

**KEVIN M. MARTIN, P.E.**  
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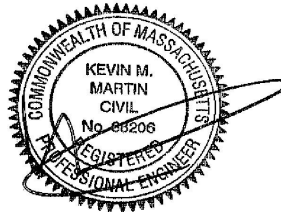
**MEMORANDUM**

**TO:** Armando Plata, AIA  
11 Landry Road  
Medford, MA 02155

**FROM:** Kevin M. Martin, P.E.  
Geotechnical Engineer

**DATE:** March 4, 2024

**RE: GEOTECHNICAL REVIEW  
PROPOSED RESIDENCE  
22 MONTVALE STREET  
MELROSE, MASSACHUSETTS**



This memorandum serves as a geotechnical review for the referenced project. The contents of this memorandum are subject to the attached *Limitations*.

**BACKGROUND**

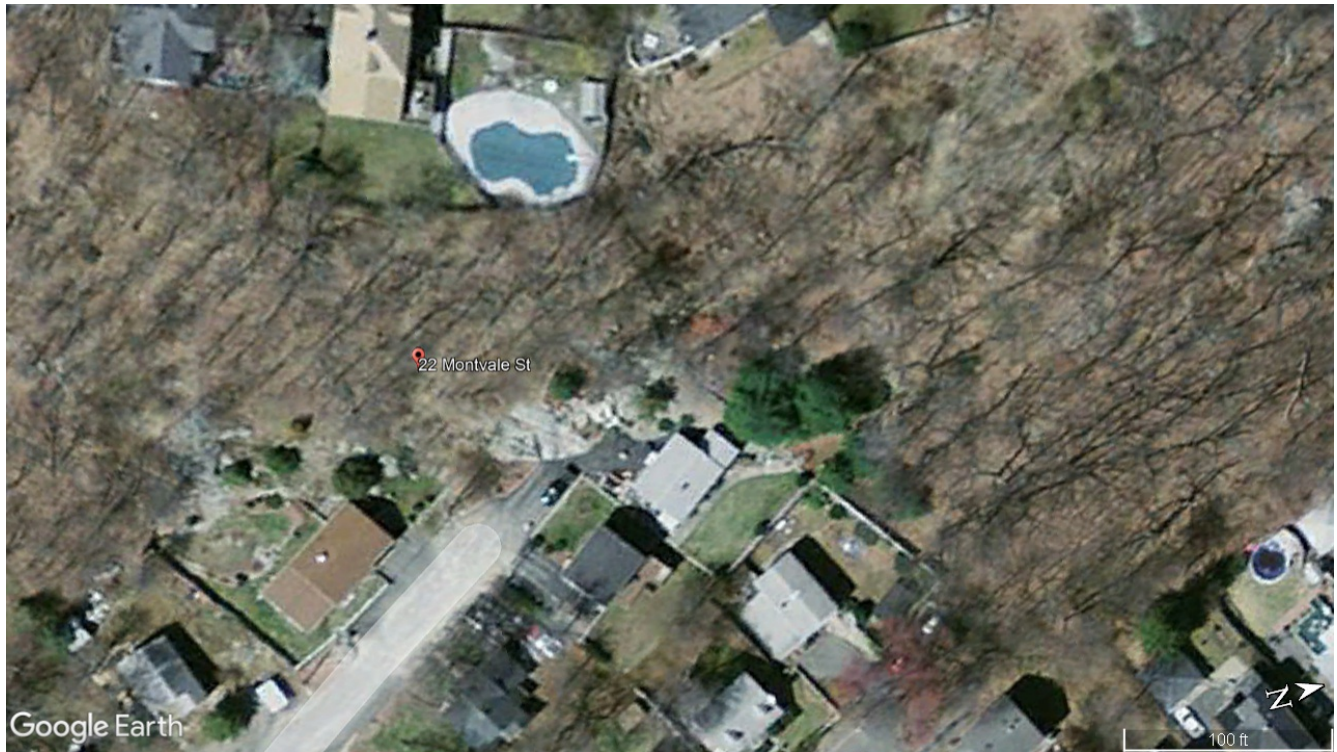
The site includes an undeveloped, residential hillside lot. The site is dominated by steep and shallow bedrock. Bedrock outcropping dominates most of the property. The project includes a 2-story residence along the bedrock slope.

