSIBILITY OF THE CONSTRUCTION MANAGER OR GENERAL CONTRACTOR.

SD.7 THE STRUCTURAL ENGINEER'S REVIEW OF A SPECIFIC ITEM SHALL NOT EXTEND TO A REVIEW OF AN ASSEMBLY OF WHICH THE ITEM IS A COMPONENT.

SD.8 THE STRUCTURAL ENGINEER WILL NOT REVIEW SUBMISSIONS WHICH ARE PARTIALLY COMPLETE.

SD.9 NO WORK MAY COMMENCE UNTIL ALL RELEVANT SHOP DRAWINGS HAVE BEEN REVIEWED AND FINAL "APPROVAL WITH NO EXCEPTIONS" HAS BEEN GRANTED BY THE ARCHITECT.

SD.10 THE USE OF THE "REQUEST FOR INFORMATION" (RFI) PROCESS IS STRICTLY A FORM OF COMMUNICATION BETWEEN CM/GC AND THE DESIGN TEAM AND ITS SOLE PURPOSE IS TO RESOLVE MINOR ISSUES AND SHALL NOT BE USED TO PRE-PREPARE SHOP DRAWINGS.

SD.11 STRUCTURAL STEEL SHOP DRAWINGS SHALL BE PREPARED UNDER THE SUPERVISION OF A PROFESSIONAL ENGINEER REGISTERED IN THE STATE IN WHICH THE PROJECT IS LOCATED WHO IS EXPERIENCED IN THE DETAILING OF STRUCTURAL STEEL AND HAS A THOROUGH WORKING KNOWLEDGE OF THE REQUIREMENTS, SUGGESTIONS, EXAMPLES AND COMMENTARIES OF THE AISC MANUAL OF STEEL CONSTRUCTION, LOAD AND RESISTANCE FACTOR DESIGN SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS, THE SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A 325 OR A 490 BOLTS AND THE AMERICAN WELDING SOCIETY (AWS) D1.1 "STRUCTURAL WELDING CODE-STEEL".

SD.12 STRUCTURAL STEEL PIECE DRAWINGS SHALL NOT BE SUBMITTED UNTIL ERECTION PLANS AND TYPICAL CONNECTION DETAIL DRAWINGS (GENERALLY REFERRED TO AS JOB STANDARDS), HAVE BEEN REVIEWED AND APPROVED BY THE STRUCTURAL ENGINEER AND ARCHITECT.

SD.13 IF THE STRUCTURAL ENGINEER OF RECORD SO REQUESTS, THE CONSTRUCTION MANAGER AND/OR THE GENERAL CONTRACTOR SHALL SUBMIT CALCULATIONS FOR ANY OR ALL CONNECTIONS OR JOB STANDARDS SHOWN ON SHOP DRAWINGS. THESE CALCULATIONS SHALL BE SIGNED AND SEALED BY THE PROFESSIONAL ENGINEER SUPERVISING THE PREPARATION OF SHOP DRAWINGS.

SD.14 SHOP DRAWINGS FOR CONCRETE WORK SHALL BE PREPARED UNDER THE SUPERVISION OF AN EXPERIENCED DETAILER FOR CONCRETE STRUCTURES WHO HAS A THOROUGH WORKING KNOWLEDGE OF THE REQUIREMENTS, SUGGESTIONS, EXAMPLES AND COMMENTARIES OF ACI 318- BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE, ACI 315-DETAILS AND DETAILING OF CONCRETE REINFORCEMENT AND THE CONCRETE REINFORCING STEEL INSTITUTE (CRSI) "MANUAL OF STANDARD PRACTICE".

SD.15 SHOP DRAWINGS FOR CONCRETE WORK SHALL INCLUDE BUT NOT BE LIMITED TO BENDING DETAILS, LOCATION AND LENGTH OF ALL LAPS AND VERTICAL AND HORIZONTAL LOCATION OF ALL REINFORCEMENT (BARS AND WELDED WIRE FABRIC AND REINFORCEMENT) INCLUDING THE REINFORCEMENT IN SLABS CAST ON GRADE.

SD.16 METAL DECK SHOP DRAWINGS SHALL BE PREPARED UNDER THE SUPERVISION OF AN EXPERIENCED DETAILER FOR METAL DECK WHO HAS A THOROUGH WORKING KNOWLEDGE OF AWS D1.3 STRUCTURAL WELDING CODE - SHEET STEEL AND THE SDI MANUAL FOR FLOOR DECKS AND ROOF DECKS.

SD.17 METAL DECK SHOP DRAWINGS SHALL INCLUDE BUT NOT BE LIMITED TO THE TYPE AND GAGE OF DECK, LOCATION AND SIZE OF ALL WELDING TO STRUCTURAL STEEL, LOCATION AND TYPE OF SIDE LAP FASTENINGS, LOCATION AND SIZE OF SHEAR STUDS (IF ANY), CLOSURES, SUPPLEMENTARY FRAMING (IF ANY), SUMP PANS, CANT STRIPS, ETC.

S STRUCTURAL STEEL

S.1 ALL STRUCTURAL STEEL MATERIAL, FABRICATION AND ERECTION SHALL COMPLY WITH THE PROVISIONS OF THE AISC SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS, INCLUDING THE COMMENTARY AND ANY SUPPLEMENTS.

S.2 ALL STRUCTURAL STEEL SHALL BE ASTM A992 OR ASTM A572, GRADE 50 STEEL. ALL HSS RECTANGULAR AND ROUND STEEL SHALL BE ASTM A500, GRADE B. PLATES, ANGLES, ETC., USED AS CONNECTION MATERIAL MAY BE ASTM A36 STEEL. THE TYPE OF STEEL FOR ALL STRUCTURAL STEEL SHAPES, PLATES, BARS, ETC. SHALL BE INDICATED ON SHOP DRAWINGS.

S.3 THE STEEL CONTRACTOR SHALL FURNISH MILL TEST REPORTS FROM THE PRODUCER OF STEEL CERTIFYING THAT THE STEEL MEETS THE MINIMUM REQUIREMENTS AS DEFINED BY ASTM SPECIFICATIONS. IF REQUIRED BY THE APPLICABLE BUILDING CODE, STEEL MILL REPORTS AND COMPLETION CERTIFICATES SHALL BE FILED WITH THE BUILDING DEPT.

S.4 ALL CONNECTIONS NOT DETAILED ON THE DRAWINGS SHALL CONFORM TO THOSE SHOWN IN THE AISC STEEL CONSTRUCTION MANUAL, 13TH EDITION, WHERE POSSIBLE. ALL SHOP CONNECTIONS SHALL BE HIGH-STRENGTH BOLTED OR WELDED. ALL FIELD CONNECTIONS SHALL BE WELDED OR MADE WITH HIGH-STRENGTH BOLTS WITH HARDENED WASHERS, INSTALLED BY MEANS OF PNEUMATIC WRENCHES AND TORQUED TO THE REQUIRED VALUE, IN ACCORDANCE WITH THE SPECIFICATIONS FOR STRUCTURAL JOINTS USING ASTM A325 OR ASTM A490 BOLTS APPROVED BY THE RESEARCH COUNCIL ON RIVETED AND BOLTED JOINTS.

