

Structural Description



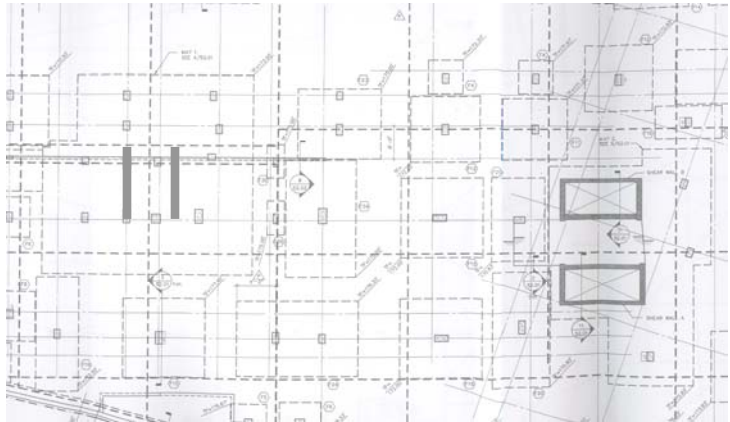


Structural Description

Foundation

The primary foundation structures of the Odyssey are concrete footings of various rectangular sizes, depths, and reinforcement throughout the lower garage level footprint.

Individual column footings are typical; however 54" deep mat footings distribute larger gravity loads and resist overturning from integrated shear walls. The primary mat foundation spans over numerous columns which support shear walls beginning on the 1st floor of the building. A second mat footing resists the lateral overturning through core shear walls located around the central elevator shafts depicted in a partial foundation plan shown to the right.

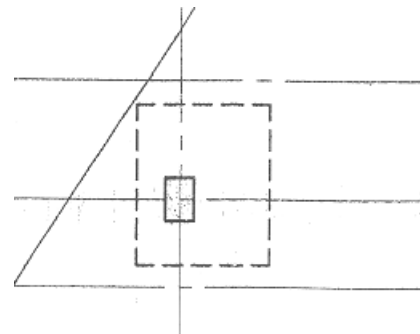


Continuous strip footings typically sized at 2'-0" x 1'-4" support a perimeter bearing wall surrounding the lower garage levels.

Floor Systems

The lower garage level (B3) is composed of 4" concrete slab ($f'c=5ksi$) on grade and reinforced with 6x6 – w1.4 x w1.4 wire mesh on 6mil vapor barrier over 6" compacted gravel.

The remaining lower garage levels through the first floor are primarily 8.5" conventionally reinforced 2-way concrete flat plate with drop panels. Drop panels are located at specified columns and typically extend 4-1/2" to 8" below the slab. Typical bays sizes for the reinforced two-way system are 25'x25' and 17'x25'. The columns throughout the lower garage levels are placed according to parking space arrangements and vehicle egress. The garage column placement dictates the location of columns throughout the upper levels and result in offset arrangements in the tower structure.

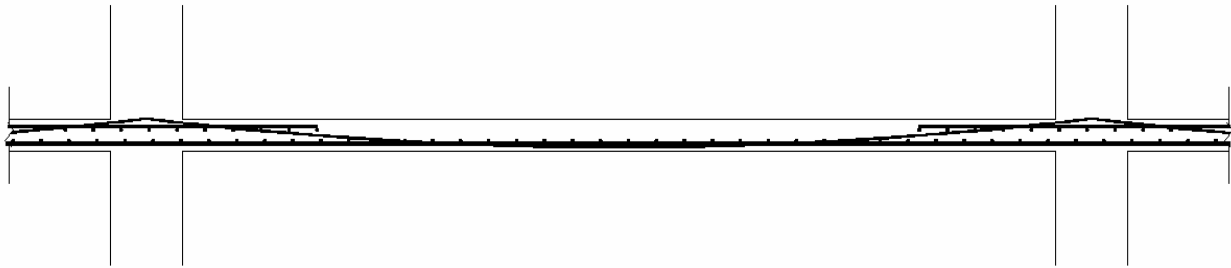




The Odyssey Condominium

Aaron Snyder
Structural Option

The Odyssey tower is primarily an 8" two-way post tensioned flat plate ($f'_c=5\text{ksi}$) with continuous bottom reinforcement of #4 bars @ 24" o.c in each direction. Negative moment reinforcement of the slab at column junctions is typically #4 bars developed to $.33l_n$ in both span directions. The post tensioning are 7 wire strand tendons spanning over typical frames in the short direction and draped at mid spans increasing the allowable stresses in the concrete. The post-tensioned flat plate construction yields higher span/depth ratios effectively reducing overall structural depth and material quantity. Floor bays vary in size and orientation however 25' x 22' and 25' x 28' are typical.



Typical Flat plate Post-Tensioning and Reinforcement Layout

Columns

The columns of the Odyssey, levels 1-16, support the floor systems and are typically sized at 18" x 26" with #11 bar reinforcement. Round columns are found at the corners of the tower with primarily architectural design influences not to detract from symmetric corner strip windows with conventional rectangular columns. Concrete strengths vary to resist accumulated gravity loads and increase constructability by maintaining column uniformity.

