

**GEOTECHNICAL ENGINEERING
SERVICES REPORT**


For the
**PROPOSED CANCER INFUSION TREATMENT
CENTER
BAY PINES VA CENTER
ST. PETERSBURG, FLORIDA**

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PSI Project No. 0775-1152

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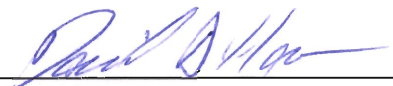

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TABLE OF CONTENTS

1.0 PROJECT INFORMATION	1
1.1 PROJECT AUTHORIZATION	1
1.2 PROJECT DESCRIPTION	1
1.3 PURPOSE AND SCOPE OF SERVICES	1
 2.0 SITE AND SUBSURFACE CONDITIONS	 3
2.1 SITE LOCATION AND DESCRIPTION	3
2.2 POLK COUNTY SOIL SURVEY	3
2.3 FIELD INVESTIGATION	3
2.4 SUBSURFACE CONDITIONS	4
2.5 GROUNDWATER INFORMATION	4
 3.0 EVALUATION AND RECOMMENDATIONS	 5
3.1 GENERAL.....	5
3.2 SITE PREPARATION	5
3.3 SHALLOW FOUNDATION RECOMMENDATIONS.....	7
3.4 SETTLEMENT	7
3.5 PAVEMENT RECOMMENDATIONS	7
3.5.1 BASE.....	7
3.5.2 ASPHALTIC CONCRETE PAVEMENT	8
3.5.3 RIGID CONCRETE PAVEMENT	8
3.6 FILL AVAILABILITY.....	9
 4.0 CONSTRUCTION CONSIDERATIONS.....	 9
4.1 GENERAL.....	9
4.2 DRAINAGE AND GROUNDWATER CONCERNS.....	9
4.3 EXCAVATIONS	9
 5.0 REPORT LIMITATIONS.....	 10
 APPENDIX	
USDA AND USGS VICINITY MAPS	SHEET 1
BORING LOCATION PLAN AND SOIL PROFILES	SHEET 2

1.0 PROJECT INFORMATION

1.1 PROJECT AUTHORIZATION

Professional Service Industries, Inc. (PSI) has completed a geotechnical exploration for the proposed Cancer Infusion Center to be located at the Bay Pines Veterans Administration (VA) Center in St. Petersburg, Pinellas County, Florida. Authorization to proceed with this project was provided by Alexander M. Long, AIA, on July 27, 2011. This study was conducted in accordance with our proposal for these services dated June 2, 2011, PSI Proposal No. 0775-46409.

1.2 PROJECT DESCRIPTION

Based on the information provided, we understand a new single-story stand-alone building covering approximately 15,000 square feet will be sited roughly adjacent to and east of the existing Radiation Oncology Center. Detailed structural loading information is not currently available. We anticipate the maximum wall and column loads will be 3 kips per foot and 150 kips, respectively. A portion of the structure may contain higher loads due to thick walls, floors, and ceilings required for radiation shielding. Some associated pavement also is planned. Detailed site grading information has not been provided to PSI; however, we anticipate earthwork at this site will not exceed 5 feet of cut or fill.

PSI performed a geotechnical study for the existing Radiation Oncology Center and presented its findings in PSI report No. 0775-95085, dated April 14, 2009. Sandy soils were encountered in the upper 25 feet. Limerock was encountered below the upper sandy soils.

The geotechnical recommendations presented in this report are based on the available project information, building location, and the subsurface materials described in this report. If any of this project description information is incorrect or has changed, please inform PSI so that we may amend, if appropriate, the recommendations presented in this report.

1.3 PURPOSE AND SCOPE OF WORK

In accordance with the requested scope of work and information provided, PSI performed a total of three (3) Standard Penetration Test (SPT) soil borings in the proposed building to a depth of 30 feet below the current ground surface. Samples were collected and SPT resistances measured virtually continuously for the top 10 feet. As required by the Southwest Florida Water Management District, soil borings were grouted upon completion.

Three (3) five feet deep auger borings also were performed in the proposed service drive. Samples were obtained at regular intervals during the performance of the auger borings.

Representative soil samples obtained during the field exploration were transported to our laboratory for classification in accordance with the Unified Soil Classification System (USCS) and a limited number of engineering properties tests.

The purpose of this study was to explore the subsurface conditions at the site to provide foundation and pavement recommendations for the proposed construction. The subsurface materials encountered were then evaluated with respect to the available project



characteristics. In this regard, engineering assessments of the following items have been formulated:

1. Feasibility of utilizing a shallow foundation system for support of the proposed structure, with a slab-on-grade floor member.
2. Design parameters required for the foundation system, including allowable bearing pressures, foundation sizes, foundation levels and soil subgrade treatments.
3. General pavement section recommendations and construction considerations.
4. Soil subgrade preparation, including stripping, grubbing and compaction. Engineering criteria for placement and compaction of approved structural fill materials.
5. Suitability and availability of materials on-site that may be moved during site grading for use as structural fill in the building area and as general backfill.
6. General location and description of potentially deleterious materials encountered in the borings which may interfere with construction progress or structure performance, including existing fills or surficial organics.
7. Identification of groundwater levels and an estimation of seasonal high groundwater levels.

