Existing Structural System

EXISTING STRUCTURAL SYSTEM

Eight Tower Bridge currently employs a composite steel frame structural system, supporting 16 above grade stories that stretch 192' into the air. The superstructure also supports a mechanical penthouse level that rises 22' above the lower roof, topping the building out at 214'. The mechanical penthouse contains two cooling towers, a fan room, and an elevator machine room that controls the six general access elevators. The framing layout was designed to maximize the open floor plan of the building, creating nearly 21,500 square feet of usable space per floor. In addition to mechanical roof loads, gravity floor loads, and lateral forces, the perimeter of the building must support a façade of pre-cast concrete panels and glazing.

BUILDING FOUNDATION

The building foundation system of Eight Tower Bridge consists of reinforced normal weight concrete pile caps ranging from 36" to 54" in depth. The pile caps range in dimension from square 6'10" size to a nearly square 10'10" x 9'10" size.

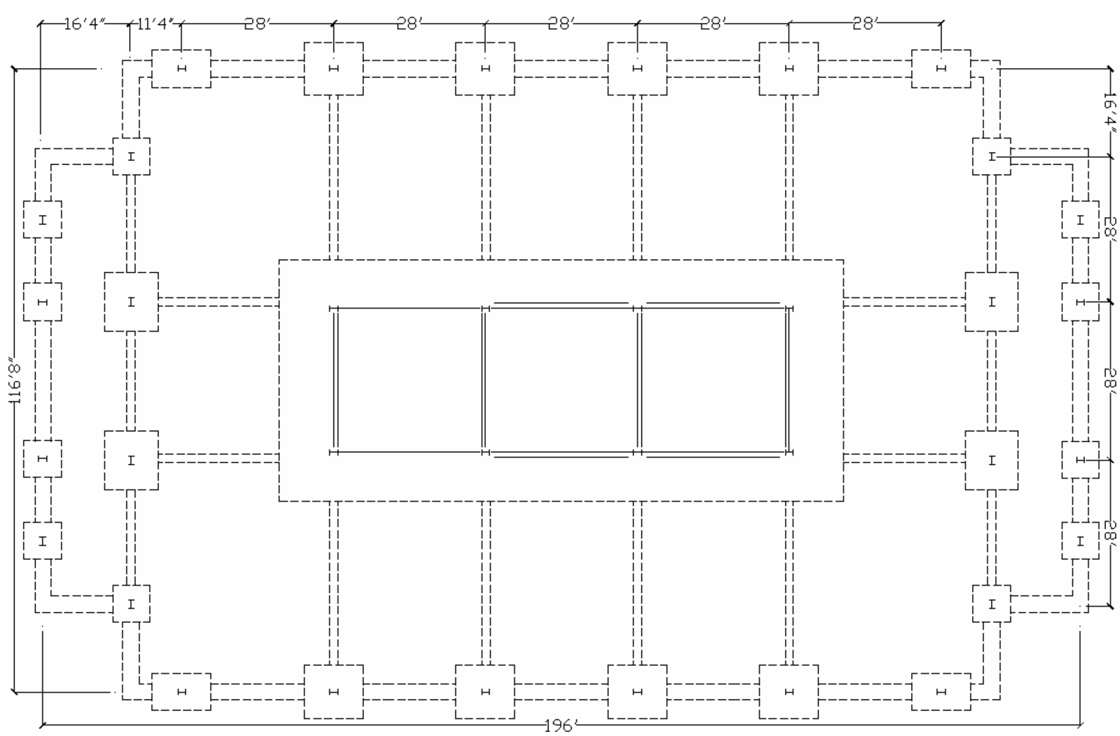

Figure 5: Existing Foundation Plan

These pile caps are supported by four to eight 16” diameter auger–cast piles driven to an average bearing depth of thirteen feet below grade. The piles are made of normal weight concrete with a compressive strength of 4,000psi, and have been designed to a capacity of 100 tons. A foundation plan can be seen above.

The core of the building is supported by a 4’3” reinforced concrete mat foundation, supported by additional auger-cast piles. The entire building is supported by a total of 328 piles. Reinforced concrete grade beams typically 18” wide by 30” deep, connect all of the pile caps, as well as the interior core mat foundation.

The slab at the lobby level is a 5” concrete slab-on-grade with one layer of welded wire fabric reinforcement. The slab sits over a loose granular fill, which sits over compacted sub-grade soil. The inner core slab-on-grade is similar, but is cast 8” thick and has two layers of welded wire fabric as reinforcement. The lobby level also functions as a parking garage, designed with a 50psf live load.

