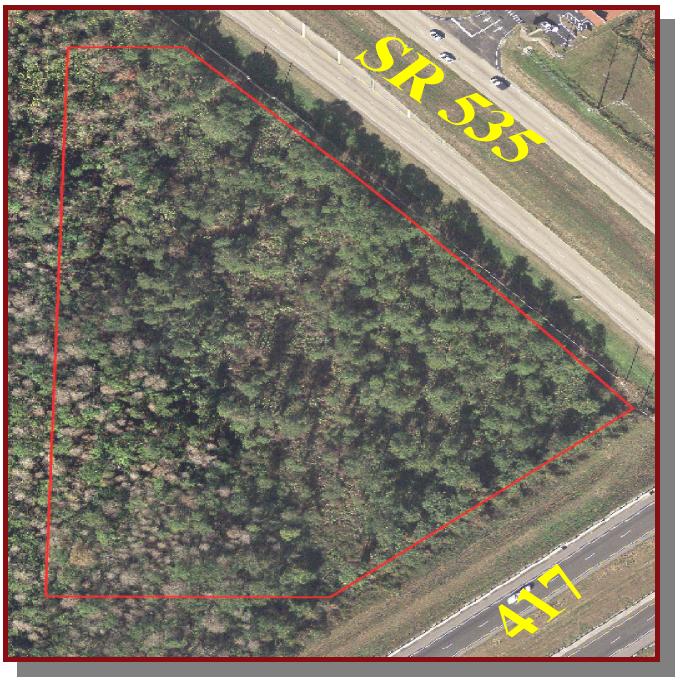
RAAD-TANNOUS ENGINEERING GROUP, INC.
214 N. Goldenrod Road, Suite A5
Orlando, Florida 32807
Phone No. 407 382-2415 Fax No. 407 382-9625

PRELIMINARY SHALLOW SUBSURFACE SOIL AND GROUNDWATER TABLE INVESTIGATION PROPOSED COMMERCIAL DEVELOPMENT STATE ROAD 535 AND TOLL ROAD 417 ORANGE COUNTY, FLORIDA RTEG, INC. PROJECT NO. 214-1023



Prepared For

Mr. Marwan Kaddoura
P.O. Box 788
Gotha, Florida 34734

March 6, 2015

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Subject: ***Preliminary Shallow Subsurface Soil and Groundwater Table Study, Property at The Corner of State Road 535 and Toll Road 417, Orange County, Florida (RTEG, Inc. Project No. 214-1023)***

As requested, **RTEG, Inc.** performed numerous shallow borings within the above referenced property. The purpose of the borings was to obtain a general overview of the shallow subsoil and groundwater table conditions in the site. The following report summarizes the results of our field exploration program and presents our preliminary conclusions relative to the general suitability of the shallow soils to support low rise construction.

SITE AND PROJECT DESCRIPTION

The site is an approximately 4.77 acre tract of land located within the west/northwest quadrant of the intersection of State Road 535 and Toll Road 417 in Orange County, Florida. Based on review of a site Boundary Survey provided to us, it appears that approximately 1.95 acres along the east side of the site is considered uplands; the remaining approximately 2.82 acres of the site fall within wetland areas. The property is currently undeveloped and is very heavily vegetated with trees and shrubbery. An aerial view of the site is presented in the attached Figure 1.

We understand that the property is being considered for construction of a small shopping plaza, consisting of a single story structure. Associated paved parking areas and an on-site retention pond for storm water management is also planned. A conceptual plan of proposed construction areas was

not available at the time of this study. Therefore, all information contained in this report should be considered preliminary in nature and is intended only to provide a general understanding of the soil and groundwater table conditions within the property. At a later date, once proposed building, pavement, and retention pond locations become known, additional deeper borings will be required in order to finalize our conclusions and recommendations.

REVIEW OF USDA/SCS SOIL SURVEY MAP BOOK

The predominant near-the-surface soils within the subject site were mapped by the United States Department of Agriculture and the Soil Conservation Service (USDA/SCS), now known as the National Resource Conservation Service (NRCS) and were, subsequently, published in the Orange County Soil Survey Report.

Based upon our review of the SCS Soil map of the area, the eastern portion of the site appears to be mostly mapped as Smyrna Fine Sands (Map Unit 44). These soils typically exhibit low permeable characteristics. According to the SCS soil map, the high wet season groundwater level in these areas normally rises to within 12 inches of the ground surface. The western portion of the site is mostly mapped as Sanibel Series (Map Unit 42). These soils normally consist of muck/organic soils. The high wet season groundwater level normally rises several inches above ground surface.

FIELD EXPLORATION PROGRAM

Our field investigation for this project included the manual advancement of seventeen shallow auger borings, scattered within the entire property. The borings varied in depth between 4 and 7 feet below ground surface. The approximate boring locations are illustrated in the attached Figure 1. Note that the boring locations shown were estimated by measurements from property corners or existing reference points on-site. Therefore, the illustrated boring locations should be considered approximate and may not represent the exact boring location.

