2.0 BUILDING INFORMATION

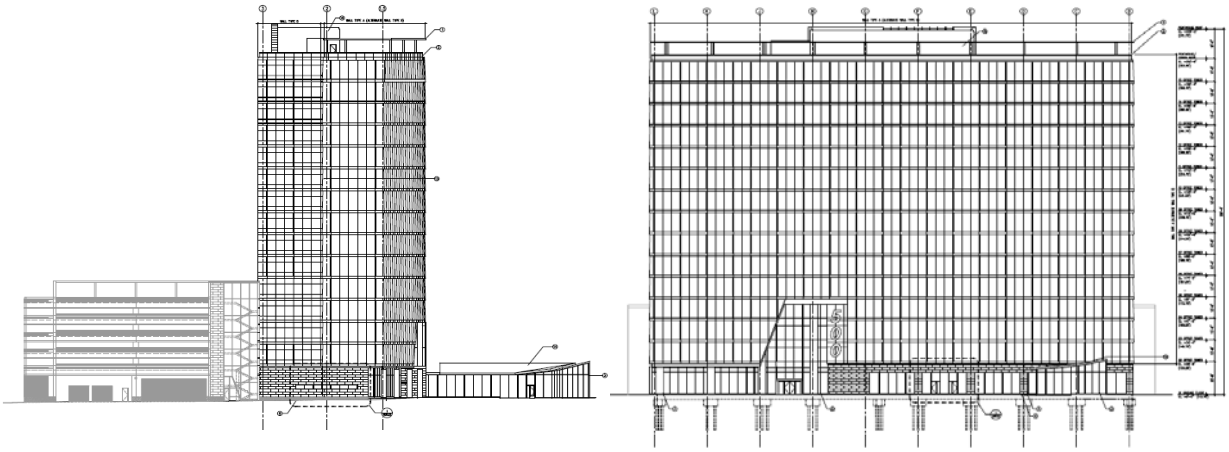


Figure 2-Front of side elevations of the office tower and parking garage. (Drawings courtesy of Gensler)

Gateway Plaza is a 15-story office tower located in the Central Business District of downtown Wilmington, Delaware. The $52 million project began in July 2005 and is projected for completion in December 2006. The 16-story, 210'-6" tower will offer 387,000 square feet of rentable office space for tenant fit-out. Two of the building's major occupants include the law firm of Morris, James, Hitchens & Williams and the WSFS Financial Corporation. The ground floor will play host for public retail including an indoor/outdoor café, post-office, and WSFS branch bank. In the rear of the building there is a 5-story parking garage housing 600 car parking spaces for the building's employees.

Primary Project Team

- Owner/Developer: Buccini/Pollin Group
- General Contractor: Gilbane
- Architect: Gensler
- Engineers:
  - *Civil*: Landmark Engineering
  - *Geotech*: Duffield Associates, Inc.
  - *MEP*: BALA Consulting Engineers, Inc.
  - *Structural*: O'Donnell, Naccarato & MacIntosh
- Project Delivery Method: Design-Bid-Build

Zoning

- Office tower
  - C-4 Use Group
  - Business Use Group B
- Garage
  - S-2 Garage
  - Construction Type: IB
  - Type 1 Protected

Location and Site

Gateway Plaza is located at 500 Delaware Avenue, between West and Washington Streets. The building and its amenities are situated in the northwestern quadrant of the Wilmington's Central Business District, which is home to many of the nation's largest financial corporations. It is on the top of a hill with views in all directions of the city, including the waterfront in the south. To get a better view of the location, see the map on the right.

The urban site on which Gateway Plaza is constructed is currently a privately owned parking lot. To determine the soil composition, borings were taken by a subcontractor to the geotechnical engineer, Duffield Associates. Ten samples were taken, and the results of laboratory tests are summarized in the soils report. Such an urban site generally consists of contains a layer of miscellaneous fill (i.e. concrete, asphalt, brick, metal, etc.) that ranges in depth from 12'-16' below the existing ground surface. 'Medium to dense, coarse

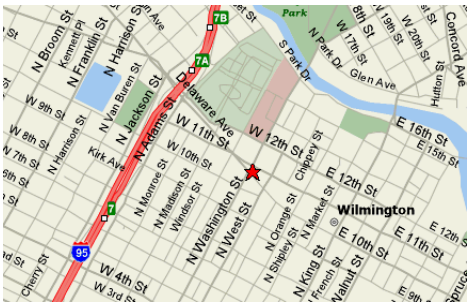


Figure 6-Map of downtown Wilmington and location of Gateway Plaza. (Photo courtesy of Mapquest)

Figure 6-Projected site plan.