The following services have been provided in order to achieve the preceding objectives:

1. Executed a requested program of subsurface exploration consisting of subsurface sampling and field testing. We performed three (3) Standard Penetration Test (SPT) borings to depths of 30 feet below the existing ground surface within the proposed building footprint. In the borings, samples were collected and Standard Penetration Test resistances were measured virtually continuously for the top 10 feet and on intervals of 5 feet thereafter. Hand auger was performed in the upper 4 feet to reduce the potential for damaging any unknown utilities.
2. We performed three (3) hand auger borings to 5 feet below existing ground surface in the proposed pavement areas.
3. Visually classified representative soil samples in the laboratory using the Unified Soil Classification System (USCS). Identified soil conditions and formed an opinion of the soil stratigraphy at each boring location.
4. The results of the exploration have been used in the engineering analysis and the formulation of recommendations. The results of the subsurface exploration, including the recommendations and the data on which they are based, are presented in this written report supervised by a professional engineer.

2.0 SITE AND SUBSURFACE CONDITIONS

2.1 SITE LOCATION AND DESCRIPTION

The proposed Cancer Infusion Treatment Center is located adjacent to and to the east of the Radiation Oncology Center at the Bay Pines VA Center in St. Petersburg, Florida.

The project site is located within Section 2, of Township 30 South, Range 15 East, according to the U.S. Geological Survey (USGS) quadrangle map of "Seminole, Florida." Site elevation is approximately +10 feet.

2.2 PINELLAS COUNTY SOIL SURVEY

The "Soil Survey of Pinellas County, Florida," published by the United States Department of Agriculture (USDA) Web Soil Survey, was reviewed for general near-surface soil information within the project vicinity. The survey indicates that *Myakka Soils and Urban Land* is the predominant mapping unit.

SOIL SERIES	Depth (inches)	Unified Classification	USDA Seasonal High Groundwater Table
			Depth (feet)
(17) Myakka Soils and Urban Land	> 80	SP, SP-SM, SC	0.5 to 1.5

Smyrna and Myakka soils are composed of sandy marine deposits making up the coastal plain. This soil type is poorly drained with a low available water capacity and moderately high to high permeability. The seasonal high water table is normally at a depth of 6 to 18 inches. Urban Land soils typically have been reworked to the degree that their original properties have been obliterated.

It should be noted that information contained in the USDA Soil Survey is very general and may be outdated. It may not therefore be reflective of actual soil and groundwater conditions, particularly if recent development in the project vicinity has modified soil conditions or surface/subsurface drainage.

2.3 FIELD INVESTIGATION

Subsurface conditions at the site were explored by drilling a total of six (6) soil borings at the approximate locations shown on the Boring Location Plan included on Sheet 2 of the Appendix.

Three (3) Standard Penetration Test (SPT) borings were performed to depths of 30 feet within the area of the proposed building. In each boring, samples were collected and SPT resistances were measured virtually continuously for the top 10 feet and on intervals of 5 feet thereafter.

Three (3) hand auger borings were performed in the areas designated for pavement and access drives to a depth of about 5 feet each.

The number of borings, approximate boring locations and boring depths were selected by PSI in accordance with the contract between Long & Associates, Inc., and PSI. The borings were located in the field by PSI personnel by measuring distances from known site reference points based on the site plan provided to PSI.

Elevations of the ground surface at the boring locations were not provided to PSI and should be determined by others prior to construction. Therefore, all references to depth of the various materials encountered are from the existing grade at the time of drilling (Aug. 5 & 8, 2011).

The SPT borings were advanced utilizing rotary mud drilling methods and soil samples were routinely obtained at selected intervals during the drilling process. Drilling and sampling techniques were accomplished in general accordance with ASTM standards. Select soil samples were returned to our laboratory for visual classification. Classifications were performed in general accordance with the Unified Soil Classification System (USCS).

2.4 SUBSURFACE CONDITIONS

The subsurface conditions at the site generally consist of a top layer of fine sand (Unified Classification SP) and slightly silty fine sand (SP-SM) to a depth of about 15 to 18 feet, followed by a layer of clayey weathered limestone to a depth of about 20 feet, then limestone to boring termination depths. The SPT resistances (N-values) in the upper sandy layer ranged from 4 to 22 blows per foot (bpf), indicating soil conditions of loose to medium density. N-values in the clayey weathered limestone layer ranged from 18 to 35 blows per foot. N-values in the deeper limestone were in excess of 50 blows per foot.

The boring logs presented on **Sheet 2** of the **Appendix** include soil descriptions, stratifications and penetration resistances. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual. Water level information obtained during field operations is also shown on these boring logs.