S.5A ALL BEAM TO BEAM/GIRDER OR BEAM/GIRDER TO COLUMN CONNECTIONS SHALL HAVE A CAPACITY OF 60% (FOR NON-COMPOSITE BEAMS) AND 100% (FOR COMPOSITE BEAMS) OF THE TOTAL UNIFORMLY DISTRIBUTED DESIGN LOAD FOR THE SIZE, SHAPE, SPAN AND Fy OF THE BEAM TO BE CONNECTED. THE EFFECT OF ANY CONCENTRATED LOADS AT THE ENDS OF THE BEAM (NEAR THE CONNECTION) SHALL ALSO BE INCLUDED. THE TOTAL UNIFORMLY DISTRIBUTED DESIGN LOADS SHALL BE CALCULATED USING THE TABLES FOR UNIFORM LOAD CONSTANTS FOR BEAMS CONTAINED IN THE AISC STEEL CONSTRUCTION MANUAL.

S.5B (NYC PROJECTS) ALL CONNECTIONS SHALL MEET THE STRUCTURAL INTEGRITY REQUIREMENTS OF NYCBC SECTION 2213.2.

S.6 UNLESS OTHERWISE SHOWN OR DETAILED, ALL BEAMS AND GIRDERS SHALL BE CONNECTED TO COLUMNS WITH FULLY RESTRAINED MOMENT CONNECTIONS WITH A CAPACITY OF 400 KIP-FEET OR THE STRENGTH OF THE BEAM OR GIRDER, THE BASIC SEISMIC-FORCE-RESISTING SYSTEM IS ORDINARY STEEL MOMENT FRAMES AND THE RESPONSE MODIFICATION COEFFICIENT IS 3½.

S.7A UNLESS OTHERWISE SHOWN IN TYPICAL DETAILS, COLUMN SPLICES SHALL BE 4'-0" ABOVE FINISHED FLOOR AND SHALL CONFORM TO SUGGESTED COLUMN SPLICE DETAILS. SHOWN IN THE AISC STEEL CONSTRUCTION MANUAL, THE CAPACITY OF THE SPLICE SHOULD BE NOT LESS THAN AN ULTIMATE LOAD OF 180 KIPS (TENSION OR COMPRESSION).

S.7B (NYC PROJECTS) COLUMN SPLICES SHALL HAVE AN AVAILABLE TENSION STRENGTH EQUAL TO THE LARGEST REACTION APPLIED AT ANY OF THE FOUR FLOOR LEVELS BELOW THE SPLICE PER NYCBC SECTION 2213.2.1.

S.8 ALL WELDING SHALL BE IN ACCORDANCE WITH THE STANDARD CODE FOR ARC AND GAS WELDING IN BUILDING CONSTRUCTION OF THE AMERICAN WELDING SOCIETY.

S.9 WELDING ELECTRODES SHALL CONFORM TO ASTM SPECIFICATION E-70XX. ALL BUTT WELDS SHALL BE 100% PENETRATION WELDS AND FILLET WELDS SHALL BE MINIMUM ¼". IF REQUIRED BY THE APPLICABLE BUILDING CODE, COPIES OF TEST REPORTS SHALL BE FILED WITH THE BUILDING DEPT.

S.10 ALL BOLTS SHALL BE 3/4" DIAMETER MINIMUM UNLESS OTHERWISE NOTED.

S.11 FOR COMPOSITE CONSTRUCTION, THE NUMBER IN PARENTHESIS AFTER THE BEAM DESIGNATION INDICATES THE TOTAL NUMBER OF 3/4" DIAMETER HEADED SHEAR CONNECTORS. SEE TYPICAL DETAILS FOR PLACEMENT AND FURTHER DETAILS. REGARDLESS OF THE QUANTITY OF STUDS SHOWN ON THE PLAN. THE MINIMUM APACING FOR STUDS SHALL NOT EXCEED 12" ON CENTER.

S.12 CAMBER BEAMS AND GIRDERS, AS SHOWN ON PLANS THUS C=________. WHERE NO CAMBER IS CALLED FOR, FABRICATE AND ERECT BEAMS WITH NATURAL CAMBER UP.

S.13 ALL CONTACT SURFACE WITHIN HIGH-STRENGTH BOLT CONNECTIONS AND WELDING AREAS SHALL BE FREE OF OIL, PAINT, LACQUER OR GALVANIZING.

S.14 THE CONTRACTOR SHALL FURNISH AND INSTALL ALL PLATES, CLIP ANGLES, CONNECTIONS, NAILER HOLES, ETC., REQUIRED FOR THE COMPLETION OF THE STRUCTURE OR BY OTHER TRADES, EVEN IF EVERY SUCH ITEM IS NOT SHOWN ON THE STRUCTURAL DRAWINGS.

S.15 THE STEEL FRAMING SHALL BE TEMPORARILY BRACED AGAINST EARTH PRESSURE, WIND, POSSIBLE LATERAL CONSTRUCTION LOADS OR UNBALANCES CAUSED BY CONSTRUCTION SEQUENCING UNTIL SLABS, BEAMS, COLUMNS, BRACING AND ANY OTHER STRUCTURE DESIGNED TO LATERALLY BRACE THE FINISHED STRUCTURE ARE IN PLACE AND HAVE ATTAINED THEIR REQUIRED STRENGTH OR HAVE HAD THEIR PERMANENT CONNECTIONS MADE. THE GENERAL CONTRACTOR AND/OR THE CONSTRUCTION MANAGER AND/OR THE STEEL CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE INTEGRITY OF THE STEEL STRUCTURE DURING ERECTION AND CONSTRUCTION.

S.16 THE STRUCTURAL STEEL SHALL BE ERECTED TO THE TOLERANCE CALLED FOR IN THE AISC CODE OF STANDARD PRACTICE UNLESS MORE STRINGENT TOLERANCES ARE REQUIRED BY OTHER TRADES SUCH AS BUT NOT LIMITED TO PRECAST, ELEVATOR, STAIR OR FAÇADE CONTRACTORS. THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER SHALL COORDINATE.

S.17 THE USE OF LEVELING PLATES UNDER COLUMN BASE PLATES WILL NOT BE PERMITTED.

S.18 ALL GROUT FOR BASE PLATES AND ANCHOR BOLTS SHALL BE OF A NON-SHRINKAGE TYPE WITH A MINIMUM ULTIMATE COMPRESSIVE STRENGTH OF 7,500 PSI AFTER 28 DAYS.

S.19 PROVIDE LOOSE LINTELS OVER ALL OPENINGS IN EXTERIOR AND INTERIOR MASONRY WALLS AS SCHEDULED BELOW, EXCEPT WHERE OTHERWISE DETAILED ON THE DRAWINGS.

MASONRY OPENINGS	NOMINAL MASONRY WALL THICKNESS				
	4"	6"	8"	10"	12"
4'-11" OR LESS	1L 4x3 1/2x5/16	1L 5x5x5/16	2LS 4x3 1/2x5/16	2LS 4x4x5/16	2LS 5x5x5/16
5'-0" TO 7'-0"	1L 5x3 1/2x5/16	1L 5x5x5/16	2LS 4x3 1/2x5/16	2LS 6x4x5/16	2LS 5x5x5/16

SHORT LEGS ARE HORIZONTAL
LENGTH OF LINTELS = M.0 + 12" (6" BEARING EACH SIDE)

D METAL DECKING

D.1 ALL METAL DECK MATERIAL, FABRICATION AND ERECTION SHALL COMPLY WITH THE PROVISIONS OF THE AISI SPECIFICATIONS FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS AND THE SDI DESIGN MANUAL FOR FLOOR DECKS AND ROOF DECKS.