Figure 6-Rendering of northwest corner from ground level.

Figure 6-Aerial view of Wilmington with rendering of Gateway Plaza superimposed. (All three renderings courtesy of Gensler)

grained soils and medium to stiff consistency silt and clay soils lay beneath the miscellaneous fill layer. Their depths range from approximately 57'-63' below the existing ground surface." Finally, dense to very dense sand soils, evidence of weathered bedrock, lay below the sandy silt layer.

Architecture

Gateway Plaza is the first new building to be constructed in Wilmington's Central Business District (CBD) in 15 years. The tower will fill in the gap between neighboring office towers. It is predicted to be a landmark among all of the CBD's office towers because it will have one of the few all-glass curtain walls in town. The curtain wall will give the façade a more modern feel than the dated 1970s architecture of the DuPont Hotel and the "cookie-cutter" appearance of the Sheraton Hotel, which both have concrete facades. The northeast quadrant of the tower features a corner that appears to be "sliced" off at an angle that imitates the angle of Delaware Ave.

The main entrance to the lobby has a 5-story cut-out of the front façade. The public café on the ground level adds interest to the building because it protrudes out of the footprint of the main tower and features a kinked, standing seam, metal roof. The protrusion creates a courtyard in front of the entrance and allows for shaded outdoor seating, a new feature to the CBD. The remaining 14 stories of the tower remain office space for tenant fit-outs.

Building Envelope

The bulk of Gateway Plaza's primary office tower is enclosed with a glass curtain wall system featuring a reflective glazing. It is characterized by the overlapping, shingle-type construction of blue-tinted glazing. The first floor, however, is a flat lock, zinc wall panel system which is also carried up the office tower on the spine of the south end. The parking garage is clad with pre-cast concrete panels. There is a painted, metal panel screen wall on the roof serves to hide the mechanical penthouse. The roof is an EPDM system using polyisocyanurate insulation over fiberglass sheathing on metal deck.

Figure 7-Mock up of curtain wall system. (Photo courtesy of Gilbane).

2.1 Primary Engineering Systems

Mechanical

The variable volume mechanical system of Gateway Plaza is located on the roof in a mechanical penthouse. Here, the 3-cell water cooling tower and heat pumps supply conditioned air to all 15 floors of the building. On floors 2-15, there are direct exchange air conditioning units using R-22 refrigerant. In the building's IT/Telephone room on the first floor, there is a Liebert Challenger 3000 air conditioning unit to provide up to 5 tons of cooling control the temperature and humidity required by the sensitive computing equipment.

Since the building is to be fit out, space for the risers has been designated to a mechanical room found on each floor in the tower's service core. Return air from each floor is dumped into the mechanical room and is exhausted. There are outdoor air louvers in each room to replace the exhausted air and provide ventilation.

Electrical

Gateway Plaza's electrical system is powered by both 480/277V and 208/120V panel boards. Power is supplied to the building by two 2500/3325 kVA transformers. There are two main distribution panels that service floors 1-8 and floors 9-roof, respectively. The voltage is stepped down through transformers on the second, fifth, eighth, eleventh, and fourteenth floors in electrical rooms in the building's core. A 1600A bus riser supplies power to the typical office levels for lighting and receptacles. There is a 750kW, 938 kVA emergency generator which services the fire pumps.

Lighting

Lighting for the service core of the typical office floors is provided with 6" open reflector down lights with compact fluorescent lamps. For the tenant spaces, the lighting plans will be finalized upon fit-out. On the exterior plaza area, metal halide downlights flood the walls of the first floor with light. Illuminating strips with tempered glass lenses are located under trees to light the plaza and seating areas.

