Subsurface Soil Exploration and
Geotechnical Engineering Evaluation
Proposed ABC Store # 197
Old Kings Road and Palm Coast Parkway
Palm Coast, Flagler County, Florida

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February 4, 2008
File No. 08-6315

ABC Fine Wines & Spirits
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Attention: Ms. Phyllis Fitzpatrick

Subject: Subsurface Soil Exploration and
Geotechnical Engineering Evaluation
Proposed ABC Store # 197
Old Kings Road and Palm Coast Parkway
Palm Coast, Flagler County, Florida

Dear Ms. Fitzpatrick:

As requested and authorized, we have completed a shallow subsurface soil exploration for the subject project. The purposes of performing this exploration were to evaluate the general subsurface conditions within the building and parking/drive areas and to provide recommendations for site preparation, foundation support, and pavement design. In addition, we have estimated the normal seasonal high groundwater level at the boring locations. This report documents our findings and presents our engineering recommendations.

SITE LOCATION AND SITE DESCRIPTION

The site for the proposed ABC Store # 197 is located on the northeast corner of the intersection of Old Kings Road and Palm Coast Parkway in Palm Coast, Flagler County, Florida (Section 18, Township 11 South, Range 31 East). The general site location is shown superimposed on the Beverly Beach, Florida U.S.G.S. quadrangle map presented on Figure 1.

The site is currently undeveloped and grass covered, with trees mostly on the north, northeast and northwest boundaries.

PROPOSED CONSTRUCTION AND GRADING

It is our understanding that the proposed development includes a one-story structure approximately 10,000 square feet in "footprint" plan area. The proposed building will consist of load bearing masonry walls and interior columns with slab-on-grade floors. For the purposes of our analysis, we have assumed the maximum loading conditions for the structure to be on the order of 5 kips per linear foot for wall foundations, 70 kips for individual column foundations, and 150 pounds per square foot (psf) for slab-on-grade floors. Grading plans are not complete at this time, therefore we have assumed that 0 to 3 feet of fill is required to raise the building and parking/drive areas to final elevations. If actual building loads or fill height exceed our assumptions, then the recommendations in this report may not be valid.

We understand that the stormwater run-off is to be retained on-site by means of retention ponds and/or an exfiltration system to be located under the parking lot.

REVIEW OF SOIL SURVEY MAPS

Based on the 1997 Soil Survey for Flagler County, Florida, as prepared by the U.S. Department of Agriculture Soil Conservation Service, the site is located in an area mapped as the "Cassia fine sand" soil series. The "Cassia fine sand" soil series consists of very deep, nearly level soils on low ridges and knolls on the flatwood. The internal drainage of the "Cassia fine sand" is somewhat poor and the soil permeability is moderate or moderately rapid. According to the Soil Survey, the seasonal high water table for the "Cassia fine sand" soil series is typically within 18 to 42 inches of the natural ground surface.

FIELD EXPLORATION PROGRAM

SPT and Auger Borings

The field exploration program included performing 4 Standard Penetration Test (SPT) borings and 5 auger borings. The SPT borings were performed within the proposed "footprint" of the building. The borings were advanced to depths of 25 and 40 feet below the ground surface using the methodology outlined in ASTM D-1586. A summary of this field procedure is included in the Appendix. Split-spoon soil samples recovered during performance of the borings were visually classified in the field and representative portions of the samples were transported to our laboratory in sealed sample jars.

The auger borings were performed in the proposed parking/drive and stormwater retention pond areas. They were drilled using a truck-mounted, 4-inch diameter, continuous flight auger to a depth of 20 feet below the ground surface. A summary of this field procedure is included in the Appendix. Representative soil samples were recovered from the auger borings and transported to our laboratory for further analysis.

The groundwater level at each of the boring locations was measured upon completion of drilling. The borings were then backfilled with soil cuttings.

Field Permeability Tests

Field permeability tests were performed at the location of the proposed stormwater pond and the pavement areas. The field permeability tests (total of 4) were performed by installing a solid-walled PVC casing snugly fit into a 4-inch diameter auger borehole. The bottom of the pipe was open and raised 1 foot above the bottom of the borehole. The bottom 1 foot of the borehole was gravel-packed. The pipe was then filled to the top with water. The tests were performed as a "falling head" test in which the rate of water drop within the pipe was measured.

