



# County of Georgetown, South Carolina

129 Screven Street, Suite 239 · Georgetown, SC 29440-3641  
Post Office Box 421270, Georgetown, SC 29442-4200  
(843)545-3083 · Fax (843)545-3500 · [purch@gtcounty.org](mailto:purch@gtcounty.org)

## REQUEST FOR QUALIFICATIONS (RFQ)

BID NUMBER: 16-083

ISSUE DATE: Friday, September 2, 2016

**OPENING DATE: Wednesday, September 28, 2016**      **OPENING TIME: 3:00 PM (Eastern NIST)**  
Bid Opening Location: Georgetown County Courthouse, Suite #239, (Purchasing Conference Room)

### Pre-Bid Conference/Site Inspection: Voluntary-By prior appointment only

PROCUREMENT FOR: Corporate Aircraft Hangar at Georgetown County, SC Airport (KGGE):  
Design/Build

Commodity Code(s): 90606, 90610, 96812

Subject to the conditions, provisions and the enclosed specifications, sealed bids will be received at the location and time stated herein and will be publicly opened and read.

#### MAILING ADDRESS:

County of Georgetown  
Post Office Drawer 421270  
Georgetown SC 29442-4200  
Attn: Purchasing

#### STREET ADDRESS:

Georgetown County Courthouse  
129 Screven Street, Suite 239  
Georgetown SC 29440-3641  
Attn: Purchasing

#### IMPORTANT OFFEROR NOTES:

- 1) Bid Number & Title must be shown on the **OUTSIDE** of the delivery package.
- 2) Federal Express does **not** guarantee delivery to Georgetown, SC before 4:30 PM Eastern Time on **Primary Overnight** Service.
- 3) **United Parcel Service (UPS)** **does** guarantee delivery to Georgetown, SC before 10:30 AM Eastern Time on Next Day "Early AM" Service.
- 4) You must register a contact name, company name, fax and/or e-mail with the Purchasing Office as below to ensure your name will be added to the contact list for future amendments and addenda.

#### **Purchasing Contacts:**

Phone: (843)545-3076  
Fax: (843)545-3500  
E-mail: [nsilver@gtcounty.org](mailto:nsilver@gtcounty.org)

**Kyle Prufer**  
(843)545-3082  
(843)545-3500  
[kprufer@gtcounty.org](mailto:kprufer@gtcounty.org)

This solicitation does not commit Georgetown County to award a contract, to pay any cost incurred in the preparation of the bid, or to procure or contract for goods or services. It is the responsibility of each bidder to see that the Georgetown County Purchasing Office receives bids on, or before, the date and time specified for the bid opening. No bid will be accepted thereafter. The County assumes no responsibility for delivery of bids that are mailed. Georgetown County reserves the right to reject any or all bids and to waive any informalities and technicalities in the bid process.



# Intent to Respond

REF: **Bid #16-083, Corporate Aircraft Hangar at Georgetown County Airport, Design/Build**

If your company intends to respond to this solicitation, please complete and promptly return this form to assure that you can be included on the mailing list to receive all addenda regarding this project.

It is not necessary to return any other portion of the bid documents if you are not bidding.

Failure to return the Intent to Respond shall not be sufficient cause to rule a submittal as non-responsive; nor does the return of the form obligate an interested party to submit a response. Georgetown County's efforts to directly provide interested parties with addenda or additional information are provided as a courtesy only, and do not alleviate the respondent from their obligation to verify they have received and considered all addenda. All addenda are published and available on the county website at [www.georgetowncountysc.org](http://www.georgetowncountysc.org) select "purchasing" and "current bids".

- Our firm **does** intend on responding to this solicitation.
- Our firm **does not** intend on responding to this solicitation.

Company Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Contact Person: \_\_\_\_\_

Telephone: \_\_\_\_\_

FAX: \_\_\_\_\_

E-Mail: \_\_\_\_\_

**Please return this completed form to Nancy Silver, Senior Buyer**

- by e-mail to [purch@gtcounty.org](mailto:purch@gtcounty.org)
- or by FAX to (843)545-3500.

[End of Intent to Respond]

## Time Line: Request for Proposal #16-083

Item	Date	Time	Location*
Advertised Date of Issue:	Friday, September 2, 2016	n/a	n/a
Pre-Bid & Site Inspection:	Voluntary-By Prior Appt.	n/a	n/a
Deadline for Questions:	Wednesday, Sept. 21, 2016	3:00 PM ET	Suite 239
RFQ Opening & Tabulation:	Wednesday, Sept. 28, 2016	3:00 PM ET	Suite 239
Owner Establishes Shortlist Firm Ranking	Wednesday, October 12, 2016	n/a	n/a
Interviews/Presentation	Thursday, October 20, 2016	TBD	TBD
County Council Consideration	Tuesday, November 8, 2016	5:30 PM ET	Chambers
Notice to Proceed May be Issued After:	Friday, November 18, 2016	n/a	n/a

\*All locations in the Old County Courthouse, 129 Screven Street, Georgetown, SC unless otherwise stated.

### Bid #16-083

#### **Corporate Aircraft Hangar at Georgetown County, SC Airport (KGGE): Design/Build**

The Georgetown County, SC Public Services Department, Airports Division, is soliciting sealed, public proposal responses for a contractor to provide the design/build of a corporate aircraft hangar at the Georgetown County, SC Airport (KGGE), 129 Airport Road (off US-17 South a/k/a South Fraser Street), Georgetown, SC 29440. In this document, which is a Request for Qualifications, the terms “Request for Qualifications (RFQ)” and “Bid” may be used interchangeably.

#### **I) Introduction**

##### 1) Purpose of Procurement

- (a) Georgetown County hereinafter referred to as “Owner”, will undertake the design and construction of a new corporate aircraft hangar at the Georgetown County, SC Airport (KGGE) located at 129 Airport Road (off US-17 South a/k/a South Fraser Street), Georgetown, SC 29440.
- (b) There will be a single solicitation and procurement of one Design-Build firm (Design-Builder) to design and construct the facility.
- (c) Cost estimates indicate a preliminary budget figure of approximately \$650,000. This will include the total cost of the entire project with all costs and fees for architectural, design, permitting and construction services.
- (d) Construction substantial completion date desired approximately eight (8) months. Two (2) months from NTP for design and permitting estimated to begin in November 2016, then an additional six (6) months from NTP for building construction estimated to begin in January dependent upon Owner obtaining land disturbance and stormwater permitting.
- (e) The delivery method for this project shall be Design-Build. There will be a single contract from the Owner with a Design-Builder who will be expected to fulfill the terms of the contract through delivery of a finished, fully usable facility, on a turnkey basis, that satisfies the Owner’s Project Requirements. The Design-Builder, as the sole responsible entity architectural design, and construction services, will have a fiduciary role and responsibility to the Owner. The Design-Builder must act in the best interests consistent with the Owner’s Project Requirements and budget. The Design-Builder will be under contract to provide architectural design, and

construction services necessary to deliver a completed facility, in a “turnkey” fashion, to the Owner for occupancy. The Design-Builder shall hold all design professional, trade contractor, and trade supplier contracts. The Design-Builder will be responsible for methods of construction and safety, as well as for the scheduled and coordination of the work of all construction and miscellaneous contracts required for completion of the project within its predetermined budget and schedule.

- (f) Land Disturbance and Stormwater permits will be the responsibility of the Owner. The Owner, through its engineer, Talbert & Bright, is currently permitting the site for stormwater plans. It is the intention, but not guarantee, of the Owner that all associated Owner responsible permits shall have been received by January 2, 2016, at which time the contractor may begin work at the site.
- (g) Selection of professional construction services will be by Requests for Qualifications (RFQ) selection. No formal design competition will be included. Based on submitted qualifications, the Owner may establish a shortlist of firms deemed most qualified. The Owner will designate a top-ranked firm based upon the submitted qualifications and, if deemed necessary by a formal interview. See Selection Process, II a).
- (h) The Owner’s Project Requirements express, in general, non-technical, and non-design terms the nature of the desired facility, its functions, its users’ performance expectations, and other information useful to a design professional for architectural design purposes.
- (i) Although the Owner is requesting separate sealed fee proposals from the responding firms, the fee proposals will not be opened during the selection process and, therefore, will not enter into the selection and ranking process. The sealed fee proposal for the top ranked firm will be opened and used as the basis to begin negotiations with the top ranked firms.
- (j) Award shall be made to the responsive offeror whose proposal is determined to be the most advantageous to the Owner, taking into consideration price and the other evaluation factors set forth in this request. No other factor or criteria will be used in evaluation. The Selection Committee will adhere to the weightings specified for each evaluation factor stated in this request. If Owner should determine that none of the proposals is advantageous to the Owner, the Owner shall have the absolute right to reject any and all proposals.

## 2) Project Objectives

- (a) The Design-Builder will be responsible for comprehending and programming the Owner’s Project Requirements, accurately translating those requirements into a Basis of Design, and incorporating all into complete construction documents. With these, the Design-Builder will deliver a finished facility in satisfaction of the Owner’s Project Requirements.
- (b) The Design- Builder will be responsible for pricing and value engineering issues. At an appropriate point during the projects, the Owner anticipates asking the Design-Builder to commit to a Guaranteed Maximum Price (GMP) for all its design and construction services.
- (c) The Design-Builder shall competitively select all construction subcontracts and other work appropriate for competitive selection but is free to use qualification factors other than price of work to select construction subcontractors that will deliver the greatest value to the Owner.

- (d) In selecting a firm, the Owner will emphasize experience of the firm and of assigned personnel in providing like functions on projects of similar magnitude and complexity as the proposed project. Selection preference will be toward firms that have depths of knowledge and resources for facility design, for general contracting, for scheduling, contract coordination and compliance, and budget control, as well as familiarity with laws, ordinances, and codes applicable to this project.
- (e) It is the responsibility of each submitter to examine the entire solicitation, seek clarification in writing, and review its submittal for accuracy before submitting their qualifications and their proposal. Once submission deadlines have passed, all submissions will be final. The Owner will not request clarification from any individual submitter relative to their submission but reserves the right to ask for additional information from all parties that have submitted qualifications. If there are multiple firms proposed as one team, each firm must describe itself according to the solicitation requirement.
- (f) The construction opportunity requires the Owners to make, as an important selection criterion, the ability of firms to place quality personnel on this job ready to work within an effective timeframe.

### 3) Project Assumptions

- (a) The Owner does not desire to enter into “joint-venture” agreements with multiple firms. At the same time, the Owner recognizes that the Design-Build delivery method often involves partnerships between and among firms to combine design and construction management capabilities. In the event that two or more firms desire to establish a joint venture, it is expected that one firm shall become the Design-Build firm for the purpose of contract execution, with the remaining firms being consultants to it.
- (b) The Owner expects all parties to this project to work closely together and deal appropriately with project conditions to finish the job successfully. A spirit of cooperation and collaboration among professional construction services providers is of utmost importance.
- (c) The Design-Builder, as part of its design and its preconstruction services, will assist with developing a strategy for the best approach for the successful completion of the project. For example, without limitation, the Design-Builder will provide guidance and assistance in preparation of a schedule and a reliable cost estimate.
- (d) The Design-Builder, as a part of its design and preconstruction services will assist with developing a strategy for the best approach for the successful completion of the project. For Example without limitation, the Design-Builder will provide guidance and assistance in the preparation of a schedule and a reliable cost estimate.
- (e) It is the sincere intention of the Owner to make every effort to be fair and equitable in its dealings with all candidates for selection.

#### 4) Definitions of Terms

- (a) Whenever the terms “RFQ”, “proposal”, and “solicitation” are used, the reference is to this Request for Qualifications or portions thereof, together with any exhibits, attachments, or addenda it may contain.
- (b) Whenever the terms “shall”, “will”, “must”, or “is required” are used, the reference task is a mandatory requirement of this RFQ. Failure to meet any mandatory requirements will be cause for rejection of a submittal.
- (c) Whenever the terms “can”, “may”, or “should” are used, the referenced specification is discretionary. Therefore, although the failure to provide any items so termed will not be cause for rejection, the Selection Committee may consider such failure in evaluating the submittal.
- (d) Whenever the terms “apparent successful” or “top-ranked” or “highest-ranking” firm or offeror are used in this document, the reference is to the firm that the Selection Committee ultimately judges to have submitted the case best satisfying the needs of the Owner in accordance with the RFQ. The selection of an apparent successful firm does not necessarily mean the Selection Committee accepts all aspects of the firm’s submittal or proposal.
- (e) Whenever the term “submittal” is used in the RFQ, the reference is to the response offered by a firm in accordance with the RFQ. The initial submittal responds only to the RFQ portion of this document. Subsequently, only firms shortlisted based on their initial submittal will be invited to respond with technical proposal submittals to the RFQ portion of this document.
- (f) Whenever the term “Selection Committee” is used in the RFQ, the reference is to the Owner’s representatives responsible for administering and conduction the evaluation and selection process of the RFQ.
- (g) “Design-Build” refers to the construction project delivery method in which, among other things, the Owner holds a single contract with a business entity that has a responsibility both to design and to construct a project, and that holds the trade contracts.
- (h) “Design Professional” and “Designer of Record” both refer to the project’s architect of design engineer, whose responsibilities generally include programming of the facility. Under the Design-Build delivery methodology, the Design Professional is an integral part of the Design-Builder entity under single contract with the Owner.
- (i) “Owner’s Project Requirements” is a written document that details the functional requirements of a project and the expectations of how it will be used and operated.
- (j) “Qualifications Submittal” and “Initial Written Submittal” both refer to a firm’s initial response to the RFQ.
- (k) “Technical Proposal” refers to a shortlisted firm’s response to the final selection process upon request.
- (l) “Qualifications-Based Selection” and “QBS” both refer to a procurement process for the selection of professional construction services for public projects. It is a competitive contract procurement process whereby consulting firms submit qualifications to a procuring entity

(owner) who evaluates and selects the most qualified firm, and then negotiates the project scope of work, schedule, budget, and consultant fee. In Georgetown County, this is termed “Multi-Step” bidding.

