November 29, 2017

Jonathan Levi Architects (JLA)
266 Beacon Street
Boston, MA 02116

Attention: Mr. Philip Gray

Reference: Fuller Middle School; Framingham, Massachusetts
Preliminary Geotechnical Engineering Recommendations

Ladies and Gentlemen:

This letter documents the results of our preliminary geotechnical engineering analyses based on our review of the provided drawings and our recent site visit. It is understood that a feasibility study is being conducted to assess options for the expansion of the existing middle school or the construction of a new school building. The existing Fuller Middle School (FMS) site is located at 31 Flagg Drive in Framingham. This letter was prepared in accordance with our proposal dated October 27, 2017 and the subsequent authorization of Mr. Philip Gray with Jonathan Levi Architects (JLA).

Available Information

Information provided to McPhail Associates, LLC (McPhail) by JLA included a set of architectural and structural drawings for the existing FMS prepared by Samuel Glaser Associates (SGA) dated May 25, 1956. In addition, McPhail was provided the logs of thirty-four (34) borings performed during the original school design in 1956. Two plans were included in the set of plans prepared by SGA: a sheet entitled "Existing Topography Map" dated May 25, 1956 and a sheet entitled "Site Improvement Plan – Boring Location Plan" dated May 25, 1956. The boring logs and location plan are attached.

Background

The subject site fronts onto Flagg Drive to the south, and is bounded by the Mass Bay Community College to the east, residential properties to the west and a wooded area to the north. Based on our review of historic United States Geological Survey (USGS) maps, the site is located along the edge of freshwater marsh. Currently, an existing one-story brick school building occupies the central portion of the site, which was built in the late 1950's. The site is occupied by a paved surface parking lot, as well as grassed and landscape areas.

It is understood that several portions of the existing building contain a crawl space located at about Elevation +157.5, with the first-floor slab above at Elevation +164.5. In addition, the drawing indicates the lowest level slab in the boiler room, gymnasium and cafeteria at Elevation +155.1, Elevation +157, and Elevation +157, respectively. The school contains three (3) open court yards (no roofs), with ground surface located about 6 inches to 1-foot below the first-floor slab elevation. Existing ground surface along the building perimeter is

at about Elevation +161 and gradually slopes to Elevation +158 to the northeast and southeast.

Based on our review of "Foundation Plan, Drawing No. S1 – Framingham High School", General Notes Nos. 11 through 13 indicate the following: No. 11 – "Piles shall be cast-in-place concrete piles, with a steel shell; No. 12 – "Butts of all interior piles shall have a minimum butt diameter 16", butts of all exterior piles shall have a minimum diameter of 13", except otherwise noted, see specifications"; and No. 13 – "Load on any one pile shall not exceed a maximum of 65 ton". In addition, typical pile details shown on the same drawing indicates that the pile is be tapered.

The existing drawings also indicate that within the boiler room, cafeteria and gymnasium, the existing floor slab was designed as a slab-on-grade, and that the first floor-slab was designed as structurally-supported slab.

Based on our review of the "Existing Topography Map", the site grade within the existing building footprint prior to its construction generally ranged from approximately Elevation +155 to Elevation +170. Thus, in consideration of the "Site Improvement Plan", site grading generally consisted of fills up to 2 feet thick and cuts up to depths between 0.5 and 12.5 feet as part of the original construction. Also, General Note No. 1 on the "Site Improvement Plan" indicates: "Excavate all peat from drives, parking areas & walks".

Site Visit

The McPhail representative conducted a site visit on November 8, 2017 to visually observe conditions related to geotechnical engineering aspects of the original construction. During our visit, from within the existing crawl space, the upper portion of 16-inch to 18-inch diameter cast-in-place concrete piles were observed. Based on our observations from within the existing crawl space and the information presented on the existing drawings, the existing piles are considered to consist of "Raymond Step-Taper" piles.

Groundwater was not observed on the exposed soil subgrade within the existing crawl space. The lowest level slab within the boiler room was observed to consist of a concrete slab. In addition, a sump pump was observed to be located in the boiler room at a depth of about 4 to 5 feet below the top of the existing slab grade. The sump pump was not in operation during the time of the visit, however, school maintenance personnel indicated that the pump does operate on occasion.

