SUBSURFACE INVESTIGATION AND REPORT – MARCH 1994

SESI consulting engineers

soils & foundations
land development
environmental

March 14, 1994
N-4177-93

Mr. Carl B. Counts, AIA
McKissack & McKissack Architects, P.C.
50 White Street
New York, NY 10013

Re: Subsurface Investigation and Report
The New York Christian Life Centre
Brooklyn, New York

Dear Mr. Counts:

We have completed our subsurface investigation and geotechnical report for the subject project. The report contains a description of our investigation, an evaluation of the geotechnical conditions at the site, and provides recommendations for foundation design and general site development.

If you have any questions regarding the report, please do not hesitate to contact us.

Very truly yours,

Soils Engineering Services, Inc.

William J. St. Pierre, P.E.

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96,030 - 2 story

The presently proposed construction will consist of a 60,000± square foot air-supported sanctuary structure with associated parking and driveway areas (see Fig. 1).

SUBSURFACE INVESTIGATION AND CONDITIONS

A total of 8 borings were drilled to depths varying from 26.0 to 51.5 feet below presently existing grade. Six of the borings were drilled around the perimeter of the proposed air-supported structure, one boring drilled in the parking area and one boring drilled in the area of the future residential tower. Three attempts were required at the location of B-3 before successfully penetrating an obstruction at 2.5 to 3.5 feet. The location of the borings and soil logs of the borings, which describe the materials encountered, are presented on Figure 3.

Soil samples suitable for identification purposes were extracted from the borings at closely spaced intervals in accordance with the procedures of the Standard Penetration test. For this test, a standard split-spoon sampler (2 inches outside diameter, one and three-eighths inches inside diameter) is driven into the soil by a 140 pound weight falling 30 inches. After discounting the initial six inches of penetration due to possible disturbance of the materials resulting from the drilling operation, the number of blows required to drive the sampler a distance of 12 inches is recorded and designated as the standard penetration resistance or "N" value. The "N" value is an indication of the relative compactness of the soil in-situ.

All field work was performed under the direct technical observation of an engineer from SESI Consulting Engineers, P.C. Our representative maintained continuous logs of the explorations as work proceeded and

Absent any special site preparation procedure or deep foundations, detrimental total and differential settlements would occur to any structures built over the miscellaneous fill in its present condition. The natural medium-dense medium to fine sands encountered beneath the miscellaneous fill are suitable for the support of the anticipated building loads.

We have evaluated three alternate foundation schemes to provide support for the proposed 60,000 square foot building.

Alternate I - Excavation of the existing uncontrolled fill, and construction of a controlled compacted fill.

Alternate II - Piled foundations with structural slab and grade beams; and,

Alternate III - Dynamic Compaction of existing fill, and construction of controlled, compacted fill.

These alternates are addressed individually in the following sections.

Alternate I - Excavation and Backfill

This procedure is typically viable when the depths of excavation required are less than 10 feet and a high percentage of the excavated soils are suitable for reuse in either the building area or parking areas. Because of the significantly greater depths of fill throughout the site and the nature of the fill, this alternate is not considered economically viable.

Alternate II - Piled Foundations and Structural Floor Slab

Friction piles driven sufficiently into the sands beneath the miscellaneous fill would provide suitable support for the building and floor slab. Treated timber piles designed for allowable loads of 25 tons

Mono tube 60 ton

The primary goal of dynamic compaction is to change an uncontrolled fill into a controlled fill. This is done by providing sufficient energy at the ground surface to cause densification of the underlying unsuitable deposits, thereby reducing the compressibility of these deposits. Dynamic compaction is an exploration tool as well as a ground improvement tool. If weak deposits are present below the ground surface, they will be revealed during the impact process by a greater than normal lowering of the ground surface.

This procedure has been used on many projects throughout the United States and Europe, including several sites done by the New York and New Jersey Port Authority. Our office has been involved in over 25 projects which have been constructed in this manner. The process has been reviewed for projects and approved by the City of New York, the State of Connecticut, and by local building officials for use on numerous projects in New Jersey.

The dynamic compaction process transmits ground vibrations that will likely be felt in the nearby buildings. However, our experience indicates that at distances greater than 30 to 50 ft. from the impact point, no structural damage will occur. However, there is the potential for cracked plaster (both real and imagined) so that a pre-construction survey of existing buildings is advisable as well as occasional seismic monitoring of ground vibrations during construction.

To handle the worst conditions on this site, we estimate that a minimum 12-ton weight dropped from a height of approximately 80± feet will be required. Two to three passes at 10 to 12± feet on centers with approximately 5 drops per pass is anticipated in the building area. The material should be accomplished as necessary to achieve the density requirements.

Foundation Design Criteria For Dynamic Compaction Alternate

After the dynamic compaction procedures have been satisfactorily completed, the structure may be constructed on conventional shallow spread/strip footings with a slab-on-grade. The footings may be designed for an allowable net soil bearing pressure of 1.5 tsf (3,000 psf). If organic refuse is encountered at the bottom of the footing excavation, the excavation should be carried a minimum of 12 inches deeper (or as directed by the soils engineer) and backfilled with clean 3/4 inch crushed stone or gravel.