- (m) “Firm” shall be interpreted as referencing the design entity, the construction entity, of the combined (e.g., joint venture) entity, as is reasonable.

## II. General Instructions

### 1) Building Program

- (a) General

The project will be designed and constructed to a level of quality and timeliness.

- (b) Owner / Design-Builder Contract

The final contract will be Actual Cost Plus a Fixed Fee not to exceed the Guaranteed Maximum Price (GMP). The project will be Open Book. All savings, including unused contingency, will be returned to the Owner. Contract documents will be based on AIA Doc. #A141-2004, Standard Form of Agreement between Owner and Design-Builder.

### 2) Selection Process

- (a) Request for Qualifications

This document is a Request for Qualifications (RFQ). An interested firm’s initial response will be **only** to this RFQ portion of this solicitation. If a firm is subsequently shortlisted, it will then be invited to respond in a separate technical proposal.

- (b) Selection Committee

The selection of professional service providers will be by a Selection Committee comprising representatives of the Owner. Offeror contact for information and clarification about the Project must be limited to Georgetown County Senior Buyer, Nancy Silver, as identified in Instructions for Bidders (page 20, item #1).

- (c) Shortlisting, Proposals, Interviews

Selection of the Design-Builder

- i) Initial Written Submittal (Qualifications Statements)

The selection Committee will receive and review statements of qualifications and performance data in response to the RFQ. The Selection Committee will evaluate all firms first against a set of criteria, provided in Section 3a below, to determine those firms most qualified and suited for this particular project. Qualifications will narrow the field to a shortlist of firms if required and deemed necessary. The Owner has the right to select a single firm after review of the RFQ thus choosing not to conduct interview, therefore moving directly to the fee proposals.

- ii) Interview & Final Evaluation (If Required and deemed necessary by the Owner)

As part of the evaluation of the technical proposals, proposing firms will be invited to a formal interview to explain firm and to answer questions from the Selection Committee. From the evaluation of the RFQ, combined with the interview, the Selection Committee will rank the shortlisted firms in order of suitability and appropriateness for the present project.

iii) Fee Proposals to be Submitted with the RFQ

Each firm submitting an offer shall prepare and include a separate, sealed fee proposal to the Owner with their proposal. After final ranking of the shortlisted firms and following all interviews, the Selection Committee will open only the fee proposal from the highest-ranked offeror. This fee proposal will provide part of the basis for initial negotiations subsequently conducted with the highest-ranked offeror. If negotiations with the highest-ranked offeror are not successful, the Owner will then invite the second-ranked firm to negotiate, and so on.

3) Proposal Validity

Any submitted proposal shall remain valid for ninety days after the proposal due date or until the Owner executes a contract, whichever is sooner. In the event the selected proposer fails to perform and/or the contract is terminated, within forty-five days of its initiation, the Owner may request the proposer submitting the next acceptable proposal to honor its proposal.

4) Scope of Work Overview

The Design-Builder's services shall conform to recognized standards of professional practice. The contract will outline the scope of work. The work shall include a Schematic Design Phase, a Construction Documents Phase, and a Construction Phase. Duties during these phases will include but not be limited to activities mentioned in this solicitation.

- (a) During the Schematic Design Phase, the Design-Builder will consult with the Owner's team to comprehend the Owner's Project Requirements, which shall be a written document and may be subject to change.
- (b) During the Construction Documents Phase, the Design-Builder will take full professional responsibility, through its Designer of Record, to create construction documents that satisfy the Owner's Project Requirements. The Design-Builder will provide cost estimates and cost evaluation, value engineering recommendations, design analysis, constructability reviews, and technical input on methods of construction, materials, details, bidding formats, and types of separate bidding packages. At an appropriate point in the project and subject to contractual negotiations, the Design-Builder shall issue a Guaranteed Maximum Price (GMP) backed by a surety bond. The project shall be constructed within this GMP. The Design-Builder will coordinate applicable permits with permit fees to be paid by Georgetown County (Owner). To the extent professionally responsible, the Design-Builder will overlap the Design Development and Construction Phases when components are conducive to early construction starts. The Design-Builder shall also develop and maintain a master project schedule.

(c) During the construction phase, which includes any previously awarded early bid packages, Design-Builder will be responsible for the following things, without limitation:

- i) Methods of construction
- ii) Safety programs
- iii) General conditions
- iv) Prequalification of potential subcontractors
- v) Procurement of all work
- vi) Certification of work-in-place
- vii) Monthly payment applications
- viii) Coordination and scheduling of all work of all construction contracts and miscellaneous contracts required for the completion of the project within the predetermined budget and schedule

(d) Design-Builder shall assist the Owner, the Owner's Project Manager, and Owner's Commissioning Provider, if any and as applicable, in management and administration of the project, except that the Owner at all times shall retain complete control of project funds and disbursements.

6) Schedule of Events

The Schedule of Events Timeline on page three (3) represents the Owner's best estimate of the schedule that will be followed. The Owner reserves the right, at its sole discretion, to adjust this schedule as it deems necessary. Notification of any adjustment to the Schedule of Events shall be provided to all who have requested this RFQ.

III. Initial Written Submittal - Qualifications Submission Format and Requirements (Response to Request or Qualifications or "RFQ")

1) Physical Submittal

One (1) unbound, reproducible ORIGINAL of your proposal must be submitted in a sealed envelope and clearly marked on the outermost container per the Instructions per Bidders (page 20, item 5). Each submittal shall include a transmittal letter. The transmittal letter (or cover letter) will not count toward the page limit (20 pages). The table of contents sheet and the tabs sheets, if used, also do not count toward the page limit. Submitters are encouraged to follow in their responses the sequence of the Initial Written Submittal outlined here. Responses should be concise, clear and relevant. Submitter's cost incurred in responding to this RFQ is submitter's alone and the owner does not accept liability for any such cost.

- (a) Responses are limited to twenty (20) standard (8.5" x 11") pages (may be fewer) using a minimum of a 10-point font. The pages of the qualification submittals must be numbered.
- (b) Submittals of qualifications will be accepted until time and date shown in the Timeline/ Schedule of Events (page 3). This is a firm deadline. The Owner is not responsible for the property or timely delivery of submittals. Failure to meet the deadline for receipt of submittals will result in rejection of the submittal. Submittals received after the deadline will not be considered whether delayed in transit or for any other cause whatsoever. Each firm is solely responsible for the accuracy and completeness of its submittal. Errors and omissions may constitute grounds for rejection.

- (c) The Owner intends to limit the cost that submitters incur to respond to this solicitation. Therefore, submitters are encouraged to be brief and succinct. Thick volumes of background and general marketing material are not desired. A firm should highlight instead its responsiveness to the evaluation criteria. If there are multiple firms proposed as one team, each component firm should describe its own relevant qualifications within the same submittal.
- (d) Firms should deliver their submittals in a sealed package. The name and address of the firm should appear on the outside of the package, and the package should reference the project, i.e., “RFQ #16-083- Corporate Aircraft Hangar at Georgetown County, SC Airport (KGGE): Design/Build.”
- (e) Any questions that have been submitted in writing before the deadline, will be compiled and answered in writing. The deadline for submission of questions relating to the RFQ is the time and date shown in the Timeline / Schedule of Events (page 3).

## 2) Initial Written Submittal Prerequisite Criteria

Firms must meet the criteria in the bullet points immediately below. Firms that do not meet these criteria are automatically disqualified from further evaluation:

- Firm’s “Designer” MUST have current South Carolina Architectural and/or Engineering license(s) as appropriate for their portion of the design work.
- Firm’s “Builder” MUST have current South Carolina Contractor’s license with classification BD and group limitation Group 5.
- Builder MUST have a safety Experience Modification Rate average of less than 1.0 over the last three years.
- Firm MUST have bonding capacity to provide a payment and performance bond with coverage equal to the total cost of the project.
- Firm MUST be able to get a Builder’s Risk Insurance Policy for this project with coverage equal to the total cost of the project.
- Firm MUST obtain and maintain liability insurance coverages and must be insurable for a total of \$1 million for commercial general liability and automotive liability, and include coverage for errors and omissions.

In order to be deemed eligible for evaluation, the submitting firm must create, officially sign, and place in its submittal a signed statement that contains the following declarations:

- *We certify that our Design-Build entity’s “Designer” has current South Carolina Architectural and/or Engineering license(s) as appropriate for their portion of the design work.*
- *We certify that our Design-Build entity’s “Builder” has a current South Carolina Contractor’s license with classification BD and group limitation Group 5.*
- *Our building firm has a safety Experience Modification Rate average of less than 1.0 over the last three years.*
- *We certify that our firm has sufficient bonding capacity to provide a payment and performance bond with coverage equal to the total cost of the project.*

- *We certify that our firm will obtain a Builder’s Risk Insurance Policy for this project with coverage equal to the total cost of the project.*
- *We certify that our firm will have and maintain liability insurance coverage for a total of \$1 million for commercial general liability and automotive liability, and that we will include coverage for errors and omissions.*

Such signed statement may be placed in an appendix and will not count toward your page limit.

### 3) Initial Written Submittal Evaluation

(a) Evaluative Criteria – The Selection Committee will evaluate the submittals uniformly based upon the criteria listed in the table below. The Owner has listed each major category of criteria in order of importance. The services being sought under this RFQ are considered professional in nature. Consequently, the evaluation of submittals will be based upon consideration of the demonstrated qualifications and capabilities of the offerors. Absent modification by addendum, factors to be considered in the evaluation will be limited to the following:

<b>Major Category</b>	<b>Criteria Summaries</b>
Depth or Resources / Personnel Capability with Relevant Experience  (POINT VALUE = 25)	<ul style="list-style-type: none"> <li>• Depth of resources with experience ability, qualified and available for Architect / Engineer / Design Professional role.</li> <li>• Depth of resources with experience and ability, qualified and available for Project Superintendent role</li> <li>• Depth of resources with experience and ability, qualified and available for Design-Builder Project Manager role.</li> </ul>
Firm’s relevant project experience  (POINT VALUE = 25)	<ul style="list-style-type: none"> <li>• Firm’s experience with preconstruction and construction services as a design build team.</li> <li>• Firm’s litigation record – past ten (10) years.</li> </ul>
Responsiveness of Submittal  (POINT VALUE = 20)	<ul style="list-style-type: none"> <li>• Extent to which the instructions in the RFQ were followed.</li> <li>• Accuracy in reflecting the project’s assumptions &amp; requirements</li> </ul>
Financial Information  (POINT VALUE = 15)	<ul style="list-style-type: none"> <li>• Firm’s financial stability</li> </ul>

Local Vendor Preference (PPOINT VALUE = 10)	<ul style="list-style-type: none"> <li>Local / Resident Vendor Preference – Location of Main Office</li> </ul>
Statement of Why the Firm Should be Selected (PPOINT VALUE = 5)	<ul style="list-style-type: none"> <li>Firm’s unique ability to provide Design-Build services at least to the extent described in this document.</li> </ul>

4) Submittal Contents

The qualification submittal should contain the following information in the following order:

- (a) Statement of Interest. Briefly tell why your firm is interested in this project.
- (b) Firm Description
- (c) Basic company information
  - i) Company Name
  - ii) Address & Zip Code
  - iii) Email address & Name of Primary Contact
  - iv) Telephone Number
  - v) Number of Years in Business
- (d) Form of ownership, including state of residency or incorporation: Is the offeror a sole proprietorship, partnership, corporation, Limited Liability Company (LLC), joint venture, or other structure?
- (e) Succinctly describe the history and growth of your firm(s).
- (f) Regarding litigation with owners, subcontractors, and other construction-related entities, list any active or pending litigation and explain. List, and briefly describe any and all legal actions for the past three (3) years in which respondent has been a debtor in bankruptcy, a defendant in a lawsuit for deficient performance under a contract or agreement; a respondent in an administrative action for deficient performance, or a defendant in a criminal action.
- (g) List and briefly describe projects that your firm has completed in the past five (5) years that also required design-build services and were valued at or above \$1,000,000. Also briefly describe the largest project your firm has completed within the past ten (10) years regardless of delivery method, but indicate the delivery method used on that largest project.
- (h) Has the firm ever failed to complete any work awarded to it or has it been removed from any project awarded to the firm? Explain.
- (i) Give three references to whom your company has provided professional services of a nature and quality similar to those required herein. This reference information should include a short paragraph describing the service(s) provided, together with the following:
  - i) The name of the organization to which the services were provided
  - ii) Project location
  - iii) Dates during which services were performed
  - iv) Brief description of project
  - v) A current contact name, together with organization title, at the firm
  - vi) The contact’s current address and telephone number (The Selection Committee will not appreciate obsolete contact information).
- (j) Office Submitting Qualifications

If the firm has multiple offices, the qualification statement should include information about the parent company and branch office separately. Identify the office from which project will be managed and that office's proximity to the project site. Parent company (or general office) financial information as totals will be acceptable IF "parent" (or "general office") means that it is financially responsible for the liabilities of the branch office. If the parent company is not so responsible, meaning that its financial resources are not available to the office that will perform the contract, it will be misleading to the Owner to offer the financial of any office other than the one with the prospect of contract with the Owner.

