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Option: Structural
Faculty Consultant: Prof. Parfitt
Building: TC Williams High School
Location: Alexandria, VA
Date: 10/15/07
Title: Building Statistics Part 2

Structural

The foundation of the building consists of both strip and spread NWC (145 pcf) footings with a compressive strength $f'_c = 3,000$ psi. The foundations are constructed on sub grade soils improved by the installation of a 'Geopier Rammed Aggregate Pier Soil Reinforcement' system and are designed to bear on strata capable of sustaining a minimum bearing pressure of 6,000 PSF.

The typical floor is a composite system consisting of a 3" concrete slab on 1½" 18 gauge steel composite deck, supported by Steel Beams typically spaced 8' O.C that vary in size. The 3 story classroom sections of the building consist of a steel braced frame construction, while other lateral force resisting systems range from Masonry Shear Walls to Steel Moment Frames.

The typical roof consists of 1½" 22 gauge steel roof deck, supported by K-Series Steel Joists which are typically spaced 5' O.C.

Lighting / Electrical

The classrooms are lit with 54W T5 HO 277V Pendant fixtures, while the corridors are lit with 32W T8 277V Recessed fixtures.

A 480 Y / 277, 3 phase, 4 wire primary feed services the building. Two main 4000 ampere, 3 phase switchboards distribute the required power to the electrical loads throughout the building. The building contains a total of (24) 270V panel boards, and (67) 120V panel boards. The life safety system is backed up by two 800kW, 480V, 3 phase 60 Hz, diesel fueled generators.

Mechanical

There are a total of 17 roof top air handling units with a combined capacity of 229,100 CFM. An additional 4 indoor air handling units combine for 40,355 CFM. These units employ the use of enthalpy wheels to recover total energy.

Four natural gas-fired condensing boilers, with capacities of 1.68 million BTUH, heat water from 120°F to 160°F. Water is cooled to 38°F by two, 600 ton water cooled, electrical chillers. Two 750 ton cooling towers condense the R-123 refrigerant so that it can be re-circulated through the chillers which will accept the heat from the systems chilled water lines.

Construction

Hensel Phelps is the CM on the job, and had working under a design build guaranteed maximum price contract. Construction started in July of 2004, and construction was completed in June of 2007. The old school which currently resides next to the new school is still currently under deconstruction.

Fire Protection

The steel in the building is protected with spray on fireproofing rated for 2 hours for floor, and column members, and 1 hour for roof members. The floor slab has a required 2 hour minimum fire rating. A fire alarm system with automatic sprinklers is in place throughout the school.

Transportation

There are three main elevators located in the 3 story classroom sections. They are all for public use.