October 8, 2013

Pee Dee Regional Transportation Authority
313 S. Stadium Road
Florence, South Carolina 29506

Attention: Sandy J. Garris
Office/Purchasing Manager

Reference: Report of Pavement Exploration and Testing
PDRTA Pavements
Florence, South Carolina
S&ME, Inc. Project No. 1639-13-168

Dear Ms. Garris:

S&ME, Inc. has completed a limited exploration of the pavement section and subgrade soils at the referenced project site. Our exploration was conducted in general accordance with our Proposal No. 1639-138-13, dated September 16, 2013 and authorized by you on September 30, 2013. This report presents the findings of our exploration, along with our conclusions and recommendations for rehabilitation of the subject pavements.

PROJECT INFORMATION

Project information was provided during a site visit and conversation with Mr. Jeriot Burr of Goforth Brown & Associates and Mr. Bill Ervin, P.E. of Ervin Engineering Co., Inc. on August 29, 2013. The project site is the existing Pee Dee Regional Transport Authority (PDRTA) facility located at 313 S. Stadium Road in Florence, South Carolina.

The existing parking lot is approximately 2 acres in area. Approximately two-thirds of the parking lot is paved with asphaltic concrete pavements and one-third is paved with Portland cement concrete (PCC). Based on our conversations with Mr. Burr, we understand that some of the site pavements are likely older than 20 years in age. We observed several areas (primarily within drive areas) which appear to have been patched with PCC; however, we are not aware of the timeframe that this took place. Based on our conversations with several of the PDRTA employees during our exploration, we understand that most of the site may have been a low-lying, "swampy" area prior to construction of the parking lot.
We understand that there were five major areas of concern that were identified by others in March of 2013; however, since that time, we understand that these pavement areas have degraded substantially, and the overall condition of the pavements has worsened. We understand that the owner is considering repairing only the rear half of the site, where the bus traffic is concentrated.

Based on the information provided in an email from Mr. Burr on August 29, 2013, we understand that there are a total of 38 buses that traverse the site. These buses range from 20 seat passenger “trolleys” to 40 seat buses. Of the 38 buses, 15 buses leave in the morning and return in the evening (total of 15, two-way trips, per day), 6 buses are back and forth all day for various reasons (we estimate 24, two-way trips, per day), and the remainder of the buses are housed off site and only return for maintenance and washing (we estimate 10, two-way trips, per day). We understand that the heaviest bus weighs about 23,000 pounds. We have not been provided information regarding axle load distribution. We also estimate that employee and visitor automobile traffic may consist of up to 50, two-way trips per day.

EXPLORATION PROCEDURES

The field work for this project was performed on September 24, 2013, which included the layout of eight test locations (HA-1 through HA-8). The approximate boring locations are shown on the Test Location Sketch attached to this report as Figure 1. As proposed, the testing was performed within the asphaltic concrete areas and not within the PCC paved areas.

At each of the test locations, the fragmented asphaltic concrete was removed (where remaining) and a hand auger boring was performed to penetrate the underlying soils. Where encountered, the asphalt fragments were measured for thickness in the field.

We performed one hand auger boring at each of test locations to a depth of approximately four feet beneath the pavement subgrade surface. Small grab samples of subsurface soil materials were collected from representative subsurface strata within the borings. Some of the soil cuttings within the upper 2 feet of the borings were also collected to form two composite bulk samples. Borings HA-1 through HA-4 formed composite sample “Bulk 1”, and borings HA-5 through HA-8 formed composite sample “Bulk 2”. Within the borings, our engineer observed and documented the subgrade soil types and subsurface water levels, where encountered.

Dynamic Cone Penetrometer (DCP) testing was performed at regular depth intervals within the hand auger borings in general accordance with ASTM STP 399 procedures to help us estimate the relative density and consistency of the subgrade soils. Upon completion of our field work, we backfilled the boreholes with soil cuttings to the exposed ground surface within areas of exposed subgrade soils (borings HA-4, HA-6, and HA-7). The remaining test locations were backfilled with soil cuttings to a depth of about 3 inches below the asphalt surface and patched with asphaltic cold patch.
A Test Location Sketch is included in the appendix as Figure 1. Features and test locations shown on the sketch should be considered approximate. A summary of the exploration procedures is included in the appendix, along with the Hand Auger Boring Logs, which present more detailed information regarding the subsurface conditions encountered at individual test locations.