From within the crawl space, the first-floor slab was observed to consist of a structurally-framed slab, and within the northwest corner of the existing building it was observed that the first-floor slab support was supplemented by temporary shoring.

In general, no obvious or significant cracks or signs of settlement were observed within the existing building during our site visit. Enclosed are photographs taken during our site visit.

Previous Subsurface Explorations

As part of the original construction, thirty-four (34) boring logs were performed within or near the footprint of the existing school structure, in the area of the existing parking lot and in the field southeast of the existing building. The borings indicate that at ground surface the explorations encountered either soft peat/organic soil or loamy sand deposits. The peat/organic soil was encountered within thirteen (13) borings and it was observed to extend to depths from about 1.7 to 6.6 feet below ground surface corresponding to approximate Elevation +157 to Elevation +150.4. The loamy sand deposit was observed to extend to depths from about 0.5 to 4 feet below ground surface corresponding to Elevation +159.5 to Elevation +153. Below the soft peat/organic soil and loamy sand deposits, the borings encountered loose to very dense sand and gravel deposit with occasional boulders. Groundwater was encountered in the borings at depth of 0 to 8 feet below ground surface corresponding to Elevation +158 and Elevation +151.

Preliminary Foundation Design Recommendations

The purpose of the preliminary study is to provide preliminary foundation design recommendations for the proposed addition(s) or new school building based on the conditions described above and the preliminary nature of the feasibility study. The selection of a specific foundation system for support of the proposed addition(s) or new school building will be dependent on the location of the proposed construction as well as the final elevation of the lowest level floor slab in relation to the existing ground surface elevation.

Foundation options for support of the proposed additions or new building include a ground-improvement technique known as Aggregate Piers (APs) and/or conventional spread footings deriving their support directly in the sand deposit. Foundation support consisting of spread footings would likely require overexcavtion and replacement of unsuitable soils.

In the event that the existing building is demolished, the existing piles, if left in-place, may be reused for the support of new construction in accordance with the Massachusetts Building Code (Code). However, based on our experience, the use of existing piles for foundation support of new construction is not typically considered economical.

The lowest-level slab of the proposed addition(s) or new building is anticipated to consist of a conventional slab-on-grade.

Preliminary Foundation Construction Considerations

In the event that spread footings are selected for support of the proposed construction, the existing unsuitable fill, loamy sand, and organic deposits would need to be removed if encountered at the proposed footing locations to allow the preparation of the bearing surface consisting of the natural sand deposit or on structural fill placed directly above the natural sand deposit. Depending on the depth of excavation required to expose the surface of the natural sand deposit, and subsequently replace it with compacted structural fill,

ground improvement using APs may be more economical by allowing the existing unsuitable soils to remain in-place.

Due to the relatively high groundwater level indicated on the previous borings, dewatering is considered likely to be required during construction. The magnitude of construction dewatering would be increased if a spread footing foundation system is utilized and overexcavation of unsuitable soils is required. In general, dewatering is anticipated to be performed utilizing conventional sumping methods. Based on the size of the site, groundwater may be recharged on site. Otherwise, a groundwater discharge permit from either the Environmental Protection Agency (EPA) or the City of Framingham will be required in order to legally dispose of groundwater collected during construction.

Final Comments

As part of future design phase of the project, it is recommended that a subsurface exploration program be conducted once the location and configuration of the proposed structure or addition(s) are determined. The subsurface exploration program will provide supplemental, location-specific information to better evaluate potential foundation support options and construction implications.

We trust that the above is sufficient for your present requirements. Should you have any questions concerning the above, please do not hesitate to call us.

Very truly yours,

McPHAIL ASSOCIATES, LLC

Fatima Babic-Konjic, P.E.

Chris M. Erikson, P.E.