Test Locations

The approximate locations of the borings are schematically illustrated on a site plan shown on Figure 1. The permeability tests were conducted adjacent to Borings AB-1, AB-3, AB-4 and AB-5. These locations were determined in the field by estimating distances from existing site features and should be considered accurate only to the degree implied by the method of measurement used.

LABORATORY PROGRAM

Representative soil samples obtained during our field sampling operation were packaged and transferred to our laboratory for further visual examination and classification. The soil samples were visually classified in general accordance with the Unified Soil Classification System (ASTM D-2488). The resulting soil descriptions are shown on the soil boring profiles presented on Figure 1.

In addition, we conducted 2 organic content tests (ASTM D2974-87), 2 natural moisture content tests (ASTM D2216) and 2 percent fines analyses (ASTM D1140) on selected soil samples obtained from the borings. The results of these tests are presented adjacent to the sample depth on the boring profiles on Figure 1.

GENERAL SUBSURFACE CONDITIONS

General Soil Profile

The results of the field exploration and laboratory programs are graphically summarized on the soil boring profiles presented on Figure 1. The stratification of the boring profiles represents our interpretation of the field boring logs and the results of laboratory examinations of the recovered samples. The stratification lines represent the approximate boundary between soil types. The actual transitions may be more gradual than implied.

The results of the borings indicate very loose to loose fine sand and fine sand with silt to depths of 2.5 to 7 feet , underlain by very loose to medium dense silty fine sand to depths of 6.5 to 12.5 feet, underlain by very loose to medium dense fine sand with varying amounts of silt to the boring termination depths of 25 and 40 feet below the ground surface. We note that deleterious organic muck was encountered in Boring TH-1 between depths of 2.5 and 3 feet and in Boring TH-3 between depths of 3.5 and 4.5 feet below the ground surface. Organic muck could exist at deeper depths and in thicker layers at unexplored locations.

The above soil profile is outlined in general terms only. Please refer to Figure 1 for soil profile details.

Groundwater Level

The groundwater level was measured in the boreholes on the day drilled after stabilization of the downhole water level. As shown on Figure 1, groundwater was encountered at depths that ranged from 6 to 6.8 feet below the existing ground surface on the dates indicated. Fluctuations in groundwater levels should be anticipated throughout the year primarily due to seasonal variations in rainfall and other factors that may vary from the time the borings were conducted.

NORMAL SEASONAL HIGH GROUNDWATER LEVEL

The normal seasonal high groundwater level each year is the level in the August-September period at the end of the rainy season during a year of normal (average) rainfall. The water table elevations associated with a higher than normal rainfall and in the extreme case, flood, would be higher to much higher than the normal seasonal high groundwater level. The normal high water levels would more approximate the normal seasonal high groundwater levels.

The seasonal high groundwater level is affected by a number of factors. The drainage characteristics of the soils, the land surface elevation, relief points such as drainage ditches, lakes, rivers, swamp areas, etc., and distance to relief points are some of the more important factors influencing the seasonal high groundwater level.

Based on our interpretation of the site conditions using our boring logs, we estimate the normal seasonal high groundwater level at the boring locations to be approximately 2½ feet above the groundwater levels measured at the time of our field exploration. Water may perch temporarily at higher elevations on top of silty soils during periods of heavy or prolonged rain fall.

ENGINEERING EVALUATION AND RECOMMENDATIONS

General

The results of our exploration indicate that, with proper site preparation as recommended in this report, the existing soils, with the exception of the deleterious organic muck, are suitable for supporting the proposed building on a conventional shallow foundation system. Spread footings should provide an adequate support system for the structures.

The deleterious organic muck (Stratum 6 on Figure 1) will need to be removed from the areas of the building, pavement, and other structures which can not tolerate greater than typical settlement. Additional exploration is recommended to further explore the location and nature of the muck.

The following are our recommendations for overall site preparation, foundation support, and pavement construction which we feel are best suited for the proposed facility and existing soil conditions. The recommendations are made as a guide for the design engineer and/or architect, parts of which should be incorporated into the project's specifications.

Stripping and Grubbing

The "footprint" of the proposed building and the parking/drive areas, plus a minimum margin of five feet, should be stripped of all surface vegetation, stumps, debris, organic topsoil or other deleterious materials, as encountered. Specifically, the organic topsoil as encountered in the borings to a depth of 12 inches should be stripped. Buried utilities should be removed or plugged to eliminate conduits into which surrounding soils could erode.