**Laboratory Testing**

After the recovered soil samples were brought to our laboratory, a geotechnical professional examined and/or tested each sample to estimate its distribution of grain sizes, plasticity, organic content, moisture condition, color, presence of lenses and seams, and apparent geologic origin in general accordance with ASTM D 2488, “Standard Practice for Description and Identification of Soils (Visual- Manual Procedure)”. The resulting classifications are presented on the boring logs included in the appendix. Similar soils were grouped into representative strata on the logs.

We performed the following quantitative ASTM-standardized laboratory tests on the composite bulk samples and small grab samples to help classify the soil and formulate our conclusions and recommendations. The laboratory tests performed included the following:

- Four samples tested in general accordance with ASTM D 1140, “Standard Test Methods for Amount of Material in Soils Finer than No. 200 (75-μm) Sieve”, to measure the percent clay and silt fraction.
- Four samples tested in general accordance with ASTM D 2216, “Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass”, to measure the in situ moisture content of the soil.
- Two samples tested in general accordance with ASTM D 422, “Standard Test Method for Particle Size Analysis of Soils”, to characterize the grain size distribution of the soils.
- Two samples tested in general accordance with ASTM D 1557, “Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 lb/ft²)”, to measure the moisture-density relationship of the soil.
- One specimen from each bulk sample recompacted and tested in general accordance with ASTM D 1883, “Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils”, to evaluate soil support characteristics for pavements.

The laboratory test results are attached in the appendix. The procedures for the above listed tests are also attached to this report in the appendix.
SURFACE CONDITIONS

During our exploration, we observed that the pavements within the majority of the parking lots and drive areas appeared to be moderately to severely distressed with fatigue cracking throughout the asphalt pavements. In several isolated areas, the pavement was severely rutted and the subgrade soils were visible at the pavement surface. In some of these areas, surface water was observed to be ponded.

Photo 1: Ponded water and exposed subgrade soils near boring HA-4

Photo 2: Ponded water and exposed subgrade soils near boring HA-6

Photo 3: Exposed subgrade near boring HA-7

Within these areas, based on our observations of loose asphalt fragments, we observed that the asphalt thickness may have been approximately 1 1/4 to 2 inches prior to fragmentation. We did not observe any aggregate base course beneath the asphalt pavements within the areas of exposed soil subgrade. There are also several areas of
Portland cement concrete (PCC) paving at the site. Several of these areas appeared to be somewhat distressed; however, not to the degree of distress that was observed within the asphalt pavements. We observed some settlement and crackling at joints within the PCC pavements and some spalling of the surface within several areas. We understand that the concrete pavements will not be replaced at this time.

**SUBSURFACE CONDITIONS**

The generalized subsurface conditions encountered within borings performed in the explored areas are described below. For more detailed descriptions and stratifications at a test location, the respective test logs should be reviewed.

**Undocumented Fill**

Undocumented fill soils were encountered directly beneath the surficial asphalt in borings HA-1, HA-2, HA-3, HA-5, and HA-8 and at the ground surface in borings HA-4, HA-6, and HA-7. Aggregate base course was not encountered at any of the boring locations. The fill soils generally consisted of clayey sand (USCS Classification “SC”) and silty sand (SM), and extended to depths ranging from 2.5 to 3.5 feet. Penetration resistances to a Dynamic Cone Penetrometer (DCP) in the fill soils ranged from 3 to 13 blows per increment (bpi), with an average penetration resistance of 7 bpi, indicating a generally loose relative density with some very loose to medium dense layers. The fill soils were generally dark brown, reddish brown, gray, and tan in color and were moist to wet.

Where measured, soils within this stratum measured natural moisture contents ranging from 11.9 to 20.0 percent, silt and clay fines contents ranging from 21.6 to 41.9 percent, and Atterberg limits testing of the minus #40 sieve materials indicated non-plastic behavior at three test locations and a plasticity index of 20 percent at a fourth test location. Modified Proctor moisture-density relationship testing indicated maximum dry densities ranging from 117.8 to 123.9 pounds per cubic foot at optimum moisture contents ranging from 13.7 to 9.8 percent.

The California Bearing Ratio (CBR) of the bulk sampled soils ranged from 16.6 to 25.3 percent at penetration of 0.1 inches when the samples were re-compacted to 95 percent of the modified Proctor maximum dry density. This range of values indicates generally good support conditions for pavements when the soil is properly compacted at the optimum moisture content. However, based on the in-situ moisture contents, these soils range from 5.3 to 7.3 percent wet of the optimum moisture content. To achieve the necessary degree of soil support for pavements, significant drying of the material is expected to be necessary.