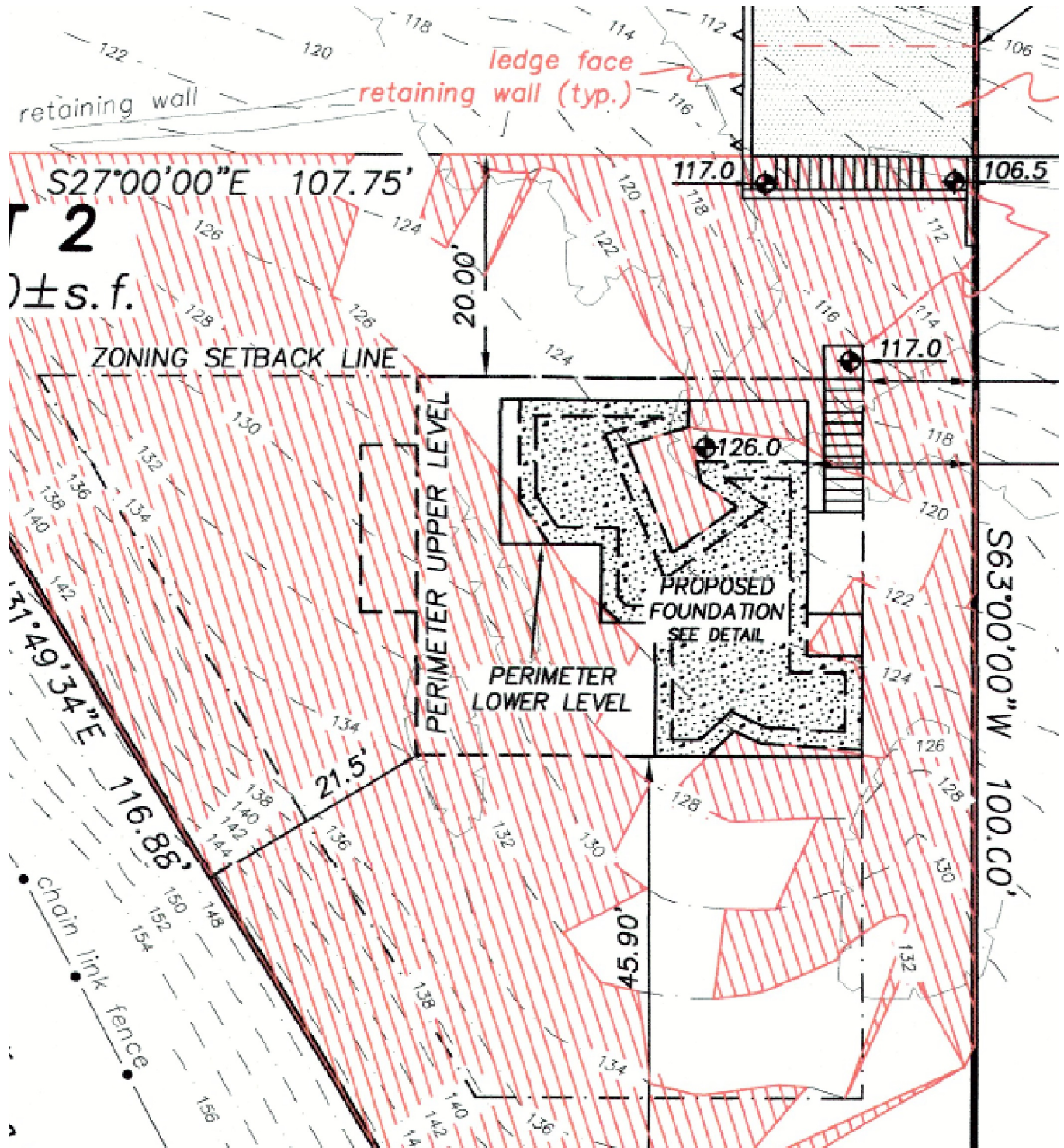
*In order to get the special permit to build on this sloping site, we're preserving the existing topographic conditions except for the parking area; so, we're not doing any hammering or blasting, only minimal excavation to remove top soil and expose the ledge to sit the footing. The proposed house sits on an area of the site where there is more of a leveled base; see noted drawing attached where the house only contacts the ground on an area of about 542 sq ft.*

