Project Design Overview

West Elevation

Architecture:

Columbia Heights Community Center is just one step Washington DC is taking to uplift many of its neighborhoods. In an area where graffiti is a common sight, this building will provide a center for the neighborhood to gather and take part in recreational activities such as sporting events, summer camps, and learning. The facilities that will support this type of use include classrooms, a computer lab, an art room, dance studio, library, weight / exercise rooms, gymnasium, toilets/locker rooms, stage and dressing rooms, as well as administrative offices. Since the design is LEED® (Leadership in Energy and Environmental Design) Silver Rated, much emphasis is placed on natural lighting and energy efficiency. From the sky-lights in the administrative office area to the many sizeable windows throughout the rest of the building, daylight is ever present. Natural light can even be viewed from the center of the building, such as from the glass balcony that provides a magnificent view of the entire gymnasium and its full-storied windows. Along the lines of energy efficiency, much work went into the design of the mechanical systems as well as the green roof and fourth floor terrace, which overlooks the neighboring park and playground. The glass spiral staircase, which branches off of the spacious main lobby, also gives one a view of the surrounding neighborhood and park. With its clean and modern appearance, Columbia Heights Community Center will truly transform the neighborhood into a wonderful area.

Building Codes Implemented:

1996 BOCA National Building Code

1996 BOCA National Electric Code

2000 International Mechanical and Plumbing Codes

ADA Accessibility Guidelines and CABO A117.1-92

1992 DC Construction Codes Supplement

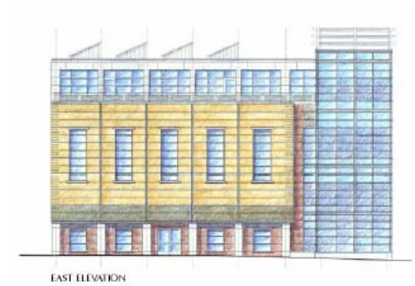
Zoning and Historical Requirements:

Washington DC R-4 with Variances: Height, Lot Size, Occupancy, Parking

Building Envelope:

North Elevation

The exterior walls of the Columbia Heights Community Center are primarily norman brick, which creates the illusion of length through its enhancement of horizontal lines. Pre-cast Concrete strips make a grid pattern throughout the brick assembly, giving the building a very rigid appearance. The windows surrounded by the brick and pre-cast are typically 1" Passive Solar Low-E Insulated-Glass Units. At the North-East corner, curtainwall glazing is used to run the entire height of the building. This is the corner where the glass stairs branch off the main lobby and run to the second floor. The remaining curtainwall is used to cover the weight / exercise room and the library. Different colored panes were used in the curtainwall to also give that horizontal appearance. The remaining East side incorporates large full-storied windows above the second floor to allow daylight into the gymnasium. The rest of the North and most of the West elevation consist of an overhang above the first floor. Pre-cast concrete is used to cover the steel columns at these locations. Along the West elevation, salvaged brick and limestone are used from the previous apartment building that was demolished to be replaced by the community center. This not only enables the community center to blend in with its neighbors, it is environmentally friendly since this material is being recycled. A metal garage door is also used on the West to allow for private entry into the staff parking lot. The South elevation is composed of solid brick with pre-cast accents. This is due to the extremely close apartment building, which is adjacent to this site.



East Elevation

At the roof level, you can observe pre-cast coping along the North-West corner and a Sun Shading Trellis above the North-East curtainwall. From the East, the skylights above the office area can be seen pointing upward from the roof. The roof system is composed of a PVC Membrane, approximately 1/8 of an inch thick, over a ½ inch cover board on tapered insulation. All of this rests on a composite metal deck system.

Construction:

Even before construction of the Columbia Heights Community Center can begin, some demolition has to be performed. The foundation slabs of the pre-demolished apartment buildings will have to be broken up in order to allow the drainage of water into the soils beneath. The existing adjacent apartment wall will have to be abated of lead (*see picture below left*). Once the abatement is complete, the tongue-and-grooved bricks from the pre-existing apartment wall will be chiseled out. After this demolition and the foundations are poured, the steel can be erected. The Columbia Heights Community Center's steel structure and composite metal decking will be erected by a truck crane. Since there are extremely tight site conditions, the crane will eventually have to work from the street, closing down one lane for a weekend. The brick and pre-cast façade, including the curtainwall, are also affected by the tight site conditions. A hydraulic scaffold will be used in lieu of traditional scaffolding since the building line abuts the sidewalk. All in all, there is approximately 8' of working space from the building face to the curb. Increased planning for material delivery and staging will also be needed. The parking garage slab on grade will not be poured until the crane is removed from within the building and onto the street. Once poured, the garage area will serve as a material staging area. Since this building sits on a corner of two One-Way streets, this delivery of materials will have to be carefully orchestrated. Construction was to begin in early May 2005, but was delayed until the beginning of July 2005 due to permit complications. The entire project will last approximately 14 months until its completion in early September of 2006.