2.2 Additional Engineering Systems

Fire Protection

Almost every area of Gateway Plaza is protected by a wet sprinkler system with a 4" wet standpipe in each of the two stairwells. The water is supplied to the standpipes by a fire pump and a jockey pump for the higher floors; both are located on the 1st floor in the water service room. The fire pump has a capacity of 750 GPM and the jockey pump has a capacity of 109 GPM. These can run on emergency power supplied by a diesel generator.

Transportation

Gateway Plaza has a central service core servicing most of the building's transportation needs. There are 5 public elevators, 1 service elevator, and two stairwells in the core. The public elevators and stairwells run to all floors of the office tower and the service elevator will also run to the mechanical penthouse.

The main entrance to the public is on Delaware Ave. and will have a vestibule to control air loss. The service core can be accessed from this main entrance, while the public areas will have separate entrances also along Delaware Ave. including one to the café and one to the WSFS bank.

Telecommunications

The building has a main technology/data center on the ground floor. It is located in the parking garage and will service all of the security systems and telephone lines in the building.

3.0 STRUCTURAL SYSTEM DESCRIPTION

Gateway Plaza has two distinct buildings and two distinct building systems. The office tower is composite steel construction with braced frames and the parking garage is pre-cast concrete with pre-cast shearwalls. The two structures are separated using a 2" expansion joint. The structural engineer is responsible for designing the office tower and the pre-cast supplier is responsible for the design of the garage. For this reason, focus will be centered on the office tower design.

Foundations

Due to the poor soil conditions on site, deep foundations were deemed necessary for the high gravity column loads and overturning moments from lateral resisting elements. The soils report recommended end-bearing caissons, but due to designer preference, concrete filled, steel tube piles were chosen. The piles are 12" in diameter and use high strength concrete to develop 120 tons of end-bearing capacity per pile. Most of the piles are drilled 70' down to bedrock. The clusters are topped with pile caps that range from 40"-65" thick. Grade beams span the pile caps around the entire building's perimeter, and a 5" slab on grade span the grade beams in much of the foundation and are intermittently supported by single piles.

The office tower's steel columns sit on pile caps of various shapes. The columns from the lateral load resisting system generally sit on clusters of 18 piles or more where those from the gravity system sit on clusters of 6-12. The larger foundations under the lateral frames are to resist the overturning moment from wind and seismic loading. The pile clusters in the office tower are on a 30'x52' grid on the north side and a 30'x36' grid on the south side (see the foundation plan on next page).

The vertical support members in the parking garage sit on pile caps that are 40-50" thick and are generally square. The lateral load resisting system of the garage, pre-cast concrete shearwalls, sits on 7-pile clusters while the cast-in-place concrete columns rest on 4-pile clusters. The clusters in the parking garage are on a 30'x62' grid (not shown).

