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October 30, 2023

Town of Clinton
P.O. Box 5194
Clinton, New Jersey 08809
c/o Bob Clerico
Van-Cleef Engineering, on behalf of the Town of Clinton
Email: **RClerico@vancleefengineering.com**

Clinton Moebus 34, LLC – Technical Report #5 Clinton Commons
Response to Questions & Comments by Van Cleef Engineering

Dear Mr. Clerico:

ANS Geo has been provided additional comments regarding our Geotechnical Recommendations Report from yourself and Van Cleef, on behalf of the Township of Clinton, in a letter dated October 16, 2023. We have prepared this letter to summarize the comments provided by yourself (indicated in **bold** and *italic* text), as well as ANS Geo's responses in-line with each comment.

In addition, ANS Geo has provided our updated Geotechnical Recommendations Report dated October 30, 2023, which incorporates the changes discussed herein. ANS Geo notes that Section numbers of the original Recommendations Report as referenced by name and number below may vary between the September 6th, 2023 and October 30th, 2023 versions of the same report, as additional information has been provided, and to incorporate requested responses from yourself and the Town.

• Section 2 - Site Grading & Carbonic Rock (From Tech Rpt #5 Page #16 of 30)

A. There were several discussions with ANS Geo relating to the earthwork elements of the site grading and the underlying carbonate rock. Soil laboratory testing was performed by ANS Geo to provide additional soil data and support their recommendations related to the reuse and compaction of the on-site soils. This soil data was attached to their revised Geotechnical Recommendations Report. My supplemental comments relating to this aspect of their new submission are as follows:

> *1. The results of lab testing (sieve analysis, atterberg limits, rock strength and proctor) were included in the Geotechnical Recommendations Report. Due to the variation in soil types identified in the lab testing (clays to clayey sands), additional modified proctor testing will be required. One proctor was performed and the max dry density of 110.8 would be representative of a fine-grained soil, but too low for the coarse-grained sandy soils present on-site.*

ANS Geo Response 1:

> ANS Geo has completed sampling and testing to inform our engineering evaluation for the provided Geotechnical Recommendation Report. It is not typical or feasible to test the variation in properties of all soil types across the project site; and, as typical of civil-earthwork and roadway projects, samples will be taken at the start of and during construction as part of the quality assurance and quality control process for backfilling and compacting. It is expected that, during construction, these additional samples will be collected and Modified Proctor Testing completed on the material to inform that expected maximum reference density against which compaction and moisture specifications for re-use will be compared against.

Separately, it is our professional opinion that the variation in Modified Proctor test results (whether fine-grained as tested, or coarse-grained, which may exist across the site) will not impact our current foundation recommendations. Our current recommendations provide required compaction, re-use, and placement specifications which will allow the material to be evaluated to confirm it meets the expected performance regardless of variation in Modified Proctor test results.

2. Disposal of unsuitable material not addressed. Section 9.1.1 (Soil and Bedrock Disposal) does not include a discussion of unsuitable material but does discuss structural vs general fill.

ANS Geo Response 2:

ANS Geo clarifies that the material excavated and removed from the site may be re-usable as general fill across the project site, or to an off-site user. It is not ANS Geo's recommendation that soil be disposed at a landfill. To the extent that it is not impacted, at the contractual agreement between the Owner and excavation contractor, the clean, extracted material may be re-used in a manner which is consistent with Section 9.4 of our Geotechnical Recommendations Report or taken off-site to end-user.

Additionally, ANS Geo has updated Section 9.4 in the current Geotechnical Recommendations Report which discusses the re-use of native soil, including recommendations for handling, placement, and compaction.

3. Report does not clearly define structural fill or which structures, improvements, roads or utilities where it's use will be necessary.

ANS Geo Response 3:

Structural Fill is intended to be used within the footprint of where load-bearing structures will be constructed. The purpose is to provide a firm, level surface, to provide sufficient bearing capacity, to limit and control settlement for load-bearing structures, and to promote drainage away from below foundations to provide a capillary break. The specifications of the structural fill to be used at the project site are provided on page 16 of 19 in 'Table 9: Recommended Gradation of Structural Fill'.