Per the *Site Plan*, it appears building construction can not occur where the slope is steeper than 25%. As such, there is small area where the foundation will be constructed for support of the residence. A Geotechnical Review was requested to review support of the foundation.

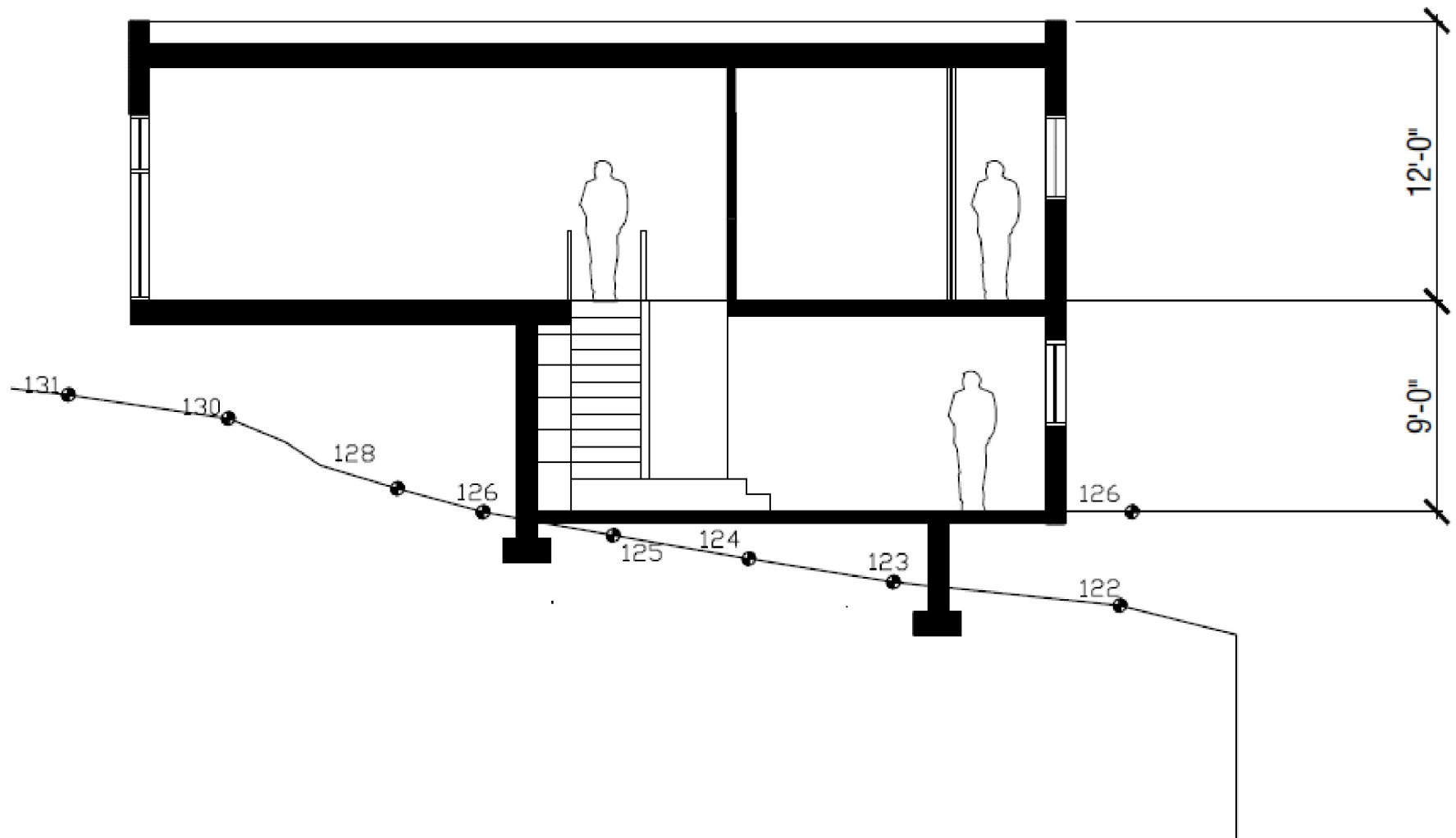
The purpose of this study is to review the subgrade conditions and provide a geotechnical evaluation related to foundation design and construction as required by the *Massachusetts State Building Code*. This report does not include an environmental assessment relative to oil, gasoline, solid waste and/or other hazardous materials. The environmental conditions of the property should be addressed by others as necessary. This study also does not include review of site design or construction issues such as infiltration systems, dry wells, retaining walls, excavation support, structural design, underground utilities, crane pads, protection of surrounding buildings/utilities, shoring, vibration control, blasting, foundation water-proofing or other site and/or temporary design unless specifically addressed herein.