(k) Financial Responsibility

- i) List your total annual billings for each of the past three (3) calendar years. If forming a partnership, list separately by firm.
- ii) List the contact persons, addresses, and telephone numbers for your insurance carrier and agent.
- iii) List the contact persons, addresses, and telephone numbers for your firm's bonding company and agent.
- iv) What percentage of your firm's work has been negotiated and/or design build during the past three (3) years?
- v) Supply firm's Current Ratio (Current Assets / Current Liabilities) experience for the last five (5) years.

(l) Personnel Capability

Provide general information about the firm's personnel resources, including classifications and numbers of employees and the locations and staffing of relevant offices. Provide list of qualified and available personnel resources, identifying experience and ability for key personnel. The key personnel, at a minimum, are the proposed Designer of Record, supporting project architects and engineers, project superintendent and the Design-Builder's project manager. At this stage, firms may list more than one person qualified and available for the proposed project.

(m) Relevant Project Experience of the Designer

Relevant project experience refers especially to buildings comparable to this project in relevant ways. The most relevant experience will be on other Design-Build projects as designer. Describe no fewer than four (4) projects in order of most relevant to least relevant that demonstrate the firm's capabilities to provide design services on the project at hand. For each project, the following information should be provided:

- (i) Project Name
- (ii) Project Location
- (iii) Dates during which services were performed
- (iv) Physical description (e.r., square footage, number of stories, site area)
- (v) Brief description of project
- (vi) Services performed as Designer
- (vii) Statement of performance versus owner expectations in the areas of cost, quality, and schedule
- (viii) Owner reference

(n) Relevant Project Experience of the Builder

Relevant project experience includes similar building type and delivery method relevant to the type of project to be constructed using the Design-Build delivery method or performing as a general contractor on comparable types and sizes of projects. Describe no fewer than four (4) projects in order of most relevant to least relevant that demonstrate the firm's capabilities to

perform the project at hand. For each project, the following information should be provided:

- Project Name
- Project Location
- Dates during which services were performed
- Physical description (e.g., square footage, number of stories, site area)
- Brief description of project
- Services performed as Designer
- Statement of performance versus owner expectations in the areas of cost, quality, and schedule
- Owner reference

(o) Safety Information

Provide a letter on the letterhead of the building firm's insurance company stating the Worker's Compensation Experience Modification Rate (EMR) for the past three (3) years. This letter may be placed in the appendix and will not count toward the page limit.

(p) Resident (Local) Business Presence

Indicate whether the offeror is a "local vendor" as indicated by one of more of the following three (3) criteria: a) the vendor has a valid business license issued by one of the municipalities within the county that was issued at least twelve (12) months prior to qualifications submission date; b) the vendor has a physical business address located and operating within the limits of the county and has been doing business in the county for a period of twelve (12) months or more; c) the vendor can prove payment of all applicable county taxes and fees if so requested. The **Residence Certification for Local Preference** submittal form enclosed shall be used for this purpose. This form will not contribute to the twenty (20) page maximum submittal total.

(q) Statement of "Why the Proposing Firm Should Be Selected"

This section provides each firm the opportunity to provide specific information that differentiates them from others in the competition. This statement is limited to two pages of the allowed total

### III. Preliminary Considerations

1) Superior Technical Proposal

Final selection of the Design-Build firm for this project shall be made using the Superior Technical Proposal (Pure QBS) method: the cost of the work (price) is not considered when making the initial selection of the best or most appropriate provider of the professional services required. Fees for services will be negotiated, however, following selection and before contracting.

2) Role of Fee Proposal

Fee proposals will be collected at the time of RFQ submittal. A fee proposal shall be submitted in a sealed envelope, which the Selection Committee will not open until a top-ranked firm is determined and, then, only the envelope from the top-ranked firm will be opened. Other fee proposal envelopes will remain sealed, ensuring that no selection is based on fees. The fee proposal will be used as a basis for subsequent negotiations with the top-ranked firm.

(a) Fees included in the fee proposal shall cover proposed, anticipated, or estimated compensation to the Design-Builder exclusive of the Cost of the Work. Following successful negotiations with the

top-ranked firm, during which proposed fees can be adjusted, the Design-Builder's contractual fee will be the amount established by and agreed to by both parties that is the full amount of compensation due to the Design-Builder as gross profit and for any and all expenses of the project not included and identified as a Cost of the Work or the Design-Builder's Overhead Cost, provided that the Design-Builder performs all the requirements of the contract documents within the time limits established. The Design-Builder's Fee consists of the following:

- i) Design Fee. For design services, including the Design Professional's construction contract administration services, the Owner shall pay a Design Fee representing the gross profit relative to the design and construction contract administration services.
- ii) Construction Fee. For the construction services provided by the Design-Builder a Construction Fee representing the gross profit relative to the construction services.

(b) This RFQ includes a format for the fee proposal. The "Design-Builder Fee Proposal" Form contains a Project Cost Matrix that should be used to list and calculate projected overhead.

### **Contract Negotiation**

Soon after notification of the evaluation outcome, the Owner will initiate negotiations with the top-ranked firm to understand assumptions and to determine the Design-Builder's fixed fees and the proposed costs for general conditions and overhead. In the event that a satisfactory fee cannot be agreed upon with the highest-ranking firm, the Owner will formally terminate the negotiations in writing and enter into negotiations in turn with the second-ranked firm and so-on until a mutually agreed-upon contract is established. Contract documents will be based on AIA Doc. #A141-2004, Standard Form of Agreement between Owner and Design-Builder on the basis of Actual Cost Plus a Fixed Fee not to exceed the Guaranteed Maximum Price (GMP), or other such format as may be found acceptable to both parties by mutual agreement.

### **Additional Information**

- The Owner reserves the right to withdraw this RFQ or to reject any and all submittals at any time and cancel the project if, in the sole discretion of the Owner, continuation is deemed not to be in the best interest of the Owner.
- In addition to the Owner's general right to reject all submittals, a submittal may be rejected if the submittal contains false or misleading statements or references that, in the sole judgment of the Selection Committee, do not support an attribute or condition contended by the firm and, in the sole judgment of the Selection Committee, such statements were intended to mislead the Selection Committee in its evaluation of the submittal.
- The Selection Committee's identification of an apparent successful firm does not necessarily mean the Selection Committee accepts all aspects of the firm's submittal or proposal.
- All submittals, together with any supporting material submitted by the firm, become the property of the Owner and may be retained, destroyed, or otherwise disposed of at the convenience of the Owner. All submittals, if retained by the Owner, become a matter of public record when final negotiations are completed except, however, that unopened fee proposal envelopes will be returned unopened to the shortlisted firms not selected. The submittal received from the selected firm will become part of the agreement reached by the Owner and the firm.
- By providing a submittal, each firm agrees not to request access to another firm's submittals until after a contract has been executed.
- By providing a submittal, each firm agrees that the Owner will have the right to use any or all ideas or concepts presented in any submittal without restriction and without compensation to the firm.

- VI. Bid Security will be required from only the highest ranked design-builder with whom the Owner begins negotiations. At the appropriate time and upon request the design-builder shall be prepared to submit:
- 1) A Bid Bond, or by a certified check payable to Georgetown County, SC, for an amount equal to five per-cent (5%) of the total base bid as a guarantee that if the bid is accepted, the required Contract will be executed within fifteen (15) days after receipt of written notice of formal award of Contract.
  - 2) The successful offeror must provide a Performance Bond from a surety company qualified to do business under the laws of the State of South Carolina in the amount of 100 percent (100%) of the contract amount, within fifteen (15) days the after receipt of written notice of formal award of the Contract. Pricing for such Performance Bond should be indicated separately on the Vendor Bid Submission Form.
  - 3) The successful offeror must provide a Payment and Material Bond from a surety company qualified to do business under the laws of the State of South Carolina in the amount of 100 percent (100%) of the contract amount, within fifteen (15) days after receipt of written notice of formal award of Contract.

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## OWNER'S PROJECT REQUIREMENTS

### 1.0 PROJECT DESCRIPTION

The County of Georgetown, SC seeks proposals from qualified firms to provide design-build services for the design and construction of a new aircraft "corporate/executive" hangar, to be located at the Georgetown County, SC Airport (KGGE), Airport Road (off US-17 South a/k/a South Fraser Street), Georgetown, SC 29440. Details of the hangar are as follows:

- 1.1 Exterior aircraft storage hangar dimensions are approximately 100 feet wide by 120 feet deep. The ceiling height has not been specified but the maximum building height per County zoning is 35'.
- 1.2 The front hangar door will have a minimum opening width of at least 90 feet and full span if cost effective with a minimum height of 22 feet. However, please see alternate bid item #1 regarding hangar door height.
- 1.3 The owner would prefer the front aircraft hangar door to be an insulated self-supporting door, such as that of the brand "Higher Power".
- 1.4 The hangar should use LED lights and clear reflector lights. There should also be timers installed for all lights. Light should also include high bay lights. The owner would also like opaque window side skylights be added.
- 1.5 The hangar bay will have duplex outlets in a quantity sufficient to satisfy codes for the building use. The hangar is to be built with 6 inch insulation in the roof and 4 inch insulation on the side walls. The personnel doors should also be insulated.
- 1.6 Exterior walls and roof are to be pre-finished metal, to match the color of existing T-hangars. However, please see alternate bid item #2 regarding roof. The owner would also like air vents in the roof.
- 1.7 The hangar building will also have one personnel door in the back at the northwest corner and one personnel door on the side located in the southeast area.
- 1.8 There will be one 10' X 12', chain operated, overhead garage door located in the center of the back wall in the north area.
- 1.9 Total size of the proposed hangar is approximately 12,000 square feet and therefore would not require fire sprinklers to be included in this proposal. The interior is to be free of any support and/or columns. The new hangar site location is shown on the site plan in Appendix A.
- 1.10 The contractor will provide an adequate number of fire extinguishers for electrical and fuel fires to meet local and State Fire Codes.
- 1.11 The hangar must comply with all state and local building codes, including a 130-mph wind load.
- 1.12 Geotechnical soil boring analysis has already been completed for this location. See Appendix B for the results of that analysis.
- 1.13 The contractor will be responsible for any and all site preparation work (excluding clearing, tree and stump removal), and the establishment of an appropriate foundation and concrete hangar floor to include sealing. The contractor shall design the slab, foundation and other required subsurface ground improvements as may be required based upon the Report of Geotechnical Investigation dated June 2, 2016 as prepared by S&ME, Inc. The slab design shall also meet the requirements of FAA circular AC 150-5320-6D as it pertains to rigid pavements. All design drawings, specifications and reports shall be prepared, signed and sealed by a licensed Professional Engineer. In particular, the contractor shall determine the most effective method for mitigating the seismic liquefaction/settlement potential, whether by earthquake drains, post-tensioned slab, or other means. It is the desire of the County that the structure be serviceable following the code-level seismic event (i.e. nominal differential settlement).
- 1.14 Completed Hangar floor must be at same elevation as Taxiway A (located on airport LOP).
- 1.15 Electrical power will be provided to the Hangar by underground conduit. The electrical conduiting and wiring of the building will be installed by the contractor and will terminate at a meter junction box at mutually agreed location on the exterior of the building for connection by others.
- 1.16 The hangar door shall have mounted above two (2) high output metal halide flood fixtures for general

area lighting of the apron immediately in front of the hangar, located at such height as not to cause cockpit glare.