Penetrometer probes were performed at the boring locations in order to evaluate the relative compactness of the subgrade soils. The hand cone penetrometer is a steel shaft with a conical point that is pushed into the ground in one-foot intervals. The resistance to penetration is registered by

a gauge attached to the top of the shaft. The gauge reading provides a measure of the relative density of the subgrade soils. The probes were advanced to depths of 6 to 8 feet below grade.

Representative soil samples were recovered from the borings during the field investigation. These samples were visually classified on-site by our field technician and were subsequently, returned to our office for further visual examination by the Project Engineer. In addition to the soil sampling, groundwater levels were measured when encountered in the borings at the time of the field investigation.

Shallow Stratigraphy

The stratigraphy in the upper 7 feet of the site was determined based on our visual classification of the soil samples collected from the borings. The description and stratification of the soils were accomplished in general accordance with the Unified Method of Soil Classification. The results of our visual interpretations are presented in the form of soil profiles, shown in the attached Figure 2.

In general, our borings indicate that the western portion of the site contain muck soils in the upper 2.5 to 5.5 feet. Below the muck soils, dark reddish brown slightly silty fine sands were encountered to the termination depths of the borings. In the eastern (upland) portion of the site, the soils generally consisted of dark grayish grown silty fine sands in the upper few inches, underlain by layers of light grayish brown slightly silty fine sands and reddish brown slightly silty to silty fine sands to the boring termination depths. An abundance of root debris was encountered in the upper 12 inches below grade within the upland portion of the site. A more detailed delineation of the soils encountered can be reviewed in the attached soil profile sheet.

The results of the penetrometer probes performed with the auger borings suggest that the muck soils are in a very soft condition. The remaining sandy and silty soils encountered in the site were typically found to be in a relatively loose to a relatively medium dense condition to the maximum probed depths.

Groundwater Table

The groundwater table in the wetland (western) portion of the site was typically encountered at an average depth of about 1 foot below ground surface. In the eastern portion of the site, the

groundwater table was mostly encountered at an average depth of about 3 feet below ground surface. It should be emphasized that the measured groundwater depth is indicative of the prevailing groundwater level at the time of measurement. The groundwater level will fluctuate in response to seasonal variations in rainfall amounts.

Based on the results of our borings and a review of the SCS soil map, it is our opinion that the high wet season groundwater table will rise to an average depth of about 12 inches in the non-wetland portion of the site and to the ground surface within the wetland portion of the property.

PRELIMINARY EVALUATIONS AND CONCLUSIONS

Suitability of Subsurface Soils

Based on the results of this investigation, it is our opinion that the soils encountered in the site are not suitable to support proposed structures on shallow conventional foundation support systems. The soils are also, in our opinion, unsuitable for proper support of conventionally constructed pavement sections. Finally, neither the soil nor the groundwater table are favorable for proper operation of dry bottom retention ponds without substantial raising/filling of the site or the use of artificial pond drainage systems.

General Site Preparation

In the portions of the site where muck soils were not encountered, site preparations should include normal clearing, grubbing and stripping of all surficial organic soils, surficial vegetation and other deleterious materials from beneath and to a minimum lateral distance of 5 feet beyond all proposed construction areas.

We suspect that at least 12 inches of the upper soils will need to be excavated in order to properly remove buried roots from the heavy vegetation which exists on site. We have estimated at least 5,000 to 6,000 cubic yards of soils would have to be removed and replaced from non-muck containing portions of the site.

It is our understanding that the western portion of the site (where muck soils were encountered) is also being considered for development. Site preparation in this area will be substantial and will include removal and replacement of 2.5 to 5.5. feet of muck soils. Substantial artificial lowering of the groundwater table will be required during the de-mucking operation. We suspect that the groundwater level will have to be lowered to a minimum depth of 2 feet below the maximum depth of excavation required for muck removal. Based on our preliminary calculations, we have estimated that at least 16,000 to 20,000 cubic yards of muck exist in the western portion of the site.

Fill Placement

After removal of all unsuitable soils, filling of the area will be required. Fill material proposed to achieve final site grades should consist of non-organic and debris-free fine sands containing no more than 8 percent passing the U.S. Standard No. 200 Sieve. The fill soils should be placed in loose lifts not exceeding 12 inches in thickness and should be compacted as needed to achieve a minimum density equivalent to 95 percent of the soil's Maximum Modified Proctor Density (ASTM D-1557) value. To facilitate the compaction efforts, the fill soils should have a moisture content that is within 2% of the soil's Optimum Moisture Content.

As discussed above, artificial lowering of the groundwater table will be required during the site preparation activities. Artificial lowering of the groundwater table can be accomplished with the use of a well point system. However, the proper authorities will need to be consulted in order to determine where water collected by the de-watering system can be discharged during the site preparation work.

Building Foundation Support

Assuming that the site preparation activities are accomplished as discussed above, the resulting soil conditions should be suitable to support low rise construction on conventional shallow foundation systems. However, as discussed earlier in this report, additional deeper borings will be required once proposed building areas have been determined so we may finalize our recommendations for building foundation support.

