July 19, 2019

[redacted], Inc.
[redacted] Boulevard
[redacted]

Attention: Mr. [redacted]

Project No.: [redacted] **DRAFT**

Subject: **DRAFT Response Report**
[redacted] Improvements
[redacted] Road
[redacted]

References: 1) Geotechnical Feasibility Study, Proposed Feasibility Study, Proposed Commercial/Industrial Building, [redacted], prepared for [redacted], prepared by [redacted] Project No. [redacted], dated November 14, 2016.

2) Geotechnical Investigation, Proposed Feasibility Study, Proposed Commercial/Industrial Building – [redacted] and [redacted], prepared for [redacted], prepared by [redacted] Project No. [redacted] 1, dated December 5, 2017.

3) Geotechnical Investigation, Gateway South Building 4, [redacted], [redacted], prepared for [redacted], prepared by [redacted] Project No. [redacted], dated December 20, 2017.

4) Geotechnical Investigation, Proposed Feasibility Study, Proposed Commercial/Industrial Development, [redacted] at [redacted], prepared for [redacted], prepared by [redacted] Project No. [redacted], dated March 22, 2019.

5) Geotechnical Technical Review Form, [redacted], prepared by [redacted] Permission Request Number [redacted], Submittal No: Second, dated January 17, 2018.

Gentlemen:

In accordance with your request, we have prepared this report to address the review comments generated by the [redacted] following their review of storm drain improvement plans and other associated documents. The comments were provided in the above-referenced [redacted] document. It is our understanding that the review comments were generated in order to allow [redacted] permission to perform a geotechnical investigation for the proposed storm drain improvements within the channel. As part of our response to the review comments, we have reviewed geotechnical investigations prepared by [redacted] for nearby adjacent projects.

Geotechnical Technical Review Form Comments (Provided by [redacted])

The comments were provided [redacted] and are presented in the above-referenced city of [redacted] document. Each of the comments issued by the reviewer are presented below, followed by [redacted] response. A copy of the review sheet is enclosed with this correspondence for reference purposes.

[redacted] *In order to review this permit request, please provide the applicable geotechnical report(s) for this project which includes, but is not limited to, the following information:*

i) Anticipated soil and groundwater conditions near and at the channel where the improvements are proposed. Include nearby boring logs and a location map.
ii) Written details, cross sections (to scale), and plan view of the method and configuration of excavation for installation at and near the channel. Temporary slopes must be in accordance with the [redacted] requirements.
iii) Backfill and compaction requirements at and near the channel (material for backfill; benching; loose lift thickness; minimum compaction requirements, test method, and equipment both adjacent to the pipe and further away; moisture content; pipe bedding; etc.)
iv) Stockpiles or other surcharges near the channel
v) Applicable calculations, as necessary, to support the construction of the proposed improvements.
vi) Discussion of any effect anticipated by construction to the proposed improvements to the channel.
vii) Discussion of inspection and testing equipment.

[redacted] Item i: **Nearby Subsurface Exploration**

As requested by the reviewer, we have included the boring logs from thirty-eight (38) borings, advanced to depths of 5 to 50± feet below existing grades at those sites during subsurface exploration operations for previous projects located within 1,000± to 1,800± feet north, east and south of the subject site.

The previous borings were advanced with hollow-stem augers, by a truck-mounted drilling rig. Representative bulk and in-situ soil samples were taken during drilling. In-situ samples were taken using a 1.4± inch inside diameter split spoon sampler, in general accordance with [redacted]. The sampler is driven into the ground with successive blows of a 140-pound weight falling 30 inches. The blow counts obtained during driving were recorded for further analysis. Bulk samples were collected in plastic bags to retain their original moisture content. The relatively undisturbed ring samples were placed in molded plastic sleeves that were then sealed and transported to our laboratory.

The approximate locations of the previous borings are indicated on the Previous Boring Location Plan, included as Plate 1 in the appendix of this report. The Boring Logs, which illustrate the conditions encountered at the boring locations, as well as the results of some of the laboratory testing, are also included in the appendix. Please note that it is our understanding that the client intends to authorize [redacted] to perform

subsurface exploration at the subject site in order to complete a geotechnical investigation at the subject site to support the proposed improvements.

Nearby Geotechnical Conditions

North of the Subject Site

The following geotechnical conditions were encountered at the project site located northwest of the intersection of [redacted] in [redacted]. The results of our investigation are summarized in our reference (2) geotechnical report.

Native alluvial soils were encountered at the ground surface at all of the boring locations. At two of the boring locations, the near-surface alluvium possessed a disturbed appearance, and was identified as disturbed alluvium. These soils generally consisted of loose to medium dense silty fine sands to fine sandy silts with varying amounts of medium to coarse sand.

