May 28, 2024

Lenity Architecture
3150 Kettle Court SE
Salem, OR 97301

Attn: David Hulbert, Architect, Project Manager

Subject: **MEMO: Geotechnical Report Update**
Proposed Gas Station & Convenience Store
Tax Lot 6800 of Tax Map 18122322
SE Corner of US Highway 101 & 36th Street
Florence, Lane County, Oregon

GNN Project No.: 223-1642-1

Reference: GN Northern, Inc., *Geotechnical Site Investigation Report, New Dollar General Store, Southeast Corner of 36th Street and Highway 101, Florence, Lane County, Oregon*, GNN Project No. 223-1642, dated May 18, 2023.

Dear Mr. Hulbert,

As requested, GN Northern, Inc. [GNN] has prepared this memorandum letter for the purpose of updating the referenced *Geotechnical Site Investigation Report* and to validate the recommendations and soil design parameters contained therein. You provided notice to proceed in the form of a signed document (Authorization to Proceed for US Market – 35th/US101 Florence, OR) dated 5/6/2024.

Except the additional recommendations presented in this memo, the findings and recommendations within the above referenced Geotechnical Site Investigation Report remain valid for design and construction of the planned gas station and convenience store.

The original geotechnical investigation at the subject site was completed for development of a new Dollar General store. Based on the *Architectural Site Plan* you provided via email on March 18, 2024, we understand that proposed development at the subject site will now consist of a gas station including four gas pumps with a 46'x50' overhead canopy in the western portion and a 5,856 SF convenience store & coffee shop building in the eastern portion. Site improvements will include associated drive-lanes and

parking spaces, along with the installation of two new underground storage tanks (USTs) for gas/diesel north of the fuel islands. Based on our experience with similar projects, we anticipate maximum wall loads and column loads to be less than or similar to those previously assumed.

As part of the previously performed subsurface investigation, GNN completed seven (7) exploratory borings and two (2) infiltration tests. The attached updated *Site Exploration Plan* (Figure 2A) shows these points of exploration/testing superimposed on the new site plan.

The following additional recommendations and design parameters apply to the planned development:

Canopy Foundations Uplift Resistance: Uplift forces on spread footings can be resisted by the weight of the footings and the backfill soil material that is placed over the footings. It is recommended that the backfill soil weight considered to resist uplift loads be limited to that immediately above the footings. A total soil unit weight of 115 pcf may be used for the onsite sandy soil placed as compacted engineered backfill atop the footings in accordance with the recommendations of the referenced report. An appropriate factor of safety shall be used for calculation of uplift resistance.

The footings should be founded below an imaginary line projecting at a 1-horizontal to 1-vertical (1H:1V) slope from the base of any adjacent parallel utility trenches.

UST Excavation Dewatering: Due to groundwater encountered at depths ranging from approximately 6.25 to 8 feet BGS within the borings, dewatering of the UST excavations will be necessary. The dewatering system should consist of sloping the excavated subgrade to one side of the excavation, and digging of a shallow sump at that corner. A perforated drum should then be placed in the sump excavation. Pea gravel, washed rock or crushed rock should then be packed around the perforated drum and the sump excavation. It shall be noted that groundwater is expected to recharge at a rapid rate, therefore, based on the soil type and hydrogeologic conditions, a high-capacity pump should be employed. The high-capacity pump should be placed in this sump and the water should be pumped out of the excavation to a suitable outlet. The pumped water should be filtered through hay bales or filter fabric before it is introduced into the drainage outlet.

UST Anchoring: Installation of USTs shall be in strict conformance with the tank manufacturer's requirements and specifications. All USTs should be adequately anchored to counteract buoyant forces acting upon the tanks due to the groundwater. The USTs should be fastened with straps anchored in

concrete deadman beams on both sides of the proposed tanks. The deadman anchors should be designed by a qualified structural engineer to counteract the buoyant forces acting upon the USTs empty tank conditions. Seismic design shall be completed in accordance with ASCE 7-22 (American Society of Civil Engineers, 2022). Adequate containment should be provided around the new USTs and UST intake valves to mitigate spills contributing to the contamination of the groundwater.