After stripping, the site should be grubbed or root-raked such that roots with a diameter greater than ½ inch, stumps, or small roots in a dense state, are completely removed. The actual depth(s) of stripping and grubbing must be determined by visual observation and judgment during the earthwork operation.

Demucking

Organic muck (Stratum 6 as shown on Figure 1) was encountered in Boring TH-1 between depths of 2.5 and 3 feet and in Boring TH-3 between depths of 3.5 and 4.5 feet below the ground surface. Organic muck may exist in thicker layers and/or at deeper depths at unexplored locations.

The organic muck is not suitable for providing foundation support and should be removed (demucked) to its entire vertical limits and to a minimum horizontal margin outside the structure areas equivalent to the depth to the bottom of the muck, but not less than a 5-foot horizontal margin.

The excavated organic muck must not be used as structural fill material and should be disposed of as directed by the owner of his representative. Demucking and backfilling operations should be monitored continuously to ensure that all unsuitable material is removed and the backfill soils are suitable and well compacted.

Excavation slopes and/or bracing are the responsibility of the Contractor. However, at a minimum, all excavations should be sloped and/or braced to meet the requirements of the Occupational Safety and Health Administration (OSHA) Standards.

De-mucking should be conducted "in-the-dry". Dewatering should be accomplished as discussed in the "Dewatering" section of this report.

We recommend excavating test pits to further explore the location of deleterious organic muck on the site. Test pits can be excavated before or during the initial phases of construction. The test pit excavations should be monitored by a representative of Ardaman & Associates. Unsuitable materials, if encountered, should be removed and replaced with suitable compacted fill during site construction.

Prior to backfilling of the excavation, we recommend that the excavation be inspected by Ardaman & Associates to verify the complete removal of all deleterious material.

Proof-rolling

We recommend proof-rolling the cleared surface to locate any unforeseen soft areas or unsuitable surface or near-surface soils, to increase the density of the upper soils, and to prepare the existing surface for the addition of the fill soils (as required). Proof-rolling of the building areas should consist of at least 10 passes of a compactor capable of achieving the density requirements described in the next paragraph. Heavy vibratory compaction should not be used within 150 feet of existing structures. Each pass should overlap the preceding pass by 30 percent to achieve complete coverage. If deemed necessary, in areas that continue to "yield", remove all deleterious material and replace with clean, compacted sand backfill. The proof-rolling should occur after cutting and before filling. The number of passes can be reduced to 5 within the proposed parking/drive areas.

A density equivalent to or greater than 95 percent of the modified Proctor (ASTM D-1557) maximum dry density value for a depth of 2 feet in the building area and 1 foot in the parking/drive areas must be achieved beneath the stripped and grubbed ground surface. Additional passes and/or overexcavation and recompaction may be required if these minimum density requirements are not achieved. The soil moisture should be adjusted as necessary during compaction.

Proof-rolling may cause upward movement or "pumping" of the groundwater. However, we recommend that the existing surface be level and firm prior to the addition of fill soils. Proof-rolling with a front-end loader may help achieve the desired surface and compaction condition before adding the fill soils. The site should be dewatered as necessary. Depending on the time of year, a 12- to 18-inch layer of clean fine sand (SP) fill may be required prior to proof-rolling.

Care should be exercised to avoid damaging any neighboring structures while the compaction operation is underway. Prior to commencing compaction, occupants of adjacent structures should be notified and the existing condition (i.e. cracks) of the structures documented with photographs and survey (if deemed necessary). Compaction should cease if deemed detrimental to adjacent structures, and Ardaman & Associates should be notified immediately.

Suitable Fill Material and the Compaction of Fill Soils

All fill materials should be free of organic materials, such as roots and vegetation. We recommend using fill with less than 12 percent by dry weight of material passing the U.S. Standard No. 200 sieve size. The fine sand and fine sand with silt (Strata No. 1 and 2 without roots, as shown on Figure 1) are suitable for use as fill materials and, with proper moisture control, should densify using conventional compaction methods. Soils with more than 12 percent passing the No. 200 sieve can be used in some applications, but will be more difficult to compact due to their inherent nature to retain soil moisture.

All structural fill should be placed in level lifts not to exceed 12 inches in uncompacted thickness. Each lift should be compacted to at least 95 percent of the modified Proctor (ASTM D-1557) maximum dry density value. The filling and compaction operations should continue in lifts until the desired elevation(s) is achieved. If hand-held compaction equipment is used, the lift thickness should be reduced to no more than 6 inches.