- 1.17 Each offeror will determine the necessary number of 20 amp circuits to power lights and duplex outlets.
- 1.18 The contractor will be responsible for all regulatory permitting, Federal State and Local. Owner will provide the Stormwater permitting and related construction services. NPDES Stormwater discharges will be secured by the County. All drainage features specific to the site will be the responsibility of the County.
- 1.19 The contractor will be responsible for any third party inspections as required by Chapter 17 of the International Building Code.
- 1.20 The contractor will be responsible for disposal of any and all removed, unused and surplus materials and any fees and transportation costs associated with the disposal.
- 1.21 Contractor to provide seeding and mulching.
- 1.22 **Alternate Bid Item #1:** The owner would like to compare the costs of a front hangar door height of 24 feet versus the 22 feet mentioned above. The design/build team should include this as an alternate item in their proposal.
- 1.23 **Alternate Bid Item #2:** The owner would like to consider a standing seam roof instead of a metal roof. The design/build team should include this as an alternate item in their proposal.
- 1.24 The contractor must be familiar with and follow all FAA regulations including but not limited to AC 150/5370-2C Operational Safety on Airports during Construction and Guide to Ground Operations on the Airport. AC 150/5380 -5B Debris Hazards at Civil Airports and procedures regarding construction on an active airport.
- 1.25 **Alternate Bid Item #3** -will include the construction of a separate stand-alone structure on the South side of the completed hangar that would contain suitable office space and restrooms for hangar occupants.
  - 2.371 Incorporate one (1) single occupant unisex restroom with “on-demand” hot water. Contractor shall stub-out water and sewer services to five (5’) feet from the building and cap. The Owner shall be responsible for providing water and sewer service line extensions to the site.
  - 2.372 Incorporate one (1) combination office/lounge area space.
- 1.26 The scope of services for the Aircraft Hangar is intended to provide a complete and useable facility for the County of Georgetown which can be put into operation immediately after acceptance by the County.
- 1.27 The scope of services includes all aspects of design and construction, including but not limited to the following:
  - (A) **Project Orientation & Program**
    - i) Meet with County and Airport officials to gain a detailed understanding of the project requirements and general parameters under which the project will be designed and constructed.
    - ii) Based on discussions in the initial meeting(s), formulate Conceptual Design for review and approval.
    - iii) Prepare project budget and cash flow projections.
    - iv) Develop project schedule using CPM subject to owner’s approval.
    - v) Prepare and submit to Owner a Schedule of Values.
  - (B) **Design Development and Construction Documents**
    - i) Soil borings and logs will be conducted by successful bidder.
    - ii) Prepare complete Construction Documents.
    - iii) Coordinate construction plans with the County’s Department Public Services.
    - iv) Obtain all federal, state and local construction permits as may be required.
    - v) Comply with all applicable State and Federal Fire codes
  - (C) **Construction / Construction Administration**
    - i) Complete construction in conformance with approved Construction Drawings and permit drawings.
    - ii) Administer weekly progress meetings and prepare and distribute minutes of the meetings.
    - iii) Prepare and submit pay applications on a monthly basis.
    - iv) Schedule any special inspections as required by County ordinances.
    - v) Arrange for required County code inspections

- vi) Perform testing and of all building systems.
- vii) Compile, review and submit project closeout documentation, including as-built drawings.
- vii) Storm water specifications will be subject to approval by the Georgetown County Engineer.

Additional Information

Questions which may arise as a result of this Request for Qualifications should be directed to Nancy Silver, Senior Buyer, in writing by FAX to (843)545-3500, or by e-mail at [nsilver@gtcounty.org](mailto:nsilver@gtcounty.org). To schedule an appointment for a site visit please contact Rick Westfall, Airport Manager, at (843)545-3638 or by e-mail at [rwestfall@gtcounty.org](mailto:rwestfall@gtcounty.org).

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**Instructions for Bidders**  
**Bid #16-083**  
**Corporate Aircraft Hangar at Georgetown County Airport, Design/Build**

1. **Submission of Questions**

Questions must be submitted in writing via electronic mail, facsimile or postal mail to the Issuing Officer no later than the “Deadline for Questions” cutoff identified in the Bid Timeline on page three (3) in order to generate an official answer. All written questions will receive an official written response from the Georgetown County Purchasing Office (GCPO) and will become addenda to the solicitation.

GCPO reserves the right to reject or deny any requests made by the provider.

Impromptu, unwritten questions are permitted and verbal answers may be provided, but are only intended as general direction and will not represent the official GCPO position. The only official position of GCPO is that which is stated in writing and issued in the solicitation as addenda thereto.

No other means of communication, whether oral or written, shall be construed as a formal or official response/statement and may not be relied upon. SEND QUESTIONS TO:

Nancy Silver, Senior Buyer  
Post Office Box 421270, Georgetown, SC 29442-2400  
Fax: (843) 545-3500  
Email: [nsilver@gtcounty.org](mailto:nsilver@gtcounty.org)

2. **IMPORTANT OFFEROR NOTES:**

- a) Bid Number & Title must be shown on the OUTSIDE of the delivery package.
- b) Federal Express does NOT guarantee delivery to Georgetown, SC before 4:30 PM Eastern Time on Next Day Service.
- c) UPS WILL guarantee delivery to Georgetown, SC before 10:30 AM Eastern Time on Next Day “Early AM” Service.

3. **Incident Weather/Closure of County Courthouse**

If the County Courthouse is closed for business at the time scheduled for bid opening, for whatever reason, sealed bids will be accepted and opened on the next scheduled business day, at the originally scheduled time.

4. This solicitation does not commit Georgetown County to award a contract, to pay any cost incurred in the preparation of the bid, or to procure or contract for goods or services. It is the responsibility of each bidder to see that the Georgetown County Purchasing Office receives bids on, or before, the date and time specified for the bid opening. No bid will be accepted thereafter. The County assumes no responsibility for delivery of bids that are mailed. Georgetown County reserves the right to reject any or all bids and to waive any informalities and technicalities in the bid process.

5. One (1) unbound, reproducible ORIGINAL of your proposal must be submitted in a sealed envelope and clearly marked on the outermost container as follows:

**OFFEROR’S NAME**  
**BID ITEM NAME**  
**BID NUMBER**

6. No offeror may submit more than one response.
7. Correction or Withdrawal of Bids; Cancellation of Awards  
An offeror must submit in writing a request to either correct or withdraw a bid to the Procurement Officer. Each written request must document the fact that the offeror's mistake is clearly an error that will cause him substantial loss.
  - a) Correction of awards : An offeror shall not be permitted to correct a bid mistake after bid opening that would cause such offeror to have the low bid unless the mistake in the judgment of the Procurement Officer is clearly evident from examining the bid document; for example, extension of unit prices or errors in addition.
  - b) Cancellation of awards prior to performance: When it is determined after an award has been issued but before performance has begun that Georgetown County's requirements for the goods or services have changed or have not been met, the award or contract may be canceled and either reawarded or a new solicitation issued.
8. Faxed or E-mailed bids will not be accepted by Georgetown County.
9. If you need any reasonable accommodation for any type of disability in order to participate in this procurement, please contact the purchasing office as soon as possible.
10. Any deviations from the specifications or modification of this bid and any extra or incidental work or reductions in work shall be set forth in writing and signed by both parties prior to making such change. Any increase or decrease in the bid price resulting from such change shall be included in writing.
11. Exceptions: The bidder shall list on a separate sheet of paper any variations from, or exceptions to, the conditions and specifications of this bid. This sheet shall be labeled "Exception(s) to Bid Conditions and Specifications," and shall be attached to the bid. When Proposers find instances where they must take exception with certain requirements or specifications of the bid, all exceptions shall be clearly identified. Written explanations shall include the scope of the exceptions, the ramifications of the exceptions for the County of Georgetown, and a description of the advantage to be gained or disadvantages to be incurred by the County as a result of these exceptions. If no exceptions, write "No Exceptions".
12. The County reserves the right to reject any or all bids, waive any informality in bids and accept in whole or in part such bid or bids as may be deemed in the best interest of the County. Georgetown County reserves the right to reject any bid submitted, at sole option that the vendor may not be able to meet the service requirements of the bid.
13. Publicity releases: contractor agrees not to refer to award of any resulting contract in commercial advertising in such a manner as to state or imply that the products or services provided are endorsed or preferred by the user.
14. Material Safety Data Sheets: The County of Georgetown will not receive any materials, products, or chemicals which may be hazardous to an employee's health unless accompanied by a Material Data Sheet when received.
15. Ownership of Copyright: All right, title and interest in all copyrightable materials which vendor shall create in the performance of its obligations hereunder shall be the property of the procurer. Vendor agrees to

assign and hereby does assign any and all interest it has in and to such material to procurer. Vendor agrees, upon the request of procurer to execute all papers and perform all other such acts necessary to assist procurer to obtain and register copyrights on such materials. Where applicable, works of authorship created by the vendor in the performance of its obligations hereunder, shall be considered “works for hire” as defined in the U.S. Copyright Act.

16. Ownership of Documents: Any reports, studies, photographs, negatives or other documents prepared by vendor in the performance of its obligations shall be the exclusive property of the procurer and all such material shall be remitted to the procurer by the vendor upon completion, termination or cancellation of this order. Vendor shall not use, willingly allow or cause to have such material used for any purpose other than performance of its obligations under this order without the prior written consent of the procurer.
17. Affirmative Action: The contractor will take affirmative action in complying with all Federal and State requirements concerning fair employment and employment of the handicapped, and concerning the treatment of all employees, without regard or discrimination by reason of age, race, color, religion, sex, national origin or physical handicap. The following are incorporated herein by reference: 41 C.F.R. 60-1.4, 60-250.4 and 60-741.4.
18. ETHICS ACT (JAN 2004): By submitting an Offer, you certify that you are in compliance with South Carolina’s Ethics, Government Accountability, and Campaign Reform Act of 1991, as amended. The following statutes require special attention: (a) Offering, giving, soliciting, or receiving anything of value to influence action of public employee – Section 8-13-790, (b) Recovery of kickbacks – Section 8-13-790, (c) Offering, soliciting, or receiving money for advice or assistance of public official – Section 8-13-720, (d) Use or disclosure of confidential information – Section 8-13-725, and (e) Persons hired to assist in the preparation of specifications or evaluation of bids – Section 8-13-1150.
19. Bidders must clearly mark as "confidential" each part of their bid which they consider to be proprietary information that could be exempt from disclosure under section 30-4-40, Code of Laws of South Carolina 1976, as amended (Freedom of Information Act). If any part is designated as confidential, there must be attached to that part an explanation of how this information fits within one or more categories listed in section 30-4-40. The County reserves the right to determine whether this information should be exempt from disclosure and no legal action may be brought against the County or its agents for its determination in this regard.
20. CERTIFICATION REGARDING DRUG-FREE WORKPLACE:  
The contractor certifies that the vendor(s) will provide a “drug-free workplace” as that term is defined in Section 44-107-30 of the Code of Laws of South Carolina, 1976, as amended, by the complying with the requirements set forth in title 44, Chapter 107.
21. Nothing herein is intended to exclude any responsible vendor, his product or service or in any way restrain or restrict competition. On the contrary, all responsible vendors are encouraged to bid and their bids are solicited.
22. Acknowledgement of Addenda  
Each contractor is responsible to verify the number of total addenda issued prior to bid. **Failure to acknowledge all addenda shall disqualify the bidder.** All addenda are posted by the County at the website located at [www.gtcounty.org](http://www.gtcounty.org), select “Bid Opportunities” from the Quick Links box on the homepage. It is each proposer’s responsibility to verify that all addenda have been received and acknowledged.

23. Responses must be made in the format specified or will be rejected. Proposals shall be typewritten or written in ink. The person signing the bid shall initial all corrections or erasures.

24. **Builders' Risk Insurance.** Contractor shall provide and maintain, during the progress of the work and until execution of the Certificate of Contract Completion, a Builder's Risk Insurance policy to cover all work in the course of construction including false work, temporary buildings, scaffolding, and materials used in the construction process (including materials designated for the project but stored off site or in transit). The coverage shall equal the total completed value of the work and shall provide recovery at replacement cost.

- a) Such insurance shall be on a special cause of loss form, providing coverage on an open perils basis insuring against the direct physical loss of or damage to covered property, including but not limited to theft, vandalism, malicious mischief, earthquake, tornado, lightning, explosion, breakage of glass, collapse, water damage, and testing/startup.
- b) Coverage shall include coverage for "soft costs" (costs other than replacement of building materials) including, but not limited to, the reasonable extra costs of the architect/engineer and reasonable Contractor extension or acceleration costs. This coverage shall also include the reasonable extra costs of expediting temporary and permanent repairs to, or permanent replacement of, damaged property. This shall include overtime wages and the extra cost of express or other means for rapidly transporting materials and supplies necessary to the repair or replacement.
- c) The policy shall specifically permit and allow for partial occupancy by the owner prior to execution of the final Certification of Contract Completion, and coverage shall remain in effect until all punch list items are completed.
- d) The Builder's Risk deductible may not exceed \$5,000. The Contractor or subcontractor experiencing any loss claimed under the Builder's Risk policy shall be responsible for that loss up to the amount of the deductible.
- e) If Contractor is involved solely in the installation of material and equipment and not in new building construction, the Contractor shall provide an Installation Floater policy in lieu of a Builder's Risk policy. The policy must comply with the provisions of this paragraph.