SUPERSTRUCTURE FRAMING

Eight Tower Bridge is a composite steel framed structure. The simple design

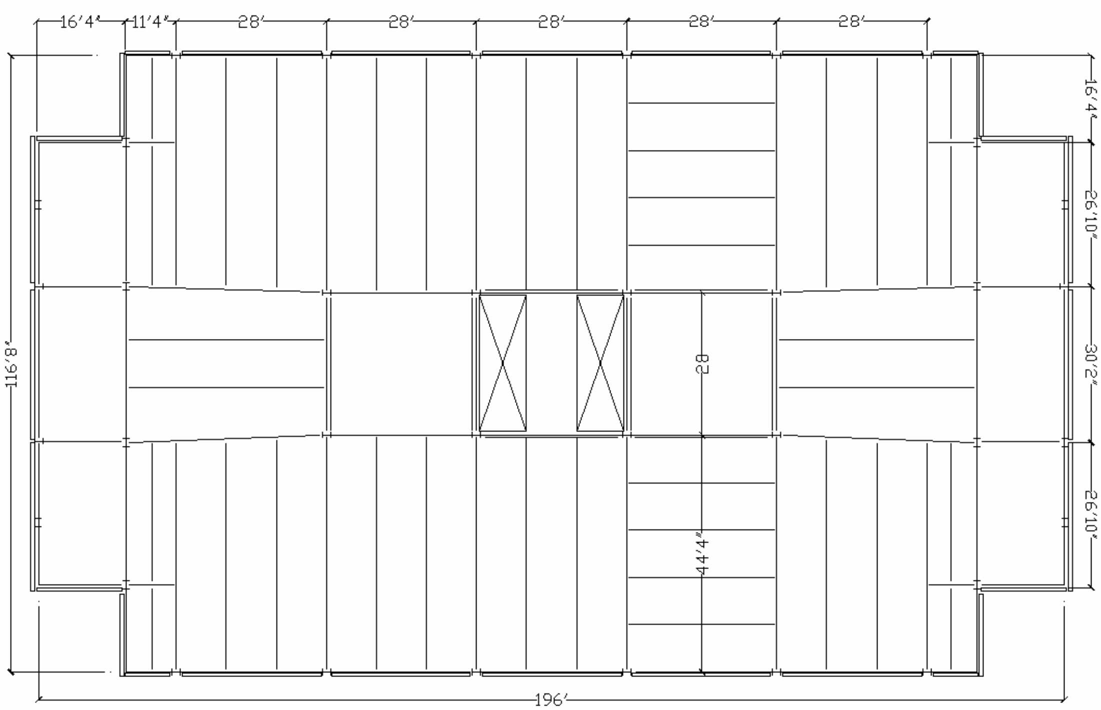

Figure 6: Typical Framing Plan for Floors 4-14

and layout of the framing system has allowed for 13 of the 16 stories to be designed with a typical framing plan. The typical frame in the east-west building dimension consists of a 3 bay bent, with two external spans of 44'4" and an interior span of 28'. Beam sizes for this system are most commonly W18x40 and typically spanning the 44'4" length and spaced at 9'4".

Variations in this framing system occur at the extreme north and south end of the building, as well as in the buildings core due to mechanical system loads, and the insertion of six elevator towers through the height of the building. Exterior girders have been sized to W21x44 with spans ranging from 28' to 12'. Interior girders are primarily sized as W18 shapes with weights ranging from 26 to 86 pounds per linear foot. All beams spanning over 35' in length have been designed with a varying upward camber.

The columns supporting each floor are all W14x shapes, ranging from 550 to 90 lbs per linear foot at the bottom and top of the frame, respectively. Columns have been designed with a floor to floor story height of 12'1" and typically span two stories. Since Eight Tower Bridge was designed as a multi-tenant office tower with no set floor plan, an important design consideration was to maintain a floor space uninterrupted by columns. In order to span the 44'4" direction, a composite steel system was really the only feasible steel frame design option, as the composite action between the slab and beam increases the moment capacity of the section, and thus allows for longer spans. The steel W-shapes act in composite with a 5-1/4" normal weight concrete slab cast over a 2" steel deck. The total system floor system depth is 23-1/4". There is an additional 13-3/4" mechanical

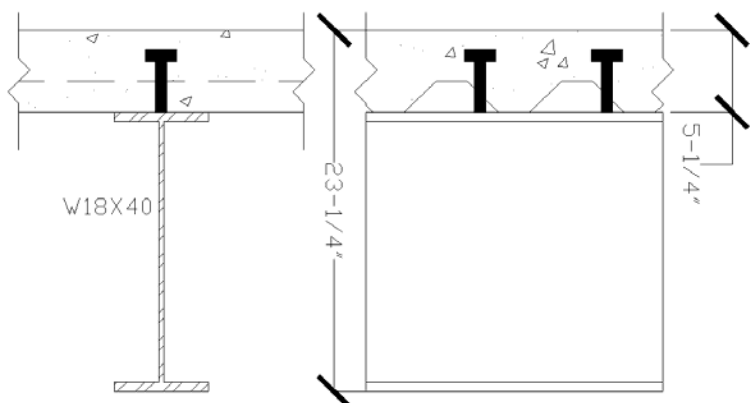

Figure 7: Composite steel floor system section

plenum space provided, which brings the floor-to-floor height from 12'1" to a floor to ceiling height of 9'0".