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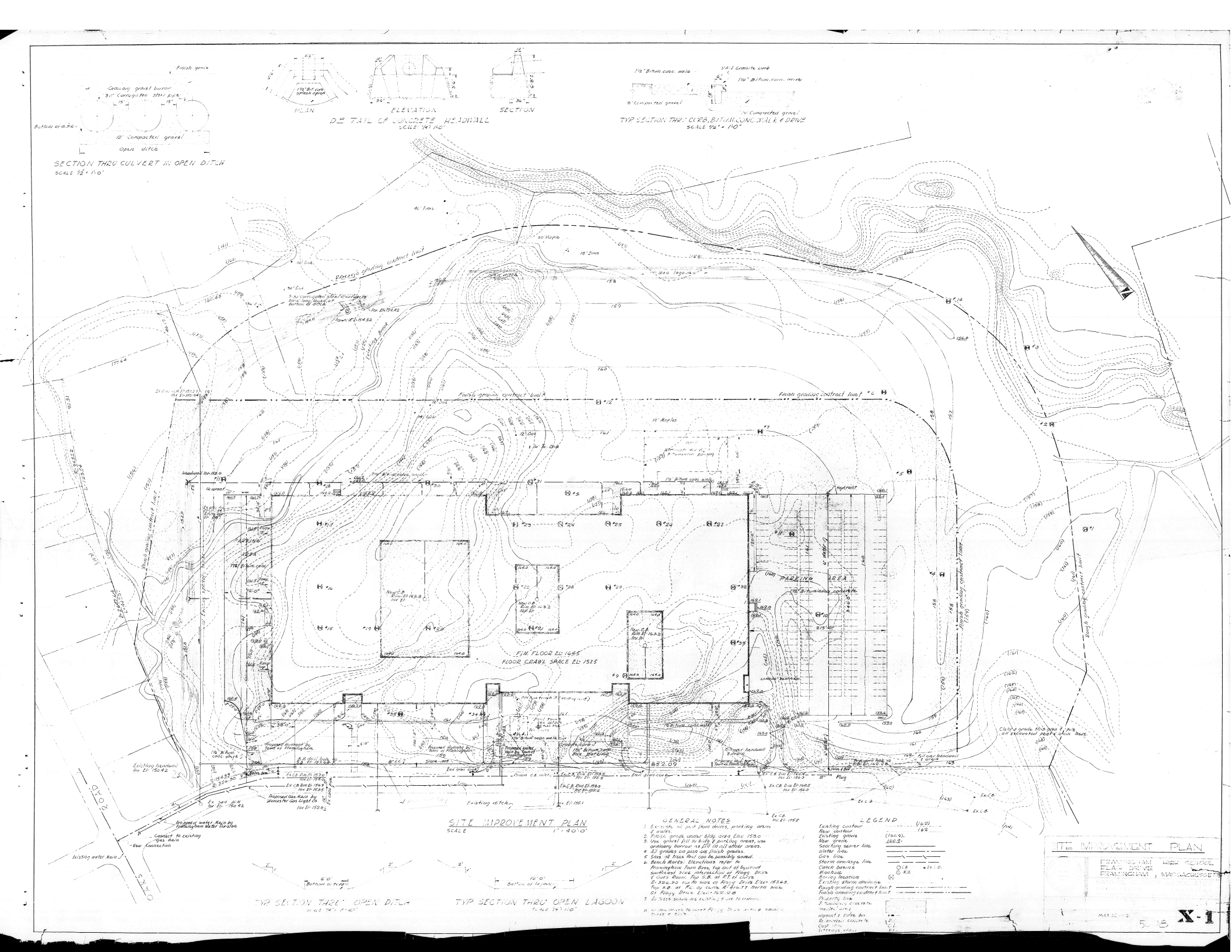
FBK/cme

Attachments:

- 1956 Boring Location Plan
- Logs of 1956 Borings B-1 through B-35
- Photographs