On page 13 of 19, ANS Geo has provided 'Table 7: Bearing Capacities for Proposed Structures By Bearing Material'. The recommendations in this table encompass all structures proposed to be built at the project site besides the retaining wall. ANS Geo has recommended that Townhome Building 1, Townhome Building 3, Townhome Building 6, Townhome Building 7, Townhome Building 8, Townhome Building 9, and Townhome Building 10, bear on bedrock and therefore need not bear on structural fill.

ANS Geo has recommended that Townhome Building 2, Townhome Building 4, Townhome Building 5, Townhome Building 11, the Food Market, the Gas Station, and the Commercial Restaurant should bear on structural fill, underlain by the native soil under each structure, respectively.

Where roadways and paved surfaces are proposed, native soil may be used to meet the grades and surfaces of the subbase soils. Then, once subbase elevations and grades are built, the road base cross section will consist of densely-graded aggregate, as well as flexible (asphaltic) pavement.

It is expected that utilities will be placed in trenches and native soil will be re-used. If the native soil is found to have sharp or angular rock at base, based on the Civil Engineer of Record, it may be requested that a thin layer of bedding sand and cover sand be used to prevent the utility from being damaged. Once placed, native soil is then recommended to return the area to proposed grade.

4. Report Section 9.4 (Backfilling and Re-use of Native Soils) indicates that none of the on-site soils can be used as structural fill since they contain more than 10% fines and will only qualify as general fill. Additionally, Section 8 (Foundation Recommendations) is requiring that all footings be over excavated by 12 inches and replaced with crushed stone or imported structural fill. The combination of these 2 items will result in additional disturbance and the need to remove/import larger quantities of soils from/to the site than originally anticipated. As originally requested, the magnitude of the Impact resulting from this recommendation should be addressed.

ANS Geo Response 4:

The statement "*Additionally, Section 8 (Foundation Recommendations) is requiring that all footings be over excavated by 12 inches and replaced with crushed stone or imported structural fill*." is not in-line with ANS Geo's recommendations. Page 13 of 19 of our Geotechnical Report indicates the expected bearing material (competent bedrock, or crushed stone/structural fill atop native soil) for each of the various structures across site. Of the 11 Townhome Buildings, seven (7) are to bear on bedrock. The remaining four (4) Townhome Buildings are to bear on structural fill underlain by native soils. The Food Market, the Gas Station, and the Commercial Restaurant should bear on structural fill, underlain by native soil as well. ANS Geo therefore expects that half of the 14 total structures planned to bear on structural fill.

Where structural fill is required, ANS Geo notes that not the entire "footprint area" of each structure will not require this thickness of crushed stone fill. The area which must be prepared with 12 inches of structural fill will be limited to only the location where isolated shallow foundations are proposed (a fraction of the overall building footprint). The thickness of the required structural fill layer underlying floor slabs of each structure shall be determined by the Structural Engineer.

5. Clarification should be provided as to why specifications for import of structural fill is discussed in 2 separate Sections. Section 9.3 (Subgrade Preparation and Compaction) and import of general fill provided in Section 9.4 (Backfilling and Re-use of Native Soils).

ANS Geo Response 5:

Section 9.3 defines ANS Geo's recommendations for preparing subgrade areas which will be accepting foundations or load-bearing structures across the project site. This includes our recommendations for the use of structural fill underneath load bearing structures, as well as specifications on type of material which would be acceptable under load bearing structures (structural fill).

For areas which are not accepting foundations (general site grading and all other areas), Section 9.4 defines the method of placing and using this material across the remainder of the project site.

B. Part of the geotechnical investigation included drilling of additional soil borings on the site.

1. The intended locations of the Borings included one adjacent to Central Avenue (B-20) that would document the location of rock in in the area of the site where the applicant is proposing a deep cut within the limited ROW to install the gravity sewer line serving this project. However, this boring was moved approximately 150-foot away from the intended location and does not provide the requested information. The Engineer should address why this modification was made.

ANS Geo Response 6:

The purpose of this boring was to gain information on the subsurface conditions in the vicinity of the proposed sewer. This proposed sewer is approximately 500 feet long. The proposed location of B-20 was about 60 feet South of the center of the length of the proposed sewer.

