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Maileg

Structural Narrative

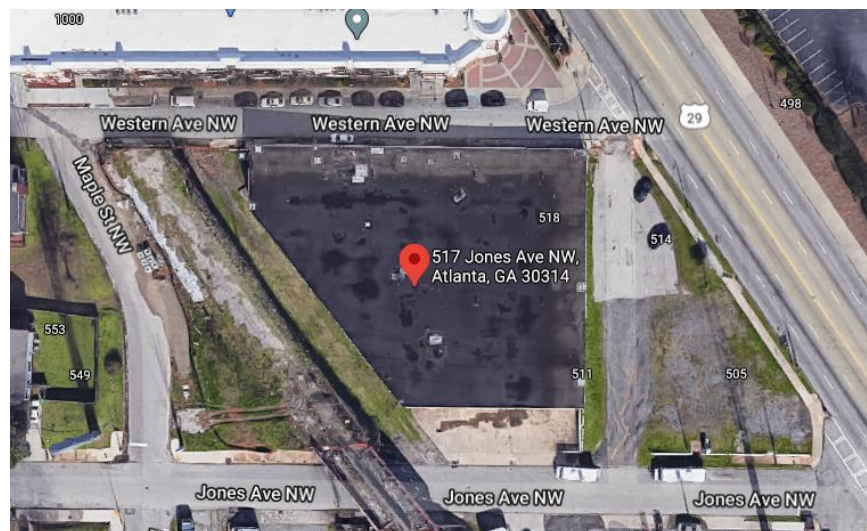
517 Jones Avenue

The project is an adaptive reuse of the existing building located at 517 Jones Avenue in Atlanta, Georgia. The buildings will remain a warehouse with two building additions of office space. The addition at the east elevation will be elevated and have covered parking below the addition. There will also be an interior addition of a mezzanine in one bay of the existing building to transition to the new building on the east side. The west elevation will be modified with additional storefront associated with new program space within the original building footprint. There may be an addition of a green roof on the warehouse building. The governing building code for the project is the International Building Code (IBC), 2018 Edition with Georgia Amendments and Chapter 34 of the 2012 IBC for existing structures.

This narrative is based on a site visit, coordination meetings, and schematic drawing provided by Smith Dalia Architects.

The existing building is believed to have been constructed in the early 1960's. The building is a single-story structure with load bearing masonry exterior walls and steel columns at the interior. The roof consists of joists and steel beams supporting cementitious roof panels. There is not a clearly defined lateral force resisting system, but it is assumed the exterior load bearing walls are providing the lateral stability for the buildings. The exterior brick walls appear to consist of single wythe 12" wide jumbo hollow core clay masonry units.

The building site varies in grade. The east side of the building, where one of the additions will occur is approximately 7'-0" above the finished floor elevation of the building. There is a loading area at the south side of the building that is approximately 4'-0" below the building elevation to accommodate truck loading at four existing dock doors.



Project Site

The internal building addition will consist of a mezzanine space 10'-0" above the building finish floor. The mezzanine area is approximately 3025 gsf. There will be office space at and below the mezzanine and include a break room and restrooms. The elevated area will be accessed by stairs from the main floor level, and exterior door from the parking area, and steps up into the new building addition. The mezzanine structure will be a steel beams and columns supporting a composite metal deck with concrete floor system. The existing roof in this area will be removed and raised to from 17'-0" up to 22'-6" above the warehouse floor elevation on the low side and slope up to the addition roof at 29'-0". The roof will be framed with steel beams and columns supporting open web steel joists and galvanized metal deck. New foundations will be required to support this building addition. Lateral support for the mezzanine can be shear walls or steel braced frames. Additional bracing will be required between the new high roof and the existing roof to transfer lateral loads to the new lateral force resisting system.

Other modifications to the existing building include new fenestration along the west and north elevations. A lateral analysis will be required to determine the amount of opening in the existing walls that are assumed to be the lateral system for the structure. New lintels will be required at all openings. The roof will have new skylights and potentially a green roof. The skylights will require perimeter framing between the existing roof joists to adequately support the roof edge and the skylight frame. The green roof will require augmentation to the building due to the added dead load from the tray system. The addition of the vegetative trays creates an approximate 1/3 increase in total roof load. Either the existing joists can be augmented, or additional joists can be added to support the load. The support beams and columns will have to be analyzed in the area of the green roof to determine if augmentation is required for these elements as well. The foundations will most likely need to be increased in the green roof areas for the additional load.

