

DRAFT Structural Narrative

Shattuck Terrace Green Apartments

2190 Shattuck Avenue
Berkeley, CA

May 31, 2016
TSE Job: 2016,015

Summary

The proposed building, located at the corner of Shattuck Ave. and Allston Way, is an 18 story, 180 feet tall concrete structure of Type 1-A construction. The development comprises approximately 244,000 square feet, incorporating below grade parking, ground floor retail space, and apartments. Above the 13th story, there is a prominent setback away from Shattuck Ave., where the eastern portion of the structure tops out approximately 120 feet above grade, while the western portion extends up to 180 feet. Two stories of below-grade parking place the building foundation approximately 36' below grade.

Gravity System

Above grade, the gravity system consists of 9" thick two-way post-tensioned (PT) concrete flat slabs supported by a regularly spaced grid of columns and walls, with spans up to 31 feet long. At the ground level and first level below grade, the floors will consist of conventionally reinforced concrete slabs supported on the same column grid. Concrete columns will have a minimum dimension of 24 inches square while the walls will vary in thickness from 18 to 30 inches. Due to the arrangement of vehicular circulation, columns supporting the tower will need to be relocated at the ground floor using deep transfer girders at four locations to avoid interfering with the ramp.

Lateral System and Seismic Design Considerations

The primary lateral system consists of special reinforced concrete shear walls. A combination of core walls and planar walls resists lateral forces. The concrete core walls consist of two C-shaped walls connected by concrete encased wide flange coupling beams. The supplementary planar walls are oriented North-South and situated on the Eastern side of the structure to help resist torsion.

Below grade, perimeter basement walls are used to both retain soil and resist lateral forces. The ground level floor acts as a lock-off level, transferring lateral forces from the core and planar walls out to the basement walls.

The design of the lateral system will follow a prescriptive approach utilizing a dynamic modal Response Spectrum Analysis (RSA). The California Building Code permits concrete shear wall structures to exceed the 160' limit without employing a dual lateral system provided the following conditions are met:

1. No plane of walls resists more than 60% of the total seismic force in each direction.
2. The structure is regular in plan and does not exhibit significant torsional tendencies.

The layout of the walls is arranged such that no plane of walls resists more than 60% of the total seismic force, and the structure is proportioned to limit the effects of seismic torsion.

If, during the design process, the proportions of the structure are unable to be maintained such that the above criteria are met, the prescriptive approach relying solely on concrete shear walls will not be allowed by the Code. Instead, a performance based approach will be necessary to demonstrate that the shear wall-only structure is in conformance with the Code.

Based on a preliminary lateral analysis, story drifts are anticipated to be on the order of 1.5%.

Foundations and Below-Grade Construction

The structure is founded on a concrete mat foundation located at the second basement level. The mat foundation system provides an efficient system for resisting gravity and seismic loads while resisting hydrostatic pressures from groundwater.

Below-grade construction will need to be closely coordinated with the existing conditions around the site perimeter. Existing concrete buildings border the west and north sides of the site. The east property line is bordered by Shattuck Avenue and an existing BART tunnel, while Allston Way forms the south edge of the site.