Upon arrival at the boring location, the driller acknowledged that the track rig was approaching a steep slope. In consideration of safety for our drill crew, an on-site decision was made to change the location of B-20 to still be along the sewer alignment, without forcing drillers to place a track rig in a potentially precarious, unsafe position. Bedrock is anticipated to be encountered at a similar depth along the portion of the sewer to the South, towards the location of B-20 as proposed. In borings B-15 and B-10, the top of bedrock was encountered at 4 feet and 10 feet, respectively.

2. There is a concern regarding shallow bedrock in the area of Central Avenue and challenge of excavating a deep trench within the limited ROW. Given the close proximity of the adjoining homes and driveways the report should address the means and methods that could be used to install this line as planned. Currently Section 9.1.1 (Excavation of Rock) only offers general recommendations for rock removal.

ANS Geo Response 7:

It's generally the Contractor's responsibility to come up with means and methods to excavate bedrock. Based on our experience, ANS Geo would expect that rock removal will consist of one of the following methods:

1. Rock hammering: the use of a hydraulic hammer to fracture and break rock into smaller pieces which can then be removed using conventional techniques. This is the initial and primary method which is typically employed first on most rock removal projects.

2. Line-drilling and splitting: the use of small, pre-drilled holes (approximately three-inches in diameter) placed in a grid pattern along the utility corridor where rock is encountered. The drill will typically be extended to two feet below the bottom of proposed excavation, and will create "pre-split" sections of rock which can then be removed using conventional excavation techniques.

However, as mentioned, the method of rock removal will be a Contractor's "means-and-methods" determination based on their available equipment, as well as their own experience.

ANS Geo has included this updated language in Section 9.1.1. of the revised Geotechnical Report.

• Section C - Wall Design – (From Tech Rpt #5 Page #17)

C. A critical part of the development of this site is the retaining wall required for the stormwater basin. Recommendations and soil properties for such retaining walls are typically included in the Geotechnical Report for use by the wall designer. The Phase 2 Report (Table 8) only provides a general soil profile for the site. While Section 8.2 (Retaining Wall Design) provides additional recommendations a Global stability analysis will be required as part of the final design of this basin retaining wall.

ANS Geo Response 8:

ANS Geo understands the request for a global stability analysis as part of the final design of the basin retaining wall. We understand that Owner has retained another individual/firm (James Brown) to complete the retaining wall design. For ease of reference and review, although this was not completed by ANS Geo, the retaining wall design provided to ANS Geo by Owner is provided as Appendix H of the revised Geotechnical Report.

• Carbonate Area District: Phase II Carbonate Area District Report (From Tech Rpt #5 Page#18 of 30)- & Geotechnical Investigations (From page #19)

D. The original submission of the Geophysical Investigation Report was deemed incomplete since the subsurface conditions at several of the proposed commercial and residential structures were not investigated. Additionally, the prior report was limited to performing a geologic investigation and

presenting the data without including an evaluation, reaching conclusions, or offering recommendations related to the development of the site. Accordingly, the current Phase 2 Report includes additional borings that were performed at the structures not previously investigated and the findings discussed in the ANS Geo's Geotechnical Recommendations Report. My comments relative to this aspect of the new submission are as follows:

> *1. The Report included performing additional borings for the habitable structures and Center Ave sewer however, it does not bring together all the subsurface data and only focuses on the borings performed in August 2023 and May to September 2022. The summary of the ANS Geo borings is presented in 2 separate tables and different sections of the report as Table 1 in Section 3.1 and Table 2 in Section 4.2. The Report does not include, refence or evaluate any of the percussion probes or soil logs previously completed by E&LP.*

ANS Geo Response 9:

ANS Geo notes that the soil logs completed by E&LP were limited in information; therefore, ANS Geo did not include an in-depth summary of their information, since detailed information could not be gathered from their limited borings. Furthermore, ANS Geo notes that E&LP only performed 10 shallow, hollow-stem soil borings, with deepest boring extending to 11.7-feet, as well as 15 "soil pits" (test pit excavations), with deepest extending to 12-feet below grade. Although the E&LP Report indicates that split spoon sampling was conducted in the borings, the boring logs provided with the Report are absent any Standard Penetration Test "N-Values" to describe relative density and stiffness for the purpose of engineering application. In addition, the soil pits describe the observed subsurface profile at each investigation location; however, the descriptions are qualitative (describing soil color, and general soil classification using USDA methods). Quantitative data (N-values, soil pocket penetrometer strength, etc.) are not included; therefore, while E&LP's data was considered in the context of understanding the site geology, the potential for rock, and confirming the material type which ANS Geo found during our investigation, the data from E&LP's investigation were not directly useable for engineering application.