Some repair work will be required in the warehouse including roof leaks and masonry cracks. The north west corner of the building has significant settlement cracks and cracks in the masonry pilaster supporting the roof beam in this area. It appears that there was prior repair to this area. Since this is new cracks over the repair work, further investigation is required to verify if there is settlement occurring. Helical piers may be required to re-support the building corner in this area. A geotechnical study will be required to determine the subsurface soil conditions.

The new building addition at the east side has a floor elevation 17'-0" above the warehouse floor and 7'-0" above the mezzanine. The exterior grade in the area is also at approximately 7'-0" above the warehouse floor and aligns with the mezzanine. There will be parking at grade below this addition. The entry into this building will have a lobby at the 7'-0" elevations with steps up to the office floor and direct access to the mezzanine level. There will be an outdoor terrace at the south end of this addition. The floor structure will be a steel beams and columns supporting a composite metal deck with concrete floor system; the floor thickness will be dependent on the required fire rating of the assembly. The roof in this area will be 29'-0" above the warehouse floor elevation. The roof will be framed with steel beams and columns supporting open web steel joists and galvanized metal deck. New foundations will be required to support this building addition. The columns adjacent to the existing building will have foundations supported by helical piers or micro piles to transfer the load below that of the at the existing building wall and foundation. Lateral support will be steel braced frames parallel to the parking spaces and a continuous moment frame at the east side of the addition to facilitate parking access. This addition will be structural isolated from the existing building with 2" expansion joint.

There will be a new site wall along the west side of the building. The wall will be approximately 17'-0" tall. It is assumed that the wall will be constructed with 12" concrete masonry units (CMU).

DESIGN CRITERIA

Design Floor Loads

Live Loads (reduced as allowed by the Building Code):

▪ General Areas: lobbies, assembly spaces, terraces	100 psf
▪ Egress Corridors	100 psf
▪ Office Space	50 psf
▪ Partitions	15 psf
▪ Parking	40 psf
▪ Warehouse (assumed)	125 psf

Design Roof Loads

Live Loads (reduced as allowed by the Building Code):

▪ Roof	20 psf
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Dead Loads (in addition to the structure self-weight):

▪ Ceiling/MEP	6 psf
▪ Miscellaneous	3 psf
▪ Roof/Insulation	9 psf
▪ Roof Top Equipment Zones	40 psf
▪ Roof Top Vegetative Trays	22 psf

Snow Loads:

▪ Ground Snow Load	5 psf
Drifts Included for unbalanced Snow Included	

Design Wind Loads

▪ Ultimate Wind Speed	106 mph
▪ Exposure	B
▪ Importance Factor	1.0

Design Seismic Loads

▪ Seismic Factors S_s , S_1 , and Soil Profile Type were determined using applicable building code tables and figures.	
▪ 0.2 Sec. Design Spectral Response Acceleration	$S_s = .184$
▪ 1.0 Sec. Design Spectral Response Acceleration	$S_1 = .085$
▪ Site Class- assumed	D
▪ 0.2 Sec. Design Spectral Response Acceleration	$S_{D5} = .197$
▪ 1.0 Sec. Design Spectral Response Acceleration	$S_{D1} = .131$
▪ Seismic Risk Category	II
▪ Seismic Performance Category	C

New Construction

▪ Structural Systems	
Basic Structural System	
Seismic Resisting System	Steel Systems not Specifically Detailed for Seismic Resistance
R	3
C_d	3
Overstrength Factor	3

MATERIAL PROPERTIES

Reinforcement

- Reinforcing Steel ASTM A615, Grade 60

Normal-Weight Concrete

- Foundation elements 3,000 psi
- Slab-on-Grade 4,000 psi
- Retaining Walls 4,500 psi

Concrete Masonry Units

- Minimum compressive strength 1,500 psi

Structural Steel

- W Shapes ASTM A992, 50 ksi
- M, S, HP, C, MC, L Shapes ASTM A36
- Round Hollow Tubing ASTM A500, GRADE B, 42 ksi
- Shaped Steel Tubing Walls ASTM A500, GRADE B, 46 ksi
- Misc. Plates / ASTM A36
- Non-High Strength Bolts ASTM A307
- High Strength Tension Bolts ASTM A325
- Anchor Bolts ASTM 1554, 36 ksi

DESCRIPTION OF STRUCTURAL SYSTEM

Site Preparation

- Regrading at the east building addition/parking areas may be required.
- The contractor shall proof roll areas of new construction to identify soft soils.

