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January 4, 2021

VIA E-MAIL: Marie.Sugar@kimley-horn.com
Ms. Marie S. Sugar, PE
Kimley-Horn and Associates, Inc.
200 S. Tryon Street, Suite 200
Charlotte, North Carolina 28202

Subject: **Addendum to Report of Geotechnical Exploration**
Cross Charlotte Trail
Orr Road to Rocky River Road
Charlotte, North Carolina
BOYLE Project No. 15-072-05

Dear Ms. Sugar:

As authorized by issuance of your "Letter of Intent" dated Nov 19, 2019, and "Standard Agreement for Professional Services" dated September 11, 2020, Boyle Consulting Engineers, PLLC (BOYLE) has performed a Geotechnical Exploration for the subject project in Charlotte, North Carolina and furnished our report dated December 22, 2020.

This addendum to our report addresses other questions presented by the structural engineer and includes additional comments for each structure. This report is intended for the use of Kimley-Horn and Associates and The City of Charlotte. The contents of this report should not be relied upon by any other entity without the express written consent of BOYLE.

Structure #1

Based on the subsurface conditions encountered at Boring B-20, a deep foundation system will be required because soft, soils are present to depths of 10 feet below existing grades. The boardwalk structure can be supported by a deep foundation system consisting of either micropiles or driven timber piles designed to bear in the underlying competent residual/PWR materials at depths of 25 to 35 feet below existing grades. Both types of deep foundations may be designed for a maximum load of 15 tons. Drilled caissons and helical piers mostly likely are not feasible based on the subsurface conditions. We recommend that the deep

foundation system be monitored during installation by a representative of the geotechnical engineer to verify that the foundations terminate in competent bearing materials.

Structure #2

Based on the subsurface conditions encountered at Boring B-28, a deep foundation system will be required because firm, soils are present to depths of 6 feet below existing grades. The boardwalk structure can be supported by a deep foundation system consisting of either micropiles or driven timber piles designed to bear in the underlying competent residual/PWR materials at depths of 10 to 20 feet below existing grades. Both types of deep foundations may be designed for a maximum load of 15 tons. Drilled caissons and helical piers mostly likely are not feasible based on the subsurface conditions. We recommend that the deep foundation system be monitored during installation by a representative of the geotechnical engineer to verify that the foundations terminate in competent bearing materials.

Structure #3

Based on the subsurface conditions encountered at Boring B-32, a deep foundation system will be required because firm soils are present to depths of 6 feet below existing grades. The boardwalk structure can be supported by a deep foundation system consisting of either micropiles or driven timber piles designed to bear in the underlying competent residual/PWR materials at depths of 10 to 20 feet below existing grades. Both types of deep foundations may be designed for a maximum load of 15 tons. Drilled caissons and helical piers mostly likely are not feasible based on the subsurface conditions. We recommend that the deep foundation system be monitored during installation by a representative of the geotechnical engineer to verify that the foundations terminate in competent bearing materials.

Structure #4

Based on the subsurface conditions encountered at Boring B-47 and B-48, a shallow foundation may be suitable with foundation bearing pressures on the order of 2,500 to 3,000 psf with settlement less than one inch. The boardwalk structure can be supported by a deep foundation system consisting of either micropiles or driven timber piles designed to bear in the underlying competent residual/PWR materials at depths of 5 to 10 feet below existing grades. Both types of deep foundations may be designed for a maximum load of 15 tons.

Structure #5

Based on the subsurface conditions encountered at Boring B-14 and B-15, a deep foundation system will be required because soft, soils are present to depths of 15 feet below

existing grades at boring B-15. The boardwalk structure can be supported by a deep foundation system consisting of either micropiles or driven timber piles designed to bear in the underlying competent residual/PWR materials at depths of 20 to 30 feet below existing grades. Both types of deep foundations may be designed for a maximum load of 15 tons. Drilled caissons and helical piers mostly likely are not feasible based on the subsurface conditions. We recommend that the deep foundation system be monitored during installation by a representative of the geotechnical engineer to verify that the foundations terminate in competent bearing materials.

