DIVISIONS 030000 THROUGH 060000 - STRUCTURAL DESIGN

SCOPE OF WORK SUMMARY

The structural scope of work will include the design of the Residential superstructure, transfer slab podium structure and all foundation elements required for support.

Minno Wasko has received a preliminary geotechnical investigation report but requires a final investigation report prior to design of the foundation system.

The 2nd floor will consist of a concrete, cast-in-place transfer slab, preliminarily identified as 12 inches in thickness with drop panels and column caps as needed and identified in the structural design process. The 3rd floor framing above the amenity area will consist of steel framing to maximize an open space. Steel beams in the amenity area(s) will be located below bearing walls above, supporting pre-engineered 18-inch floor trusses. Remaining areas of the 3rd floor as well as 4th floor will consist of pre-engineered 18-inch floor trusses. Corridor framing will consist of 2x10's at 16 inches on center (o/c). The roof framing will consist of pre-engineered roof trusses. Beams and posts for the wood framed areas of the project will be constructed with dimensional lumber. Where loads exceed the capacity for dimensional lumber, pre-engineered wood girder trusses will be used for beams or engineered lumber for beams and posts. Corridor and unit separation walls will be used to resists lateral loads along with holddown hardware at each shearwall.

Minno Wasko has requested a site survey of the first-floor elevations of adjacent buildings. Sheeting may be required to prevent lateral soil pressure from impacting adjacent structures or adjacent structures impacting the proposed foundations for 397 Millburn Avenue, based on results of the adjacent building site survey.

Cast-in-place concrete retaining walls and sheeting are anticipated to be utilized, as needed, around the perimeter of the building to facilitate excavation. Sheeting may be required based on limitations of soil layback for excavation. Sheeting activities are to be coordinated between the general contractor and excavation contractor.

Structural foundations for landscape and site work elements are excluded from the structural scope of work. All structural work within scope will be coordinated with the architectural design team and with the work of other engineering disciplines involved in the design of the project.

1. PRELIMINARY SITE PREPARATION WORK

A preliminary Geotechnical Due Diligence Investigation report was prepared by JZN Engineering (JZN), dated April 2020. The report is noted as preliminary and indicates it should not be used for final design. Site recommendations were not identified in the JZN due diligence report.

Minno Wasko recommends after on-site structures are demolished and all above and below-ground structural elements including the in-place foundations near the proposed building should be removed. All existing utilities should be located and removed or rerouted beyond the limits of the proposed building.

2. DESCRIPTION OF STRUCTURAL SYSTEMS

A. Foundation System – JZN has provided the following recommendations that have been noted as preliminary and not to be used in final design:
   a. The foundation system will conceptually consist of shallow foundations bearing on underlying natural glacial deposits, or on Compacted Granular Fill (CGF) following the removal of existing fill materials and soft cohesive soils and replacement in a controlled manner with CGF.
   b. JZN reports that it is feasible the building may be designed for an allowable bearing pressure of 4,000 pounds per square foot (PSF).
   c. Where exposed to frost, footings are to bear a minimum of 36 inches below adjacent grade.

B. Ground Floor Slab – JZN has noted that slabs on grade are acceptable. Slabs on grade within parking areas will consist of 5 inches of normal weight concrete reinforced with 6x6 welded wire fabric on six inches of 3/4 inch crushed stone.

C. Transfer Slab – The second floor consists of a cast-in-place flat slab to support the residential wood floors above and transfer load to concrete columns and the foundation below. Preliminary slab thickness is based on recommendations by the American Concrete Institute (ACI). Based on ACI recommendations a 12-inch slab without drop panels can clear span approximately 30 feet.

D. Residential Wall Construction - The exterior wall and corridor wall construction for the residential area of the building will consist of 2x6 wood studs, sheathed with oriented strand board (OSB). Interior bearing walls will consist of either 2x4 or 2x6 wood studs. Posts supporting beams in bearing walls will consist of a minimum of 2 jack studs and 1 king stud. Non-load bearing walls within the residential building will be constructed of wood studs framed in accordance with project specifications and building code requirements.