D.2 STEEL FOR PAINTED METAL DECK UNITS SHALL CONFORM TO ASTM A1008, GRADE 40.

D.3 STEEL FOR GALVANIZED METAL DECK UNITS SHALL CONFORM TO ASTM A653, GRADE 40. GALVANIZING SHALL CONFORM TO ASTM A924, G60.

D.4 ALL WELDING OF METAL DECK TO SUPPORTING STEEL SHALL BE IN ACCORDANCE WITH THE AWS D1.3 STRUCTURAL WELDING CODE - SHEET STEEL.

D.5 THE TYPE , GAGE AND DIRECTION OF METAL DECK SHALL BE AS SHOWN ON PLANS.

D.6 FASTEN FLOOR AND ROOF DECK UNITS TO STEEL SUPPORTING MEMBERS AND SPANDREL GIRDERS BY NOT LESS THAN 3/4" DIAMETER FUSION WELDS OR ELONGATED WELDS OF EQUAL STRENGTH, SPACED NOT MORE THAN 12" ON CENTER WITH A MINIMUM OF 2 WELDS PER UNIT AT EVERY SUPPORT AND AT CLOSER SPACING WHERE REQUIRED FOR LATERAL OR UPLIFT FORCE RESISTANCE.

D.7 FASTEN SIDE LAPS OF ALL ADJACENT DECK UNITS BETWEEN SUPPORTS, WITH SELF-TAPPING NO. 8 OR LARGER MACHINE SCREWS OR BY WELDING AT INTERVALS NOT EXCEEDING 24" ON CENTER.

D.8 PROVIDE HOLES IN DECK AT SHEAR CONNECTOR LOCATIONS UNLESS THE DECK MANUFACTURER CERTIFIES THAT SHEAR CONNECTORS CAN BE WELDED TO SUPPORTS THROUGH DECK UNITS WITHOUT LESSENING THE SHEAR CONNECTOR'S CAPACITY.

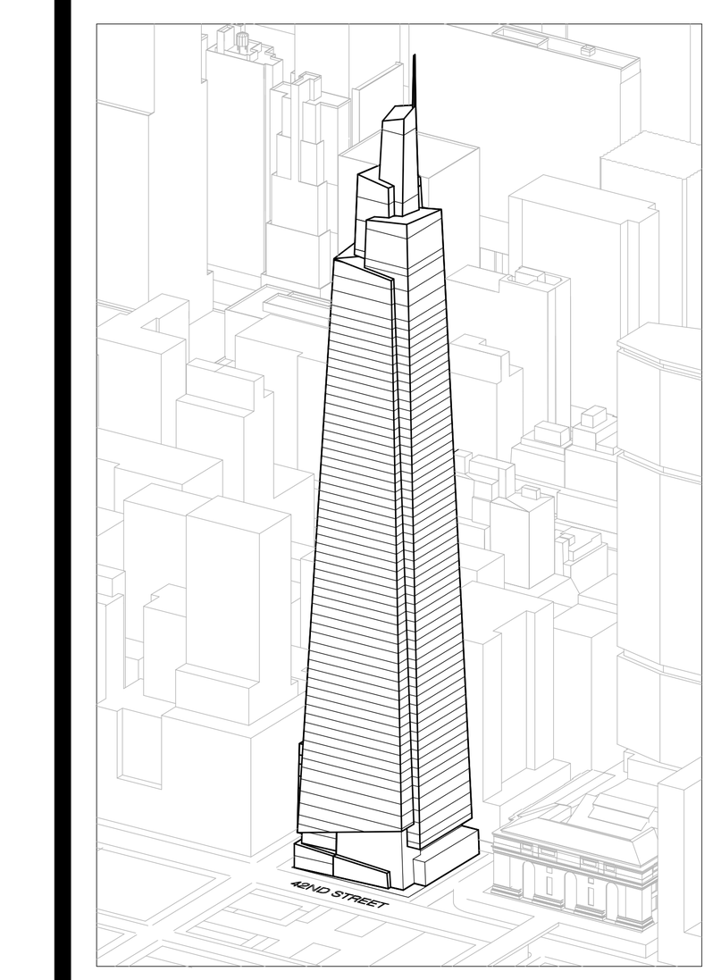
D.9 THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER AND/OR THE DECK CONTRACTOR SHALL COORDINATE OPENINGS IN DECK REQUIRED BY MECHANICAL ELECTRICAL, PLUMBING OR ARCHITECTURAL DOCUMENTS OR BY MECHANICAL OR OTHER TRADE CONTRACTORS.

D.10 THE DECK CONTRACTOR SHALL SUBMIT TO THE ARCHITECT FOR APPROVAL A DRAWING INDICATING THE SIZE AND LOCATION OF ALL OPENINGS PROPOSED TO BE PROVIDED IN METAL DECK THAT ARE NOT SHOWN ON STRUCTURAL DRAWINGS.

D.11 HANGER SLOTS IN METAL DECK SHALL BE USED FOR SUPPORT OF CEILINGS, AIR DUCTS OR LIGHTING FIXTURES AND SHALL NOT BE USED TO SUPPORT MECHANICAL OR ELECTRICAL EQUIPMENT OR PIPING. THE TRIBUTARY LOAD FOR EACH SLOT SHALL NOT EXCEED FIVE POUNDS PER SQUARE FOOT AND A TOTAL LOAD OF 60 POUNDS. HANGER SLOTS SHALL NOT BE USED TO SUPPORT CEILINGS WHERE THE APPLICABLE BUILDING CODE REQUIRES CEILING HANGERS TO SUPPORT MORE THAN 60 POUNDS.

D.12 METAL DECK SHALL BE CONTINUOUS OVER THREE SPANS MINIMUM, UNLESS SPECIFICALLY SHOWN OTHERWISE.

ONE VANDERBILT



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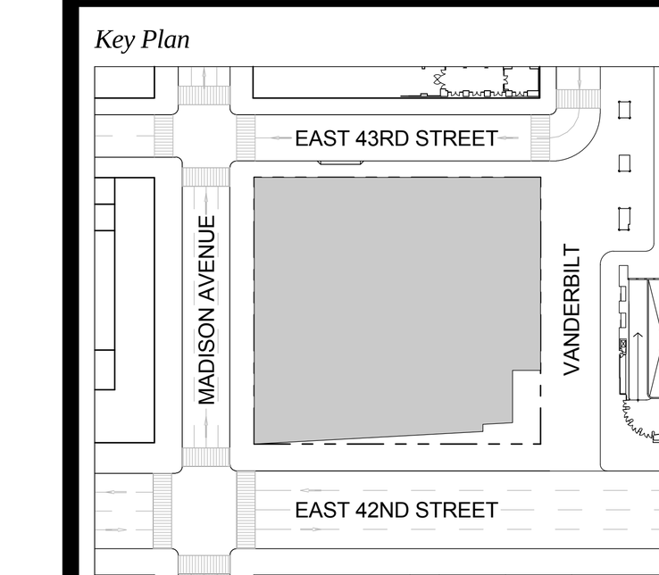
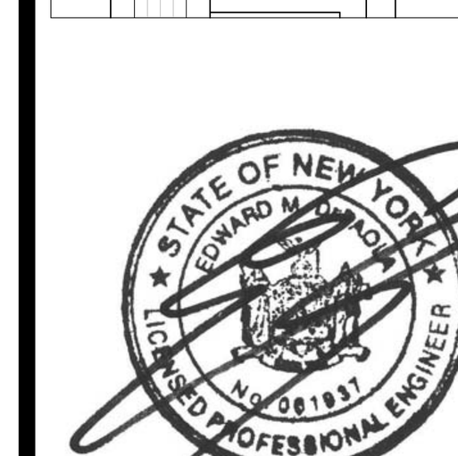
No.	Description	Date
1	D.O.B. FOUNDATION PERMIT FILING	09-01-2015