2.5 GROUNDWATER INFORMATION

Groundwater was found consistently at depths of about 5' in the borings. It should be noted that groundwater levels tend to fluctuate during periods of prolonged drought and extended rainfall and may be affected by man-made influences. In addition, a seasonal effect will also occur in which higher groundwater levels are normally recorded in rainy seasons. In this regard, and based on a review of soil information published by the United States Department of Agriculture (USDA), the seasonal high groundwater table (SHGWT) is estimated to be 3 feet below the ground surface in the soil borings performed.

PSI recommends that the contractor determine the actual groundwater levels at the site at the time of the construction activities.

3.0 EVALUATION AND RECOMMENDATIONS

3.1 GENERAL

Based on our observations, it is our opinion that subsurface soil conditions at the project site are generally favorable for the planned development from a geotechnical engineering perspective provided that the recommendations presented herein are followed.

The following design recommendations have been developed on the basis of the previously described project characteristics and subsurface conditions encountered. If there are any changes in these project criteria, including project location on the site, a review must be made by PSI to determine if any modifications in the recommendations will be required. The findings of such a review should be presented in a supplemental report.

Once final design plans and specifications are available, a general review by PSI is strongly recommended as a means to check that the evaluations made in preparation of this report are correct and that earthwork and foundation recommendations are properly interpreted and implemented.

3.2 SITE PREPARATION

The following are our recommendations for overall site preparation. These recommendations should be used as a guideline for the project general specifications prepared by the design engineer.

1. Surficial vegetation should be removed from the proposed development area. If desired, short grasses less than 3 inches tall may remain in place, as long as the grass and other organic material is not concentrated.
2. Following ground improvement operations, it is recommended that the site be proofrolled with a heavy vibratory roller (40,000 to 60,000 ft-lbs of energy) and be compacted to a minimum depth of 1 foot below stripped grade to a dry density of at least 95% of the modified Proctor maximum dry density within the proposed structure and new pavement areas. Compaction of the construction site should continue until the roller has made at least eight passes over all areas of the site. Half of the roller passes should be perpendicular to the direction of travel of the other passes. Care should be taken when using a vibratory roller within 25 feet of existing sensitive structures or receptors in order to avoid potential damage and/or disruption.
3. Following satisfactory completion of the initial compaction, the structure and pavement areas may be brought up to finished subgrade levels, if needed, using structural fill. The on-site clean to slightly silty fine sands (SP/SP-SM) are generally suitable for use as fill, if available. Off-site fill soils should be tested and approved by PSI prior to hauling to the site. Imported fill should consist of fine sand with less than 12% passing the No. 200 sieve, free of rubble, organics, clay, debris and other unsuitable material. Fill placed below 5 feet must meet these requirements and also may not have more than 5% fines content. Fill should be tested and approved prior to acquisition. Approved sand

fill should be placed in loose lifts not exceeding 12 inches in thickness and should be compacted to a minimum density of 95% of the modified Proctor maximum dry density. Density tests to confirm compaction should be performed in each fill lift before the next lift is placed.

4. Prior to beginning compaction, soil moisture contents may need to be controlled in order to facilitate proper compaction. If additional moisture is necessary to achieve compaction objectives, then water should be applied in such a way that it will not cause erosion or removal of the subgrade soils. Moisture content within the percentage range needed to achieve compaction (typically +/- 3%) is recommended prior to compaction of the natural ground and fill.
5. After compaction and proofrolling, building foundation excavations can begin. All foundation excavations should be observed by the geotechnical engineer or a representative to explore the extent of any loose, soft, or otherwise undesirable materials. If the foundation excavations appear suitable as load bearing materials, the bottom of the foundation excavations should be compacted to a minimum density of 95% of the modified Proctor maximum dry density for a minimum depth of one foot below the bottom of the footing depth, as determined by field density compaction tests. Backfill soils placed adjacent to footings or walls should be carefully compacted with a light rubber-tired roller or vibratory plate compactor to avoid damaging the footings or walls. Approved sand fills to provide foundation embedment constraint should be placed in loose lifts not exceeding 12 inches and should be compacted to a minimum density of 95% of the modified Proctor maximum dry density.
6. If soft pockets or debris are encountered in the footing excavations, the unsuitable materials should be removed and the proposed footing elevation may be re-established by backfilling after the undesirable material has been removed. This backfilling may be done with a very lean concrete or with a well-compacted, suitable fill such as clean sand, gravel, or crushed FDOT No. 57 or FDOT No. 67 stone. Backfill should be compacted to a minimum density of 95% of the modified Proctor maximum dry density.
7. Immediately prior to reinforcing steel placement, it is suggested that the bearing surfaces of all footing and floor slab areas be compacted using hand operated mechanical tampers. In this manner, any localized areas which have been loosened by excavation operations should be adequately recompacted.
8. A representative from our firm should be retained to provide on-site observation of earthwork and ground modification activities. Density tests should be performed in the top 1 foot of compacted existing ground, each fill lift, and the bottom of foundation excavations. It is important that PSI be retained to observe that the subsurface conditions are as we have discussed herein, and that foundation construction, ground modification and fill placement is in accordance with our recommendations.