E. Residential Floor Construction - The floors of the residential buildings will be framed with 18” pre-engineered wood floor trusses. Floor trusses are a delegated design with performance criteria outlined in the structural drawings. Review of shop drawings submitted for the trusses will be performed by the Engineer of Record to assure compliance with the requirements noted. Wood trusses have open web areas to accommodate utilities to pass through the floor-ceiling space, reducing the need for soffits. Bottom bearing floor trusses will be supported on double top plates on all bearing walls. The subfloor will consist of 3/4-inch-thick tongue-groove plywood of exterior grade 1, permitting exposure to the weather during construction without adversely affecting the subfloor strength. The subfloor will be indicated to be glued and nailed to the floor trusses.

   The amenity area(s) and lobby will consist of steel columns and steel beams that support bearing walls above. Floor framing between steel beams will consist of 18” pre-engineered floor trusses. Steel framing is utilized in the amenity areas and lobby to maximize openness of the subject space(s).

F. Beams and Headers – Beams and headers will be framed with pre-engineered wood girder trusses or engineered lumber (i.e. PSL's) when the loads exceed the capacity for conventional lumber framing. Per the plan notes, the subject members will be indicated as flush or dropped.

G. Residential Roof Construction - The roofs of the residential buildings will be framed with pre-engineered wood trusses of varying depth to achieve the roof shapes desired. Roof trusses are a delegated design with performance criteria outlined in the structural drawings. Review of shop drawings submitted for the trusses will be performed by the Engineer of Record to assure compliance with the requirements noted.

H. Vertical Shafts - Stair and elevator shafts will be constructed of 8-inch reinforced masonry with metal-pan stairs at the residential floors and cast-in-place concrete below the transfer podium level. Design of the floor framing within the stair towers is a delegated design with performance criteria outlined in the structural drawings. Review of shop drawings submitted for the stair framing will be performed by the Engineer of Record to assure compliance with the requirements noted.

I. Lateral Load Resisting System – At the transfer slab podium structure, reinforced concrete columns shall be designed to resists lateral loads (wind or seismic) to which the building is subjected as ordinary reinforced concrete shear walls.

Corridor walls, unit separation walls, and exterior walls will be designed to resist all lateral loads to which the building is subjected, including wind and seismic forces, as light-framed shear walls. Sheathing materials typically include gypsum board, OSB, and Thermo-Ply Structural Sheathing, which will be designed and detailed to resist the lateral forces through nailing patterns of the sheathing to the studs, as required. In addition, bolted hold-downs will be utilized at each of the subject shear walls to resist the resultant uplift and overturning forces on the walls and transfer such forces to the foundations. Where applicable, tension ties will be used in place of bolted hold-downs.

3. STRUCTURAL DESIGN CRITERIA

A. Construction Materials

a. Concrete Strength:

i. Footings and Foundation Walls	Normal weight 4,500 PSI
ii. Interior Slab on Grade	Normal weight 4,500 PSI
iii. Columns and Transfer Slab	Normal weight 6,000 psi

b. Masonry:

i. Concrete Masonry Units	Normal weight ASTM C90
ii. Mortar	Type S
iii. Grout	2,000 PSI minimum

c. Reinforcing Steel:
   i. Concrete and Masonry Walls — 60,000 psi
   ii. Slabs on Grade — 6x6 welded wire, ASTM A185, flat sheets

d. Lumber:
   i. Bearing Walls and Vertical Elements — Douglas fir-larch, Stud grade
   ii. Floors and Horizontal Elements — Hem-fir (north), No. 2 grade
   iii. Wall Sheathing — 7/16” OSB OR PLYWOOD
   iv. Roof Sheathing — 5/8” Plywood, Exterior Grade, Exposure 1
   v. Floor Sheathing — 3/4" Plywood, Exterior Grade, Exposure 1
   vi. Metal Framing Anchors — Simpson Strong-Tie (Basis of Design)

B. Codes and Standards

a. 2018 International Building Code, New Jersey Edition
b. ASCE 7-16 Minimum Design Loads for Buildings and Other Structures

C. Code-Prescribed Standards

a. ACI 301 Specifications for Structural Concrete
b. ACI 318 Building Code Requirements for Structural Concrete
c. ACI 530 Building Code Requirements for Masonry Structures
d. AFPA National Design Specification for Wood Construction
e. ASTM American Society for Testing and Materials