Trench Backfill: Trench backfill placed beneath, adjacent to, and for at least 2 feet above utility lines (e.g., the pipe zone) should consist of well-graded, granular material with a maximum particle size of 1.5 inches, have less than 10% by weight passing the U.S. Standard No. 200 Sieve, and meet Oregon Department of Transportation Standard Construction Specifications, 2021 version (ODOT SS) 405.12 - Pipe Zone Bedding. The pipe zone backfill should be compacted to at least 90% of the maximum dry density, as determined by ASTM D 1557 or as required by the pipe manufacturer or local building department.

Within roadway alignments or beneath building pad, the remainder of the trench backfill should consist of well-graded, granular material with a maximum particle size of 2.5 inches, have less than 10% by weight passing the U.S. Standard No. 200 Sieve, and meet ODOT SS 405.14 - Trench Backfill, Class B. This material should be compacted to at least 92% of the maximum dry density as determined by ASTM D1557, or as required by the pipe manufacturer or local building department. The upper 2-feet of the trench backfill should be compacted to at least 95% of the maximum dry density as determined by ASTM D1557.

Outside of structural improvement areas (e.g., roadway alignments or building pads), trench backfill placed above the pipe zone may consist of general fill materials free of organics and materials over 5 inches in size, and meet ODOT SS 405.14 - Trench Backfill, Class A, C, or D. This general trench backfill should be compacted to at least 90% of the maximum dry density, as determined by ASTM D1557 or as required by the pipe manufacturer or local building department.

Rigid Concrete (PCC) Pavement: Concrete pavement design recommendations are based on an assumed modulus of rupture of 500 psi and a minimum compressive strength of 4,000 psi for the concrete. Concrete mix shall be 1½" max. aggregate and use moderate exposure. Reinforcing steel shall be ASTM A615 Grade 40 and consist of #4's at 18" each-way in center of the section (special care

shall be taken during construction to locate the reinforcing steel in the center of the mat). Equivalent welded wire mesh may be substituted if approved by the Geotechnical Engineer or Civil Engineer. Construction joints (sawcuts) shall be 1/8" wide and T/4 deep and provided at a maximum of 15' spacing in each direction. 15' spacing is appropriate for 1" or 1 ½" aggregate. If ¾" aggregate is used, 10' spacing shall be used instead. The recommended pavement design sections are based on the assumption that subgrade preparation and fill placement are completed in accordance with the recommendations presented in the above referenced geotechnical report. Crushed base aggregate shall meet the grading requirements of ODOT SS 02630 and shall be compacted to at least 95% of the maximum dry density as determined by ASTM D1557 method. The material and construction procedures shall be in accordance with Oregon Department of Transportation Standard Specifications for Construction for Concrete Pavement.

Recommended Concrete Pavement Sections

Traffic	Crushed Aggregate Base Course Thickness (inches)	Concrete Paving Thickness (inches)
Standard Duty	6	5
Heavy Duty	6	8

Concrete Flatwork/ Pathways: Concrete sidewalk (pathways) sections shall be 4" portland cement concrete. To impede the wicking of moisture beneath pathways, we recommend a 4-inch layer of ¾" minus crushed aggregate be placed. Material shall meet the grading requirements of ODOT SS 02630 and contain less than 5% passing the No. 200 sieve size. The crushed rock material shall be compacted to at least 95% of the maximum dry density as determined by ASTM D1557 method. Prior to placing the crushed aggregate fill, the subgrade soil shall be proof rolled to a dense/non-yielding surface and to at least 95% of the maximum dry density as determined by ASTM D1557 method. Any areas pumping during proof-compacted shall be over-excavated and re-compacted.

It shall be noted that the project site is mapped within an area identified with a 'High' risk for *Earthquake Liquefaction Hazard*. Based on the findings of our site exploration and review of available geologic data, the onsite soils are susceptible to liquefaction. The scope of our original geotechnical study did not include a site- specific liquefaction analysis required to fully evaluate the risk of liquefaction induced settlement at the project site. The owner/developer should accept the risk of liquefaction settlement and angular distortion of the building pad/foundations from a seismic event.