25. **Comprehensive Insurance**

The successful bidder shall procure, maintain, and provide proof of, insurance coverage for injuries to persons and/or property damage as may arise from or in conjunction with, the work performed on behalf of the County by the bidder, his agents, representatives, employees or subcontractors. Proof of coverage as contained herein shall be submitted fifteen (15) days prior to the commencement of work and such coverage shall be maintained by the bidder for the duration of the contract period; for occurrence policies.

a. General Liability

Coverage shall be as broad as: Comprehensive General Liability endorsed to include Broad Form, Commercial General Liability form including Products/Completed Operations.

1. Minimum Limits

General Liability:

- \$1,000,000 General Aggregate Limit
- \$1,000,000 Products & Completed Operations
- \$1,000,000 Personal and Advertising Injury
- \$1,000,000 Each Occurrence Limit
- \$50,000 Fire Damage Limit
- \$5,000 Medical Expense Limit

b. Automobile Liability

Coverage sufficient to cover all vehicles owned, used, or hired by the bidder, his agents, representatives, employees or subcontractors.

1. Minimum Limits

Automobile Liability:

\$1,000,000 Combined Single Limit

\$1,000,000 Each Occurrence Limit

\$5,000 Medical Expense Limit

c. Workers' Compensation

Limits as required by the Workers' Compensation Act of SC. Employers Liability, \$1,000,000.

d. Owners' & Contractors' Protective Liability

Policy will be in name of County. Minimum limits required are \$1,000,000.

e. Professional Liability

Minimum limits are \$1,000,000 per occurrence.

f. Coverage Provisions

1. All deductibles or self-insured retention shall appear on the certificate(s).
2. The County of Georgetown, its officers/ officials, employees, agents and volunteers shall be added as "additional insured" as their interests may appear. This provision does not apply to Professional Liability or Workers' Compensation/Employers' Liability.
3. The offeror's insurance shall be primary over any applicable insurance or self-insurance maintained by the County.
4. Shall provide 30 days written notice to the County before any cancellation, suspension, or void of coverage in whole or part, where such provision is reasonable.
5. All coverage for subcontractors of the bidder shall be subject to all of the requirements stated herein.
6. All deductibles or self-insured retention shall appear on the certificate(s) and shall be subject to approval by the County. At the option of the County, either; the insurer shall reduce or eliminate such deductible or self-insured retention; or the bidder shall be required to procure a bond guaranteeing payment of losses and related claims expenses.
7. Failure to comply with any reporting provisions of the policy(s) shall not affect coverage provided the County, its officers/officials, agents, employees and volunteers.
8. The insurer shall agree to waive all rights of subrogation against the County, its' officers/officials, agents, employees or volunteers for any act, omission or condition of premises which the parties may be held liable by reason of negligence.
9. The bidder shall furnish the County certificates of insurance including endorsements affecting coverage. The certificates are to be signed by a person authorized by the insurance company(s) to bind coverage on its' behalf, if executed by a broker, notarized copy of authorization to bind, or certify coverage must be attached.
10. All insurance shall be placed with insurers maintaining an A.M. Best rating of no less than an A:VII. If A.M. Best rating is less than A:VII, approval must be received from County's Risk Officer.

26. Workman's Compensation Coverage

Georgetown County, SC will require each contractor and service provider to maintain on file with the purchasing officer, a current Certificate of Insurance showing limits as required by the Workers' Compensation Act of SC: Employers Liability, \$1,000,000.

The law also recognizes "statutory employees." These are employees who work for a subcontractor who may be working for a business or another contractor. Employers should inquire whether or not a subcontractor working for them has workers' compensation insurance, regardless of the number of employees employed by the subcontractor. If the subcontractor does not, the subcontractor's injured employees would be covered under the employer's workers' compensation insurance. If the subcontractor does not carry workers' compensation insurance, then the owner or the principal contractor would be liable just as if the subcontractor's employee was one of their employees.

For answers to additional questions, visit the SC Worker's Compensation Commission website, at:

<http://www.wcc.state.sc.us/Frequently%20Asked%20Questions/FAQ.htm>

#### 27. Hold Harmless Clause

The Contractor shall, during the term of the contract including any warranty period, indemnify, defend, and hold harmless the County, its officials, employees, agents, and representatives thereof from all suits, actions, or claims of any kind, including attorney's fees, brought on account of any personal injuries, damages, or violations of rights, sustained by any person or property in consequence of any neglect in safeguarding contract work or on account of any act or omission by the contractor or his employees, or from any claims or amounts arising from violation of any law, bylaw, ordinance, regulation or decree. The vendor agrees that this clause shall include claims involving infringement of patent or copyright.

#### 28. Condition of Items

All items shall be new, in first class condition, including containers suitable for shipment and storage, unless otherwise indicated herein. Verbal agreements to the contrary will not be recognized.

#### 29. Workmanship and Inspection

All work under this contract shall be performed in a skillful and workmanlike manner. The County may, in writing, require the Contractor to remove any employee from work that the County deems incompetent or careless.

Further, the County may, from time to time, make inspections of the work performed under this contract. Any inspection by the County does not relieve the Contractor from any responsibility regarding defects or other failures to meet the contract requirements.

#### 30. Progress Payments

Contractor's Application for Payment shall be submitted to the Owner on AIA Document G702 and G703--1992 Edition, or such other form as may be mutually agreed upon. The period covered by each Application for Payment shall be not less than one calendar month. The Owner shall make progress payments to the Contractor on undisputed amounts certified by the Architect within twenty-one (21) days from receipt of the Application for Payment by the Owner in accordance with Title 29, Chapter 6 of the Code of Laws of South Carolina, 1976, as amended. Individual contractors shall provide their social security numbers, and proprietorships, partnerships, and corporations shall provide their federal employer identification number on the pricing form.

#### 31. South Carolina Sales Tax

The County of Georgetown, SC is not exempt and pays the appropriate SC sales tax on all applicable

purchases.

32. Assignment of Contract

This contract may not be assigned in whole or part without the written consent of the Purchasing Officer.

33. Termination

Subject to the provisions below, the contract may be terminated by the County upon thirty (30) days advance written notice to the other party; but if any work or service hereunder is in progress, but not completed as of the date of termination, then this contract may be extended upon written approval of the County until said work or services are completed and accepted.

a. Termination for Convenience

In the event that this contract is terminated or canceled upon request and for the convenience of the County, without the required thirty (30) days advance written notice, then the County shall negotiate reasonable termination costs, if applicable.

b. Termination for Cause

Termination by the County for cause, default or negligence on the part of the contractor shall be excluded from the foregoing provision; termination costs, if any, shall not apply. The thirty (30) days advance notice requirement is waived in the event of Termination for Cause.

c. Non-Appropriation:

It is understood and agreed by the parties that in the event funds are not appropriated in the current fiscal year or any subsequent fiscal years, this contract will become null and void and the County will only be required to pay for services completed to the satisfaction of the County.

34. Default

In case of default by the contractor, for any reason whatsoever, the County may procure the goods or services from another source and hold the contractor responsible for any resulting excess cost and may seek other remedies under law.

35. Severability

In the event that any provision shall be adjudged or decreed to be invalid, such ruling shall not invalidate the entire Agreement but shall pertain only to the provision in question and the remaining provisions shall continue to be valid, binding and in full force and effect.

36. Applicable Laws

This Agreement shall be governed by and construed in accordance with the laws of the State of South Carolina, U.S.A.

37. Claims and Disputes:

All claims, disputes and other matters in question between parties arising out of, or relating to, this Agreement, or the breach thereof, shall be decided in the Circuit Court of the Fifteenth Judicial circuit in Georgetown County, South Carolina. By executing this Agreement, all parties specifically consent to venue and jurisdiction in Georgetown County, South Carolina and waive any right to contest jurisdiction and venue in said Court.

38. Rights of County

The County reserves the right to reject all or any part of any bid, waive informalities and award the contract to the lowest responsive and responsible bidder to best serve the interest of the County.

39. Notice of Award

A *Notice of Intent to Award* will be mailed to all respondents.

40. Protest

Bidders may refer to Sections 2-67, 2-73, and 2-74 of Ordinance #2008-09, also known as the Georgetown County, South Carolina Purchasing Policy to determine their remedies concerning this competitive process. The failure to be awarded a bid shall not be valid grounds for protest.

41. Debarment

By submitting a bid, the offeror certifies to the best of its knowledge and belief, that it and its principals, sub-contractors and assigns are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal, State or local department or agency. A copy of the County's debarment procedure in accordance with Section 2-68 of Ordinance #2008-09, also known as the Georgetown County, South Carolina Purchasing Policy is available upon request.

42. Firm Pricing for County Acceptance

Bid price must be firm for County acceptance for 90 days from bid opening date.

43. Unit Prices and Extension

If required, bid unit price on quantity specified -- extend and show total. In case of errors in extension, unit prices shall govern. Bids subject to unlimited price increases will not be considered.

44. Use of Brand Names (If Appropriate)

Unless otherwise stated in an Invitation for Bid, the name of a certain brand, make or manufacturer does not restrict bidders to the specific brand, make or manufacturer named; it conveys the general style, type, character, and quality of the article desired, and any article which the County in its sole discretion determines to be the equal of that specified, considering quality, workmanship, economy of operation, and suitability for the purpose intended, shall be accepted. Any catalog, brand name or manufacturer's reference used in bid invitation is descriptive - NOT restrictive - it is to indicate type and quality desired. Bids on brands of like nature and quality will be considered. If bidding on other than reference or specifications, bid must show manufacturer, brand or trade name, catalog number, etc. of article offered. If other than brand(s) specified is offered, illustrations and complete description must be submitted with bid. Samples may be required. If bidder makes no other bid and takes no exception to specifications or reference data, he will be required to furnish brand names, numbers, etc., as specified. Bidders must certify that item(s) bid upon meet and/or exceed specifications.

45. Permits

The successful Offeror must be responsible for obtaining all necessary city, county, and state permits/licenses and must comply with all local codes and ordinances. Copies of such permits/licenses shall be made available to the County upon request. Building contractors working within Georgetown County must also secure a Contractor's License from the Building Department. Work within the Georgetown City Limits may require a City Business License. For additional information, please review the "Forms and Fees" section of the Building and Planning web page at the link below:

<http://www.georgetowncountysc.org/building/default.html>

46. Environmental Management:

Vendor/Supplier/Contractor will be responsible for complying with all federal, state and local environmental regulations relating to transportation, handling, storage, spillage and any other aspect of providing the services specified herein, as applicable.

47. Bid Tabulation Results

Vendors wishing to view the bid tabulation results may visit the Georgetown County, SC web-site at: <http://www.georgetowncountysc.org>. Select "Purchasing", then "Bids Information" and double click the link under the individual bid listing.

48. The Bidder hereby certifies that he or she has carefully examined all of the Documents for the project, has carefully and thoroughly reviewed this Request for Bid/Quotation, has inspected the location of the project (if applicable), and understands the nature and scope of the work to be done; and that this Bid is based upon the terms, specifications, requirements, and conditions of the Request for Bid/ Documents. The Bidder further agrees that the performance time specified is a reasonable time, having carefully considered the nature and scope of the project as aforesaid.

49. Any attempt by the vendor to influence the opinion of County Staff or County Council by discussion, promotion, advertising, misrepresentation of the submittal or purchasing process or any procedure to promote their offer will constitute a violation of the vendor submittal conditions and will cause the vendor's submittal to be declared null and void.

50. Apparent omission of a detailed description concerning any point, shall be regarded as meaning the best commercial practice is to prevail and that only material and workmanship of the finest quality are to be used.

51. Response Clarification

Georgetown County reserves the right to request additional written or oral information from Bidders in order to obtain clarification of their Responses.

52. Georgetown County, SC has a Local Vendor Preference Option by code (Ordinance #2010-45):

**Sec 2-50. Local Preference Option**

1. A vendor shall be deemed a Local Georgetown County vendor for the purposes of this Section if such vendor is an individual, partnership, association or corporation that is authorized to transact business within the State, maintains an office in Georgetown County, and maintains a representative inventory or commodities within the County on which the bid is submitted, and has paid all taxes duly assessed.
2. This option allows the lowest local Bidder whose bid is the lesser of \$10,000 or within five-percent (5%) of the lowest non-local Bidder to match the bid submitted by the non-local Bidder and thereby be awarded the contract. This preference shall apply only when (a) the total dollar purchase is \$10,000 or more; (b) the vendor has a physical business address located and operating within the limits of Georgetown County and has been doing business in the County for a period of twelve (12) months or more; and (c) the vendor provides proof of payment of all applicable Georgetown County taxes and fees if so requested.
3. Should the lowest responsible and responsive Georgetown County bidder not exercise its right to match the bid as granted herein, the next lowest qualified Georgetown County bidder shall have that right and so on. The right to exercise the right to match the bid shall be exercised within 24 hours of notification of the right to match the non-Georgetown County bidder's bid.
4. In order to qualify for the local preference authorized by this Section, the vendor seeking same shall be required to submit with its bid a statement containing relevant information which demonstrates compliance with the provisions of this Section. This statement shall be on a form provided by the

County purchasing department and shall be signed under penalty of perjury. Failure to provide such affidavit at the time the bidder submits its bid shall constitute a waiver of any claim for preference.