3.3 SHALLOW FOUNDATION RECOMMENDATIONS

With proper subgrade preparation, column footings and continuous wall foundations can be designed for a net allowable soil bearing pressure of 2,500 pounds per square foot, based on dead load plus design live load. Minimum dimensions of 24 inches for column footings and 18 inches for continuous footings should be used in foundation design to account for variable subsurface conditions, regardless of whether the maximum allowable foundation bearing pressures have been fully developed.

Consideration should be given to placing exterior footings at a depth of at least 18 inches below the final exterior grade, in order to reduce the potential for erosion or excavations adjacent to the foundations from undermining the excavations. Interior footings may bear on properly compacted soils at a minimum depth of 12 inches.

After opening, footing excavations should be observed and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond. The foundation concrete should be placed promptly after the excavation is made.

3.4 SETTLEMENT

The settlement of shallow foundations supported on compacted sand fill should occur rapidly after loading. Thus, the expected settlement should occur during construction as structural loads are imposed. Provided the recommended site preparation operations are properly performed, any organic materials have been removed and the recommendations previously stated are utilized, the total settlement of wall and isolated column footings should not exceed approximately 1 inch. Differential settlement is estimated to be on the order of 50 percent of the total settlement. Settlement of this magnitude is usually considered tolerable for the anticipated construction; however, the tolerance of the proposed structure to the predicted total and differential settlement should be confirmed by the structural engineer.

3.5 PAVEMENT RECOMMENDATIONS

The recommended fill materials or compacted in-place soils should be acceptable for construction and support of a flexible (limerock, crushed concrete or shell base) or rigid (Portland cement) type pavement section after subgrade preparation. Any fill utilized to elevate the cleared pavement areas to subgrade elevation should consist of clean to slightly silty fine sands (SP/SP-SM) uniformly compacted to a minimum density of 95 percent of the modified Proctor maximum dry density (ASTM D-1557) up to the bottom of the pavement subgrade.

The upper 12 inches of subgrade immediately beneath the pavement section should be compacted to a density of no less than 98 percent of the modified Proctor value.

3.5.1 BASE

The choice of pavement base type basically will depend on final pavement grades. If there is a minimum separation of 18-inches between the bottom of the base and the normal seasonal high groundwater level at this site like the borings and USDA system suggests, a limerock, or bank-run shell base can be utilized.

Limerock, bank-run shell base and crushed concrete base materials should meet FDOT requirements including compaction to 98 percent of its maximum dry density as determined by the modified Proctor test (ASTM D-1557) and a minimum LBR of 100 percent. Crushed concrete should be graded in accordance with FDOT Standard Specification Section 204.

Based on the expected traffic conditions, we recommend that the base course be a minimum of 6 inches thick in light duty areas and 8 inches thick in medium duty areas. If heavy duty traffic areas are expected, such as in the loading area, thicker flexible pavement sections or a rigid concrete pavement section should be used. The subgrade should be firm and true to line and grade prior to paving. Traffic should not be allowed on the subgrade as the base is placed to avoid rutting.

3.5.2 ASPHALTIC CONCRETE PAVEMENT

Based on the results of our evaluation, it is recommended that the total asphaltic concrete thickness consist of Type S-1 (or SP-12.5) asphaltic concrete material with a minimum of 1½ inches for parking and 2 inches for driveway areas. The asphaltic concrete should meet standard FDOT material requirements and placement procedures as outlined in the current FDOT Standard Specifications for Road and Bridge Construction. The asphaltic concrete should be compacted to a minimum of 98% of the Marshall maximum laboratory unit weight (or 93% of the maximum theoretical specific gravity (Gmm) if using type SP-12.5).

Flexible pavement design recommendations are summarized in the following table.

FLEXIBLE PAVEMENT RECOMMENDATIONS		
Material	Minimum Thickness (inches)	
	Light Traffic	Medium Traffic
Type S-1 Asphaltic Concrete	1.5	2.0
Base Minimum LBR = 100	6.0	8.0
Stabilized Subgrade Minimum LBR = 40	12.0	12.0

3.5.3 RIGID CONCRETE PAVEMENT

Rigid (concrete) pavements could also be used. The concrete should have a minimum compressive strength of 4,000 psi at 28 days when tested in accordance with ASTM C-39. Based on our experience, a minimal thickness of 5 inches should be utilized for standard duty applications and a minimal thickness of 7 inches should be utilized for medium duty applications. The rigid pavement should be reinforced and joints should be dowelled in accordance with FDOT Standard Index 305 steel reinforcement within the concrete pavement generally consists of dowels between pavement sections and should be designed by the civil engineer.

The upper 12 inches of subgrade immediately beneath the pavement section should be compacted to a density of no less than 98 percent of the modified Proctor value. Rigid pavement design recommendations are summarized in the following table.