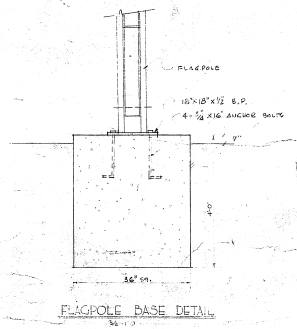

SECTION THRU CULVERT IN OPEN DITCH
SCALE 1/2" = 1'-0"
DETAIL OF CONCRETE HEADWALL
SCALE 1/4" = 1'-0"
PLAN
ELEVATION
SECTION
TYP. SECTION THRU CURB, BITUM. CONC. WALK & DRIVE
SCALE 1/2" = 1'-0"
SITE IMPROVEMENT PLAN
SCALE 1" = 40'-0"
TYP. SECTION THRU OPEN DITCH
SCALE 1/4" = 1'-0"
TYP. SECTION THRU OPEN LAGOON
SCALE 1/4" = 1'-0"
GENERAL NOTES
LEGEND
SITE IMPROVEMENT PLAN
FRAMINGHAM HIGH SCHOOL
FLAG DRIVE
FRAMINGHAM, MASSACHUSETTS
X-1

B O R I N G S C H E D U L E

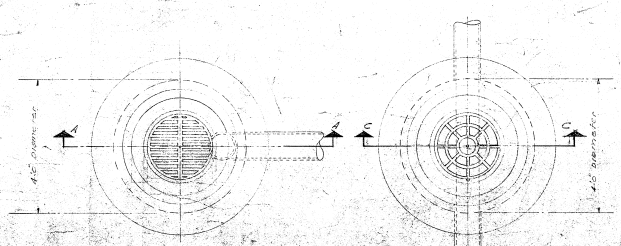
TEST BORING REPORT JAN. 21, 1955

TEST BORING REPORT SEPT. 29, 1955

NOTE: 1. WATER LEVELS INDICATED ARE THOSE OBSERVED AT THE COMPLETION OF EACH BORING, OR AS NOTED, AND DO NOT NECESSARILY REPRESENT PERMANENT GROUND WATER LEVELS.
2. FIGURES IN RIGHT HAND COLUMN INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE 1" SQ. SAMPLING PIPE ONE FOOT USING ONE-HUNDRED & FORTY LB. WEIGHT FALLING THIRTY INCHES.

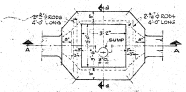


FLAGPOLE BASE DETAIL

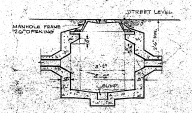


SECTION A-A
DETAILS OF CATCH BASIN
SCALE ½"=1'-0"

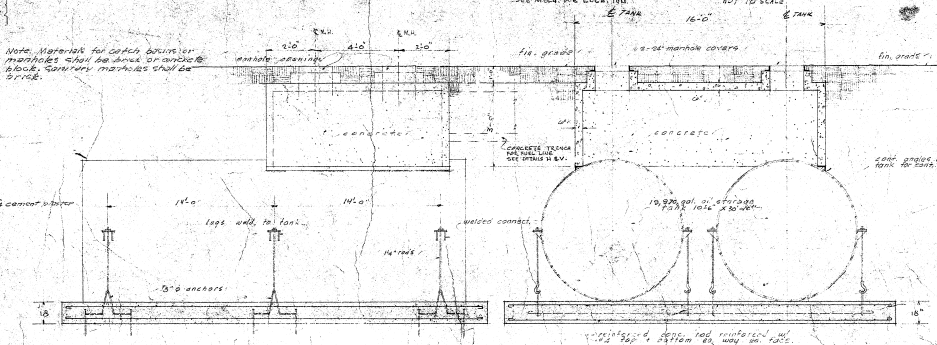
SECTION C-C
DETAIL MANHOLE
SCALE ¾"=1'-0"