Structure #6

Based on the subsurface conditions encountered at Boring B-24, a shallow foundation may be suitable with foundation bearing pressures on the order of 2,500 to 3,000 psf with settlement less than one inch. Although a deep foundation system may be desired depending on the applied loading and deflection criteria. The boardwalk structure can be supported by a deep foundation system consisting of either micropiles or driven timber piles designed to bear in the underlying competent residual/PWR materials at depths of 15 to 25 feet below existing grades. Both types of deep foundations may be designed for a maximum load of 15 tons. Drilled caissons and helical piers mostly likely are not feasible based on the subsurface conditions. We recommend that the deep foundation system be monitored during installation by a representative of the geotechnical engineer to verify that the foundations terminate in competent bearing materials.

Structure #7

Based on the subsurface conditions encountered at Boring B-35, a deep foundation system will be required because, soft to firm soils are present to depths of 6 feet below existing grades. The boardwalk structure can be supported by a deep foundation system consisting of either micropiles or driven timber piles designed to bear in the underlying competent residual/PWR materials at depths of 30 to 40 feet below existing grades. Both types of deep foundations may be designed for a maximum load of 15 tons. Drilled caissons and helical piers mostly likely are not feasible based on the subsurface conditions. We recommend that the deep foundation system be monitored during installation by a representative of the geotechnical engineer to verify that the foundations terminate in competent bearing materials.

Structure #8

Based on the subsurface conditions encountered at Boring B-39, a deep foundation system will be required because, soft to firm soils are present to depths of 8 feet below existing

grades. The boardwalk structure can be supported by a deep foundation system consisting of either micropiles or driven timber piles designed to bear in the underlying competent residual/PWR materials at depths of 30 to 45 feet below existing grades. Both types of deep foundations may be designed for a maximum load of 15 tons. Drilled caissons and helical piers mostly likely are not feasible based on the subsurface conditions. We recommend that the deep foundation system be monitored during installation by a representative of the geotechnical engineer to verify that the foundations terminate in competent bearing materials.

Timber Piles

Timber piles should be CCA-treated with a minimum tip diameter of 8 inches and driven to the maximum nominal capacity of 15 tons. For short individual piles, a maximum lateral capacity of 2,000 pounds can be used at the ground surface. Detailed design of timber piles should use the latest version of the design manual furnished by the Southern Pressure Treaters Association using actual site conditions. Piles are typically driven with a 3,000-pound drop hammer by an experienced contractor to achieve the desired load capacity. Pile lengths should be adequate to reach the estimated depths into residual materials at each structure to the rated capacity (see above and boring logs) and driven no less than five feet into the ground. We recommend that the deep foundation system be monitored during installation by a representative of the undersigned geotechnical engineer to verify that the piles terminate in competent bearing materials and that piles are not over-driven and/ or damaged.

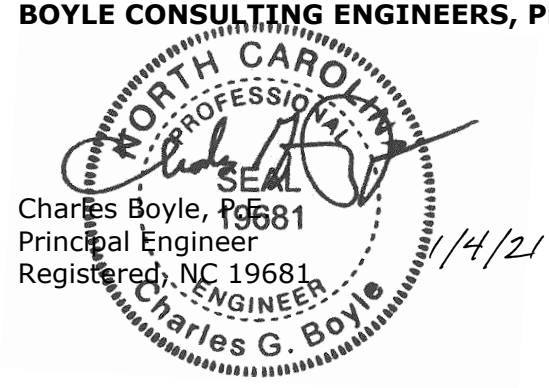
Micropiles

Micropiles should be designed by the micropile manufacturer/ supplier/ installer for stated site conditions.

We appreciate the opportunity to provide our professional services on this project. Please contact us should you have any questions pertaining to this addendum report.

Sincerely,

BOYLE CONSULTING ENGINEERS, PLLC



Charles Boyle, P.E. 1/4/21
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