2.0 - BUILDING INFORMATION

The Towers at the City College of New York is a new residence hall for CUNY students and faculty. It is the first dormitory for the Manhattan college in its 185 year history. The 11 story building is capable of housing 600 CUNY students and faculty in 165 apartments. The total cost of development and construction of the Towers was $54 million. Some features of the 181,000 square foot building include fully furnished apartments with private bedrooms, a laundry room, a fitness room, classroom spaces, administrative offices, a reception desk that is operational 24 hours a day, and numerous lounge and study spaces. Ground was broken in May 2005 and the building was completed in August 2006.

Figure 1 – Location of The Towers
(photo courtesy of Mapquest.)

2.1 - PROJECT TEAM

Architect:
Goshow Architects
Design Consultant:
Design Collective
Structural / MEP Engineer:
Greenman-Pedersen, Inc.
Owner / Developer:
Capstone Development
Civil Engineer:
Langan Engineering
Construction Manager:
Turner Construction Company

2.2 - LOCATION AND ZONING

The building is located at 130th Street and Saint Nicholas Terrace in the upper west side of New York City as seen in Figure 1. According to the guidelines set in the Building Code of the City of New York, the zoning district for The Towers is Residential 7-A. This means that the height limitations for an apartment building are dictated by the sky plane with a maximum front wall height of 60'-0". Also, the footprint of the building can only cover a maximum of 70% of the lot.

2.3 - ARCHITECTURE

Goshow Architects decided to use natural brown brick colors to reflect the terra cotta and local dark stone of the existing buildings on campus and in the upper west side of Manhattan. The architects also made the setbacks of the Towers to somewhat reflect the heights of adjacent buildings in the neighborhood. The floor to ceiling glass bays are used to accentuate the corners of the building and give it a unique look. The L-shape of the building provides privacy and protection for the quadrangle facing the center of campus. The existing granite walls of the buildings that previously occupied the site will be incorporated into the landscaping.

The façade of the Towers is a thin brick panel system. The brick panels consist of the brick, thin set adhesive cement bed over metal lath, 5/8" glas-mat sheathing and vapor barrier. This panel is connected to 6" cold formed metal studs. The studs are insulated with R19 batt insulation. The roof system consists of a multi-ply bitumen roof membrane over tapered R19 rigid insulation. The slope of the insulation is equal to ¼" per roof and ½" per foot within 24" of the roof drains. The structure of the roof is a 9 ½" thick reinforced flat plate concrete slab.

2.4 - EXISTING STRUCTURAL SYSTEM

The structural system that was originally chosen The Towers is cast in place reinforced concrete columns and floor slabs. The slabs are a two-way flat plate system that directly transfer the floor loads to the columns. The penthouse consists of structural steel tube columns, wide flange beams and steel angle bracing.

2.3.1 - FOUNDATION

Figure 2: Existing foundation (photo courtesy GPI)

Based on the soil borings and the geotechnical report, a shallow foundation was permissible for The Towers. The soil report indicated that solid bedrock was beneath 6′ – 12′ of firm soils at the site. The slabs and spread footings sit directly on top of the bedrock with a bearing pressure of 40,000 psf. Matt slab foundations that range in thickness from 36" to 42" are used to support the loads from the concrete shear walls around the stair and elevator cores. The foundation walls are cast in place reinforced concrete atop spread footings. Rectangular spread footings up to 30" in depth support the gravity load from the concrete columns.

2.3.2 - FRAMING

A cast-in-place concrete system was chosen for The Towers. Rectangular columns are laid out on an irregular grid and large concrete beams are used in the central lobby area of the building that connects the two wings. The beams also support the cantilevered portion of the building at the third floor over the main entrance. The floor slab is tied in to the columns by studrails at each face, and reinforcing bars over the column transfer the floor loads into the columns. The thin brick prefabricated panels that make up the façade of the building are also connected to the top of the slab with steel angles. Expansion joints are used at the edges of the slab where they meet with the exterior wall panels. 2″ seismic expansion joints are also used at the corners of the building.