5. For all contracts for architecture, professional engineering, or other professional services governed by § 2-56, Architect-Engineer and Land Surveying Services – Public Announcement and Selection Process, the county shall include the local business status of a firm among the factors considered when selecting which firms are “most highly qualified.” In determining which firm is the “most qualified” for purposes of negotiating a satisfactory contract, preference shall be given to a local business where all other relevant factors are equal.
6. Local preference shall not apply to the following categories of contracts: (a) Goods or services provided under a cooperative purchasing agreement or similar “piggyback” contract; (b) Contracts for professional services except as provided for in section five (§5) above; (c) Purchases or contracts which are funded, in whole or in part, by a governmental or other funding entity, where the terms and conditions of receipt of the funds prohibit the preference; (d) Purchases or contracts made pursuant to a noncompetitive award process, unless otherwise provided by this section; or (e) Any bid announcement which specifically provides that the general local preference policies set forth in this section are suspended due to the unique nature of the goods or services sought, the existence of an emergency as found by either the county council or county administrator, or where such suspension is, in the opinion of the county attorney, required by law.

See the RESIDENCE CERTIFICATION FOR LOCAL PREFERENCE form attached for details.

53. Vendor Checklist

The items indicated below must be returned as a part of the Bid Submission package:

- (a) Twenty (20) Page (maximum) Formatted Response
- (b) Mandatory Vendor Agreement & Declaration Form\*
- (c) Resident Certification for Local Preference (2 pgs.)\*
- (d) Substitute for W-9\*
- (e) Mandatory Exceptions Page\*
- (f) **SEPARATELY SEALED** Design-Builder Fee Proposal\* including Add/Alternate Fee Proposal\*

\*These forms do not constitute part of the 20-page limit.

The successful proposer will be required to provide a Certificate of Insurance naming Georgetown County, SC as an additional insured. This must be on file prior to any final award.

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**SUBSTITUTE FOR FORM W-9  
MANDATORY BID SUBMISSION FORM**

Pursuant to Internal Revenue Service Regulations, you must furnish your Taxpayer Identification Number (TIN) to Georgetown County. If this number is not provided, you may be subject to a 28% withholding on each payment.

**INDIVIDUAL OR OWNER'S NAME** \_\_\_\_\_

(Sole Proprietor Must Provide Individual Name along with Business Name)

**LEGAL BUSINESS NAME (d/b/a):** \_\_\_\_\_

**ADDRESS:**

( \_\_\_\_\_  
( \_\_\_\_\_  
( \_\_\_\_\_

**9 DIGIT TAXPAYER IDENTIFICATION NUMBER (TIN)**

(Individual Must Provide SS#; Sole Proprietorship may provide SS# or EIN#)

Social Security Number \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

Employer Identification Number \_\_\_\_\_ - \_\_\_\_\_

**BUSINESS DESIGNATION**

- Individual, Sole Proprietor, or Single-Member LLC
- S-Corporation
- Trust/Estate
- Non-Profit Organization/501(a)
- Limited Liability Company: C = Corporation S = S Corporation P = Partnership  
(Must Circle the appropriate Tax Classification)
- C-Corporation
- Partnership
- Governmental Entity
- Other: \_\_\_\_\_

**Exempt Payee Code (if any):** \_\_\_\_\_

(Exemption codes apply only to certain entities, not individuals; IRS W-9 instructions, page 3):

**PRINCIPAL BUSINESS ACTIVITY (List Type of Service or Product Provided):**

MEDICAL SERVICES PROVIDER       ATTORNEY/LEGAL SERVICES PROVIDER

**CERTIFICATION** Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
  2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
  3. I am a U.S. citizen or other U.S. person; and
  4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.
- Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. *The Internal Revenue Service does not require your consent to any provision of this document other than the certifications required to avoid back-up withholding.*

Signature: \_\_\_\_\_

Date \_\_\_\_\_



## RESIDENCE CERTIFICATION FOR LOCAL PREFERENCE

### MANDATORY VENDOR SUBMITTAL FORM

WHEREAS, Georgetown County Council desires to further its support of local businesses when awarding contracts for the provision of supplies and construction services to the County through its established procurement procedures.

THEREFOR pursuant to Georgetown County, SC Ordinance #2014-02 as adopted, §2-50 Local Preference Option, the Georgetown County Purchasing Officer requests each offeror provide Residence Certification. The Local Preference Option provides some restrictions on the awarding of governmental contracts; provisions of which are stated below:

#### **Sec 2-50. Local Preference Option**

5. A vendor shall be deemed a Local Georgetown County vendor for the purposes of this Section if such vendor is an individual, partnership, association or corporation that is authorized to transact business within the State, maintains an office in Georgetown County, and maintains a representative inventory or commodities within the County on which the bid is submitted, and has paid all taxes duly assessed.
6. This option allows the lowest local Bidder whose bid is within five-percent (5%) of the lowest non-local Bidder to match the bid submitted by the non-local Bidder and thereby be awarded the contract. This preference shall apply only when (a) the total dollar purchase is \$10,000 or more; (b) the vendor has a physical business address located and operating within the limits of Georgetown County and has been doing business in the County for a period of twelve (12) months or more; and (c) the vendor provides proof of payment of all applicable Georgetown County taxes and fees if so requested.
7. Should the lowest responsible and responsive Georgetown County bidder not exercise its right to match the bid as granted herein, the next lowest qualified Georgetown County bidder shall have that right and so on. The right to exercise the right to match the bid shall be exercised within 24 hours of notification of the right to match the non-Georgetown County bidder's bid.
8. In order to qualify for the local preference authorized by this Section, the vendor seeking same shall be required to submit with its bid a statement containing relevant information which demonstrates compliance with the provisions of this Section. This statement shall be on a form provided by the County purchasing department and shall be signed under penalty of perjury. Failure to provide such affidavit at the time the bidder submits its bid shall constitute a waiver of any claim for preference.

5. For all contracts for architecture, professional engineering, or other professional services governed by § 2-56, Architect-Engineer and Land Surveying Services – Public Announcement and Selection Process, the county shall include the local business status of a firm among the factors considered when selecting which firms are “most highly qualified.” In determining which firm is the “most qualified” for purposes of negotiating a satisfactory contract, preference shall be given to a local business where all other relevant factors are equal.
  
6. Local preference shall not apply to the following categories of contracts:
  - (a) Goods or services provided under a cooperative purchasing agreement or similar “piggyback” contract;
  - (b) Contracts for professional services except as provided for in section five (§5) above;
  - (c) Purchases or contracts which are funded, in whole or in part, by a governmental or other funding entity, where the terms and conditions of receipt of the funds prohibit the preference;
  - (d) Purchases or contracts made pursuant to a noncompetitive award process, unless otherwise provided by this section; or
  - (e) Any bid announcement which specifically provides that the general local preference policies set forth in this section are suspended due to the unique nature of the goods or services sought, the existence of an emergency as found by either the county council or county administrator, or where such suspension is, in the opinion of the county attorney, required by law.

I certify that [Company Name] \_\_\_\_\_ is a

**Resident Bidder** of Georgetown County as defined in Ordinance #2014-02, and our principal place of business is \_\_\_\_\_ [City and State].

I certify that [Company Name] \_\_\_\_\_ is a

**Non-Resident Bidder** of Georgetown County as defined in Ordinance #2014-02, and our principal place of business is \_\_\_\_\_ [City and State].

(X) \_\_\_\_\_

Signature of Company Officer



Georgetown County
DESIGN-BUILDER FEE PROPOSAL

(Submit in a SEPARATELY Sealed Envelope as Project Cost Matrix with back-up materials as necessary)

1. DESIGN-BUILDER'S FEE:

Basis of Fee: The Design-Builder's fee is the amount, established by and agreed to by both parties, which is the full amount of compensation due to the Design-Builder as gross profit, and for any and all expenses of the Project not included and identified as a Cost of Work, provided that the Design-Builder performs all the requirements of the Contract Documents within the time limits established. If applicable, the fees and costs should be broken down by each site within the project.

For the purpose of responding to the RFQ and for potential negotiations subsequent to final selection, candidate Design-Builder may express Fees A, B and C, below, in terms of percentages of this project's Guaranteed Maximum Price Limitation, which is \$650,000.00.

A. DESIGN FEE:

Design Fee: For the design services provided by the Design-Builder, the Owner shall pay to the Design-Builder a Design Fee.

Table with 2 columns: Design Fee - FIXED FEE, \$

B. CONSTRUCTION FEE:

Construction Fee: For the construction services provided by the Design-Builder, the Owner shall pay to the Design-Builder a Construction Fee.

Table with 2 columns: Construction Fee - FIXED FEE, \$

Please attach a separate sheet listing any additional costs for Add/Alternate #1, #2, and #3 as described within the RFQ and label page as "Add/Alternate Fee Proposal".

2. DESIGN-BUILDER'S OVERHEAD COSTS (Construction):

The Design-Builder's Overhead Costs: The maximum amount in dollars projected for the Design-Builder's Expenses and Construction Overhead Costs and Expenses are inclusive of all direct and incidental expenses. For this Fee Proposal, project these costs and expenses to include field office furniture/furnishing and utilities, office supplies - construction, superintendent truck/phone/cell/phone, temporary construction facilities, workers compensation insurance, liability and property insurance for project and miscellaneous insurance.

Table with 2 columns: Construction Overhead Costs and Expenses - FIXED FEE, \$

Proposer (Firm): \_\_\_\_\_

Signature: \_\_\_\_\_

Printed Name: \_\_\_\_\_

Title: \_\_\_\_\_



## **Vendor Agreement & Declaration Mandatory Submittal Form**

Each vendor submitting a bid proposal to Georgetown County shall agree to the conditions listed below. If a vendor cannot agree to these terms, or in any way violates the conditions, the response will be judged Non-Responsive and not considered for award. If the conditions are violated during the evaluation process for proposals prior to the execution of a contract by Georgetown County, the proposal of the vendor violating the conditions will become null and void and the vendor's submittal withdrawn from consideration for the award.

The Mandatory Conditions are:

- 1) We certify that our Design-Build entity's "Designer" has current South Carolina Architectural and/or Engineering license(s) as appropriate for their portion of the design work.
- 2) We certify that our Design-Build entity's "Builder" has a current South Carolina Contractor's license with classification BD and group limitation Group 5.
- 3) Our building firm has a safety Experience Modification Rate average of less than 1.0 over the last three years.
- 4) We certify that our firm has sufficient bonding capacity to provide a payment and performance bonds with coverage equal to the total cost of the project.
- 5) We certify that our firm will obtain a Builder's Risk Insurance Policy for this project with coverage equal to the total cost of the project.
- 6) We certify that our firm will have and maintain liability insurance coverage for a total of \$5 million for commercial general liability, and not less than \$1 million per claim for commercial business automobile liability, and that we will include coverage for errors and omissions of not less than \$1 million per claim. We further pledge that Georgetown County will be named as an additional insured party and loss payee on the insurance policies just described.
- 7) Such signed statement shall be placed in an appendix and will not count toward your page limit.

\_\_\_\_\_  
FIRM NAME

\_\_\_\_\_  
DATE

SIGNATURE OF PERSON AUTHORISING BID \_\_\_\_\_

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# EXCEPTIONS PAGE

## MANDATORY BID SUBMISSION FORM

List any areas where you cannot or will not comply with the specifications or terms contained within the bid documentation. If none, write "NONE".

**APPENDIX A**



Google earth

feet  
meters



APPENDIX B

**Report of Geotechnical Exploration  
Georgetown County Airport Corporate Hangar  
Georgetown, South Carolina  
S&ME Project No. 1463-16-022**



Prepared for:  
Georgetown County Department of Public Services  
108 Screven Street  
Georgetown, South Carolina 29440

Prepared by:  
S&ME, Inc.  
1330 Highway 501 Business  
Conway, South Carolina 29526

June 2, 2016



June 2, 2016

Georgetown County Department of Public Services  
108 Screven Street  
Georgetown, South Carolina 29440

Attention: Ms. Nancy Silver

Reference: **Report of Geotechnical Exploration**  
**Georgetown County Airport Corporate Hangar**  
Georgetown, South Carolina  
S&ME Project No. 1463-16-022

Dear Ms. Silver:

S&ME, Inc. has completed the subsurface exploration for the referenced project after contract execution on May 4, 2016. Our exploration was conducted in general accordance with our Proposal No. 14-1600363, dated May 3, 2016.

The purpose of this study was to characterize the surface and subsurface soils on the proposed site, and to provide recommendations for site preparation and earthwork, foundation types and seismic design values, on-site soil suitability, pavement subgrade preparation, and pavement section thickness. This report presents the findings of our exploration along with our conclusions and recommendations.

S&ME, Inc. appreciates this opportunity to be of service to you. Please contact us if you have questions concerning this report or any of our services.