RIGID PAVEMENT RECOMMENDATIONS		
Material	Minimum Thickness (inches)	
	Light Traffic	Medium Traffic
Portland Cement (Concrete 4,000 psi minimum)	5	7
Compacted Subgrade	12	12

All pavement materials and construction procedures should conform to the more stringent of Florida DOT or appropriate county/city requirements.

3.6 FILL AVAILABILITY

The fine sand and slightly silty fine sand (SP, SP-SM) encountered from the ground surface to the depth of about 15 feet can be used as structural fill material provided it is free of large rocks (>1/2 inch), significant clay, organics or other deleterious materials.

4.0 CONSTRUCTION CONSIDERATIONS

4.1 GENERAL

It is recommended that PSI be retained to provide observation and testing of construction activities involved in the foundation, earthwork and related activities of this project. This will promote project continuity and will reduce the potential for misinterpretation of our recommendations

4.2 DRAINAGE AND GROUNDWATER CONCERNS

Water should not be allowed to collect in the foundation excavations, on the floor slab areas, or on prepared subgrades of the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff. Positive site drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath the floor slabs. The grades should be sloped away from the building and surface drainage should be collected and discharged such that water is not permitted to infiltrate the backfill and floor slab areas of the building.

4.3 EXCAVATIONS

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, Part 1926, Subpart P". This document was issued to better insure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavations or footing excavations, be constructed in accordance with current OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary

excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractors “responsible person”, as defined in 29 CFR, Part 1926, should evaluate the soil exposed in the excavations as part of the contractor’s safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in all local, state, and federal safety regulations.

We are providing this information solely as a service to our client. PSI does not assume responsibility for construction site safety or the contractor’s or other party’s compliance with local, state, and federal safety or other regulations. It is the policy of PSI not to provide recommendations regarding temporary slopes during construction which is the sole responsibility of the contractor as indicated above.

5.0 REPORT LIMITATIONS

The Geotechnical Engineer warrants that the findings, recommendations, specifications or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed. The services provided were conventional in nature and did not include any special services that may lessen the risk of conditions that can contribute to moisture, mold or other microbial contaminant growth in buildings. You may be aware that mold is abundant throughout nature and is comprised of a wide variety of microscopic fungi. Due to its nature, the potential for mold infestations cannot be completely eliminated.

The scope of services also does not include an environmental assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, groundwater, or air on or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes.

Florida is underlain by a soluble limestone formation, which can dissolve and result in surface subsidence and the formation of sinkholes. A more comprehensive assessment of the site for the potential for sinkhole development typically includes Ground Penetrating Radar (GPR) studies and the extension of deeper soil borings into the underlying limestone formation. Such an assessment is beyond the scope of this proposed study, but can be performed at significant additional cost, if desired.

The recommendations submitted are based on the available subsurface information obtained by PSI and design details furnished by Long & Associates, Inc., for the proposed project. If there are any revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the recommendations are required.

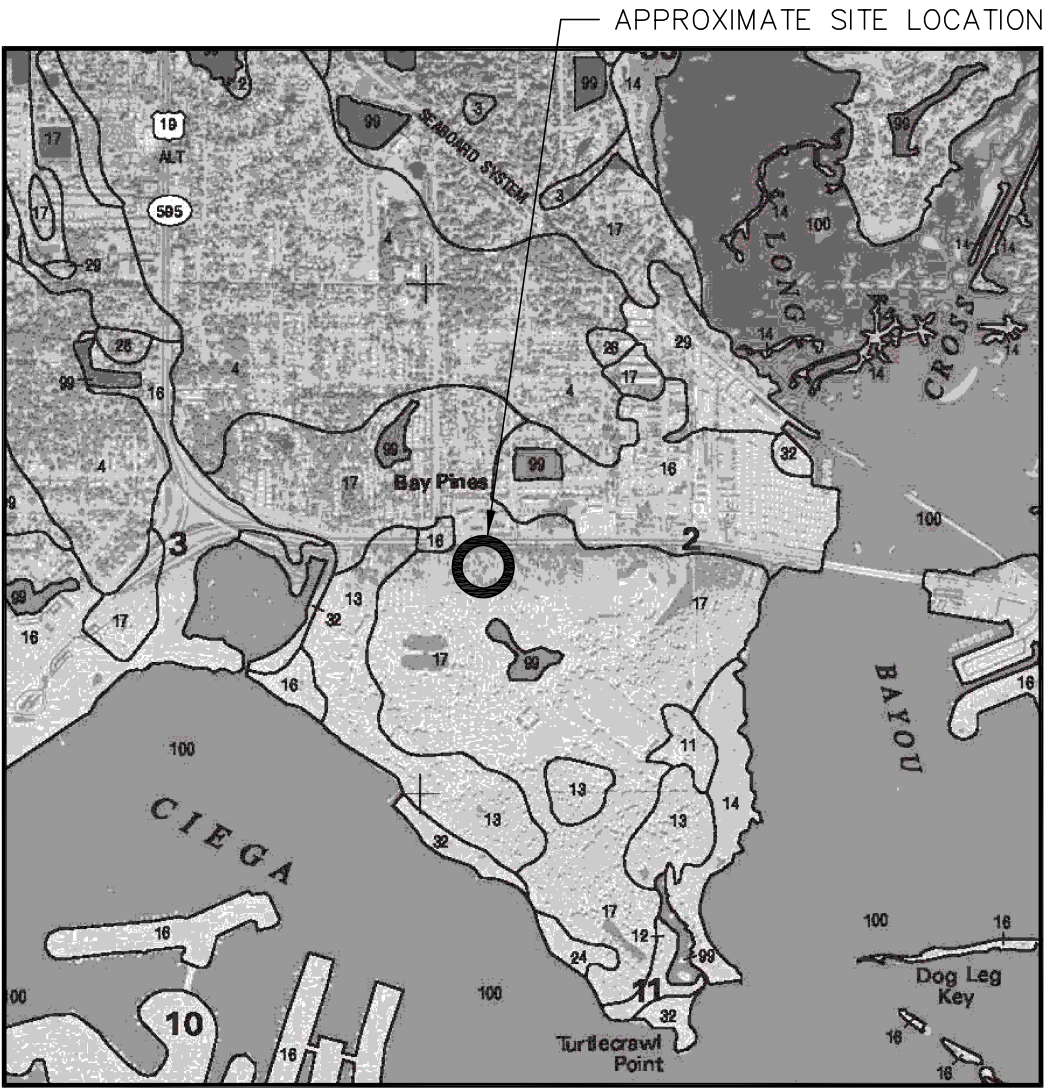
After the plans and specifications are more complete, the Geotechnical Engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Long & Associates, Inc., and its