Key Plan





Issue Date: 09-01-2015
Project No: 14500
Drawn By
Scale 1/8" = 1'-0"

FOR REFERENCE ONLY

Drawing Title
GENERAL NOTES

Drawing Number
S-701.00
SHEET 7 OF 9

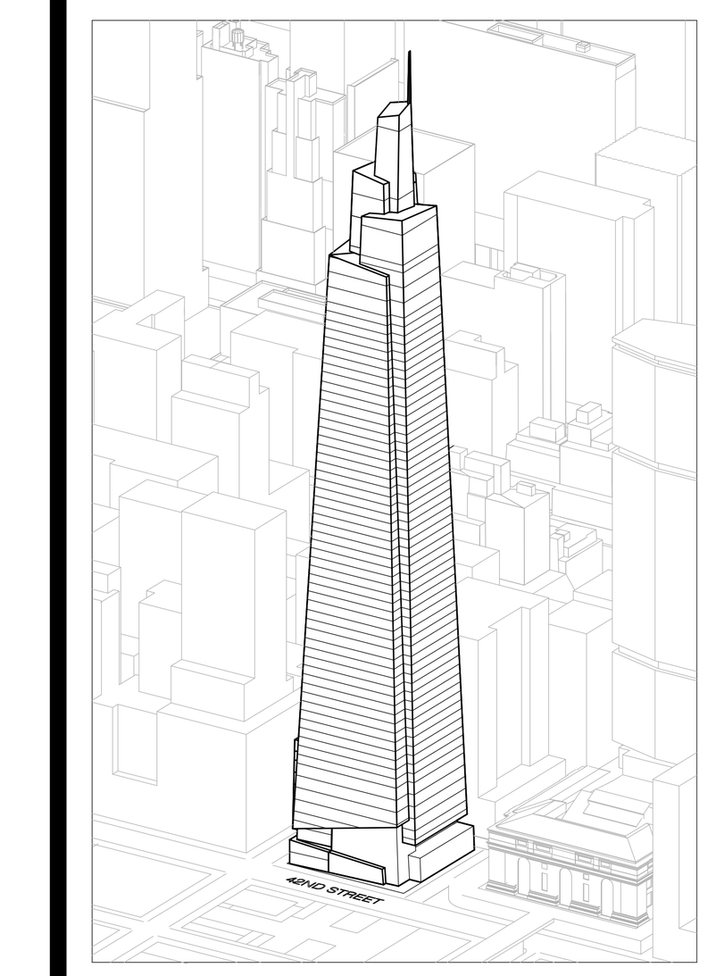
LOADING SCHEDULE (PSF)

FLOOR	AREA	STRUCT SLAB	STEEL	RAISED FLOOR	BUILT UP SLAB	FINISH	MISC.	PARTITIONS	CEILING HUNG MEP	DEAD LOAD	LIVE LOAD	TOTAL LOAD	SLAB CONSTRUCTION	REMARKS
B3/B4 (FOUNDATION)														
B2 (SUB-CELLAR)	SHUTTLE PLATFORM	225	-	-	-	50	-	-	10	285	100	385	18" NWC SLAB	
B1 (CELLAR)	NORTHWEST	300	-	-	-	50	-	-	10	360	100	460	24" NWC SLAB	
	WEST	80	20	-	-	50	-	-	10	160	100	260	TYPE 2	
	EAST	225	-	-	-	50	-	-	10	285	100	385	18" NWC SLAB	
	CORE	75	-	-	-	50	-	-	10	135	100	235	6" NWC SLAB	
1ST	TEMPORARY CONSTRUCTION LOADING - TRUCK AREAS	80	20	-	-	-	-	-	-	100	600	700	TYPE 4	
	TEMPORARY CONSTRUCTION LOADING - STAGING AREA	80	20	-	-	-	-	-	-	100	250	350	TYPE 4	
	TYPICAL - TRANSIT HALL TYPICAL - RETAIL TYPICAL - AMENITY TYPICAL - OFFICE LOBBY TYPICAL - SUBWAY ENTRANCE TYPICAL - MESSENGER CENTER TYPICAL - DOCK MASTER	80	20	-	-	50	-	-	10	160	100	260	TYPE 4	
	CORE - PASSENGER ELEVATOR LOBBY	75	-	-	-	50	-	-	10	135	100	235	6" NWC SLAB	
	CORE - MER CORE - FREIGHT ELEVATOR VESTIBULE CORE - BACK OF HOUSE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
2ND	TEMPORARY CONSTRUCTION LOADING - STAGING AREA	80	20	-	-	-	-	-	-	100	250	350	TYPE 1	
	TYPICAL - RETAIL	80	20	-	-	25	-	-	10	135	100	235	TYPE 1	
	TYPICAL - AMENITY	80	20	-	-	25	-	-	10	135	100	235	TYPE 1	
	CORE - CIRCULATION	75	-	-	-	50	-	-	10	135	100	265	6" NWC SLAB	
	CORE - BACK OF HOUSE CORE - MER CORE - FREIGHT ELEVATOR VESTIBULE	75	-	-	-	-	-	-	10	85	100	210	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
3RD	TYPICAL - AMENITY	80	20	-	-	25	-	-	10	135	100	235	TYPE 1	
	TERRACE	80	20	-	-	50	-	-	10	160	100	260	TYPE 1	
	CORE - CIRCULATION	75	-	-	-	50	-	-	10	135	100	235	6" NWC SLAB	
	CORE - BACK OF HOUSE CORE - MER CORE - FREIGHT ELEVATOR VESTIBULE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
4TH	TYPICAL - MECHANICAL	115	20	-	-	-	-	-	10	145	150	295	TYPE 3	
	CORE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
5TH	TYPICAL - MECHANICAL	80	20	-	-	-	-	-	50	150	150	300	TYPE 3	*CONCRETE FILL AND MECHANICAL PADS
	CORE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
6TH	TYPICAL - TRADING FLOOR	115	12	15	-	-	-	-	50	192	100	292	TYPE 1	
	TYPICAL - TOILET ROOMS	115	12	-	-	50	-	-	50	227	100	327	TYPE 1	
	TYPICAL - STAIRS	50	12	-	-	-	-	-	-	62	100	162		
	TYPICAL - BACK OF HOUSE	55	12	15	-	-	-	-	50	132	100	232	TYPE 1	
	TYPICAL - PASSENGER ELEVATOR LOBBY	55	12	-	50	50	-	-	50	217	100	317	TYPE 1	
	CORE - MER CORE - FREIGHT ELEVATOR VESTIBULE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - PASSENGER ELEVATOR LOBBY CORE - TOILET ROOMS	75	-	-	-	50	-	-	10	135	100	235	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
7TH-11TH	TYPICAL - TRADING FLOOR	55	12	15	-	-	-	-	10	92	100	192	TYPE 1	
	TYPICAL - TOILET ROOMS	55	12	-	-	50	-	-	10	127	100	227	TYPE 1	
	TYPICAL - STAIRS	50	12	-	-	-	-	-	-	62	100	162		
	TYPICAL - BACK OF HOUSE	55	12	15	-	-	-	-	10	92	100	192	TYPE 1	
	TYPICAL - PASSENGER ELEVATOR LOBBY	55	12	-	50	50	-	-	10	177	100	277	TYPE 1	
	CORE - MER CORE - FREIGHT ELEVATOR VESTIBULE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - TOILET ROOMS	75	-	-	-	50	-	-	10	135	100	235	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
12TH	TYPICAL - MECHANICAL	115	20	-	-	-	-	-	10	145	150	295	TYPE 3	*CONCRETE FILL AND MECHANICAL PADS
	CORE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
13TH	TYPICAL - MECHANICAL	80	20	-	-	-	-	-	50	150	150	300	TYPE 3	*CONCRETE FILL AND MECHANICAL PADS
	ELEVATOR MACHINE ROOM	80	20	-	-	-	-	-	-	100	75+*	175+*	TYPE 3	*+SHEAVE BEAM REACTIONS
	CORE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
14TH	TYPICAL - OFFICE	115	12	15	-	-	-	12	50	204	50	254	TYPE 1	
	TERRACE	55	12	-	-	50	-	-	50	167	100	267	TYPE 1	
	CORE - MER CORE - FREIGHT ELEVATOR VESTIBULE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - PASSENGER ELEVATOR LOBBY CORE - TOILET ROOMS	75	-	-	-	50	-	-	10	135	100	235	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
15TH-35TH	TYPICAL - OFFICE	55	12	15	-	-	-	12	8	102	50	152	TYPE 1	
	CORE - MER CORE - FREIGHT ELEVATOR VESTIBULE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - PASSENGER ELEVATOR LOBBY CORE - TOILET ROOMS	75	-	-	-	50	-	-	10	135	100	235	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
	CORE - ELEVATOR MACHINE ROOM	100	-	-	-	-	-	-	-	100	75+*	175+*	6" NWC SLAB	*+SHEAVE BEAM REACTIONS
36TH	TYPICAL - MECHANICAL	115	20	-	-	-	-	-	10	145	150	295	TYPE 3	*CONCRETE FILL AND MECHANICAL PADS
	CORE	75	-	-	-	-	-	-	10	85	100	210	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
	CORE - ELEVATOR MACHINE ROOM	100	-	-	-	-	-	-	-	100	75+*	175+*	6" NWC SLAB	*+SHEAVE BEAM REACTIONS
37TH	TYPICAL - OFFICE	115	12	15	-	-	-	12	50	204	50	254	TYPE 1	
	TYPICAL - TOILET ROOMS	55	12	-	-	50	-	12	50	179	50	229	TYPE 1	
	CORE - MER CORE - FREIGHT ELEVATOR VESTIBULE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - PASSENGER ELEVATOR LOBBY	75	-	-	-	50	-	-	10	135	100	235	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
38TH-49TH	TYPICAL - OFFICE	55	12	15	-	-	-	12	8	102	50	152	TYPE 1	
	TYPICAL - TOILET ROOMS	55	12	-	-	50	-	12	50	179	50	229	TYPE 1	
	CORE - MER CORE - FREIGHT ELEVATOR VESTIBULE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - PASSENGER ELEVATOR LOBBY	75	-	-	-	50	-	-	10	135	100	235	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION