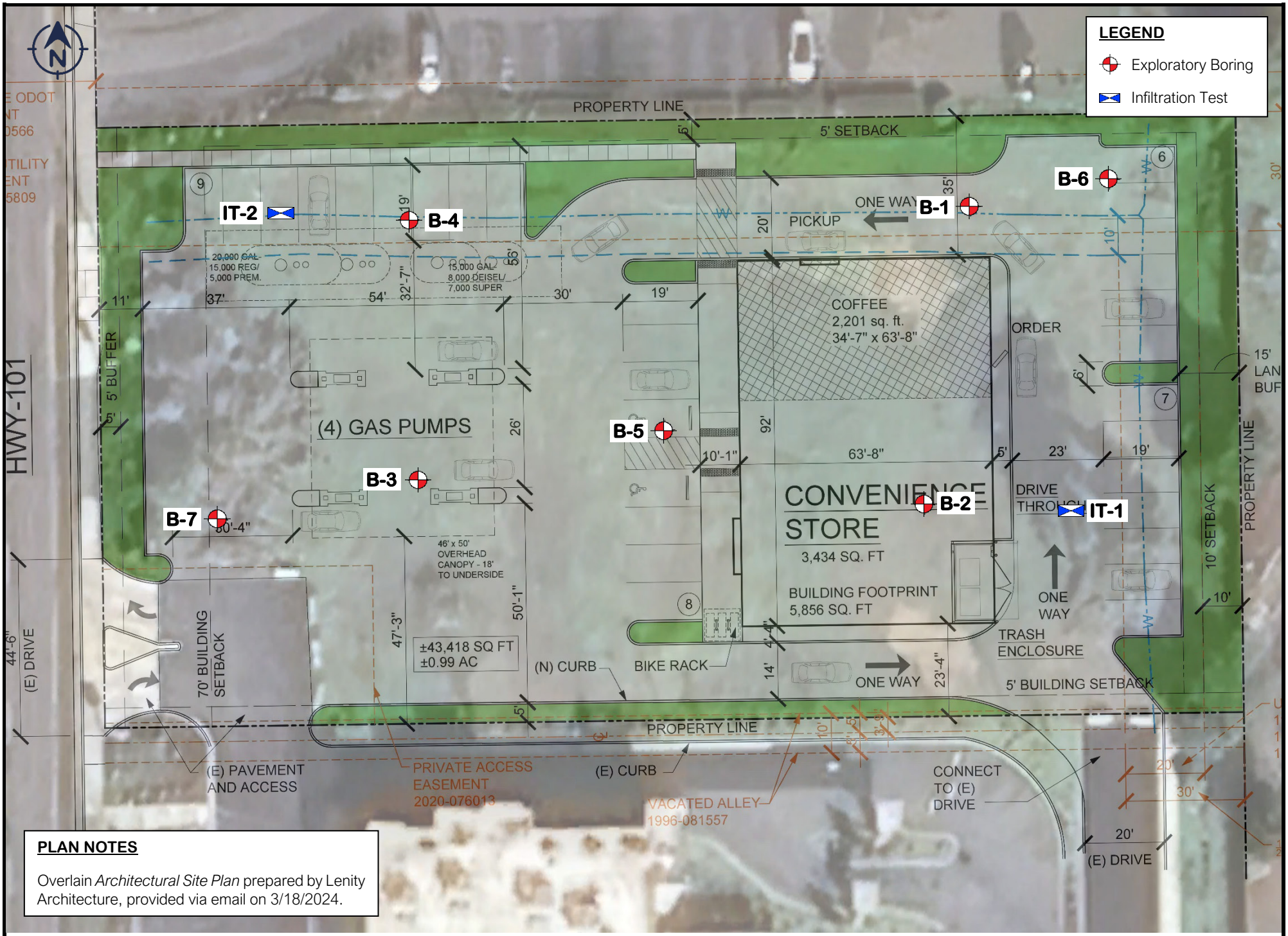
Please feel free to contact our office with any questions regarding this memorandum letter.

Sincerely,

GN Northern, Inc.

Imran Magsi, PE, GE
Sr. Geotechnical Engineer

Attachment: *Site Exploration Plan (Figure 2A)*



PLAN NOTES

Overlain *Architectural Site Plan* prepared by Lenity Architecture, provided via email on 3/18/2024.

FIGURE 2A: SITE EXPLORATION PLAN

PROJECT NO. 223-1642-1