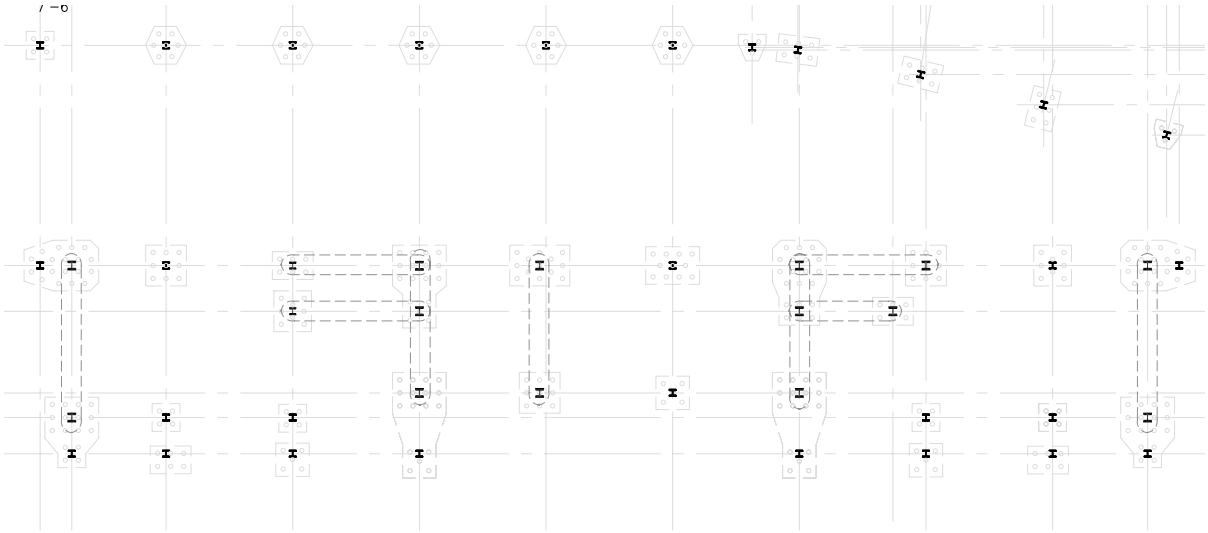


Figure 8-Foundation plan

Framing

Gateway Plaza uses two types of framing systems for its two types of use: composite steel for the office tower and precast/cast-in-place concrete for the parking garage.

The composite steel in the office tower uses two grid systems: one orthogonal and one rotated. As aforementioned, the grids are 30'x52' and 30'x36'. The rotated grid is an adaptation of the orthogonal grid that is turned 14° clockwise from plan north, and is used to create the sliced surface on the northeast face. The columns are spliced every other floor or 27'. All framing members on the office floors use wide-flange shapes of A992, Gr. 50 steel where the framing of the penthouse and screen-wall on the roof use HSS tube shapes of A36 steel. All of the columns, in both the lateral and gravity systems, are W14 shapes of various sizes. The girders and beams range in size but are usually W18 or W24 shapes. The plan below shows the framing for a typical floor. The dashed lines indicate the locations of the braced frames.

Figure 9-Steel framing during construction. (Photo courtesy of Gilbane)

The garage is typical construction of cast-in-place concrete columns and pre-cast concrete beams. The pre-cast double tee beams span girders that are pre-cast L-beams. Sizing of these members is left to the pre-cast contractor.

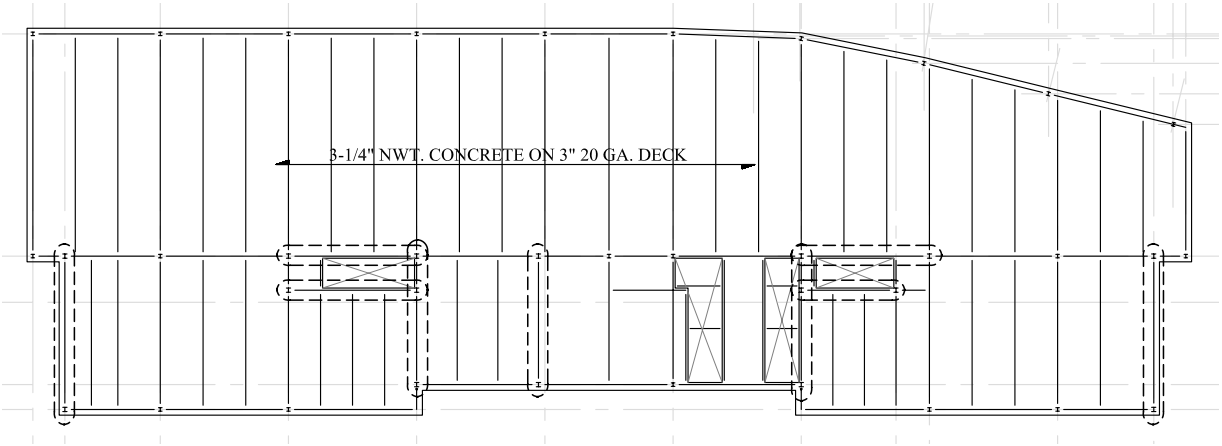


Figure 10-Framing plan of a typical floor.

Structural Slabs

There are 6 types of structural slabs used in Gateway Plaza: three slabs on grade and three supported metal deck slabs.