Lastly, ANS Geo clarifies that no percussion probes were completed by E&LP. These percussion probes were completed by ANS Geo as part of our follow-on investigation, as an outcome of our earlier geophysical (Electrical Resistivity Imaging [ERI]) studies.

To provide additional clarification on the previous studies completed by E&LP, ANS Geo has included this summary into a new section, Section 3.3 – Investigations by Others.

2. The Report does not provide conclusions or evaluation of the site's karst conditions. Section 7 (Risk Evaluation and Conclusions) from the Geophysical Investigation report (REV 4) attached as Appendix F touches on this subject however, this section was prepared prior to the completion of the additional borings. Accordingly, the Report should be updated to reflect the additional data and insight provided by the additional borings and soil laboratory testing.

ANS Geo Response 10:

ANS Geo notes that our Geophysical Investigation Report was intended to provide the factual data collected as part of the karst study. Unlike the factual Geophysical Investigation Report, the purpose of the Geotechnical Recommendations Report was to summarize the collected factual data, and then provide engineering recommendations based on the factual data.

The geophysical investigation and follow-on percussion probes and soil borings did not identify any open, cavernous features which are of largest concern in karst environments. Instead, the investigation found the predominance of weathered rock, as well as pinnacled rock which is reminiscent of paleo-karst environments that have had karst activity and subsidence events occur during a previous period in time. Given these identified conditions, ANS Geo's engineering recommendations were not influenced or reduced due to karst across the project site.

Notwithstanding the above, ANS Geo understands that small karstic features may be identified during construction, and management of karst on this site will be more directly related to proper site grading, site management, stormwater controls, and best management practices for work in karst throughout construction. While it is a low possibility based on our interpretation of the field investigation findings, should a karst feature be found, ANS Geo has now included a Karst Management and Mitigation Plan for the Project as Appendix F to the Geotechnical Recommendations Report to provide guidance for the management and mitigation of karst features which may be found during construction.

3. Section 9.3 (Subgrade Preparation and Compaction) does not include proof rolling the subgrade. This section mentions inspecting below the fabric for unsatisfactory conditions but does not include specifying what type of inspecting or testing shall be performed. Typically, in large areas (building slabs, paved areas etc.) the most common method for determining subgrade soil suitability and stability is to proof roll the subgrade with a large roller or loaded triaxle prior to the placement of any fabric. Additionally, the Report does not mention probing of the footing subgrade for soft soil or possible voids as is standard practice for karst sites. ANS Geo shall expand this section to include specific testing used to identify unsuitable material and type of remediation.

ANS Geo Response 11:

ANS Geo has included additional information regarding proof-rolling and subgrade verification in Section 9.3 - Subgrade Preparation and Compaction, of our revised Geotechnical Recommendations Report.

Within areas of proposed foundations, it is recommended that the topsoil, organic material, fill materials and other miscellaneous debris be removed from the proposed footing areas. Native material beneath the separation fabric should be inspected for unsatisfactory conditions such as standing water, frozen soil, organics, protruding cobbles or boulders, or deleterious materials. Upon excavation to the desired grade based on the foundation type, the exposed subgrade should be proof-rolled, followed by the placement of structural fill.

Given that the project site exists in a potential karst area, should soft exist which do not pass the proof-roll be observed within foundation footprints, ANS Geo recommends performing a percussion probe, Geoprobe, or similar soil probing technique to a minimum depth of two-times the foundation width below the proposed footing prior to backfilling and construction of the foundation. The intent of this probing in a potentially-soft area is to identify if a soil-filled karst feature may have previously existed beneath the proposed footing. If the soil probe does not indicate the presence of consistently soft soil throughout the probe, encounters weathered or competent rock, or does not detect any karst feature, the near-surface soft soil which failed the proof-roll should be undercut and replaced with properly compacted fill materials. The excavation should be undercut a minimum of six inches prior to placement of the geotextile separation fabric and/or crushed stone/structural fill material. If the soil probe indicates the presence of a potential karst feature, ANS Geo should be contacted to evaluate and provide recommendations for the specific foundation(s) in question.