The use of soils with relatively high fines content (i.e; silty and clayey soils) as fill should be avoided near the ground surface in green-space areas since these relatively low permeability soils promote ponding of water during and following rainfall. Also, in high groundwater areas, silty and clayey soils may cause a rise in the water table elevation due to capillary action. Additionally, these relatively low permeability soils should not be used directly beneath any pavement section as they may trap water within the pavement section leading to premature pavement failure.

Foundation Support by Spread Footings and Foundation Compaction Criteria

Excavate the foundations to the proposed bottom of footing elevations and, thereafter, verify the in-place compaction for a depth of 2 feet below the footing bottoms. If necessary, compact the soils at the bottom of the excavations to at least 95 percent of the modified Proctor maximum dry density (ASTM D-1557) for a depth of 2 feet below the footing bottoms. Based on the existing soil conditions and, assuming the above outlined proof-rolling and compaction criteria are implemented, an allowable soil bearing pressure of 2,000 pounds per square foot (psf) may be used in the foundation design. This bearing pressure should result in foundation settlement within tolerable limits (i.e., 1 inch or less).

All bearing wall foundations should be a minimum of 18 inches wide and column foundations 24 inches wide. A minimum soil cover of 18 inches should be maintained from the bottom of the foundations to the adjacent finished grades.

Floor Slab Moisture Reducer and Slab Compaction Requirements

Compaction beneath all floor slabs should be verified for a depth of 12 inches and meet the 95 percent criteria (modified Proctor, ASTM D-1557).

Precautions should be taken during the slab construction to reduce moisture entry from the underlying subgrade soils. Moisture entry can be reduced by installing a membrane between the subgrade soils and floor slab. Care should be exercised when placing the reinforcing steel (or mesh) and slab concrete such that the membrane is not punctured. We note that the membrane alone does not prevent moisture from occurring beneath or on top of the slab.

If interior columns are isolated from the floor slab, an expansion joint should be provided around the columns and sealed with a water-proof sealant.

Dewatering

If the control of the groundwater is required to achieve the necessary stripping and subsequent construction, backfilling, and compaction requirements presented in the preceding sections, the actual method(s) of dewatering should be determined by the contractor. However, regardless of the method(s) used, we suggest drawing down the water table sufficiently, say 2 to 3 feet, below the bottom of any excavation or compaction surface to preclude "pumping" and/or compaction-related problems with the foundation soils. The requirement for control of groundwater should particularly be anticipated for footing and utility excavations.

Dewatering should be accomplished with the knowledge that the permeability of soil tends to decrease with an increasing silt and clay content. Therefore, a silty fine sand is typically less permeable than a fine sand. The SP, SP-SM, and some SM type soils can usually be dewatered by well pointing or ditch/sump methods.

Typical Pavement Section

Site Preparation

All areas to be paved should be prepared as previously outlined. Prior to pavement base installation, the subgrade soil compaction should be verified for a depth of 12 inches (i.e.; compacted to at least 95 percent of the modified Proctor (ASTM D-1557, AASHTO T-180) maximum dry density value).

Limerock Base

A limerock base course 6 inches thick overlying an 8-inch thick stabilized subbase can be used provided that grading and drainage plans preclude periodic saturation of the base material. The periodic saturation of a limerock base material could lead to premature pavement distress. A minimum clearance of 18 inches must be maintained between the bottom of the limerock base and the seasonal high groundwater table.

The limerock should have a minimum Limerock Bearing Ratio (LBR) value of 100 and should be compacted to at least 98 percent of the modified Proctor (ASTM D-1557, AASHTO T-180) maximum density value. For truck parking and drive areas, the base thickness should be a minimum of 8 inches.

An 8-inch thick subbase having a minimum Limerock Bearing Ratio (LBR) value of 40 must be achieved beneath the limerock base. The natural soils may have to be stabilized with suitable clayey soil in order to achieve the required LBR value. The stabilized subbase must be compacted to at least 95 percent of the modified Proctor maximum dry density (ASTM D-1557, AASHTO T-180).

Crushed Concrete Base (Optional)

Crushed concrete base may be used in lieu of limerock base. We recommend that the crushed concrete base course be supported by a free-draining subgrade. Six inches of base should be used in parking areas while 8 inches of crushed concrete base should be used in truck parking and drive areas. A minimum clearance of 12 inches should be maintained between the bottom of the crushed concrete base and the seasonal high groundwater table.