**Organic-Laden Soils**

Beneath the undocumented fill, organic-laden soils consisting primarily of silty sands (SM) with roots, wood fragments, and other organic matter were encountered to depths ranging from about 3.5 to 3.75 feet in borings HA-4, HA-6, HA-7, and HA-8 to the boring termination depth of about 4 feet in borings HA-1, HA-2, and HA-5. These soils were wet to saturated and were of very loose relative density as evidenced by typical
DCP values ranging from 2 to 4 blows per increment. Coloration was generally dark gray. Organic content was not measured.

Coastal Plain Sediments

Beneath the organic-laden soils, Coastal Plain sandy sediments consisting of silty sands (SM) were encountered in borings HA-4, HA-6, HA-7, and HA-8 to the boring termination depth of 4 feet. These soils were wet and were gray in color and were generally loose in relative density, as evidenced by DCP values ranging from 7 to 10 bpi.

Subsurface Water

At the time of our exploration, subsurface water was encountered within borings HA-2, HA-4, HA-6, HA-7, and HA-8 at depths ranging from about 3.5 to 3.75 feet below the ground surface. Subsurface water was not encountered in the other borings at the time of boring. The boreholes were backfilled with soil cuttings after water levels were measured. Water levels may fluctuate seasonally at the site, being influenced by rainfall variation and other factors.

FINDINGS OF THE EXPLORATION

Based on our observations, most of the asphaltic pavements exhibit signs of severe distress. In general terms, we would characterize the majority of the asphaltic pavements to be at the end of their usable service life as indicated by a generalized very weathered surface, with numerous areas of generalized block cracking and transverse cracking, and potholing. The severe alligator cracking, rutting, and settlement cracking exhibited in the higher-traffic areas are likely indicative of traffic loads or frequencies exceeding the structural capacity of the pavement-subgrade system.

We observed significant depressions (potholes) at several locations along the driveway. Potholes typically begin as depressions, then experience cracking and deterioration, and finally the pavement surface becomes displaced and the underlying layer becomes exposed. A common failure mechanism for potholes is as follows: Once a depression develops, water accumulates in the depression. Then the accumulated water infiltrates into the subgrade through cracks in the pavement. Passage of traffic over the pavements supported by the wetted subgrade accelerates the formation of cracking and eventually the weakened soils fail under the applied wheel loads. After displacement of the failed material occurs, a pothole is formed. The pothole continues to expand in all directions until the problem is remedied. Simply replacing asphalt or concrete into a pothole does not permanently solve the problem, because the disturbed, saturated subgrade soils cannot properly support the pavement.

The observed pavement condition along with our subgrade evaluation results indicates generally poor subgrade support in these areas, likely due to the excess moisture in the soils that we tested. Additionally, the majority of pavement areas consist of pavement sections that in our opinion are inadequate for the support of the applied traffic loading and frequency. The lack of a graded aggregate base course beneath the asphalt is inappropriate for traffic loads of this magnitude. It is our opinion that the combination of these two factors have contributed to the degradation of the pavements at the site.
RECOMMENDATIONS

The recommendations included in this section are based on the project information outlined previously and the data obtained during our exploration. If conditions are encountered during construction that differ from those encountered at our test locations, then S&ME, Inc. should be retained to review the following recommendations based upon the new information and make any necessary changes.

Based on our exploration results and past experience with similar projects, our recommendations for repairs within the designated exploration area are presented in the following sections of this report. Our recommendations generally relate to subgrade preparation to improve available soil support, and construction of new pavement sections comprised of both hot mix asphaltic concrete, with graded aggregate base course (GABC) atop properly prepared subgrade soils.

Subgrade Preparation

Based on the findings of our exploration, we offer the following recommendations regarding stabilization of the subgrade soil conditions within the asphalt pavement areas of the site. An S&ME engineer or his designated representative should be requested to be present during repair operations to observe field conditions and provide further recommendations for stabilization based on observed conditions. The recommended methods, extent and depth of repairs will depend to some extent upon the conditions encountered at the time of construction.