LOADING SCHEDULE (PSF)

FLOOR	AREA	STRUCT SLAB	STEEL	RAISED FLOOR	BUILT UP SLAB	FINISH	MISC.	PARTITIONS	CEILING HUNG MEP	DEAD LOAD	LIVE LOAD	TOTAL LOAD	SLAB CONSTRUCTION	REMARKS
50TH	TYPICAL - MECHANICAL	115	20	-	-	-	-	-	10	145	150	295	TYPE 3	*CONCRETE FILL AND MECHANICAL PADS
	CORE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
51ST	TYPICAL - OFFICE	115	12	15	-	-	-	12	50	204	50	254	TYPE 1	
	TYPICAL - TOILET ROOMS	55	12	-	-	50	-	12	50	179	50	229	TYPE 1	
	CORE - MER CORE - FREIGHT ELEVATOR VESTIBULE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - PASSENGER ELEVATOR LOBBY	75	-	-	-	50	-	-	10	135	100	260	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
52ND-58TH	TYPICAL - OFFICE	55	12	15	-	-	-	12	8	102	50	152	TYPE 1	
	TYPICAL - TOILET ROOMS	55	12	-	-	50	-	12	8	137	50	187	TYPE 1	
	CORE - MER CORE - FREIGHT ELEVATOR VESTIBULE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - PASSENGER ELEVATOR LOBBY	75	-	-	-	50	-	-	10	135	100	235	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
59TH	TYPICAL - MECHANICAL	115	20	-	-	-	-	-	10	145	150	295	TYPE 3	*CONCRETE FILL AND MECHANICAL PADS
	CORE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
60TH	TYPICAL - MECHANICAL	80	20	-	-	-	-	-	50	150	150	300	TYPE 3	*CONCRETE FILL AND MECHANICAL PADS
	CORE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
61ST	TYPICAL - AMENITY	115	12	-	-	25	-		50	202	100	302	TYPE 1	
	TYPICAL - TOILET ROOMS	55	12	-	-	50	-		50	167	100	267	TYPE 1	
	CORE - MER CORE - FREIGHT ELEVATOR VESTIBULE	75	-	-	-	-	-	-	10	85	100	185	6" NWC SLAB	
	CORE - PASSENGER ELEVATOR LOBBY	75	-	-	-	50	-	-	10	135	100	235	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-	-	-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
62ND-63RD	TYPICAL - AMENITY	55	12	-	-	25	-		10	102	100	202	TYPE 1	
	CORE	75	-	-	-	50	-		10	135	100	235	6" NWC SLAB	
	CORE - STAIRS	130	-	-	-	-	-		-	130	100	230	CONCRETE RISERS*	*SEE STAIR PLANS AND DETAILS FOR CONSTRUCTION
64TH	ROOF - GLASS	40	12			-			-	52	40	92		
	ROOF - SLAB	80	12			20			10	122	100	222		
64M	MECHANICAL	80	20			50			10	160	150	310		
65TH	BMU-1	40	12			20			-	72	100	172		GRATING AT FLOOR
66TH	BMU-2	40	12			20			-	72	100	172		GRATING AT FLOOR
67TH	BMU-3	40	12			20			-	72	100	172		GRATING AT FLOOR
68TH	TOP OF BUILDING	80	20			20			10	130	40	170		

ONE VANDERBILT



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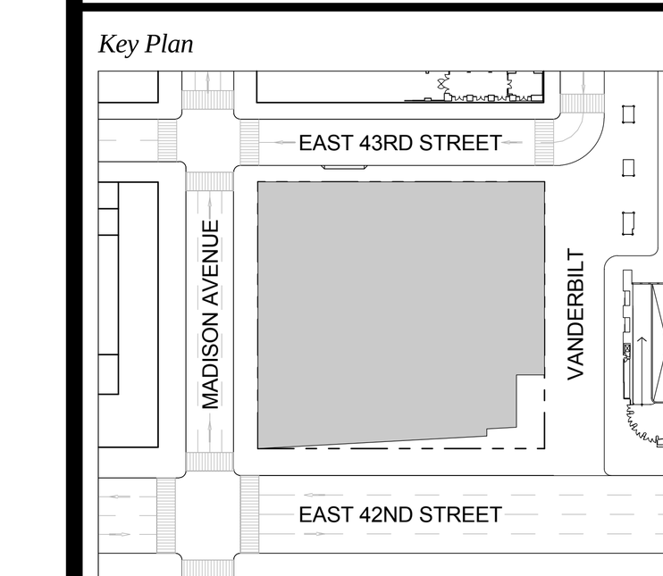