Pavement Construction

Assuming that the site preparation activities are accomplished as discussed above, the resulting soil conditions should be suitable to support either a flexible or semi-flexible pavement section. Depending upon final pavement elevations, a soils cement or limerock base may be utilized with the pavement construction.

Provided that at least 12 inches of separation can be maintained between the bottom of the pavement section and the estimated high wet season groundwater level, then pavement under drains will not be required. A limerock base course material may be utilized with the pavement construction, if at least 18 inches of separation can be maintained between the bottom of the pavement base material and the estimated high wet season groundwater level. The base should be at least 6 inches in thickness in normal traffic areas and 8 inches in thickness in heavy traffic areas (such as entrance/exit driveways, loading/unloading areas, etc.). The base should be compacted to a minimum of 98 percent of the Modified Proctor Moisture-Density Test (AASHTO T-180). It is recommended that a stabilized subgrade, consisting of 12 inches or more of soils compacted to at least 98 percent of the Modified Proctor Moisture-Density Test (AASHTO T-180), with a minimum Florida Bearing Value (FDOT FM 5-517) of 50 psi, be constructed below the roadway base material. An approved emulsified asphaltic tack coat should be applied on a clean (swept) limerock base surface to develop a sufficient bond before paving begins.

If 18 inches of separation cannot be maintained between the bottom of the base course material and the estimated wet season groundwater table, then we recommend that a soil-cement base be utilized with the pavement section since it is more resistant to groundwater degradation than the limerock alternative. Because of the relatively shallow groundwater table condition in this site and due to the relatively poor drainage characteristic of the shallow sub-garde soils, a soil cement base is, in our opinion, the more preferred alternative for this project. The soil cement base should also be at least 6 inches in thickness in normal traffic areas and 8 inches in thickness in heavy traffic areas. The base should be compacted to a minimum of 95% of the Standard Proctor Moisture-Density Test (AASHTO T-134) and should achieve a 7-day laboratory compressive strength equivalent to at least 300 psi. It is our opinion that a stabilized sub-base is not needed with the soil-cement base, however, the upper 12 inches of subgrade (below the base course) shall be compacted to at least 98% of the Modified Proctor Moisture-Density Test (AASHTO T-180).

Due to the shrinkage cracking which normally occurs during the hydration of a soil-cement base, we recommend that a curing period of at least 14 to 21 days be allowed prior to the placement of the overlying asphaltic concrete wearing surface. Although this will not eliminate the formation of cracks in the finished asphaltic surface (due to cracking of the underlying base), it should help minimize the magnitude/size of the cracks. An appropriate sealant should be applied on the base within a maximum of one day after placement in order to minimize moisture loss during the hydration process. Before paving begins, an approved emulsified asphaltic tack coat should be applied on a clean (swept) soil-cement or dura-rock surface to develop a sufficient bond between the base and the overlying asphalt.

The asphaltic wearing surface should consist of a minimum of 1¼ inches of Type S asphaltic concrete having a minimum Marshall Stability of 1,500 pounds and compacted to at least 95 percent of the laboratory mix design of the asphaltic concrete. Specific requirements for the design and application of asphaltic concrete are outlined in the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

Proposed Storm Water Retention Pond

Storm water management will be accomplished via an on-site retention pond. Although the proposed pond location is not yet known, we suspect that a wet bottom retention pond will be required for this project.

For design purposes, the Project Civil Engineer may assume an estimated high wet season groundwater level as discussed earlier in the groundwater section of this report. The estimated low season groundwater level in the site will likely occur at an average depth of about 3 to 4 feet below our estimated high wet season groundwater level.

In the event that the site will be raised enough to where a dry bottom pond may operate effectively, then the following soil and groundwater table parameters may be assumed by the Civil Engineer for design purposes:

- A high wet season groundwater level as estimated earlier in this report

- A coefficient of vertical and horizontal permeabilities equivalent to no more than 6 and 9 feet per day, respectively. Please note that these values are estimated based on past experience. If design of a dry bottom pond is planned, then collecting undisturbed soil samples from the pond area will be required in order to verify the estimated percolation rates provided above.

- A confining layer (bottom of pond aquifer) at a depth of about 4 feet below current existing ground surface elevation.

- Porosity of the soils within the pond aquifer equivalent to about 25%.

CLOSURE

The conclusions and recommendations provided in this report were based on the subsoil conditions encountered in our borings. It is assumed that the subsurface profile depicted by our borings is representative of the subsurface profile in all portions of the site. If during construction activities, variations in the subsurface profile are encountered, our firm should be notified immediately so we may re-evaluate the conclusions and recommendations provided in this report.

We have appreciated the opportunity of providing our engineering services to you on this project and trust that the information presented in this report is satisfactory. Should you have any questions, or if we can be of any further assistance, please do not hesitate to contact the undersigned.

Sincerely,
RAAD-TANNOUS ENGINEERING GROUT, INC.

Raad H. Raad, P.E.
Principal Engineer
Florida Registration No. 45354

Attachments: Figures 1 and 2