Sincerely,

S&ME, Inc.

*Chelsea Jones*  
Chelsea Jones NK  
Staff Professional



*Ronald P. Forest, Jr.*  
Ronald P. Forest, Jr., P.E.  
Senior Engineer





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## ❖ Executive Summary

For your convenience, this report is summarized in outline form below. This brief summary should not be used for design or construction purposes without reviewing the more detailed information presented in the remainder of this report.

1. **Soil Conditions:** Topsoil between 3 to 4 inches thick was observed at the surface at each sounding/boring location. Beneath the topsoil, the soil profile generally consists of a loose to medium dense sand layer with thin interbedded clay seams (Stratum I) to depths of about 47 feet, where our cone penetration test encountered refusal to further advancement on very dense materials. The thin interbedded clay seams started at a depth of 27.5 feet and were layered between sandy soils to a depth of about 42 feet.
2. **Subsurface Water:** Water was not encountered within the hand auger borings which were each advanced to a depth of 4 feet. Water levels within the cone soundings were interpreted from pore pressure readings to be approximately 5.5 feet below the existing ground surface.
3. **Seismic Site Class and Liquefaction:** Sounding data indicates that this site is best described as IBC 2012 seismic Site Class F. Liquefaction was determined to be a significant risk at this site, based upon our soundings, with liquefaction-related settlement magnitudes estimated to reach about 10 to 12 inches during an earthquake considering the design earthquake ground accelerations. This is due to the very sandy profile, and the loose condition of much of the sands. Subsurface ground improvement using geo-composite drains (or "earthquake drains") is recommended to mitigate these settlements.
4. **Seismic Design Parameters:** Once the liquefaction risk has been mitigated, the following Site Class D seismic design parameters would be applicable for seismic design:  $S_{DS} = 0.61g$ ,  $S_{D1} = 0.32g$ , and Mapped MCE Geometric Mean Peak Ground Acceleration ( $PGA_M$ ) = 0.47g. The Seismic Design Category is D for all Risk Categories.
5. **Shallow Foundations:** Shallow foundations may be used to support the corporate hangar building assuming that the structure can be designed to tolerate the predicted static settlements associated with the building loads, and assuming that the seismic settlement potential is mitigated by ground improvement, or that the structure is designed to tolerate the predicted magnitudes of seismic settlement without collapsing.
  - Considering the provided structural loads, we recommend an allowable bearing capacity of 2,000 psf for design of isolated shallow spread footings. The estimated total static settlement under the assumed loads is approximately  $\frac{3}{4}$  inch or less.
6. **Pavements:** The anticipated traffic loads of the aircraft, passenger automobiles, and occasional fuel truck or light delivery truck are anticipated to be very low; therefore, the pavement section thickness designs at this site are governed by the subgrade conditions. The laboratory California Bearing Ratio of the upper sand, compacted to 95 percent of the modified Proctor maximum dry density and then allowed to saturate, was 15 percent.

Based upon the estimated traffic frequencies and loadings, and using SCDOT design guidelines, we recommend a hot mix asphalt (HMA) thickness of at least 2 inches, overlying a graded aggregate base course thickness of at least 8 inches. For rigid (concrete) pavement areas, we recommend a joint-reinforced Portland cement concrete thickness of at least 5 inches, overlying a



base course layer with a thickness of at least 6 inches. These pavement sections may not be suitable for repeated heavy truck traffic, which was not anticipated to occur.

If the pavement is designed to FAA standards (instead of SCDOT), recognize that in our experience the FAA standards for the small aircraft expected to use this facility would require a minimum crushed aggregate base course thickness of 6 inches with a minimum hot mix asphalt (HMA) thickness of 4 inches of SCDOT Type B Surface Course HMA placed in two, 2-inch lifts. The HMA must be placed in general accordance with FAA P-403 procedures.

## 1.0 Introduction

The purpose of this exploration was to obtain subsurface information to allow us to characterize the subsurface conditions at the site and to develop recommendation concerning earthwork, foundations, pavements, and other related construction issues. This report describes our understanding of the project, presents the results of the field exploration and laboratory testing, and discusses our conclusions and recommendations.

A site plan showing the approximate exploration location is included in Appendix I. The sounding logs, hand auger logs, discussion of the field exploration procedures, and legends of soil classification and symbols are included in Appendix II. Appendix III contains the results of the laboratory testing and our laboratory test procedures.

### 1.1 Site and Project Description

Project information was provided in an email from Nancy Silver (Georgetown County) to Tommy Still (S&ME, Inc.) on April 29, 2016. Ms. Silver followed up with an email to Chelsea Jones (S&ME) that contained a preliminary site plan with an issue date of April 22, 2016.

### 1.2 Site Description

The site is located at the Georgetown County Airport off of 129 Airport Road in Georgetown, South Carolina. A site vicinity map is attached in Appendix I as Figure 1. The site currently exists as a recently cleared/mulched lot.

### 1.3 Project Description

The project includes construction of one new, single-story, metal-framed, corporate hangar building, having approximately 12,000 square feet in plan area. The new structure is intended to be constructed upon a soil-supported concrete slab with shallow foundations.

Asphalt pavement apron area totaling approximately 6,300 square feet in plan area is planned to be provided on the front side of the new hangar building with the taxiway extending to the new hangar from the previous hangars.

Although a site topographic plan was not provided to us, we understand that proposed site grades may be raised approximately one foot above existing grades.

## 2.0 Exploration Procedures

### 2.1 Field Exploration

Between May 16, 2016 and May 20, 2016, representatives of S&ME, Inc. visited the site. Using the information provided, we performed the following tasks:

- ◆ We performed a site walkover, observing features of topography, existing structures, ground cover, and surface soils at the project site.

- ◆ We established one seismic cone penetration test (SCPT) sounding location and one cone penetration test (CPT) sounding location. We also established locations for four hand auger borings with dynamic cone penetrometer (DCP) testing at the site within the future apron. A test location sketch is attached in Appendix I as Figure 2.
- ◆ We advanced one SCPT sounding (SCPT-1) within the approximate future building footprint to the refusal depth of 47 feet, and one CPT sounding (CPT-2) to a depth of 20 feet. Within the SCPT sounding, downhole shear wave velocity measurements were obtained at approximate 1 meter depth intervals until the sounding was terminated. In the SCPT/CPT soundings, an electronically instrumented cone penetrometer was hydraulically pushed through the soil to measure tip point stress, pore water pressure, and sleeve friction. The data was then used to determine soil stratigraphy and to estimate soil parameters such as preconsolidation stress, friction angle, and undrained shear strength.
- ◆ We advanced a hand auger boring at the sounding locations SCPT-1 and CPT-2 within the future building footprint to a depth of 4 feet each.
- ◆ We advanced four hand auger borings (HA-1 through HA-4) within the future apron to a depth of 4 feet each. In conjunction with these hand auger borings, DCP testing was performed at approximate one-foot intervals in each boring in general accordance with ASTM STP 399, "Dynamic Cone for Shallow In-Situ Penetration Testing" to provide us with an index for estimating soil strength parameters and relative consistency of the near-surface soils encountered.
- ◆ The subsurface water level at test location was measured in the field at the time of our field work, or interpreted from CPT pore pressure readings.

A brief description of the field exploration procedures performed, as well as the sounding and hand auger boring logs, is attached in Appendix II.

## 2.2 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, 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 hand auger boring logs, included in Appendix II. Similar soils were grouped into representative strata on the logs. The strata contact lines represent approximate boundaries between soil types. The actual transitions between soil types in the field are likely more gradual in both the vertical and horizontal directions than those which are indicated on the logs.

We performed the following quantitative ASTM-standardized laboratory tests on several samples to help classify the soils and formulate our conclusions and recommendations. The laboratory tests performed included the following:

- ◆ One sample 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.
- ◆ One sample tested in general accordance with ASTM D 422, "Standard Test Method for Particle Size Analysis of Soils," without hydrometer, to measure the distribution of particle sizes greater than 75  $\mu\text{m}$ .

- ◆ One sample tested in general accordance with ASTM D 1140, Standard Test Methods for Amount of Material in Soils Finer than No. 200 (75- $\mu$ m) Sieve, to measure the percent clay and silt fraction.
- ◆ One sample tested in general accordance with ASTM D 4318, "Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils", to measure the plasticity of the soil.
- ◆ One sample tested in general accordance with ASTM D 1557, "Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 lbf/ft<sup>3</sup>)", to measure the moisture-density relationship of the soil.
- ◆ One 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 and procedures for the above listed tests are attached to this report in Appendix III.

### **3.0 Site and Surface Conditions**

This section of the report describes the general site and surface conditions observed at the time of our exploration.

#### **3.1 Topography**

We observed that the proposed construction area appears to be relatively level. Ground surface elevations were not directly surveyed, and no site specific topographic plan was made available to us; therefore, for the purpose of our hand auger logs (Appendix II), the ground surface level was set to zero.

#### **3.2 Topsoil Thickness**

Topsoil was encountered at each of the boring locations. Topsoil thickness ranged from about 3 to 4 inches. Rootmat may be thicker in previously wooded areas, and stumps can be expected where vegetation is cleared.

#### **3.3 Local Geology**

The site lies within the Coastal Terraces Region of the Lower Coastal Plain of South Carolina. The topography of this region is dominated by a series of archaic beach terraces, exposed by uplifting of the local area over the last one million years. The lower coastal plain terraces are relatively young Quaternary age features, exhibit only minor surface erosion, and can be traced large distances on the basis of surface elevation. Each terrace forms a thin veneer over older, consolidated marine shelf or terrestrial Coastal Plain residual soils that are Cretaceous to Tertiary in age.

Surface soils penetrated at our test locations have been interpreted to be a part of the Socastee Formation, consisting of relatively recent marine deposits of sands and clays laid down approximately 200,000 years ago.

Below the Socastee Formation, soils are mapped as sands of the Bear Bluff Formation. These are late Pliocene-age materials that were laid down approximately 1.8 to 2.4 million years ago.

## 4.0 Subsurface Conditions

The generalized subsurface conditions at the site are described below. For more detailed descriptions and stratifications at test locations, the respective sounding logs should be reviewed in Appendix II.

### 4.1 Description of Subsurface Soils

This section describes subsurface soil conditions observed at the site. A subsurface cross-sectional soil profile has not been generated to show the stratigraphy, because there was only one major soil stratum observed during our exploration.

#### 4.1.1 *Stratum I: Loose to Medium Dense Sands with Interbedded Clays*

Underlying the topsoil, a layer of sands consisting of poorly graded sand (USCS Classification "SP") and poorly graded sand with silt (SP-SM) was encountered to a depth of approximately 47 feet. Within the CPT soundings, the sandy soils of this stratum exhibited tip stresses ranging from 30 tons per square foot (tsf) to about 250 tsf but were typically in the range of 40 tsf to 120 tsf, indicating typically medium dense conditions with some loose zones and some dense zones. The sleeve stresses in these soils ranged from near 0.25 tsf to 1.5 tsf, typical of sandy soils. Thin seams of interbedded clays started at a depth of about 27.5 feet and continued to a depth of about 42 feet, and were layered between zones of loose to medium dense sand. These clay seams exhibited tip stresses of about 15 tsf to 30 tsf, indicating stiff clays. The sleeve stresses in these clay soils ranged from near 0 tsf to 0.2 tsf.

DCP penetration resistance values, as measured in the hand auger borings to a depth of 4 feet, ranged from 8 blows per increment (bpi) to greater than 20 bpi, and averaged about 12 bpi overall. Soil conditions in borings HA-1 through HA-3 were typically medium dense. Soils were loose in hand auger boring HA-4.

A composite bulk sample was collected from the upper portion of Stratum I and subjected to natural moisture content, grain size distribution, and plasticity testing. The soil was collected from approximately 1 to 3 feet below grade in hand auger borings HA-1 through HA-4 and was classified as poorly graded sand with silt (SP-SM) with a fines content of 5.8% passing the No. 200 sieve. This sample exhibited non-plastic behavior and was brown in color. The natural moisture content was measured to be 8.0%. Modified Proctor testing indicated a maximum dry density of 109.1 pounds per cubic foot (pcf) at an optimum moisture content of 9.1 percent. The CBR value measured at 95.2 percent compaction was 15 percent.

#### 4.1.2 *Refusal to Further Advancement*

At a depth of 47 feet in sounding SCPT-1, refusal to further advancement of the drilling tools was encountered in very hard materials. This likely represents a cemented marine sand layer or a cemented shell zone, which is relatively common in this geology.

## 4.2 Subsurface Water

Water was not encountered within the hand auger borings which were each advanced to a depth of 4 feet. Water levels within the cone soundings were interpreted from pore pressure readings to be

approximately 5.5 feet below the existing ground surface. Subsurface water levels may fluctuate seasonally at the site, being influenced by rainfall variations and other factors.

## 5.0 Seismic Site Class and Design Parameters

Seismic-induced ground shaking at the foundation is the effect taken into account by seismic-resistant design provisions of the International Building Code (IBC). Other effects, including landslides and soil liquefaction, must also be considered.