1. The existing asphaltic pavement and upper loose fill soils should be removed to a sufficient depth to accommodate the installation of the new pavement section. We anticipate that this depth will be approximately 11 to 13 inches below the planned finish grade elevation for both asphaltic and PCC pavements. If debris-laden or organic-laden soils are observed at the cut surface, they should be removed.

   Note: It was beyond the scope of this exploration to provide recommended grade elevations for the future pavements, or to perform any civil design services or drawings for construction. Determination of pavement grade elevations should be performed by your site civil design engineer.

2. Following removal of the asphalt and soils to accommodate the new pavement section, the surface should be moisture conditioned (dried) until the soil moisture content is at or slightly below optimum to a depth of at least 8 inches, and thoroughly densified with a heavy, steel drum vibratory roller under the observation of the Geotechnical Engineer (S&ME, Inc.) or his representative.

   Note: Based on the elevated moisture levels documented in this report (approximately 5 to 7 percent higher than the optimum moisture content), drying of the existing subgrade soils may be time consuming; likely requiring plowing, diskng, or scarifying during favorable weather conditions. In extreme cases, it may be necessary to add a small amount (2 to 4 percent by weight) of unhydrated
limestone or Portland cement into the soils in order to provide additional soil strength and reduce the effective moisture content of the blended material.

3. Field density ("compaction") tests should be performed after surface densification is performed to measure that the compaction levels recommended in this report are achieved (at least 95 percent of the modified Proctor maximum dry density). Areas not meeting the compaction requirements should be reworked and retested until the proper degree of compaction is achieved, unless otherwise approved by the Geotechnical Engineer.

4. Following densification and prior to new fill placement or pavement section construction, the densified soil surface should be proofrolled under the observation of the Geotechnical Engineer by making repeated overlapping passes with a fully-loaded tandem-axle dump truck. The proofrolling should be conducted only during dry weather to avoid deteriorating the surface. Areas of rutting or pumping soils indicated by the proofroll may require selective undercutting or further stabilization prior to fill placement or slab or pavement section construction, as determined by the Geotechnical Engineer.

5. If the schedule constraints are tight, if prevailing weather conditions are unfavorable, or if extreme difficulty is encountered in stabilizing the cut soil surface using traditional methods, then it may be more feasible remove the loose, wet undisturbed fill soils to a depth of about 2 feet below the designed soil subgrade elevation, install a geo-grid such as Tensar TX 140 on the exposed excavation bottom, and replace the excavated soils with compacted lifts of select imported sandy fill having 25 percent silt/clay fines (percent passing the No. 200 sieve) or less.

6. Soil replacement work (backfilling) should be performed in accordance with the "Fill Placement and Compaction Recommendations" of this report. Some of the excavated materials may meet the recommendations for structural fill as described within this report; however, if these materials are wet of optimum when excavated, and the construction schedule will not allow time for drying of soils to below their optimum moisture content prior to their reuse as fill, then the use of suitable, dry, imported fill may be required. Due to the high moisture content of the existing soils, we anticipate that most of the replacement soils will need to be imported.

7. Since our observations indicate that perched water may be present within the exploration area, dewatering of the excavation may be required if subsurface water is encountered within the cut areas, such as the debris-laden areas. This can likely be facilitated by pumping from a sump hole located within the excavation. If subsurface water seepage is observed to be more prevalent during or after excavation, installation of underdrains may be needed to divert water from the construction area. The need for underdrain construction should be evaluated by the geotechnical engineer based on conditions encountered during construction.
8. Once final soil subgrade elevations are achieved and the subgrade is properly prepared, the exposed soils should be proofrolled under the observation of the geotechnical engineer (S&ME) at final soil subgrade elevation. If any areas of instability are observed during the proofroll, further stabilization may need to be performed, as determined by the Geotechnical Engineer.

**Fill Placement and Compaction Recommendations**

Where new fill soils are to be placed, the following recommendations apply:

1. Before beginning to place fill, sample and test each proposed fill material to determine suitability for use, maximum dry density, optimum moisture content, and natural moisture content. It is recommended that any fill soils meet the following minimum requirements: plasticity index of 10 percent or less; clay/silt fines content of not greater than 25 percent. Soil types that would qualify include some SC, SM, SP, SP-SM, and SP-SC soils. If available, the use of granular soils containing less than about 12 percent fines would be preferred, since soils with lesser fines content tend to be less sensitive to instability when wet and are typically more adaptable to drying when placed over wet subgrades.