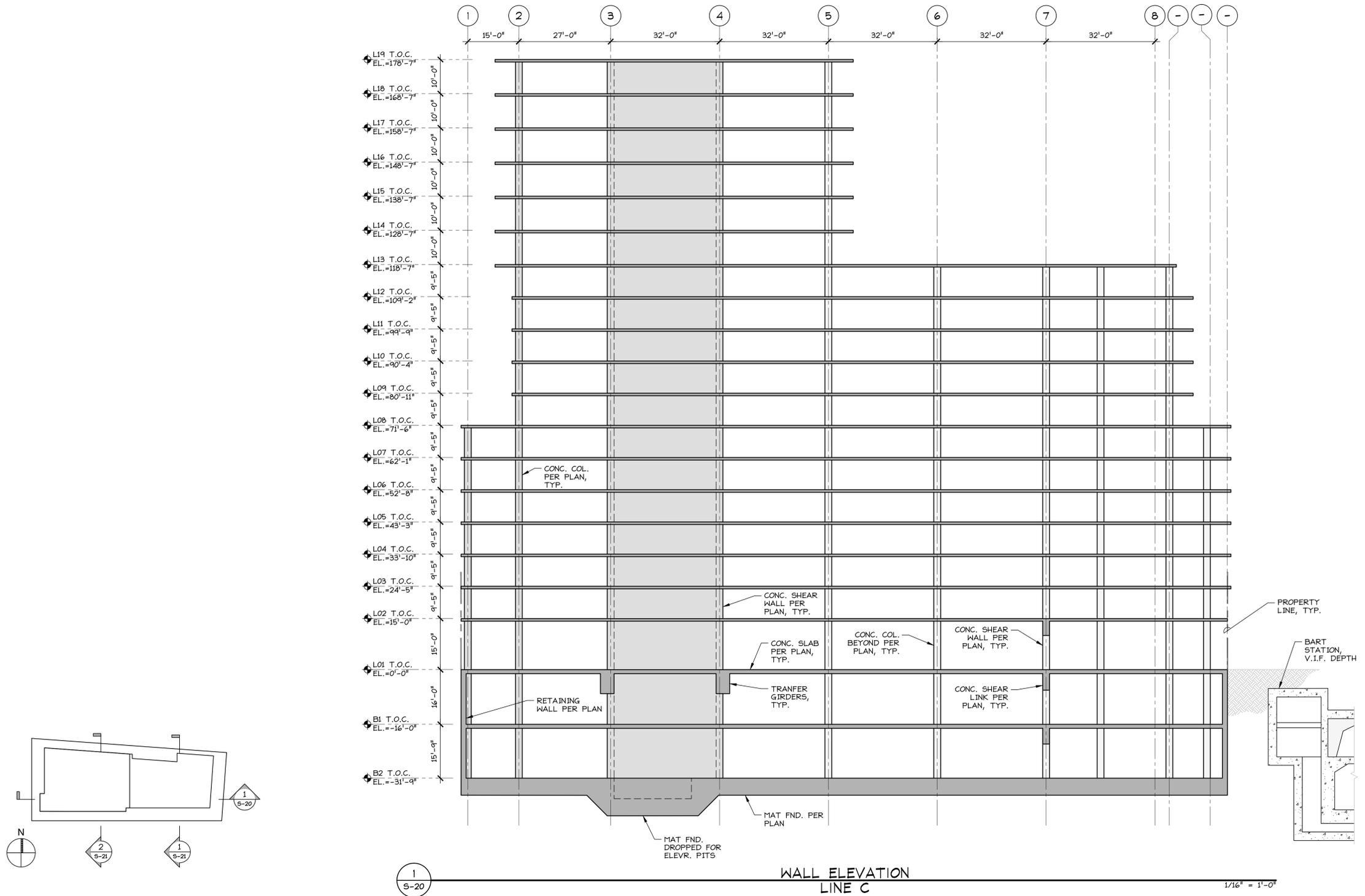
An existing underground culvert, carrying Strawberry Creek, is located below Allston Way to the south. The presence of the culvert will not impact the permanent structure, but any tiebacks used for temporary shoring will need to be carefully coordinated to avoid damage to the culvert.

Owing to the depth of the proposed basements, underpinning will be required to temporarily support the adjacent buildings to the north and west. The design of the temporary shoring system will need to be coordinated with the owners of the neighboring properties. If the neighbors do not agree to tieback installation below their buildings, any temporary shoring will need to be located within the project site and internally bracing will be required along the north and west sides of the site.