consultants for the specific application to the proposed Cancer Infusion Treatment Center to be located at the Veterans Administration Center in St. Petersburg, Florida.

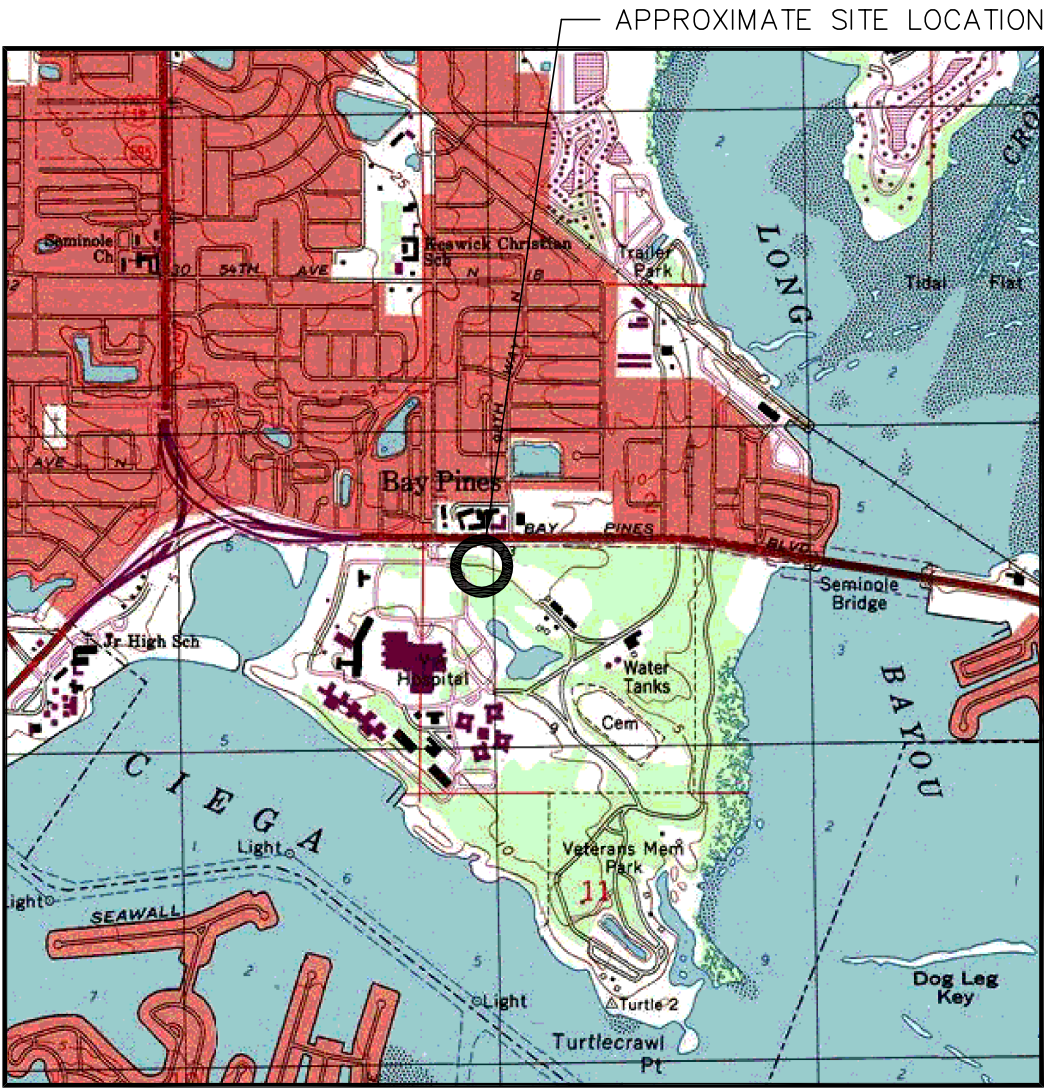
APPENDIX

P:\775-Geo\07751152 Cancer Infusion Therapy Ctr\cod\07751152



REFERENCE: USDA SCS, "SOIL SURVEY OF PINELLAS COUNTY, FLORIDA"