The crushed concrete base should have a minimum Limerock Bearing Ratio (LBR) value of 100 and should be compacted to at least 98 percent of the modified Proctor maximum dry density (ASTM D-1557, AASHTO T-180). The crushed concrete should meet Graded Aggregate Base gradation requirements according to Section 204, of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, 2004 Edition. The subgrade beneath the crushed concrete base should consist of free draining sand compacted to at least 98 percent of the modified Proctor maximum dry density (ASTM D-1557, AASHTO T-180).

We note that if the contractor's means and methods include stabilizing soils beneath the crushed concrete base, then the stabilizing material should be coarse material (e.g; gravel). Low permeability soils (e.g; silt and/or clay) should not be used as stabilizing material beneath crushed concrete base.

Wearing Surface

A minimum 1½ inch layer of Type SP-9.5 or SP-12.5 asphaltic concrete should be used for a wearing surface in automobile parking areas. For truck parking and drive areas, 2 inches of Type SP-9.5 or SP-12.5 asphaltic concrete should be used. Specific requirements for the Type-SP asphaltic concrete wearing surface are outlined in Section 334 in the Florida Department of Transportation, Standard Specifications for Road and Bridge Construction, 2004 Edition. Equivalent Type S asphaltic concrete may be substituted for Type SP-9.5 or SP-12.5.

The latest specifications of Florida Department of Transportation shall govern the design and placement of the base and asphaltic concrete wearing surface. The above minimum requirements will satisfactorily support Traffic Level A*. If a heavier traffic pattern is anticipated, the design section should be increased accordingly.

Stormwater Pond and Exfiltration System

We understand that a stormwater pond and an exfiltration system are planned. For this study, soil conditions were explored in the proposed pond and pavement areas with 5 auger borings to a depth of 20 feet.

Soil Profile and Soil Permeability

The fine sand and fine sand with silt (Strata 1 and 2 on Figure 1) are generally considered to be relatively permeable. The underlying silty fine sand (Stratum 3 on Figure 1) is likely less permeable than the fine sand and fine sand with silt, and should be considered to be an aquitard for retention pond drawdown evaluation.

The results of the falling head field permeability tests are presented in the following table:

Test Location	Test Depth (feet)	Measured Permeability (inches/hour)
AB-1	3 - 4	6
AB-3	4 - 5	2
AB-4	3 - 4	10
AB-5	3 - 4	7

For the type of soils tested, a transformation ratio of 1 horizontal to 1 vertical is appropriate (i.e; the estimated ratio of horizontal to vertical permeability).

QUALITY ASSURANCE

We recommend establishing a comprehensive quality assurance program to verify that all site preparation and foundation and pavement construction is conducted in accordance with the appropriate plans and specifications. Materials testing and inspection services should be provided by Ardaman & Associates.

As a minimum, an on-site engineering technician should monitor all stripping and grubbing and demucking to verify that all deleterious materials have been removed and should observe the proof-rolling operation to verify that the appropriate number of passes are applied to the subgrade. In-situ density tests should be conducted during filling activities and below all footings, floor slabs and

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* Reference: "Flexible Pavement Design Manual", Florida Department of Transportation. (2002)

pavement areas to verify that the required densities have been achieved. In-situ density values should be compared to laboratory Proctor moisture-density results for each of the different natural and fill soils encountered.

Additionally for the pavements, Limerock Bearing Ratio tests should be performed. The base course(s) should be tested for density and thickness. Samples of the asphaltic concrete should be obtained and tested in the laboratory for Marshall stability (Type S asphalt), flow, asphalt content, and aggregate gradation. Also, the asphaltic concrete thickness should be verified in the field.

Finally, we recommend inspecting and testing the construction materials for the foundations and other structural components.

IN-PLACE DENSITY TESTING FREQUENCY

In Central Florida, earthwork testing is typically performed on an on-call basis when the contractor has completed a portion of the work. The test result from a specific location is only representative of a larger area if the contractor has used consistent means and methods and the soils are practically uniform throughout. The frequency of testing can be increased and full-time construction inspection can be provided to account for variations. We recommend that the following minimum testing frequencies be utilized.

In proposed parking areas, a minimum frequency of one in-place density test for each 5,000 square feet of area should be used. The existing, natural ground should be tested to a depth of 12 inches at the prescribed frequency. Each 12-inch lift of fill, as well as the stabilized subgrade (where applicable) and base should be tested at this frequency. Utility backfill should be tested at a minimum frequency of one in-place density test for each 12-inch lift for each 200 linear feet of pipe. Additional tests should be performed in backfill for manholes, inlets, etc.