Undisturbed native alluvial soils were encountered at all of the boring locations, beneath the disturbed alluvium or at the ground surface, extending to the maximum depth explored of 50± feet. The near-surface native alluvium consisted of loose to medium dense silty fine sands, fine sandy silts, and fine sands with varying silt and medium to coarse sand content, extending to depths of 12 to 17± feet. Beneath these materials, the alluvium consisted of medium dense to dense fine to coarse sands with varying gravel content, extending to at least the maximum depth explored of 50± feet. Boring No. B-6 encountered a stiff silty clay stratum, between the depths of 6½ to 8½. Boring Nos. B-2 and B-5 encountered stiff to hard sandy clay and silty clay layers, at depths of 42 to 50± feet and 42 to 47± feet, respectively.

Free water was encountered during drilling at one of the borings. Boring No. B-2 encountered free water at a depth of 33± feet. Based on the water level measurements and the moisture contents of the recovered soil samples, and on the fact that groundwater was not encountered at the second 50-foot boring location, the encountered groundwater was determined to be perched groundwater. The static groundwater table was considered to have existed at a depth in excess of 50± feet below existing site grades at the time of the subsurface investigation. Due to the granular nature of the soils and caving within the boreholes, delayed water level readings were not feasible.

The following geotechnical conditions were encountered at the project site located at the intersection of [redacted] and [redacted] in [redacted], [redacted]. The results of our investigation are summarized in our reference (3) geotechnical report.

Artificial fill soils were encountered at the ground surface at all of the boring locations, except Boring No. B-1. These artificial fill soils contained varying amounts of debris including glass, aspaltic concrete, wood The fill soils extend to depths of 2½ to 4½± feet below the existing site grades. The fill soils generally consisted of very loose to loose silty sands and very stiff silts. The fill soils possessed a disturbed appearance

and varying amounts of debris consisting of glass, asphaltic concrete and wood fragments, resulting in their classification as artificial fill.

Soils classified as possible fill were encountered at depths of 2½ to 6½± feet at Boring No. B-7. The possible fill soils generally consist of loose silty sands. The soils possess a disturbed appearance, but lack obvious indicators of fill, resulting in their classification as possible fill.

Native alluvial soils were encountered at the ground surface at the ground surface at Boring No. B-1 and beneath the artificial fill or possible fill at all of other boring locations, extending to at least the maximum depth explored of 50± below existing site grades. The alluvium generally consists of loose to very dense silty sands, sandy silts, fine to coarse sands, and gravelly fine to coarse sands. Boring Nos. B-2, B-4, B-5, B-6, B-7, B-8 and B-11 encountered occasional isolated layers of medium stiff to hard clayey silts, silty clays and silts at various depths.

Free water was encountered during drilling at one of the borings. Boring No. B-5 encountered free water at a depth of 33± feet. Based on the water level measurements and the moisture contents of the recovered soil samples, and on the fact that groundwater was not encountered at any of the other 50-foot boring locations, the encountered groundwater was determined to consist of perched groundwater. The static groundwater table was considered to have existed at a depth in excess of 50± feet below existing site grades at the time of the subsurface investigation. Due to the granular nature of the soils and caving within the boreholes, delayed water level readings were not feasible.

South of the Subject Site

The following geotechnical conditions were encountered at the project site located at [redacted] in [redacted], approximately 1,800 feet south of the site. The results of our investigation are summarized in our reference (1) geotechnical report.

Soils identified as possible fill were encountered at the ground surface at Boring Nos. B-3 and B-4 extending to depths of 4½ and 5½± feet below the existing site grades. The possible fill soils generally consist of loose to medium dense silty fine sands and fine to medium sands. These possible fill soils possess some indicators of fill but also resemble the underlying native soil.

Disturbed alluvial soils were encountered at the ground surface at one of the boring locations, Boring No. B-1. These soils generally consist of loose silty fine sands and extend to a depth of 2½± feet below existing grades. These soils are classified as disturbed alluvium because they resemble the underlying native soils, however these soils, at the ground surface, are expected to have been disturbed as part of the current site use.

Native alluvium was encountered beneath the disturbed soils, possible fill soils, or at the ground surface, at all of the boring locations. The near-surface alluvial soils generally consist of loose to medium dense fine sands and silty sands with varying

fine to coarse sand content and zones of stiff to very stiff silty clays, extending to depths of 12 to 24± feet. At greater depths, the alluvium generally consists of medium dense to very dense fine to medium sands, silty fine sands and stiff to hard silty clays extending to the maximum depth explored of 50± feet.

Groundwater was not encountered during drilling of the borings. In addition, delayed readings taken within the open boreholes did not identify any free water. Based on the lack of any water within the borings, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 50± feet at the time of the subsurface exploration.

