6.0 MECHANCAL DEPTH: EXISTING CONDITONS

Waterside of Existing Mechanical System:

The existing waterside system for the Bronx School for Law consists of two 250 ton air cooled DX chillers that provide chilled water for the ten air handling units. The total capacity needed by the air handlers at peak load is only 320 tons therefore; the extra capacity of the chiller is used for redundancy or for future cooling loads. Each chiller uses R-22 refrigerant and was designed for an entering and leaving temperatures of 55°F and 44°F. Once the chilled water is supplied to the air handlers it is returned by three end suction pumps that pump the return chilled water back to the chillers. An expansion tank is connected to the chilled water system on the inlet (suction) side of the distribution pumps by a branch line. The chiller process can be shown in Figure 4 and 5.



Figure 4: Existing Condenser Water System Schematic



Figure 5: Existing Chilled Water Supply and Return

Airside of Existing Mechanical System:

All of the air handling units came pre-packaged and each equipped with steam heating coils. However, the primary heating in the building comes from steam fin tube radiators while the heating coils inside the air handling units act as the secondary or back-up heat source. There are a total of ten air handlers serving all of the major spaces within the school. Bronx High School of Law utilizes both variable air volume (VAV) and constant air volume (CAV) systems. The CAV system is used primarily for either single zone spaces or zones that are not temperature sensitive such as storage spaces. The VAV system was used for the multi-zone spaces such as the classrooms and offices. The VAV allows for better temperature and humidity control throughout the variety of spaces. Figure 6 represents a typical VAV detail from the original design documents.



Figure 6: VAV Detail Schematic

*Figure 6 Detail Schematic from Joseph R. Loring & Associates

A pneumatic automatic temperature system was installed. Air compressors, pneumatic lines, thermostats, freeze stats, etc. are installed to provide a control system. A local control panel was provided for each of the HVAC and mechanical systems. Individual room thermostats in classrooms and offices sequence the room VAV box control damper with each room's respective perimeter steam heating convector's valve. Space thermostats in assembly areas (auditorium, gymnasium, cafeteria, kitchen, etc.) control the operation of their respective constant volume air handling units and perimeter heating.

As with any building supplying fresh outdoor to the building was an important issue. The Bronx School for Law's site falls within the boundaries of the New York City Energy Code. The NYC energy code requires a greater percentage of fresh outdoor delivered through the building, which is ideal because of the population density within the city. Table 1, on the following page, represents the ten scheduled air handlers, area served, type and scheduled supply ventilation and fresh outdoor air.

Heating System:

The primary heat source comes from two duel-fired boilers that produce steam for all of the fin tube radiators and packaged air handling units. The boilers use natural gas as the primary fuel source with fuel oil as the back-up. The duel source boiler was chosen in case the incoming natural gas was not accessible. Both boilers send steam to a main distribution steam pipe in which, the respective loads branch off this main pipe. All the steam return is pumped into a boiler feeder tank and then is re-pumped to both boilers at a rated temperature of 212°F. A separate condensate pump is provided for return steam which is then pumped into the feeder tank. Figure 7 illustrates the heating system for Bronx School for Law.

		Total	Min. Outdoor Air	
Air Handling Units (AHU)	Туре	[CFM]	[CFM]	OA %
AHU 1 [Classrooms & misc.]	VAV	48000	26000	54.2
AHU 2 [Classrooms & misc.]	VAV	19000	9000	47.4
AHU 3 [Gymnasium]	CAV	18500	7500	40.5
AHU 4 [Library]	CAV	3400	1020	30.0
AHU 5 [Lobby & Corridor]	CAV	12000	6900	57.5
AHU 6 [Kitchen]	CAV	5200/2600	5200/2600	100/100
AHU 7 [Administration]	VAV	12000	3800	31.7
AHU 8 [Dining]	CAV	6000	3360	56.0
AHU 9 [Plant Operations]	CAV	7200	2200	30.6
AHU-10 [Orchestra]	CAV	3100	1050	33.9
TOTAL		133440	66030	49.1

Table 1: Air Handler Schedule

Figure 7: Steam Heating System