Existing Apartment Wall

Electrical:

Power in the Columbia Heights Community Center is strictly in 208/120V. The main feeder into the building is a 2000A, 3-phase service consisting of 10-#4 conduits. Once the feeder enters the main distribution switchboard, it is split up to service the fire pump, the jockey pump, local panel boxes, and the elevators on the ground floor. Other lines rise up the building and service the local lighting and power panel boxes, as well as the three rooftop air handlers. The feeders to the local panels range from a 60A to 150A rating. Each floor has its own set of local panels. Also, 200A rated line is used to power the high demanding stage lighting, audio, and video system. The two service lines to the rooftop air handlers are rated at 300A and 500A. Lastly, a 125kW Natural Gas Generator located on the roof is used to supply emergency power to the building's elevators, fire control system, and emergency lighting.

Lighting:

Columbia Heights Community Center is mainly composed of fluorescent fixtures which all run at 120V power and have a color temperature rating of 3500K. The two most common lamp types that can be seen throughout the building include the T8 rapid-start low-mercury lamps and the compact fluorescent triple-tube lamps. The T8 lamps have a minimum Color Rendering Index (CRI) of 75 and a minimum of 2800 initial lumens per lamp. The compact fluorescent triple-tubes have a minimum CRI of 80. In the gymnasium, two other lighting systems can be found. For the basketball court, special 15" x 48" fluorescent down lights are used and come included with 4 lamps rated at 54W each. Special theater lighting is used for the stage area. Since this is an energy efficient LEED® rated building, motion sensors and timers are used to control all of the office, classroom, and multi-use spaces.

Mechanical:

The climate inside Columbia Heights Community Center is controlled by three rooftop air-handler units (RTU's). Whether during heating or cooling modes, all air from RTU-1 (22,000 average cfm) and RTU-3 (3,700 average cfm) is blown to the many Variable Air Volume (VAV) boxes throughout the building where it is then locally heated or cooled. This accounts for much of the system's energy savings. Air from RTU-2 (5,500 cfm) is blown directly into the stage and gymnasium area at constant volume. Two finned water-tube boilers and pumps are used to serve the VAV heating system during heating mode. Unit heaters are also used in certain areas for local heating. Nine exhaust fans are used in the building, mainly in the ceiling plenums around the exterior as well as on the roof.

VAV Box

Structural:

The structural system of Columbia Heights Community Center is composed of structural steel columns and beams. The floors incorporate a composite concrete slab on metal decking, which is supported by the steel structure. The typical beam size under a classroom or multiuse space is W14x22 where a typical girder is W16x31. Since the gymnasium's two-story high ceiling supports the administrative office floor above, W40x199 girders are used and are laterally braced to two parallel W24x62 girders by W14x22 pieces. The two sizes of girders both span a length of approximately 90 feet. Column sizes range from W10x39 to W14x145. The exterior columns all rest on pedestals which in turn rest on the exterior footing. On the north side of the community center, the footing must be stepped down gradually to an elevation of 10' below the datum so that the zone of influence does not affect the buried water meter vault. The interior foundation system consists of strap beams. Tie beams are used on the south-west corner as a cantilever since the community center is directly next to an existing apartment building. This is to prevent the community center's zone of influence from affecting the foundation of the apartment building. All is topped with a 5" concrete slab on grade. All concrete on this project is to achieve a compressive strength of 4000psi within 28 days.

Fire Protection:

The majority of Columbia Heights Community Center uses a wet sprinkler system. The administrative office area uses a pre-action sprinkler system. Standpipes are used in both stairwells and pressure is controlled by a fire pump, which can be fed from the emergency generator on the roof during power outages. A jockey pump and controller also exists. The alarm system is composed of smoke detectors, bells, pull stations, and strobes. All sprinklers and alarms meet the Washington DC code for fire control as well as ADA requirements.

Plumbing:

The Columbia Heights Community Center domestic water system is supplied by a duplex booster pump assembly, which includes an expansion tank. Cold water is pumped throughout the building as well as to the gas-fired domestic water heater on the roof. A pump is used to re-circulate the hot water through a make-up boiler and back to the water heater. At several locations, electronic trap primers are used to prevent floor drains on the sanitary system from becoming dry. Drains on the roof are used to direct water into the storm drainage system. The sanitary system disposes of all the domestic waste. Motion detectors are used on sinks, toilets, and urinals to limit the amount of water use and meet LEED® requirements.

Transportation:

There are three elevators inside the Columbia Heights Community Center. All elevators use hydraulic lift. There are two adjacent passenger elevators and one service elevator, all of which access every floor. The service elevator has a rated load of 4500lbs. and travels 100fpm. The passenger elevators both have a rated load of 3500lbs. and travel at 150fpm. Each elevator pit is 4 feet deep and a portable sump pump and alarm will notify and dispose of any standing water.

Special Systems:

Great emphasis is placed on Columbia Heights Community Center's Silver LEED® Design. Not only is energy efficiency an issue, but air quality and environmental impact also exist as criteria. In order to satisfy air quality guidelines, materials with low Volatile Organic Compounds (VOC's) must be used. Also, an indoor air quality management plan must be developed by the Construction Manager. Environmental impact has to be minimized in order to meet LEED® requirements. On this project, materials with recycled content, such as steel or drywall, are used and must be purchased from a location within 500 miles of the project site. Light pollution into the environment is minimized through the use of special outdoor fixtures which direct the light away from the sky and surrounding neighborhood. All of this requires increased planning from all project members.