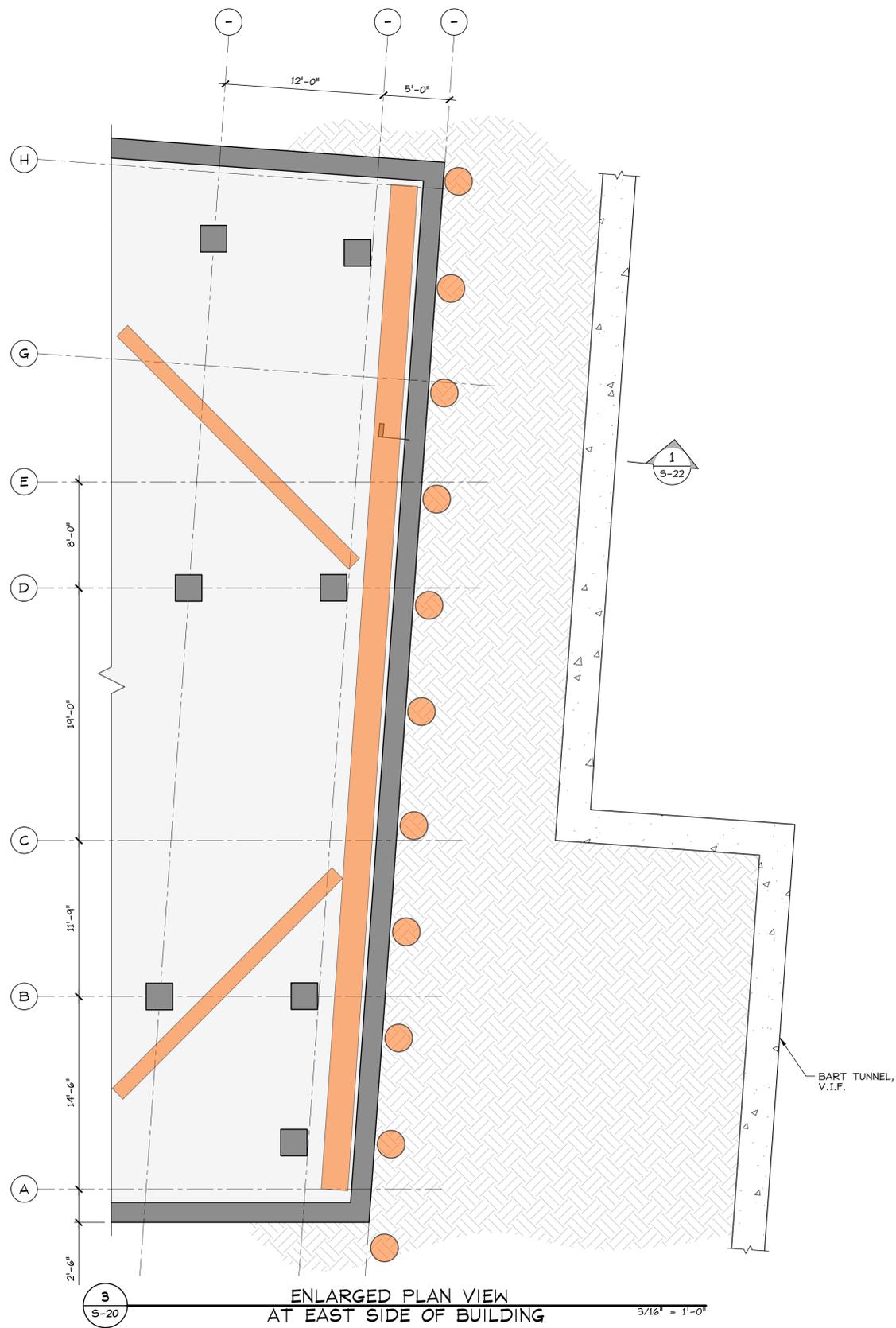
The existing BART tunnel below Shattuck Avenue introduces several constraints on both temporary and permanent below-grade construction. BART guidelines require a minimum clearance of 8 feet between buried tunnel structures and any new development. The guidelines require that the new development does not impose any vertical or lateral loads on the soil located within the 8 foot offset. To meet these requirements, the excavation along Shattuck Avenue will need to be internally braced.

BART guidelines also place limitations on a Zone of Influence defined as a line projecting upward at a 1.5H : 1V from the bottom corner of the tunnel structure. Any structures located within this zone must be supported below the Line of Influence. Reviewing the 1966 Structural Arrangement drawings for the Berkeley BART Station, it appears that the tunnel is founded approximately 47 feet below grade. In order to meet the BART requirements, columns east of gridline 7 will need to be pile supported to ensure that they are founded below the zone of influence.

