

Project Name

Geotechnical Investigation at Public School #1, West New York, Hudson County

Client

New Jersey Schools Construction Corporation (now known as New Jersey Schools Development Authority)

Services Provided

- Geotechnical investigation, analysis and recommendations for the foundation of a 3-story school addition and a two-deck garage structure
- Recommendations for different excavation and construction/earthwork procedures
- Recommendations for retaining structures
- Recommendations for detention basin



Project Description

Public School #1, in West New York, Hudson County, consists of two buildings. The main building is a 3-story masonry building with a partial basement. The second building is a 3-story annex building with no basement. The proposed project involved constructing an addition to the school building, consisting of a 2-story steel frame structure. The proposed building addition was designed to cover an area of approximately 10,000 square feet (sf), while also adding approximately 14,000 sf of open space to the school. To achieve this, approximately 4 to 6 feet of fill would be needed to reach the proposed final grades. A retaining wall was to be constructed to maintain the difference in elevations between the elevated open space area and the surrounding properties. Finally, an L-shaped, on grade, public parking area located across the street from the main building was proposed to be converted into a two-deck garage.

SAI was retained by the New Jersey Schools Construction Corporation (now the New Jersey Schools Development Authority [NJSDA]) to perform the geotechnical services for the proposed building addition and the new two-deck garage structure.

Approach

SAI began its geotechnical subsurface investigation by performing sixteen (16) Standard Penetration Test (SPT) borings at the site. All borings were terminated due to auger and spoon refusal. Rock cores 5 feet long were obtained from most of the borings. The core samples provided the required information regarding the type and quality of rock. Hand auger borings were performed in the location proposed for a detention basin. Borings were terminated at the top of bedrock, which was encountered 1.5 to 3 feet below the existing grade in this area.

To gather sufficient information regarding the different subsurface soil strata and the top of bedrock elevation, SAI drilled more borings than required by the IBC. The additional information was used to address excavation issues, define the bearing stratum and allowable bearing stresses, and determine the depth of



the foundations based upon the properties of the soil and rock in the area.

SAI also conducted laboratory testing to determine the physical and mechanical properties of the subsurface soils and rocks. These tests included Gradation analysis, Atterberg limits, Moisture content, Permeability, Unconfined compressive strength, and Unconsolidated-undrained triaxial (UU) tests.

The subsurface data indicated that the proposed school building addition is underlain by miscellaneous fill material, which is underlain by glacial deposits/residual soil. This material is further underlain by Diabase bedrock at different depths ranging from a couple of feet to 22 feet below existing grades. The proposed 2-deck garage is underlain by miscellaneous fill material placed on soft organic marsh deposits and peat. That material is underlain by glacial deposits and residual soil, which is further underlain by Diabase bedrock. As the subsurface conditions in the proposed school addition were significantly different from those encountered in the proposed garage area, the foundation recommendations for each structure were addressed separately.

In the proposed building area, the top of bedrock is relatively shallow; accordingly, it is SAI's opinion that utilizing a shallow foundation system supported on intact bedrock will be the most suitable and economical foundation system. SAI addressed the need for a groundwater management and dewatering system, and special provisions to be considered during the excavation of the rock. SAI also addressed earth pressure parameters for the design of the retaining walls. In the area of the proposed garage, however, a deep foundation system consisting on drilled shafts socket into intact rock would be utilized to transfer the structural loads to the competent bedrock. This is due to the presence of a thick heterogeneous miscellaneous fill material and soft marsh deposits at that location. As the site is located in a developed area with residential, commercial and school buildings in its immediate vicinity, driven piles (which induce high vibrations during the driving) had to be avoided. SAI performed pavement design for the first deck and the on-grade parking as well.

Permeability tests performed on soil samples obtained from the area of the proposed detention basin indicated that the top of bedrock is relatively shallow and the existing soil cover is relatively thin, approximately 1.5 to 3 feet, and consists of clayey soils with low permeability. Flexible wall permeameter and falling head permeability tests were performed on soil samples obtained from the cover soil stratum to assist the civil engineer in the design of the stormwater management system.

[Project Impacts](#)

SAI completed its geotechnical investigation and analysis, and provided recommendations to the Client on design parameters to employ when preparing the structural design of the building.