Figure 3: Concrete framing (photo courtesy GPI)

The penthouse of the building is structural steel. Steel tube columns are used as the columns and W-shapes are used as beams. Bracing is provided by steel angles for the beam to column connections. The penthouse consists of two levels. The floor of the first level is the cast in place roof slab. The second floor framing consists of W24x55 beams. The roof of the penthouse is framed with W12x14 beams. The exterior girders that carry the floor and roof framing are connected to the columns with moment connections, and are additionally braced with steel angle knee bracing.

2.3.3 - FLOOR SLAB

The typical structural slab for all 11 stories of the Towers is a two way 8″ elevated flat plate concrete slab. The slab is reinforced with #4 bars at 12″ on center. Extra bars are provided at column locations for added resistance against shear forces. For the basement, a 4″ slab on grade was used. The slab on grade is reinforced with welded wire fabric and is cast over a vapor barrier and 4″ of a porous fill base. The floor system for the first level is the flat plate concrete slab. The floor system of the structural steel penthouse consists of a 4 ½″ concrete slab with metal deck.

2.3.4 - LATERAL FORCE RESISTING SYSTEM

Lateral loads imposed on the building are resisted by concrete shear walls located throughout the building. One wall is located in the north wing of the building, and the other walls are around the stair towers and elevator core. The typical structural layout in Figure 1 below illustrates the locations of columns

and shear walls. The floor slab acts as a rigid diaphragm to transfer the toads to the lateral force resisting system. The shear walls are 10" thick and are reinforced with two curtains of rebar.

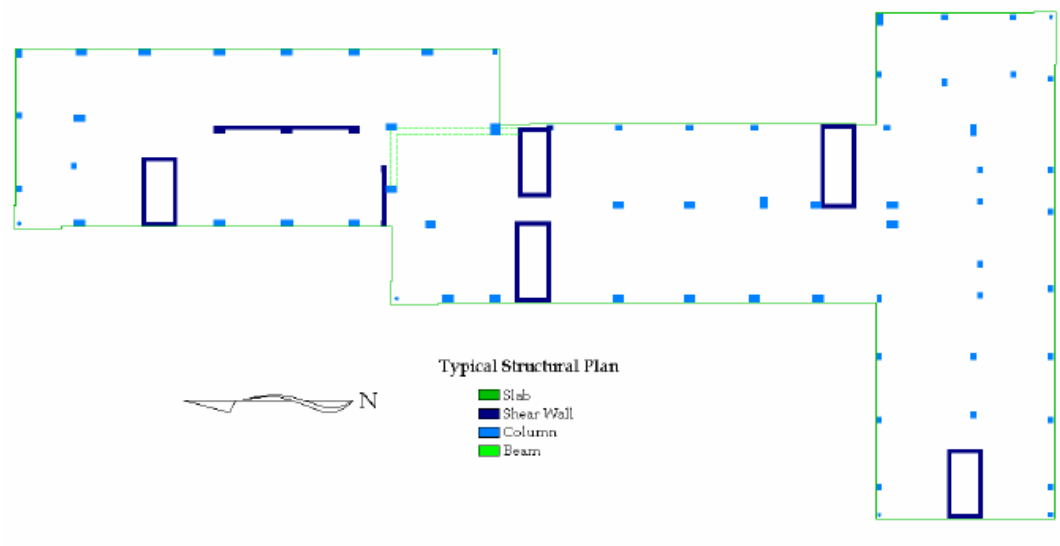

Figure 4: Typical structural plan of existing building

2.4 - OTHER BUILDING SYSTEMS

The electric power for The Towers is 120/208V, 3 phase 4 wire. Seven sets of 4 #750MCM cables are run from the service at 130th street to a 4000A service entrance located at the lower level of the building. Each apartment unit has its own electrical panel sized according to the New York City Electrical Code. There is no generator for emergency power for the building. Emergency lighting and fire alarms are powered by integral batteries inside the fixtures.

HVAC for the apartments is provided by packaged terminal air conditioning (or PTAC) units. The PTAC units use a 1/2 ton direct expansion cooling system and are located below each window. Heating is provided by a hot water heating coil which is served from the central hot water boiling plant.