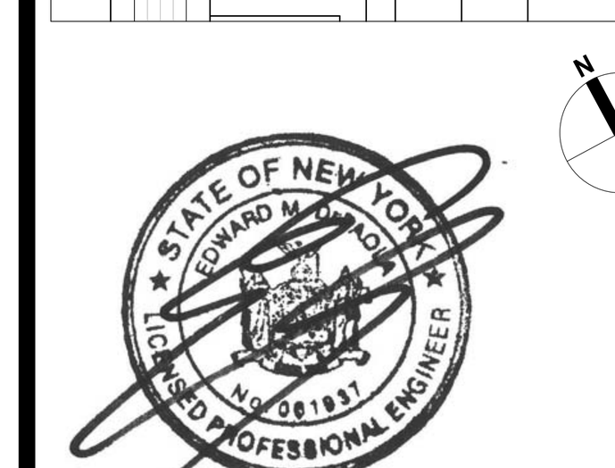

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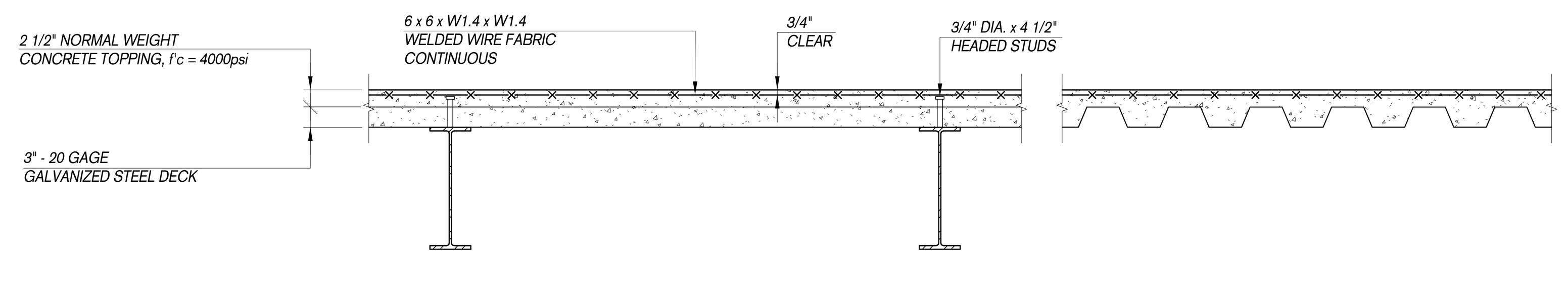
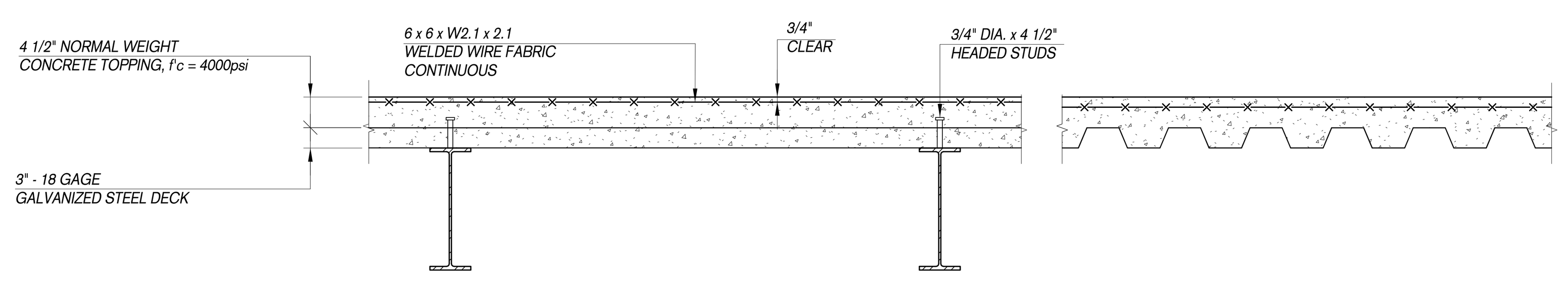
Drawing Title
LOADING SCHEDULE

Drawing Number
S-702.00
SHEET 8 OF 9



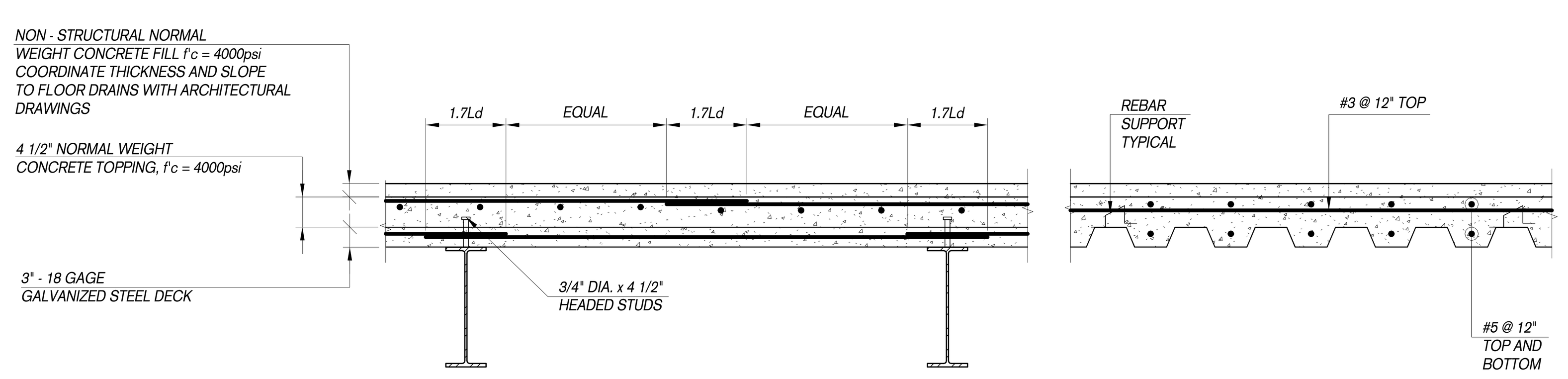
STRUCTURAL FLOOR TYPE 1

3/4" = 1'-0"



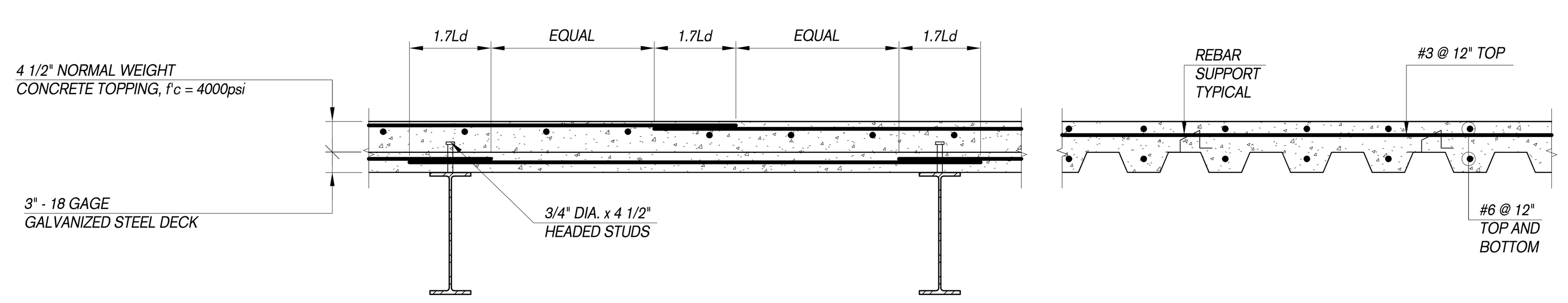
STRUCTURAL FLOOR TYPE 2

3/4" = 1'-0"