Exterior footings, and footings in non-heated areas, should be founded at a minimum depth of 3.0 ft. for protection against frost uplift. Interior footings in heated areas may be founded at conventional depths below the floor slab. Regardless of the loads, the minimum plan dimension of isolated column footings should be 36 inches and the minimum plan width of continuous strip footings should be 24 inches.

Pavement Design

Site preparation procedures for paved areas and for pavement design details should be evaluated after a preliminary site grading plan is developed.

Utility Lines

It would be advisable to dynamically compact utility lines that are sensitive to settlement. The bottom of utility line excavations will likely fall within the existing miscellaneous fill. If any soft or organic soils are encountered at invert elevation, over-excavation and

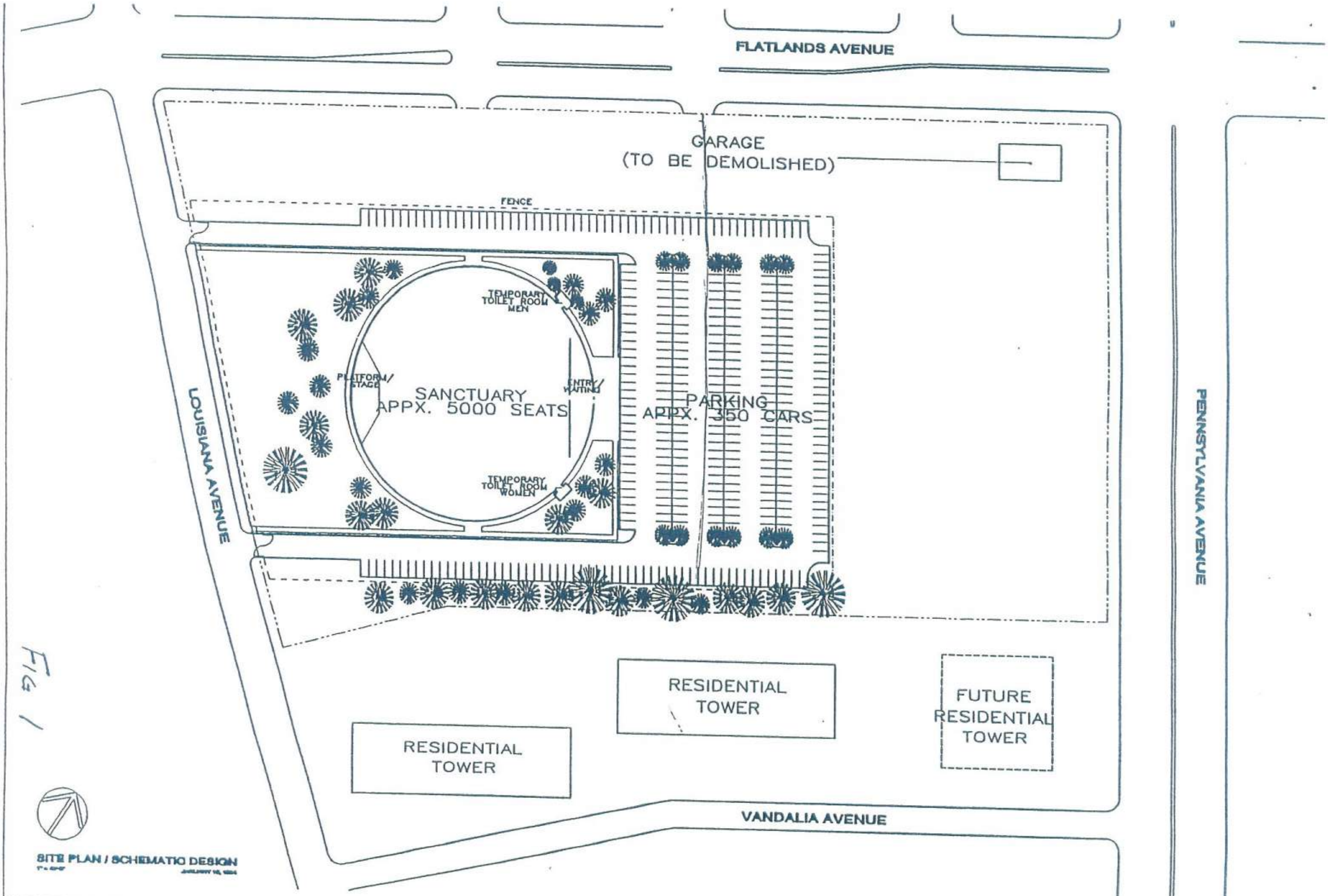

FIG 1

THE NEW YORK CHRISTIAN LIFE CENTRE

BROOKLYN, NEW YORK

DR. A.R. BERNARD, SR., PASTOR

McKISSACK & McKISSACK ARCHITECTS, P.C.