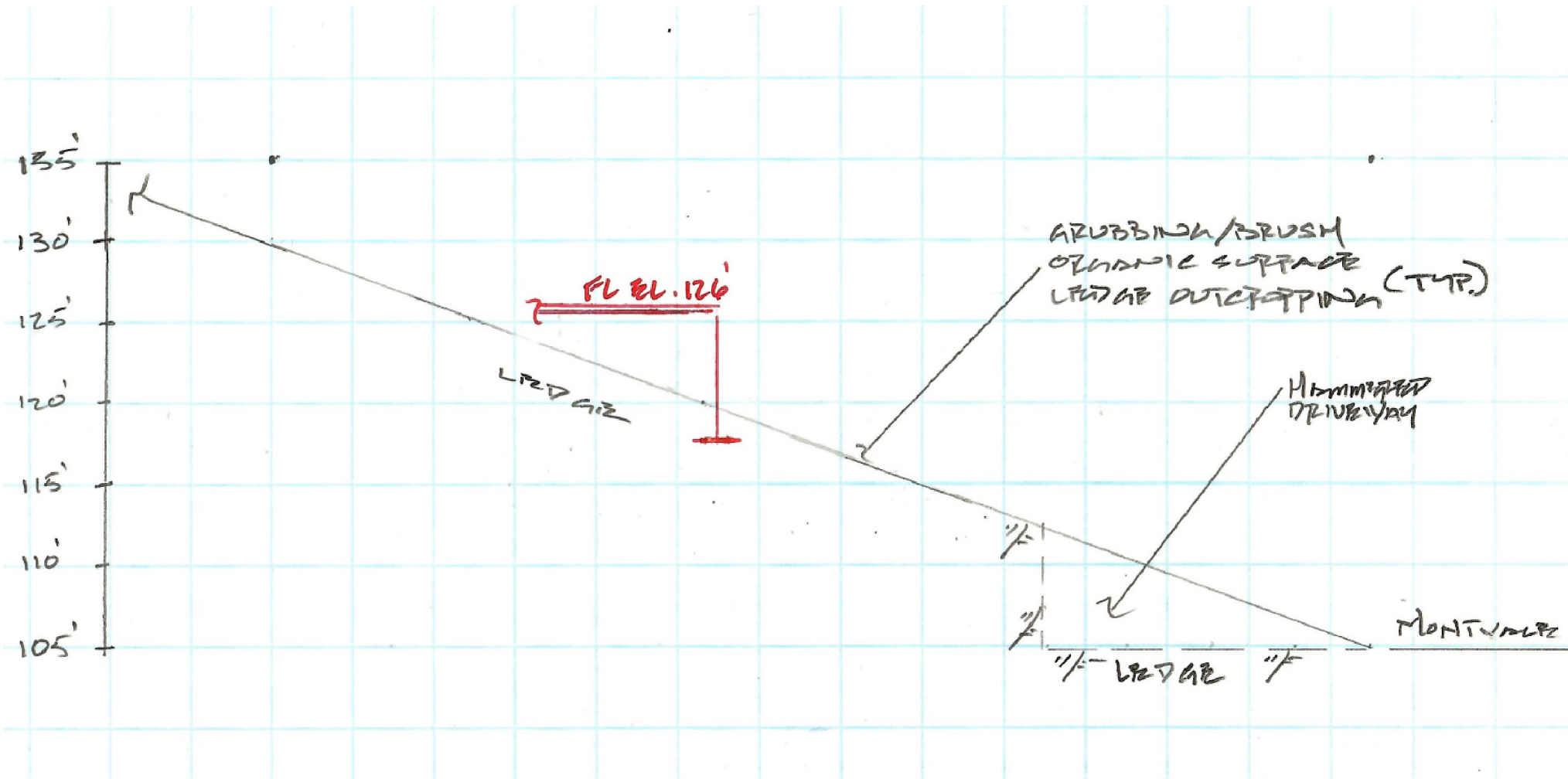




PROPOSED SITE PLAN



**HOUSE PROFILE W/ CANTILEVER**



APPROXIMATE LEDGE PROFILE

## **FOUNDATION RECOMMENDATIONS**

The foundation may be supported on the shallow bedrock. The bedrock has adequate strength for compressive support (ie: bearing capacity). The concerns with the shallow bedrock include (1) frost, (2) lateral (shear) load and (3) uplift.

### **Frost**

Frost concerns may be addressed with a solid bedrock surface. Soil, loose rock, etc. shall be adequately cleaned to expose solid, intact bedrock. This is usually accomplished with high pressure water and/or air. Fractures should be filled with a cement grout as necessary. As long as water can not infiltrate below the foundation then frost will not be an issue.

### **Shear**

Shear or lateral load may be addressed with passive rock anchors. A passive rock anchor includes grouted or epoxy rebar drilled into the bedrock. The size and spacing of the rock anchors is dependent on the load, the bedrock slope and embedment. Given limited embedment and an expected sloping/undulating bedrock, we would prescribe a minimum No. 5 rebar (60 ksi) with a staggered spacing no greater than 24 inches and 12 inches deep.

### **Uplift**

There may be uplift load especially given the cantilevered second floor. Uplift may also be addressed with similar rock anchors. The anchors may be drilled deeper if necessary for additional resistance.

The Bedrock appears to be a Rhyolite or Gabbo of the Lynn Formation. This is consistent with the *USGS Bedrock Geologic Map of Massachusetts*. The Bedrock is hard and competent. Allowable bearing capacity could vary from 10-20 ksf.



## **TYPICAL ROCK ANCHOR**

We trust the contents of this memorandum report are responsive to your needs at this time. Should you have any questions or require additional assistance, please do not hesitate to contact our office.



## LIMITATIONS

### Explorations

1. The analyses, recommendations and designs submitted in this report are based in part upon the data obtained from preliminary subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.
2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretation of widely spaced explorations and samples; actual soil transitions are probably more gradual. For specific information, refer to the individual test pit and/or boring logs.
3. Water level readings have been made in the test pits and/or test borings under conditions stated on the logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors differing from the time the measurements were made.

### Review

4. It is recommended that this firm be given the opportunity to review final design drawings and specifications to evaluate the appropriate implementation of the recommendations provided herein.
5. In the event that any changes in the nature, design, or location of the proposed areas are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of the report modified or verified in writing by KMM Geotechnical Consultants, LLC.

### Construction

6. It is recommended that this firm be retained to provide geotechnical engineering services during the earthwork phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.

### Use of Report

7. This report has been prepared for the exclusive use of the Armando Plata, AIA in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.
8. This report has been prepared for this project by KMM Geotechnical Consultants, LLC. This report was completed for preliminary design purposes and may be limited in its scope to complete an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to preliminary geotechnical design considerations only.