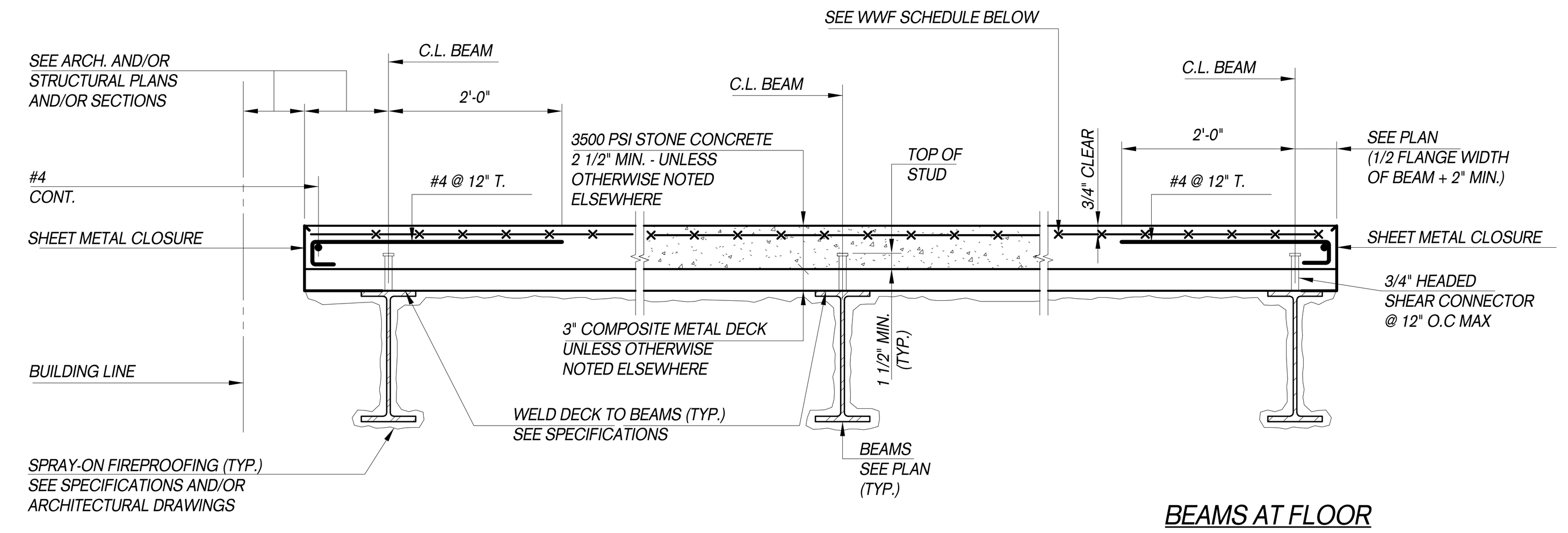
STRUCTURAL FLOOR TYPE 3

3/4" = 1'-0"



STRUCTURAL FLOOR TYPE 4

3/4" = 1'-0"



SPANDREL BEAMS | FLOOR BEAMS | BEAMS AT FLOOR OPENINGS

PARALLEL TO SPAN OF DECK

TYPICAL FLOOR CONSTRUCTION DETAIL

NOTES:

1. THE SIZE AND CONNECTION OF ALL SHEET METAL CLOSURES SHALL BE FURNISHED, DESIGNED AND SHOWN ON SHOP DRAWINGS BY THE METAL DECK MANUFACTURER AND INSTALLED BY THE METAL DECK CONTRACTOR.

2. CLOSURES SHALL BE DESIGNED TO SAFELY SUPPORT THE WET WEIGHT OF SUPERIMPOSED CONCRETE WITH MINIMAL DEFLECTION. SHORE IF NECESSARY.

3. ANY ATTACHMENT TO THE SLAB EDGE FOR SUPPORT OF EXTERIOR WALLS SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE WHERE THE PROJECT IS LOCATED AND SUBMITTED FOR THE REVIEW OF THE ENGINEER OF RECORD.

4. SHEAR CONNECTORS SHALL BE EQUALLY SPACED ALONG THE SPAN OF THE BEAM UNLESS OTHERWISE NOTED. THE TOTAL NUMBER OF SHEAR CONNECTORS PER BEAM IS SHOWN THUS (. . .) ON PLAN. SPACING OF STUDS NOT TO EXCEED 12" (AVERAGE OVER BEAM LENGTH)

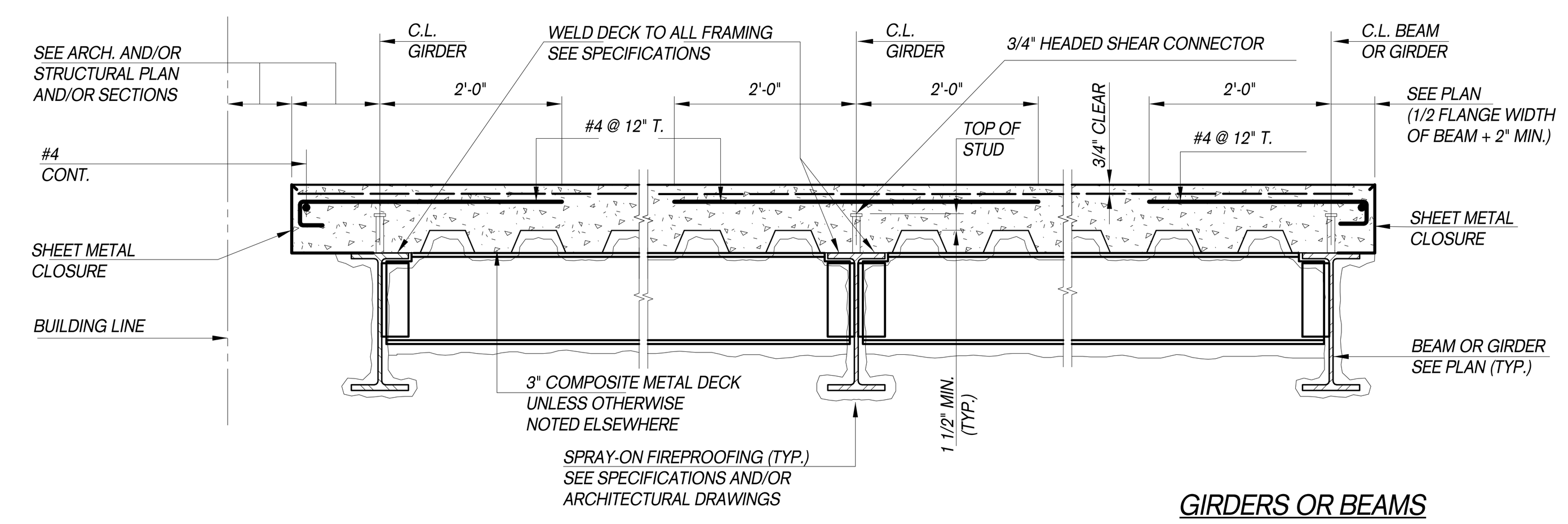
5. FOR GAGE AND TYPE OF DECK, SEE PLAN.