Levels B3-B1 : 6000psi

Levels 1-4 : 8000psi

Levels 5 : 6000psi

Levels 6-16 : 5000psi



Lateral System

The lateral resisting structural elements of the Odyssey are groupings of shear walls placed throughout the floor plan integrated with a slab frame system. The entire post tensioned flat plate system acts as series of moment frames transferring lateral forces through the plate into adjacent columns. Banded tendons span longer frame directions and are depicted in the floor plan creating primary slab frames acting in combination with shear walls to resist direct effects on the building. Open residential spaces in the building limited feasible locations for shear wall construction capable of resisting full lateral forces. The integrated dual system enables minimal space intrusions of shear walls by placement around slab openings and egress towers. The contribution of the post-tensioned slab frame effectively distributed lateral forces with the central shear walls to the 4th floor. The locations of the shear walls are depicted below in plan with a description of each wall included on the following page.

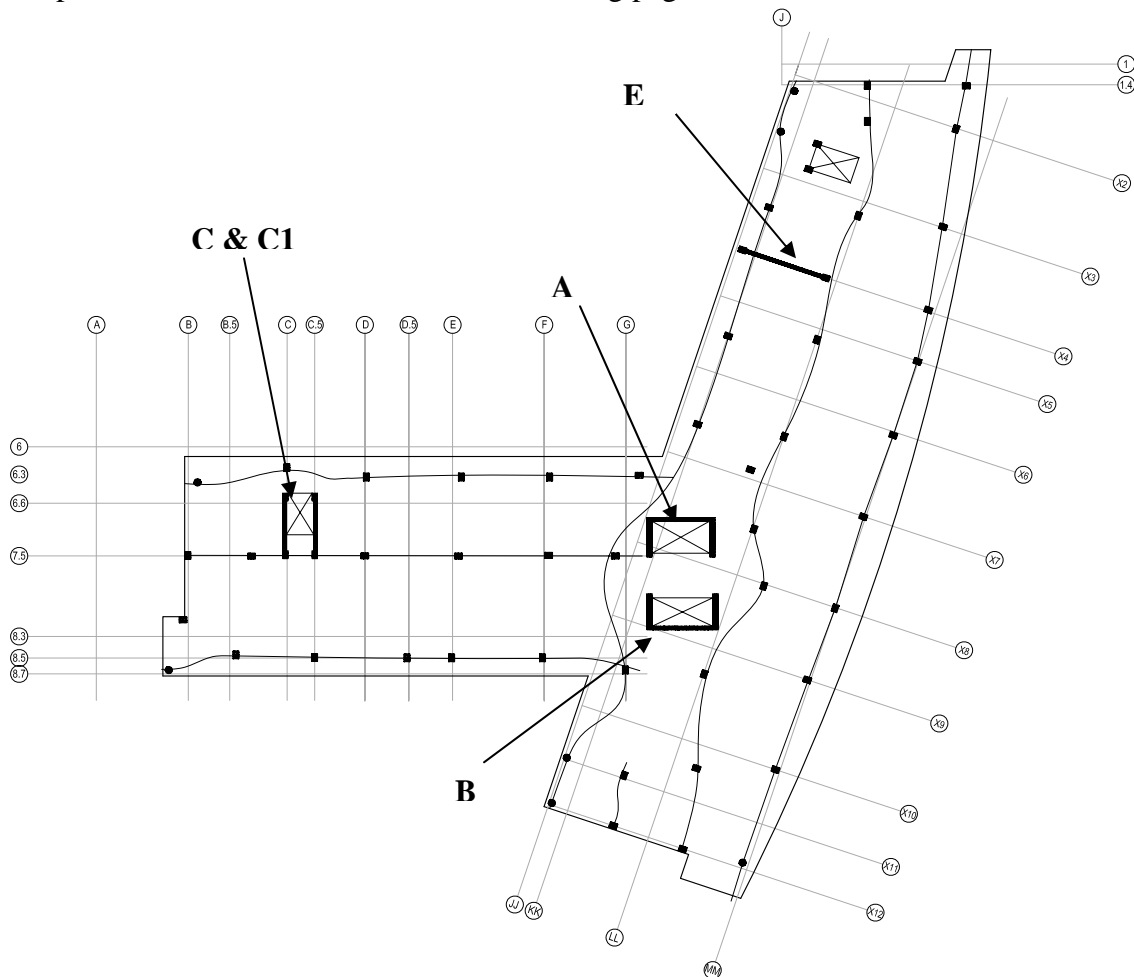


Fig. – Typical Floor Plan / Banded PT Layout



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Shear wall A:

Location: Surrounds 2 central-north elevator shafts

Range: B3 - 4th level

Size: North-South walls - 14' x 10'

East-West wall - 10'x17'-10"



Shear wall B:

Location: Surrounds 2 central-south elevator shafts

Range: B3 - 4th level

Size: North-South walls - 14' x 10'

East-West wall - 10'x17'-0"

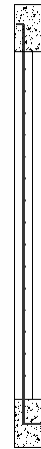


Shear wall C , C1:

Location: Adjacent sides of the West stair tower.

Range: 1st - 16th level

Size: 10'x 13'-10.5"



Shear wall E:

Location: Column line X4 - North side of East tower

Range: 1st - 14th level

Size: 10'x 29'-5"