In proposed structural areas, the minimum frequency of in-place density testing should be reduced to one test for each 2,500 square feet of structural area. In-place density testing should be performed at this minimum frequency for a depth of 2 feet below natural ground and for every 1-foot lift of fill placed in the structural area. In addition, density tests should be performed in each column footing for a depth of 2 feet below the bearing surface. For continuous or wall footings, density tests should be performed at a minimum frequency of one test for every 50 linear feet of footing, and for a depth of 2 feet below the bearing surface.

Representative samples of the various natural ground and fill soils, as well as stabilized subgrade (where applicable) and base materials should be obtained and transported to our laboratory for Proctor compaction tests. These tests will determine the maximum dry density and optimum moisture content for the materials tested and will be used in conjunction with the results of the in-place density tests to determine the degree of compaction achieved.

CLOSURE

The analyses and recommendations submitted herein are based on the data obtained from the soil borings presented on Figure 1 and the assumed loading conditions. This report does not reflect any variations which may occur adjacent to or between the borings. The nature and extent of the variations between the borings may not become evident until during construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations presented in this report after performing on-site observations during the construction period and noting the characteristics of the variations.

This study is based on a relatively shallow exploration and is not intended to be an evaluation for sinkhole potential. Based on the results of all borings conducted for this exploration, no soil conditions resembling sinkhole activity were encountered. This study does not include an evaluation of the environmental (ecological or hazardous/toxic material related) condition of the site and subsurface.

This report has been prepared for the exclusive use of ABC Fine Wines and Spirits in accordance with generally accepted soil and foundation engineering practices. In the event any changes occur in the design, nature, or location of the proposed facility, we should review the applicability of conclusions and recommendations in this report. We recommend a general review of final design and specifications by our office to verify that earthwork and foundation recommendations are properly interpreted and implemented in the design specifications. Ardaman and Associates should attend the pre-bid and preconstruction meetings to verify that the bidders/contractor understand the recommendations contained in this report.

We are pleased to be of assistance to you on this phase of the project. When we may be of further service to you or should you have any questions, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

2/4/08

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08-6315 ABC Store 197 abp.wpd (2008 Geo)

cc: Ms. Cindy Smith - DRMP

APPENDIX

Standard Penetration Test and Auger Boring Procedures

STANDARD PENETRATION TEST

The standard penetration test is a widely accepted test method of *in situ* testing of foundation soils (ASTM D 1586). A 2-foot long, 2-inch O.D. split-barrel sampler attached to the end of a string of drilling rods is driven 18 inches into the ground by successive blows of a 140-pound hammer freely dropping 30 inches. The number of blows needed for each 6 inches of penetration is recorded. The sum of the blows required for penetration of the second and third 6-inch increments of penetration constitutes the test result or N-value. After the test, the sampler is extracted from the ground and opened to allow visual examination and classification of the retained soil sample. The N-value has been empirically correlated with various soil properties allowing a conservative estimate of the behavior of soils under load.

The tests are usually performed at 5-foot intervals. However, more frequent or continuous testing is done by our firm through depths where a more accurate definition of the soils is required. The test holes are advanced to the test elevations by rotary drilling with a cutting bit, using circulating fluid to remove the cuttings and hold the fine grains in suspension. The circulating fluid, which is a bentonitic drilling mud, is also used to keep the hole open below the water table by maintaining an excess hydrostatic pressure inside the hole. In some soil deposits, particularly highly pervious ones, NX-size flush-coupled casing must be driven to just above the testing depth to keep the hole open and/or prevent the loss of circulating fluid.

Representative split-spoon samples from the soils at every 5 feet of drilled depth and from every different stratum are brought to our laboratory in air-tight jars for further evaluation and testing, if necessary. Samples not used in testing are stored for 30 days prior to being discarded. After completion of a test boring, the hole is kept open until a steady state groundwater level is recorded. The hole is then sealed, if necessary, and backfilled.

AUGER BORINGS

Auger borings are used when a relatively large, continuous sampling of soil strata close to ground surface is desired. A 4-inch diameter, continuous flite, helical auger with a cutting head at its end is screwed into the ground in 5-foot sections. It is powered by the rotating action of the Kelly bar of a rotary drill rig. The sample is recovered by withdrawing the auger out of the ground without rotating it. The soil sample so obtained, is classified and representative samples put in bags or jars and brought back to the laboratory for classification testing.