Foundations

- A geotechnical report will be required.
- Foundations are assumed to be shallow spread footings and continuous strip footings bearing on soil capable of supporting 3,000 psf and 3,000 psf, respectively.
- New foundations immediately adjacent to the existing building will need to be supported on helical piers or micro piles to avoid surcharging the building wall and foundations below grade. Alternately, the foundations will have to be lowered to that of the existing building, requiring additional excavation.

Slab on Grade

- The existing floor slab in the warehouse building will remain in place.
- The slab on grade in the building addition at the parking area will be 5 inches thick reinforced with WWF 6x6 – W2.9xW2.9 welded wire fabric. A turned down slab edge bearing 12 inches below grade will be along each side of the connector.
- The entry stairs will be constructed on grade. Steps shall be reinforced with #4 reinforcing bars spaced at 12" on center each direction with a #4 nosing bar in each tread.

Mezzanine and Office Floor

- The elevated floor slab system will include a 5 1/2-inch-thick, normal weight concrete slab including a 2" composite 18 gage steel deck with WWF 6x6 - W2.1xW2.1 reinforcing.
- The elevated floor slab will be supported by steel composite beams and girders; maximum depth of 16" at the beams and 18" for the girders.
- Structural steel supporting masonry will be design to a deflection limitation of L/600. Members supporting masonry may be deeper than the typical floor steel members.
- There will be stairs from the warehouse floor to the mezzanine and from the mezzanine into the new office floor. The stairs are anticipated to be steel framed with channels.
- Estimated material requirement for primary members (joists, girders, columns, and braced frames) is 12 pounds per square foot of gross floor area. Material for secondary members (edge angles, bent plates, opening framing, etc.) and special structures (e.g. canopies, handrails, and stairs) is in addition to the above estimate.
- Shallower members may be desired at the mezzanine to maximize head room. Shallower members will increase the estimated pounds per square foot.

Columns

- Column types can include 8-inch steel wide flange members or 4" and 6" HSS steel tubes. Anticipated sizes include W8x24 and W8x31 or HSS 4x4 and HSS 4x6 members. These sizes are based on a building grid system of approximately 25'-0" x 30'-0".

Lateral Force Resisting System

- The existing lateral force resisting system appears to be provided by the existing exterior masonry walls. Due mezzanine addition to the existing building, supplementary lateral bracing will be required at the mezzanine floor and roof. The bracing will allow continuity for the existing roof diaphragm that will be removed from the eastern shear wall.
- Lateral bracing for the new construction will be a combination of braced frames and moment frames. The braced frames will span in the east west direction at each level, and the north south direction above the parking level. The north south stability will be provided by a moment frame at the eastern edge of the lowest level to allow open access for the parking area.
- The size of openings in the existing masonry walls will be controlled by the lateral demand/capacity for these walls.

Wall Penetration

- Penetrations will be added in the existing load bearing masonry walls to accommodate new doors, window. New lintels will consist of steel channels. A C8x11.5 channel will be placed on each side of the wall above the new opening and extending 2 feet on each side. The channels will be through bolted together with 3/4 inch diameter bolts at 2 feet on center to provide a header. Four additional bolts will be required at each end of the channels. Once the channels are installed, the wall below can be removed without having to shore the wall above or the roof.

Roof Structure

- The new roof system will include 1-1/2" metal deck (galvanized, 20 gage).
- The roof deck will be supported by steel beams and steel girders at the mechanical bay and steel open web joists and steel girders typically. Joist are anticipated to be 16" deep and steel girders are anticipated to be 18" deep
- Miscellaneous steel will be required around the perimeter of mechanical units and roof penetrations 12" and larger.
- Estimated material requirement for primary members of the new construction (joists, girders, columns, and braced frames) is 10 pounds per square foot of gross roof area. Material for secondary members (edge angles, bent plates, opening framing, joist bridging, etc.) is in addition to the above estimate.
- The existing roof will require modification if a green roof is added. If additional framing is used to support the added weight, consideration must be made regarding installation based on existing systems that may obstruct the installation. Alternately the existing joists must be augmented by adding steel bars and/or angle the each of the member webs and top and bottom flanges.