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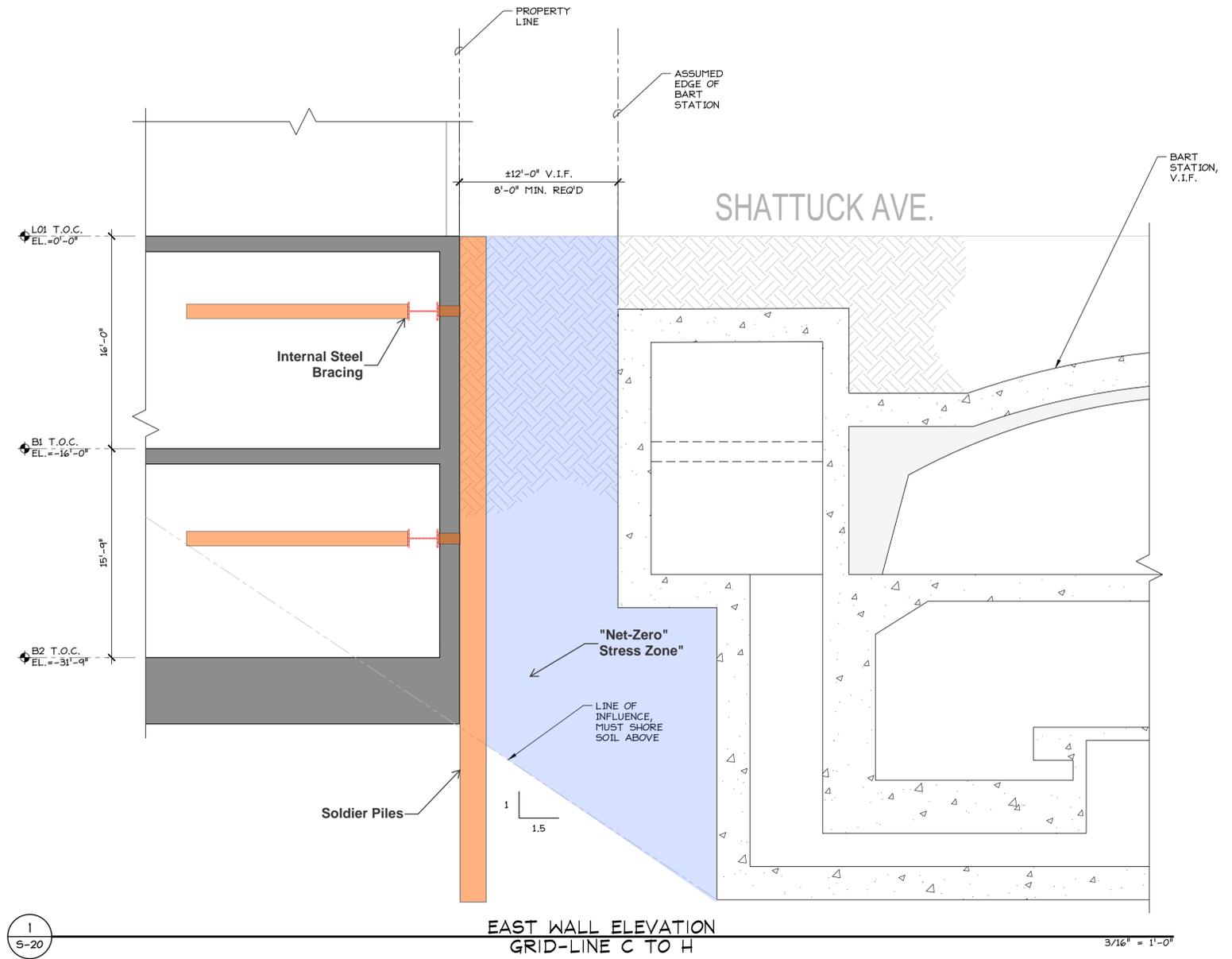


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ENLARGED PLAN VIEW AT EAST SIDE OF BUILDING

3/16" = 1'-0"



EAST WALL ELEVATION GRID-LINE C TO H

3/16" = 1'-0"