TOWNSHIP: 31 SOUTH ISSUED: 2006
RANGE: 15 EAST PHOTO: 1999
SECTION: 2 SCALE: 1" = 2000'

USDA VICINITY MAP




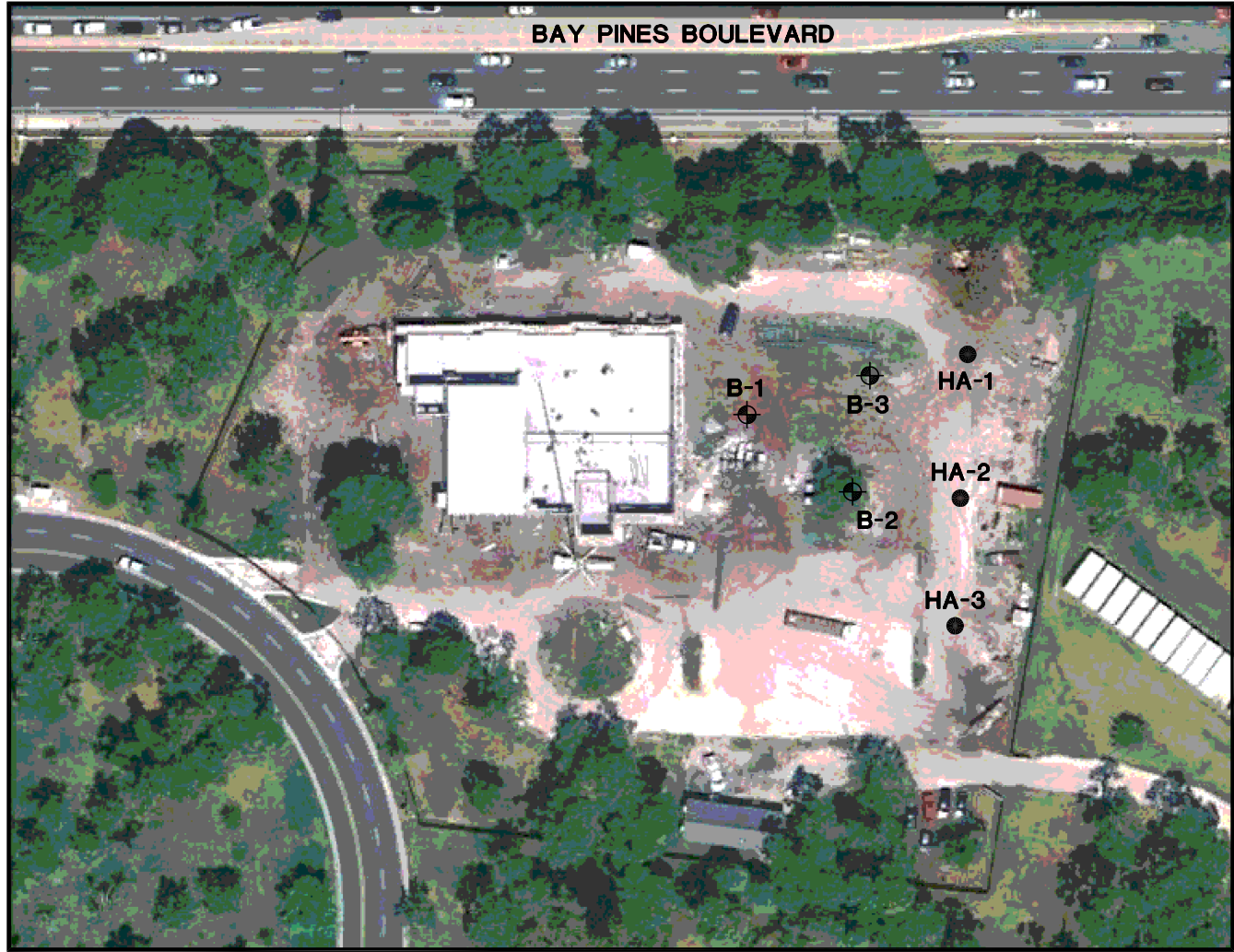
REFERENCE: USGS "SEMINOLE, FLORIDA" QUADRANGLE MAP
TOWNSHIP: 31 SOUTH MAP VERSION: 1995
RANGE: 15 EAST PHOTOREVISED: -
SECTION: 2 SCALE: 1" = 2000'