6. FASTEN SIDE LAPS OF ALL ADJACENT DECK UNITS BETWEEN SUPPORTS WITH SELF-TAPPING No. 8 OR LARGER MACHINE SCREWS OR BY WELDING, AT INTERVALS NOT EXCEEDING 24" o.c.

7. THE CONCRETE CONTRACTOR SHALL INCLUDE IN HIS BID THE ADDITIONAL QUANTITY OF CONCRETE THAT MAY BE REQUIRED TO COMPENSATE FOR METAL DECK, FILLER BEAM AND GIRDER DEFLECTION.

WWF SCHEDULE

THICKNESS OF CONCRETE COVER	MIN. WELDED WIRE REINFORCEMENT REQ'D
2 1/2"	6X6-W2.5 X W2.5
3 1/4"	6X6-W2.9 X W2.9
4 1/2"	6X6-W4.0 X W4.0
OTHER	0.0015 X CONCRETE AREA



SPANDREL GIRDERS | FLOOR GIRDERS | GIRDERS OR BEAMS AT FLOOR OPENINGS

PERPENDICULAR TO SPAN OF DECK

TYPICAL FLOOR CONSTRUCTION DETAIL

NOTES:

1. THE SIZE AND CONNECTION OF ALL SHEET METAL CLOSURES SHALL BE FURNISHED, DESIGNED AND SHOWN ON SHOP DRAWINGS BY THE METAL DECK MANUFACTURER AND INSTALLED BY THE METAL DECK CONTRACTOR.

2. CLOSURES SHALL BE DESIGNED TO SAFELY SUPPORT THE WET WEIGHT OF SUPERIMPOSED CONCRETE WITH MINIMAL DEFLECTION. SHORE IF NECESSARY.

3. ANY ATTACHMENT TO THE SLAB EDGE FOR SUPPORT OF EXTERIOR WALL SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE WHERE THE PROJECT IS LOCATED AND SUBMITTED FOR THE REVIEW OF THE ENGINEER OF RECORD.

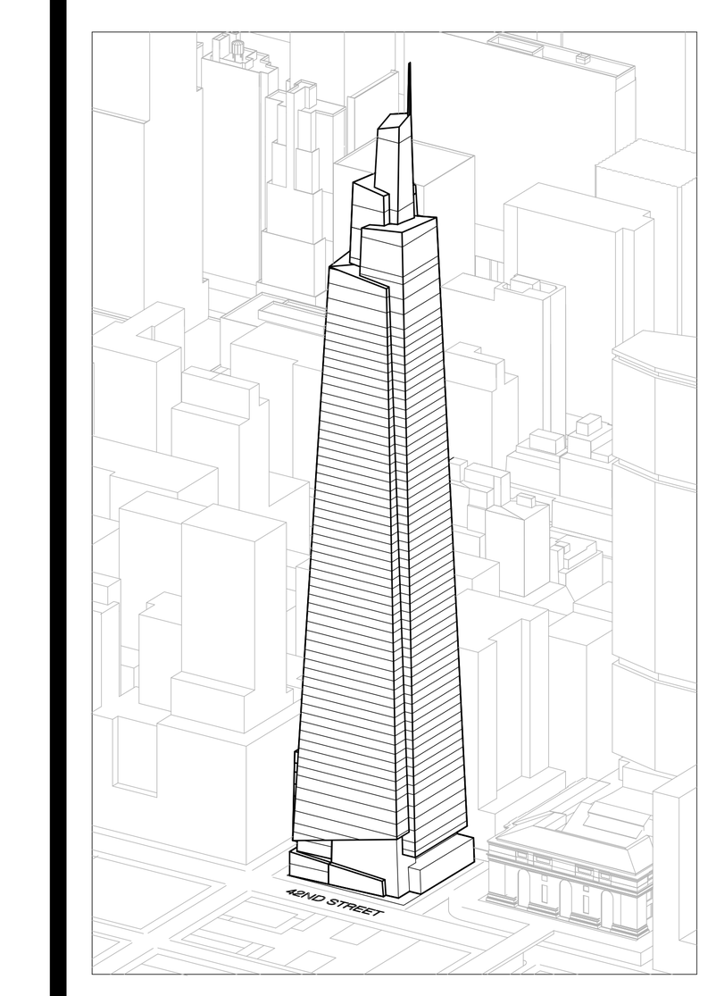
4. THE TOTAL NUMBER OF SHEAR CONNECTORS SHALL BE EQUALLY SPACED BETWEEN FILLER BEAMS OR BETWEEN COLUMNS AND FILLER BEAMS OR BETWEEN OTHER GIRDERS AND FILLER BEAMS. THE TOTAL NUMBER OF SHEAR CONNECTORS ARE SHOWN ON PLAN THUS (. . .), e.g. (. . .) (. . .) (. . .) SPACING OF STUDS NOT TO EXCEED 12"

5. FOR GAGE AND TYPE OF DECK, SEE PLAN.

6. FASTEN SIDE LAPS OF ALL ADJACENT DECK UNITS BETWEEN SUPPORTS WITH SELF-TAPPING No. 8 OR LARGER MACHINE SCREWS OR BY WELDING, AT INTERVALS NOT EXCEEDING 24" o.c.

7. THE CONCRETE CONTRACTOR SHALL INCLUDE IN HIS BID THE ADDITIONAL QUANTITY OF CONCRETE THAT MAY BE REQUIRED TO COMPENSATE FOR METAL DECK, FILLER BEAM AND GIRDER DEFLECTION.

ONE VANDERBILT



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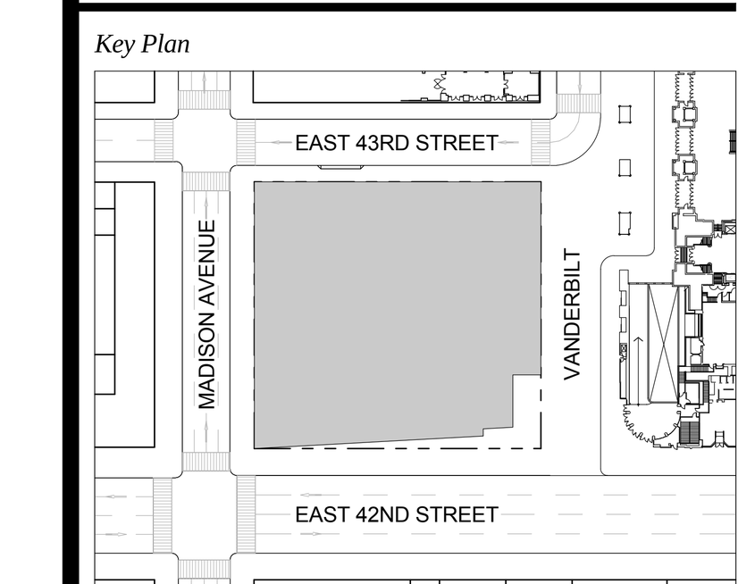

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TYPICAL FLOOR CONSTRUCTION DETAILS

Drawing Number
S-703.00
SHEET 9 OF 9