PLAN OF CONCRETE ELECTRICAL MANHOLE



CONCRETE ELECTRICAL MANHOLE DETAILS
SEE MECH. DWG. FOR LOCATION
NOT TO SCALE



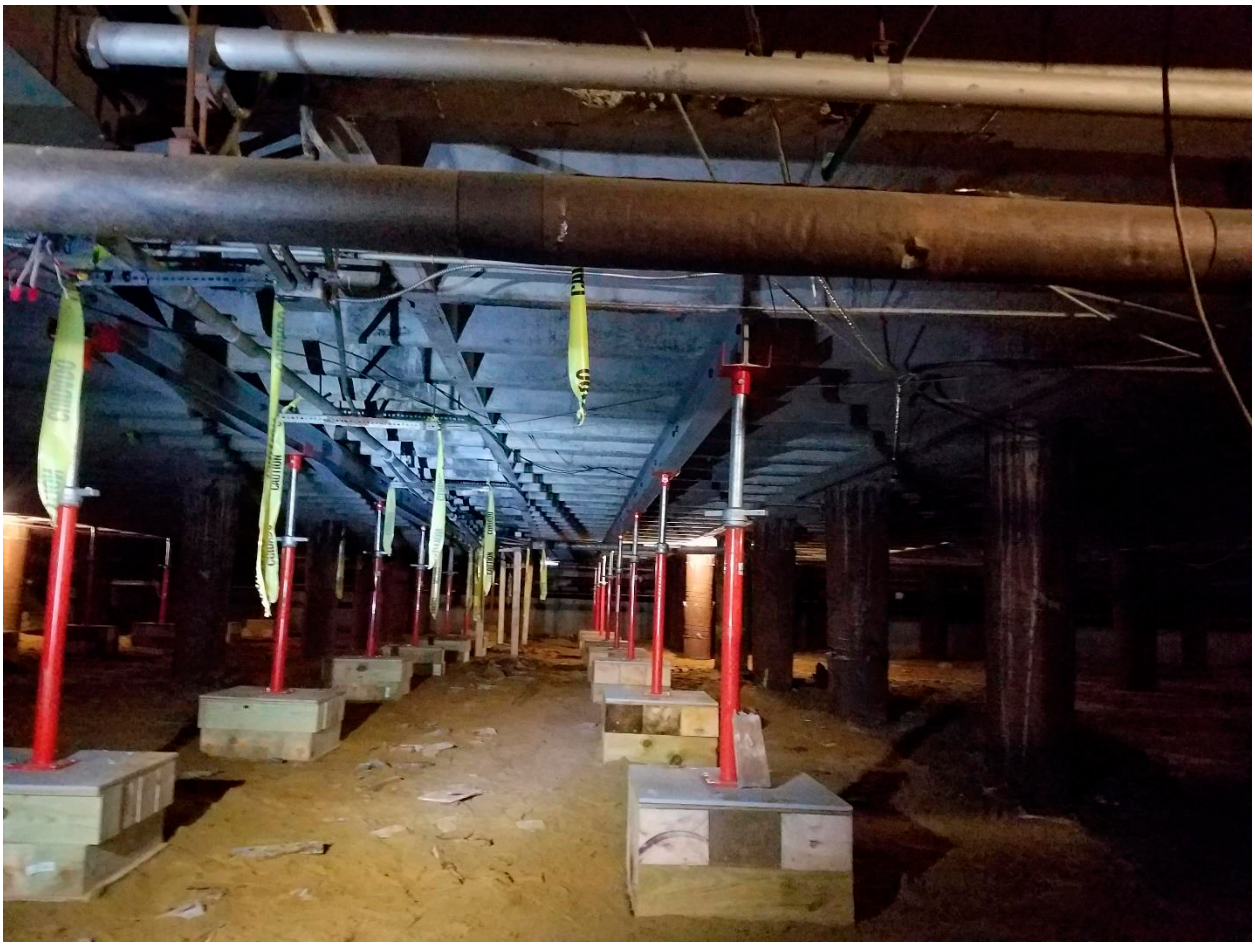
DETAILS OF OIL STORAGE TANKS
SCALE: ¼"=1'-0"

BORING SCHEDULE AND DETAILS	
FRAMINGHAM HIGH SCHOOL	
FLAGG DRIVE	
FRAMINGHAM, MASSACHUSETTS	
SAMUEL GLASER ASSOCIATES	
ARCHITECTS · ENGINEERS	
105 NEWBURY STREET · BOSTON 16, MASSACHUSETTS	
DRAWN BY	
CHECKED BY	
DATE MAY 05, 1956	JOB No. 5608
APPROVED BY	DRAWING No. X-2

Crawl space area.

Boiler room.

Sump pump located in the boiler room.



Temporary shoring of the existing structural slab within the northwest corner of the existing building footprint.