D. Design Criteria – Geotechnical

a. Soil Bearing Capacity — 4,000 PSF (to be confirmed)
b. Frost Depth — 36 inches

E. Design Criteria – Roof and Floor Surfaces

a. Roof Trusses, Live Load:
   i. Storage: 20 PSF Applied to bottom chord
   ii. Wind: See Design Criteria – Lateral Loads, Wind
   iii. Snow Loads:
      1. Ground Snow Load — Pg = 25 PSF
      2. Flat Roof Snow Load — Pf = 25 PSF
         Note: Snow Loads on lower roofs/valleys/behind parapets, etc. will be higher
      3. Snow Exposure Factor — Ce = 1.0
      4. Snow Load Importance Factor — I = 1.0

5. Thermal Factor Ct = 1.0

b. Roof Trusses, Dead Load:
   i. +/- 50 PSF applied to the top chord at rooftop condensers, to be confirmed with MEP consultant
   ii. 10 PSF applied to the top chord (roofing membrane, insulation, deck material)
   iii. 5 PSF applied to the bottom chord

c. Floor Trusses, Live Load:

i. Storage Areas	125 PSF
ii. Mechanical Rooms	125 PSF
iii. Lobbies	100 PSF
iv. Corridors	100 PSF
v. Egress Stairs	100 PSF
vi. Residential Floor	40 PSF
vii. Decks	100 PSF

d. Floor Trusses, Dead Load:
   i. 25 PSF Applied to the top chord (wall partitions, gypcrete, deck material)
   ii. 5 PSF applied to the bottom chord

F. Deflection Limitations

a. Roof Trusses:

i. Total Load Deflection	L/240 (1 inch maximum)
ii. Live Load Deflection	L/360

b. Floor Trusses:

i. Total Load Deflection	L/360 (1 inch maximum)
ii. Live Load Deflection	L/480

G. Design Criteria – Wind Load Parameters

a. Ultimate Wind Speed (3 second gust)	Vult = 115 MPH
b. Nominal Wind Speed (3 second gust)	Vasd = 90 MPH
c. Risk Category	II
d. Wind Exposure	B
e. Internal Pressure Coefficient	GCpi = +/-0.18

f. Wind Load on Structural Frame:

Height	North/South Direction	East/West Direction
0 – 15 feet	16 PSF	16 PSF
15 – 20 feet	16 PSF	16 PSF
20 – 25 feet	16 PSF	16 PSF
25 – 30 feet	16 PSF	16 PSF
30 – 40 feet	16 PSF	16 PSF
40 – 50 feet	16 PSF	16 PSF

Roof:

Windward Roof	+7/-23 PSF	+7/-23 PSF
Leeward Roof	+7/-23 PSF	+7/-23 PSF
Overhang & Eaves	+9/-23 PSF	+9/-23 PSF

Wind Loads on Components and Cladding:

Walls:

Typical Wall	+21/-23 PSF
Wall Corners	+21/-34 PSF
Parapet Walls	+76/-51 PSF

Roof:

Typical Roof	+20/-23 PSF
Roof Perimeter	+20/-44 PSF
Roof Corners	+20/-66 PSF
Roof Overhang and Eaves	+20/-66 PSF

H. Design Criteria – Seismic Design Information

a.	Risk Category	II
b.	Seismic Importance Factor	1.0
c.	Mapped Spectral Response Acceleration	Ss = 0.279
		S1 = 0.059
d.	Site Class	C (anticipated by geotechnical report)
e.	Site Coefficient	Fa = 1.3
		Fv = 1.5
f.	Adjusted Mce Spectral Resp. coeff.	S_{MS} = .362
		S_{M1} = 0.088
g.	Design Spectral short period acceleration	S_{DS} = 0.241
h.	Design Spectral one second period acceleration	S_{D1} = 0.059
i.	Seismic Design Category	B
j.	Basic Seismic-Force Resisting System	Light Framed Walls
		with Shear Panels
k.	Seismic Response Modification Coefficient	R = 2
l.	Seismic Overstrength Factor	Omega = 2.5
m.	Seismic Deflection Amplification Factor	Cd = 2
n.	Analysis Procedure Used	Equivalent Lateral Force