The final, desired grade will depend on finished elevation and the depth of any subgrade modifications as discussed in the following sections. An ANS Geo rep or similar independent, experienced geoprofessional should determine the actual removal depth during construction.

E. As noted above, additional borings were performed by ANS Geo since the subsurface conditions at several of the proposed commercial and residential structures were not investigated. As part of the submission, we requested that a spreadsheet be included that listed the proposed structures, their square footage, the number of borings that had been performed and number of borings proposed.

1. ANS Geo provided a spreadsheet with the proposed structures prior to testing but did not incorporate this item into the Geotechnical report. One of the purposes of the report was to bring

together all the information and data submitted. Report shall include this item and previously submitted spreadsheet updated based on the results of the August 2023 test borings.

ANS Geo Response 12:

ANS Geo has included the requested table as Table 2 in Section 3.1 of our revised Geotechnical Recommendations Report.

• 2-Stormwater Management – Design Methodology- Groundwater Recharge (Tech Rpt #5- page 21)

F. ANS Geo had previously recommended that the proposed stormwater basin be lined so that it would not infiltrate however that recommendation was in conflicted with the design of the stormwater basin. ANS Geo responded by stating that the basin was being designed by others to infiltrate in smaller volume and addressed infiltration in their Geotechnical Recommendations Report. Clarification of this recommendation is required to address the following:

1. The current recommendation is for infiltration to be less than existing conditions. which is not consistent with the Towns Stormwater Control regulations.

ANS Geo Response 13:

ANS Geo notes that the design and evaluation of stormwater basins and features have been completed by others for the project. ANS Geo clarifies that our earlier response was miscommunicated, and we intended to indicate that the proposed infiltration rate, as communicated to us by the Civil Engineer of Record (E&LP), is to be the same as the existing rate for the project site. At the direction of the Owner, ANS Geo respectfully requests that further inquiries regarding the design of stormwater features be directed to the Civil Engineer of Record, Mr. Wayne Ingram of E&LP, through comments provided on the Stormwater Management Report dated April 18, 2023, by E&LP.

2. The current SWM Basin has been designed to address stormwater infiltration. Accordingly, ANS Geo should review the current plan and offer any recommendations related to issues associated with any potential impact on the underlying karst formations.

ANS Geo Response 14:

ANS Geo notes that the stormwater management basin and stormwater design has been prepared by other (E&LP). Notwithstanding, given the consideration of the karst setting of the project site, we recognize that the control of surface water and infiltration is of importance to the potential impact on the karst environment. Generally speaking, best practices on sites with potential karst features call for drainage to be directed away from potential features, avoiding channelizing flow and creating point sources of infiltration (such as injection wells), and maintaining flow quantities and volumes to match existing conditions. By maintaining flow quantities, volumes, and existing infiltration rates, the potential for karst to be aggravated by manmade development will be minimize. In addition, ANS Geo has now included a Karst Mitigation Plan as Appendix H to identify our recommendations related to karst which may be encountered at the projet site.

G. ANS Geo had previously recommended that the applicant "be prepared to mitigate any impacts to the basin" but stated "construction and operation of the basin will not impact Geotechnical Recommendations Report. Clarification of the conflicting statement was requested.

1. Geotechnical Report Section 7 (Stormwater Basin Recommendations) does not contain any references to mitigation of impacts to the basin or the basin not impacting karst formations. Section 9.6 (Karst Mitigation Plan) does not mention the stormwater basin or discuss any specifics with regard to mitigation. ANS Geo shall provide an explanation as to why these items were withdrawn and not incorporated into the Geotechnical report.

ANS Geo Response 15:

> At the request of the Client, ANS Geo was requested to remove reference to the design of stormwater basins, as this has been completed by E&LP. ANS Geo has instead included our recommendation to maintain stormwater to pre-development conditions, including volume, velocity, and flow-rate. At the request of our Client, ANS Geo has noted that further inquiries regarding the design of stormwater features be directed to the Civil Engineer of Record, Mr. Wayne Ingram, through comments provided on the Stormwater Management Report dated April 18, 2023, by E&LP.

Should you have any questions regarding our responses presented above, please feel free to reach out at your convenience.

Yours Truly,

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