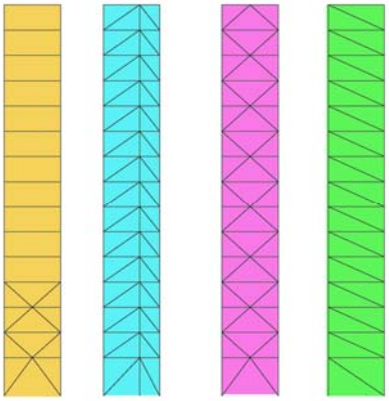
Each type of slab on grade is normal-weight concrete cast over 6" crushed stone and compacted fill. The first type of slab on grade (SOG) is used in the on a majority of the ground level where there will be retail space and parking. This type is 5" of concrete with 6x6-W2.9x2.9 WWF reinforcing. Another type of slab on grade is 6" of concrete with 6x6-W2.0x2.0 WWF reinforcing. This SOG can be found in the loading area for the retail occupants. The final type of SOG is 12" concrete reinforced with #8 @ 12" o.c. each way in the top and #6 @ 12" o.c. each way in the bottom. This larger slab is used in the loading dock that is accessible by the entire building.

All three types of supported slabs on deck utilize ¾"ϕ shear studs and concrete with a compressive strength of 3000 psi. Two types of supported slabs are 3-1/4" light-weight concrete on 3" Lok-Floor composite deck and use 6x6 W1.4x1.4 WWF reinforcing. The difference between them is the gage of the deck. One type is 20 gage and used in the office area of all the elevated floors, the other is 16 gage which will be shored during construction and will be used in the mechanical areas of each floor. The third type of supported slab is

found on the penthouse floor and is 2-1/2" of normal-weight concrete on 1-1/2" Lok-Floor composite deck. It, too, uses 6x6 W1.4xW1.4 WWF reinforcing.

Lateral Load Resisting System

The lateral load resisting system for Gateway Plaza utilizes ordinary moment frames and concentrically braced frames. The bracing members are not the traditional, A36, angles but are A992 wide flange shapes. There are five frames resisting load in the north-south direction, and four in east-west direction. The braced frames are located around the service core of the building, where bracing is not a concern. The moment frames are located on the east and west edges of the building, which is exposed by curtain wall. The location of these frames does a good job at preventing torsion by keeping the floor's center of rigidity very close to its center of mass. However, this is only the case for loads in the north-south direction. The structure may be subjected to torsion in the case of loads in the east-west direction because the center of rigidity is further from the center of mass.



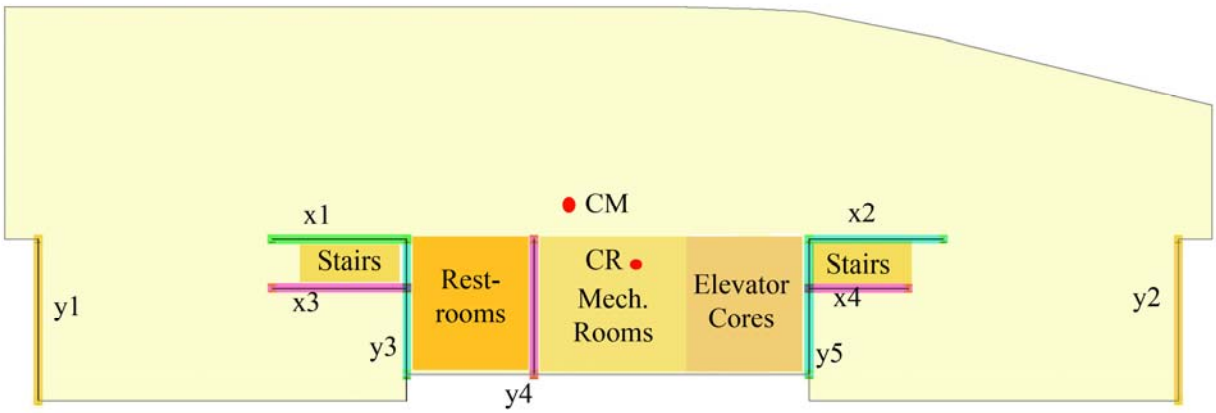


Figure 11-Location of braced frames and centers of mass and rigidity.