Interior beam-to-column and beam-to-girder connections are typically simple shear connections. Beam-to-column connections in the moment resisting frames within the building are fully welded moment connections, or as an alternate, have bolted end-plate moment resisting connections. All structural steel beams and columns have been specified to ASTM A992 grade 50 steel.

LATERAL SYSTEM

The lateral system of Eight Tower Bridge is actually two separate concentric

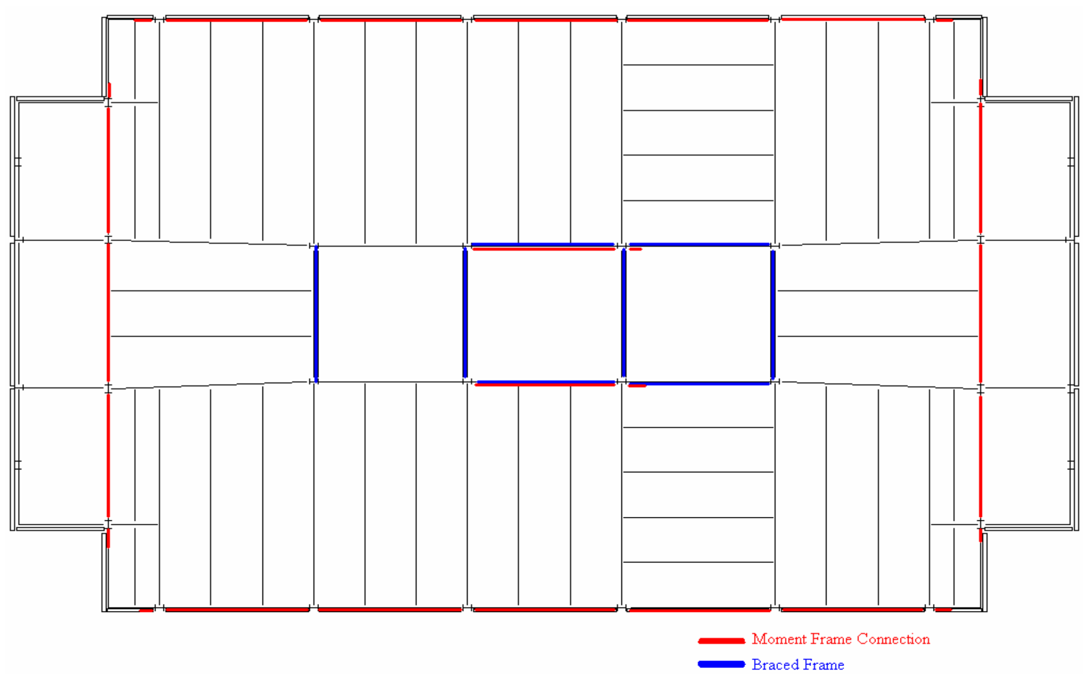

Figure 8: Lateral system framing plan, with moment frames in red and braced frames shown in blue

frame systems. The inner lateral resisting frame is an 18-story tower located around the buildings elevator, mechanical and stairwell spaces. It is comprised of a combination of moment and braced frames. The braced frames span 28' along column lines D, E, F and G in the east-west dimension of the building. Additional braced frames span 56' along column lines 4.1 and 4.9 in the north-south direction between column lines D and F. The lateral system framing schematic can be seen in the framing plan above.

The outer frame is comprised of structural steel moment resisting frames located around the building perimeter. All structural steel is specified as ASTM A992 grade. These moment connections have been designed with single shear plate slip-critical connections in order for the beam to resist lateral and gravity loads and develop the total designed beam end reaction.

The combination of both moment resisting and braced frames limited the overall drift of the building to a maximum of 3.26" under direct wind loading perpendicular to the long dimension of the building. It should be noted that the "long dimension" of the Eight Tower Bridge is also referred to as the "y-dimension" and the "x-direction". The above drift was determined in a previous inspection to be the maximum drift of the steel framed structure as modeled in ETABS.