2. Where fill soil is required, structural fill should be compacted throughout to at least 95 percent of the modified Proctor maximum dry density (ASTM D 1557). Compacted soils must not exhibit pumping or rutting under equipment traffic.

3. All fill placement should be witnessed by an experienced S&ME soils technician working under the guidance of the geotechnical engineer. In general, at least one field density test for every 2,500 square feet should be conducted for each lift of soil.

**Pavement Recommendations**

You have requested that two different pavement sections be provided for this project, including both flexible pavement using Hot-Mixed Asphalt (HMA), and rigid pavement consisting of Portland cement concrete (PCC).

Based upon the requirement that the in-situ materials will be densified as described in the "Fill Placement and Compaction" section of this report, and assuming that the pavement support soils consist of sandy soils meeting the material requirements of the aforementioned section, we estimate that a California Bearing Ratio (CBR) value of at least 15 percent will be available for pavement support. This results in a resilient modulus of at least 14,450 psi available for flexible pavement design, and a modulus of subgrade reaction (k) value of about 225 psi/inch available for rigid PCC pavement design. If materials having lesser subgrade support values are to be considered for use, the pavement design should be reevaluated and required pavement thicknesses may need to be increased as a result.

Flexible pavement design assumes an initial serviceability of 4.2 and a terminal serviceability index of 2.0, and a reliability factor of 90 percent. ESALs per axle were
estimated using data provided in AASHTO literature. Assuming that only SCDOT approved source materials will be used in flexible pavement section construction, we used a structural layer coefficient of 0.44 for the HMA layers and a coefficient of 0.18 for the graded aggregate base course (GABC). A sub-base drainage factor of 1.0 was assigned, based upon the assumption that the sub-base soils will consist of sandy soils.

Rigid pavement design assumes an initial serviceability of 4.5 and a terminal serviceability index of 2.5, and a reliability factor of 90 percent. Assuming that appropriately designed load transfer devices (dowels) will be used at all of the joints in the rigid pavement, we used an average load transfer coefficient of 3.2. We also assumed a minimum 28-day design compressive strength of at least 4,000 psi for the PCC. A sub-base drainage factor of 0.9 was assigned, based upon the assumption that the sub-base soils will consist of native sandy soils.

Based on the provided information and our experience with similar projects, we estimate that site traffic may consist of the following vehicles, loading, and frequencies:

- **Buses**: 50, two-way trips, per day, 365 days per year, for 20 years – average vehicle factor of 1.1, 18-kip Equivalent Single Axle Load (ESAL).
- **Garbage Trucks**: 2, two-way trips per week, 52 weeks per year, for 20 years – average vehicle factor of 4, 18-kip ESALs.
- **Fuel Trucks**: 1, 2-way trips per week, 52 weeks per year, for 20 years – average vehicle factor of 3, 18-kip ESALs.
- **Delivery Trucks**: 5, two-way trips per day, 250 days per year, for 20 years – average vehicle factor of 0.7, 18-kip ESALs.
- **Automobiles**: 50, two-way trips per day, 365 days per year – average vehicle factor of 0.001, 18-kip ESALs.

The total 18-kip ESAL demand as outlines above is approximately 900,000 ESALs over a 20-year period. Based on this ESAL demand, we have estimated the pavement section thickness for both asphaltic (flexible) and PCC (rigid) pavements. These results are presented in Table 1 on the following page.
Table 1: Recommended Minimum Pavement Sections \(^{(a)}\)

(a) Single-stage construction and soil compaction as recommended is assumed, S&ME, Inc. must observe pavement subgrade preparations and pavement installation operations.

<table>
<thead>
<tr>
<th>Pavement Type</th>
<th>Theoretical Traffic Load (ESALs)</th>
<th>HMA Surface Course Type B (inches)</th>
<th>4,000 psi PCC Pavement Section (inches)</th>
<th>Compacted SCDOT Graded Aggregate Base Course [GABC] (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy-Duty HMA Flexible</td>
<td>900,000</td>
<td>3.0*</td>
<td>---</td>
<td>8.0</td>
</tr>
<tr>
<td>Heavy-Duty PCC Rigid</td>
<td>900,000</td>
<td>---</td>
<td>7.0**</td>
<td>6.0</td>
</tr>
</tbody>
</table>

* Denotes a reliability level of 90%. If a reliability level of 95% is preferred, increase section thickness to 3.5 inches.
** Denotes a reliability level of 85%. If a reliability level of 90% is preferred, increase section thickness to 8 inches.