USGS VICINITY MAP



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CHECKED	DH
APPROVED	MEM
SCALE	NOTED

USDA & USGS VICINITY MAPS		
CANCER INFUSION THERAPY CENTER		
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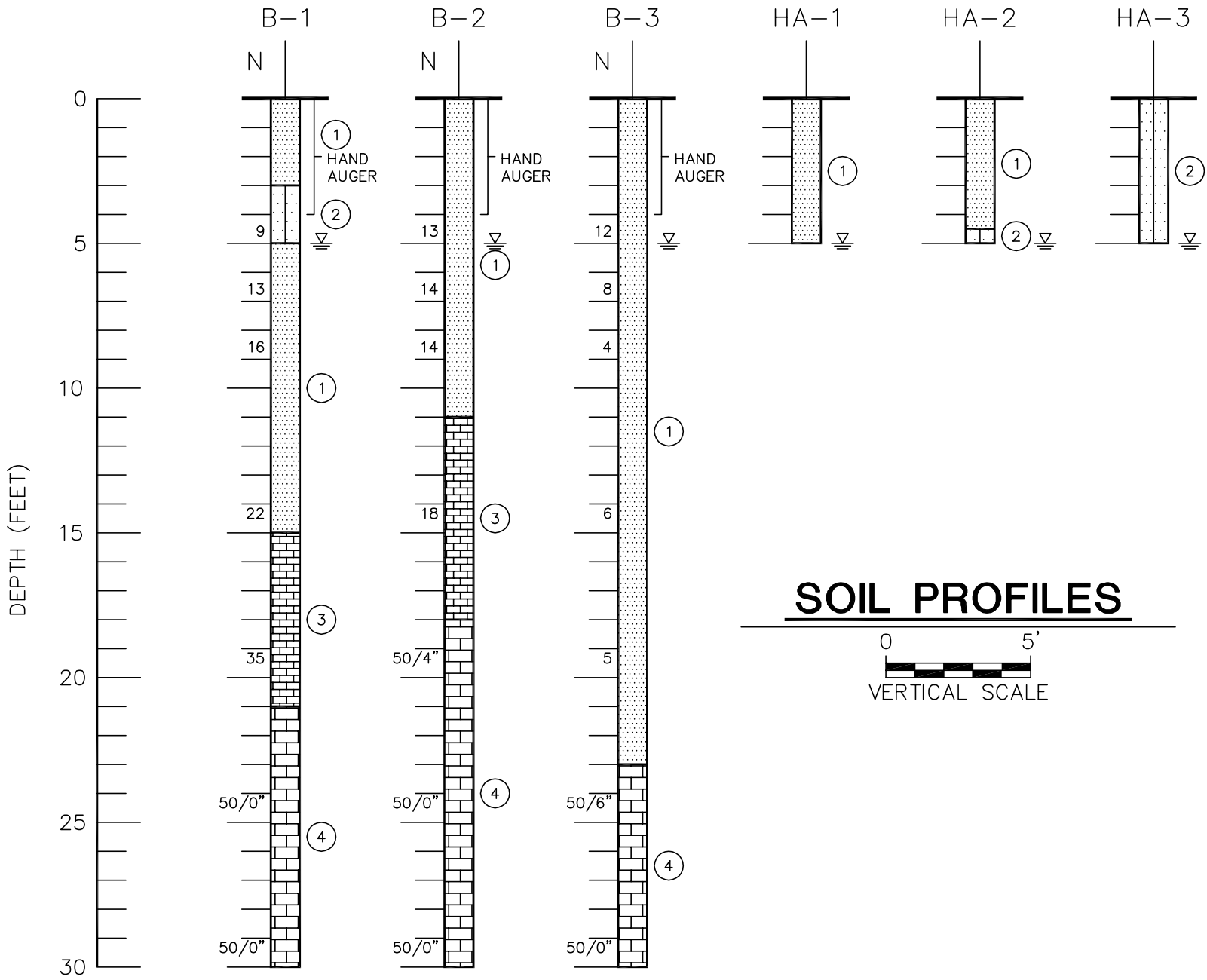


BORING LOCATION PLAN



LEGEND

- | | | | | |
|----|--|--|-------|--|
| ① | | Tan or gray fine SAND (SP) | ▽ | Groundwater level, August 2008 |
| ② | | Tan or gray slightly silty fine SAND (SP-SM) | N | SPT N-value in blows/foot |
| ③ | | Gray clayey weathered LIMESTONE | 50/6" | Fifty blows for six inches |
| ④ | | LIMESTONE | ⊕ | Approximate SPT boring location |
| | | | ● | Approximate Hand Auger boring location |
| SP | Unified Soil Classification System (ASTM D 2487) group symbol as determined by visual review | | | |



DRAWN	DJG
CHECKED	DH
APPROVED	MEM
SCALE	NOTED

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Information To Build On Engineering • Consulting • Testing		
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		SHEET 2