Please note that it is our understanding that the client intends to authorize [redacted] to perform subsurface exploration at the subject site in order to investigate the actual geotechnical conditions at the subject site and complete a geotechnical investigation at the subject site to support the proposed improvements.

[redacted] Item ii: The project structural engineer, [redacted], prepared a structural analysis document for the [redacted] at the [redacted] in [redacted] dated July 18, 2018. The soil parameters utilized in the structural design consisted of the following:

- Passive pressure: 250 pcf
- Allowable bearing: 2000 psf
- Internal friction: 30 degrees
- Soil Weight: 120 pcf
- Soil Classification: SP-SM, Poorly Graded Sand

Based on the results of the nearby subsurface exploration and laboratory testing, it is our opinion that these values are acceptable from a geotechnical standpoint. Consideration should be given to performing future subsurface exploration, laboratory testing, and engineering analysis to verify these values.

[redacted] Item iii: Responses to this item and geotechnical design parameters utilized by other members of the design/construction team to prepare responses to this item will be contained in the future design-level geotechnical investigation, which is one of the purposes of this permit application.

It is anticipated that corrective grading recommendations for treatment of the existing soils will be provided in the future design-level geotechnical investigation. Additionally, recommendations for fill placement, oversized material placement (if necessary), imported structural fill and utility trench backfill will be provided as necessary in the future design-level geotechnical report. The following are preliminary recommendations based on our previous nearby investigations. These should be verified as necessary in our design-level geotechnical investigation:

<u>Preliminary Fill Placement Recommendations</u>

- Fill soils should be placed in thin (6± inches), near-horizontal lifts, moisture conditioned to 2 to 4 percent above optimum moisture content, and compacted.

- On-site soils may be used for fill provided they are cleaned of any debris to the satisfaction of the geotechnical engineer.
- All grading and fill placement activities should be completed in accordance with the requirements of the [redacted] Building Code and the requirements of the city or county of [redacted].
- All fill soils should be compacted to at least 90 percent of the [redacted] maximum dry density. Fill soils should be well mixed.
- Compaction tests should be performed periodically by the geotechnical engineer as random verification of compaction and moisture content. These tests are intended to aid the contractor. Since the tests are taken at discrete locations and depths, they may not be indicative of the entire fill and therefore should not relieve the contractor of his responsibility to meet the job specifications

Preliminary Oversized Material Placement Recommendations

The native alluvial soils possess significant cobble content and occasional boulders. This oversize (greater than 6 inches) material will be encountered during the excavation of the storm drain. Therefore, screening to a 6-inch minus will be required prior to reusing the excavated soils as fill material.

Preliminary Imported Structural Fill Recommendations

All imported structural fill should consist of very low to non-expansive (EI < 20), well-graded soils possessing at least 10 percent fines (that portion of the sample passing the No. 200 sieve). Additional specifications for structural fill are presented in the Grading Guide Specifications, included as Appendix D.

Preliminary Utility Trench Backfill Recommendations

In general, all utility trench backfill should be compacted to at least 90 percent of the [redacted] maximum dry density. Compacted trench backfill should conform to the requirements of the local grading code, and more restrictive requirements may be indicated by the city or county of [redacted]. All utility trench backfills should be witnessed by the geotechnical engineer. The trench backfill soils should be compaction tested where possible; probed and visually evaluated elsewhere.

[redacted] Item iv: It is our understanding that other members of the design/construction team will prepare a response or responses to this item.

[redacted] Item v: The project structural engineer, [redacted], prepared a structural analysis document for the [redacted] the [redacted] Crossing in [redacted] dated July 18, 2018. The soil parameters utilized in the structural design consisted of the following:

- Passive pressure: 250 pcf
- Allowable bearing: 2000 psf
- Internal friction: 30 degrees
- Soil Weight: 120 pcf
- Soil Classification: SP-SM, Poorly Graded Sand

Based on the results of the nearby subsurface exploration and laboratory testing, it is our opinion that these values are acceptable from a geotechnical standpoint. Consideration should be given to performing future subsurface exploration, laboratory testing, and engineering analysis to verify these values.

[redacted] Item vi: It is our understanding that other members of the design/construction team will prepare a response or responses to this item.

[redacted] Item vii: It is our understanding that other members of the design/construction team will prepare a response or responses to this item.

Closure

We sincerely appreciate the opportunity to be of continued service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

[redacted]

[redacted]
Senior Geologist

[redacted], M.Sc., [redacted]
Principal Engineer

Enclosures: Plate 1: Previous Boring Location Plan
Boring Logs from Previous Nearby Projects
[redacted] Geotechnical Technical Review Form

Distribution: (1) Addressee