**Permanent Drainage**

Control of subsurface water will be very important to continued satisfactory performance of pavements. Where possible, road alignments should be crowned and ditched to promote positive drainage from the road surface and subgrade. Where crowning and ditching is not feasible, site drainage plans should result in water levels being maintained at least 2 feet below the pavement surface.

**Base Course and Pavement Section Construction**

The following recommendations are provided for base course and pavement section construction:

1. Prior to placement of base course stone, all exposed pavement subgrades should be methodically proofrolled under the observation of the geotechnical engineer (S&ME), and any identified unstable areas should be repaired. Pavement subgrades should not exhibit rutting or pumping under the proofroll load. Rutting or pumping areas shall be undercut and replaced and/or stabilized as directed by the engineer.

2. Crushed stone aggregate base material used in pavement section construction should consist of graded aggregate base course (GABC) as defined by Section 305 of the South Carolina Department of Transportation Standard Specifications for Highway Construction (2007). The base course should be compacted to at least 100 percent of the modified Proctor maximum dry density (SC-T-140). The base course material should not exhibit pumping or rutting under equipment traffic.

3. Heavy compaction equipment is likely to be required in order to achieve the required base course compaction, and the moisture content of the material will
likely need to be maintained near optimum moisture content in order to facilitate proper compaction.

4. Construct the surface course HMA in accordance with the specifications of Sections 401 and 403 of the South Carolina Department of Transportation Standard Specifications for Highway Construction (2007 edition).

5. Sufficient testing should be performed during flexible pavement installation to confirm that the required thickness, density, and quality requirements of the pavement specifications are followed.

6. Experience indicates that a thin surface overlay of asphalt pavement may be required in about 7 to 10 years due to normal wear and weathering of the surface. Such wear is typically visible in several forms of pavement distress, such as aggregate exposure and polishing, aggregate stripping, asphalt bleeding, and various types of cracking. There are means to methodically estimate the remaining pavement life based on a systematic statistical evaluation of pavement distress density and mode of failure. We recommend the pavement be evaluated in about 7 years to assess the pavement condition and remaining life.

7. For rigid pavements, we recommend air-entrained ASTM C 94 jointed Portland cement concrete that will achieve a minimum compressive strength of at least 4,000 psi at 28 days after placement, as determined by ASTM C 39. We also recommend that the pavement concrete be constructed in a manner which at least meets the minimum standards recommended by the American Concrete Institute (ACI).

8. We recommend that at least 1 set of 4 cylinder specimens be cast by S&ME per every 100 cubic yards of concrete placed or at least once per placement event in order to measure achievement of the design compressive strength. We also recommend that a certified S&ME concrete technician be present on site to observe all concrete placement activities.

LIMITATIONS OF THIS REPORT

This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. The conclusions and recommendations in this report are based on the applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, express or implied, is made.

The analyses and recommendations submitted herein are based, in part, upon the data obtained from the borings. The nature and extent of variations across the site will not become evident until construction. If variations appear evident, then we will re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the improvements are planned, the conclusions and recommendations
contained in this report will not be considered valid unless the changes are reviewed and conclusions modified or verified in writing by the submitting engineers.

Assessment of site environmental conditions; sampling of soils, ground water or other materials for environmental contaminants; identification of jurisdictional wetlands, rare or endangered species, geological hazards or potential air quality and noise impacts were beyond the scope of this geotechnical exploration. Information regarding other construction items including but not limited to the building, trash dumpster storage pads, curbing, street lights, signage, utilities, fountains, flagpoles, etc. was not provided by the client and therefore has not been addressed as part of the scope of this report. If additional foundation design or construction recommendations are needed with regard to any such items, please contact us.

CLOSURE

S&ME, Inc. appreciates the opportunity to have provided our services on this project. If you have any questions concerning this report, please do not hesitate to contact us.

Very truly yours,

S&ME, Inc.

William D. Kannon
Geotechnical Engineer
wkannon@smeinc.com

Ronald P. Forest, Jr., P.E.
Senior Engineer
rforest@smeinc.com

Attachments: Appendix
APPENDIX

TEST LOCATION SKETCH

EXPLORATION PROCEDURES

HAND AUGER BORING LOGS

LABORATORY PROCEDURES

LABORATORY TEST RESULTS