### 5.1 IBC Site Class

As of July 1, 2013, the 2012 edition of the International Building Code (IBC) has been adopted for use in South Carolina. We classified the site as one of the Site Classes listed in IBC Section 1613.3, using the procedures described in Chapter 20 of ASCE 7-10.

We understand that the 2015 edition of the IBC becomes effective in South Carolina for projects permitted after July 1, 2016. (Source: <http://www.llr.state.sc.us/POL/BCC/>); therefore, it is important to note that if this project is not permitted for construction prior to July 1, 2016, a seismic update to this report may become necessary.

The initial step in site class definition is a check for the four conditions described for Site Class F, which would require a site-specific evaluation to determine site coefficients  $F_A$  and  $F_V$ . Soils vulnerable to potential failure under item 1) including quick and highly sensitive clays or collapsible weakly cemented soils were not observed in the soundings. Three other conditions, 2) peats and highly organic clays; 3) very high plasticity clays ( $H > 25$  feet); and 4) very thick soft/medium stiff clays were also not evident in the soundings performed. One other determining characteristic, liquefaction potential under seismic conditions, was assessed. Soils were assessed qualitatively for liquefaction susceptibility based on their age, stratum, mode of deposition, degree of cementation, and size composition. This assessment considered observed liquefaction behavior in various soils in areas of previous seismic activity.

Our analysis, which is more fully described below, indicates that significant liquefaction of subsoils appears likely to occur at this site in the event of the design magnitude earthquake due primarily to the sandy and somewhat loose characteristics of the majority of the soil profile. Therefore, the seismic Site Class for this site is "F".

The IBC requires a site-specific evaluation for Site Class F, but it allows an exception for structures having fundamental periods of vibration equal to or less than 0.5 seconds. We expect that the structure proposed for this site would meet this criterion for this exception. For these stiff structures, site-specific evaluations are not required to determine spectral accelerations for sites with liquefiable soils. Rather, the site class may be determined in accordance with the soil profile, assuming no liquefaction, and the corresponding values of  $F_A$  and  $F_V$  may be determined from the tables contained in the code provisions, as long as the risks of liquefaction are considered in design. Under these criteria, site response factors  $F_A$  and  $F_V$  that correspond to Site Class D would be applicable for this site to determine spectral acceleration values for design. This recommendation is provided based on the average weighted shear wave velocity measured to a depth of 45 feet and interpolated to a depth of 100 feet. The average weighted shear wave velocity was estimated to be 790 feet per second, which is greater than the minimum of 600 feet per

second that is required for consideration of Site Class D design parameters. See Appendix I for the shear wave velocity profile.

## 5.2 Seismic Design Coefficients

Selection of the base shear values for structural design for earthquake loading is the responsibility of the structural engineer. However, for the purpose of evaluating seismic hazards at this site, S&ME has evaluated the spectral response parameters for the site using the general procedures outlined under the 2012 International Building Code Section 1613.3. This approach utilizes a mapped acceleration response spectrum reflecting a targeted risk of structural collapse equal to 1 percent in 50 years to determine the spectral response acceleration at the top of seismic bedrock for any period. The 2012 IBC seismic provisions of Section 1613 use the 2008 Seismic Hazard Maps published by the National Earthquake Hazard Reduction Program (NEHRP) to define the base rock motion spectra.

The Site Class is used in conjunction with mapped spectral accelerations  $S_S$  and  $S_1$  to determine Site Amplification Coefficients  $F_A$  and  $F_V$  from tables 11.4-1 and 11.4-2 in section 11.4.7 of ASCE 7-10. For purposes of computation, the Code includes probabilistic mapped acceleration parameters at periods of 0.2 seconds ( $S_S$ ) and 1.0 seconds ( $S_1$ ), which are then used to derive the remainder of the response spectra at all other periods. The mapped  $S_S$  and  $S_1$  values represent motion at the top of seismic bedrock, defined as the Site Class B-C boundary. The surface ground motion response spectrum, accounting for inertial effects within the soil column overlying rock, is then determined for the design earthquake using spectral coefficients  $F_A$  and  $F_V$  for the appropriate Site Class.

The design ground motion at any period is taken as 2/3 of the smoothed spectral acceleration as allowed in section 1613.3.4. The design spectral response acceleration values at short periods,  $S_{DS}$ , and at one second periods,  $S_{D1}$ , are tabulated below for the unimproved soil profile using the IBC 2012 criteria.

The 2012 IBC specifically references ASCE 7-10 for determination of peak ground acceleration value for computation of seismic hazard. Peak ground acceleration is separately mapped in ASCE 7-10 and corresponds to the geometric mean Maximum Credible Earthquake ( $MCE_G$ ). The mapped PGA value is adjusted for site class effects to arrive at a design peak ground acceleration value, designated as  $PGA_M$ .

**Table 5-1: Spectral Acceleration Response Parameters**

Site Class D Parameters	
Parameter	Design Value
$S_{MS}$	0.92 g
$S_{M1}$	0.49 g
$F_A$	1.19
$F_V$	1.89
$S_{DS}$	0.61 g
$S_{D1}$	0.32 g
$PGA_M$	0.47

For a structure having a Risk Category classification of I, II, III, or IV the  $S_{DS}$  and  $S_{D1}$  values obtained are consistent with "Seismic Design Category D" as defined in section 1613.3.5 of the IBC.

### 5.3 Liquefaction Potential

Liquefaction of saturated, loose, cohesionless soils occurs when they are subjected to earthquake loading that causes the pore pressures to increase and the effective overburden stresses to decrease, to the point where large soil deformation or even transformation from a solid to a liquid state results. Earthquake-induced ground surface acceleration at the site was assumed from the building code design peak ground acceleration of 0.47g.

To evaluate liquefaction potential, we performed analyses using the data obtained in the soundings, considering the characteristics of the soil and water levels observed. The liquefaction analysis was performed based on the design earthquake prescribed by the 2012 edition of the International Building Code, the "simplified procedure" as presented in Youd et al. (2001), and recent research concerning the liquefaction resistance of aged sands (Hayati & Andrus, 2008; Andrus et al. 2009; Hayati & Andrus, 2009). Our analysis indicates that sandy zones below the water table between depths of about 6 to 40 feet below the existing ground surface have the potential to liquefy during the design seismic event.

To help evaluate the consequences of liquefaction, we have computed the Liquefaction Potential Index (LPI), which is an empirical tool used to evaluate the potential for liquefaction to cause damage. The LPI considers the factor of safety against liquefaction, the depth to the liquefiable soils, and the thickness of the liquefiable soils to compute an index that ranges from 0 to 100. An LPI of 0 means there is no risk of liquefaction; an LPI of 100 means the entire profile is expected to liquefy. The level of risk is generally defined below.

- ◆ **LPI < 5** – surface manifestation and liquefaction-induced damage not expected.
- ◆ **5 ≤ LPI ≤ 15** – moderate liquefaction with some surface manifestation possible.
- ◆ **LPI > 15** – severe liquefaction and foundation damage is likely.

The LPI for this site is greater than 15, which indicates that the risk of liquefaction is significant and foundation damage may occur in the event of the code-level earthquake unless the ground is improved.

### 5.4 Settlement Due to Volumetric Compression

The settlement of sands due to volumetric compression of liquefied soils depends on the induced cyclic stresses from the earthquake, the vertical effective stress at the depth of the layer being examined, and the equivalent clean sand corrected SPT value. A rigorous evaluation of surface settlement due to earthquake motion was beyond our current scope, but settlements were estimated in general terms to be on the order of 10 to 12 inches for the liquefiable layer. Settlements occurring due to volumetric strains within the liquefied soils are likely to be highly variable across the site. Differential settlement of slabs or structures bearing on the surface may approach three-quarters of the total settlement potential, or in this case, 7 to 9 inches, unless the ground is improved. In our experience, these magnitudes of settlement cannot typically be tolerated by most structures.

## 6.0 Conclusions and Recommendations

The conclusions and recommendations included in this section are based on the project information outlined previously and the data obtained during our exploration. If the construction scope is altered, the proposed building location is changed, or if conditions are encountered during construction that differ from those encountered by the borings or soundings, then S&ME, Inc. should be retained to review the following recommendations based upon the new information and make any necessary changes.

### 6.1 Seismic Considerations

We have estimated that up to 10 to 12 inches of total settlement and up to 7 to 9 inches of differential settlement may occur in the event of the design magnitude earthquake. The 2012 IBC requires that the design account for (or mitigate) the effects of liquefaction in order to prevent structural collapse and the potential for loss of life, but does not require prevention of the loss of building serviceability. Loss of serviceability would include the economic loss due to cracking and distress of the floor slabs, sheetrock walls and other interior finishes, possible distress or cracking of exterior facia, windows, and distress to conduits, service lines, and building contents, all requiring partial or complete replacement after an earthquake.

The structural engineer should consider the anticipated earthquake-induced settlements during foundation design to evaluate the potential for collapse or significant loss of serviceability of the structure without below-ground mitigation of the liquefaction potential. If the design can prevent structural collapse, the owner may choose to accept the level of risk associated with any loss of serviceability that would occur in the event of the code-level earthquake. The owner may not choose to accept life safety risks.

If it is determined that the structural design cannot accommodate the potential combined static and seismic settlements, then ground improvement should be performed.

### 6.2 Ground Improvement Alternatives

Based on our exploration at the site and experience in the general area, we considered feasible ground improvement alternatives to reduce the risk of unacceptable settlements produced by liquefaction-related volumetric change within Stratum I. Assuming proper design and construction, each alternative reduces the estimated combined static and liquefaction-related (resulting from the design earthquake) settlement to one inch or less. The two alternatives presented are: geo-composite drains and vibro-compaction.

In our experience, it is likely that geo-composite drains will be the more economical choice because of the relatively small size of this project and site; however, we have also presented vibro-compaction as a second alternative to be considered.

#### 6.2.1 *Geo-Composite Drains*

An option to reduce, but not completely mitigate the site susceptibility to liquefaction is to install a grid of geo-composite drains (a.k.a. earthquake drains) beneath the proposed structure. The drains allow for the rapid dissipation of excess soil porewater pressures generated during a seismic event, thus reducing the potential for liquefaction. The drains are composed of corrugated, perforated plastic pipe encased in a

filter fabric that prevents migration of fines into the pipe. They are installed by vibrating a small diameter steel casing into the ground that helps densify the surrounding loose sands and allows insertion of the drainpipe. The drains are typically installed on a 4-ft to 6-ft, center-to-center spacing, and fully penetrate the liquefiable soils, which at this site would be about 40 feet below the existing grade. Design for the geo-composite drains should be solicited from a specialty contractor and then reviewed by S&ME. The treated area should extend at least 20 feet outside the building footprint.

Following installation of geo-composite drains, it is estimated that earthquake-related settlement potential due to liquefaction will be on the order of  $\frac{3}{4}$  to 1 inch.

### 6.2.2 *Ground Improvement by Vibro-Compaction*

Ground improvement by vibro-compaction could be performed at the site to densify the in situ soils and limit risk of liquefaction and surface rupture under the design seismic event.

Vibro-compaction is a construction technique used to densify, and reduce the liquefaction susceptibility of, "clean", cohesionless soils. Vibro-compaction uses a specially designed vibrator, typically suspended from a crawler crane, which penetrates the ground with the aid of water jets. A rotating eccentric mass within the vibrator generates relatively large horizontal vibrations that densify loose sands. Once the vibrator has penetrated to the specified depth, the water flow is stopped or reduced, and then the densification process begins by slowly withdrawing the vibrator from the ground. During compaction, a clean sand backfill is added from the ground surface to compensate for the reduction in soil volume resulting from the densification process. In this way, the original site elevation is maintained. The process is then repeated across the target area on a grid spacing.

The effectiveness of treatment is typically very dependent on operator skill and employment of a vibrator operating at the optimum amplitude and frequency. Often the pattern of the probe points has to be determined by trial and error, using one or more test points to gauge the effectiveness of the treatment, before going into production.

Vibro-compaction is effective on clean, relatively uniform sandy soils with a fines content of less than 5 percent using a grid spacing of about 6 to 10 feet. This method can also be effectively performed on soils of up to 10 to 15 percent fines if the spacing is reduced. The method provides effective densification of saturated sands with a range of grain sizes.

Outside of the optimum gradation, effectiveness of the densification becomes progressively lower. Also, the presence of thin clay seams can also dampen out vibrations and lower the densification achieved. Further, densification above the water table will be minimal. Densification should be carried out until liquefiable sands achieve a minimum density level sufficiently high to minimize their liquefaction risk.

The treated area should extend at least 20 feet outside of the proposed building footprints. Vibro-compaction should be extended to a depth of about 40 feet. Volume reduction due to densification of non-cohesive soils may result in surface settlements of 5 to 10 percent of the treated depth. This settlement could necessitate the use of additional fill material to raise the site to its original level.

Following vibro-compaction, it is estimated that earthquake-related settlement potential due to liquefaction will be on the order of  $\frac{3}{4}$  to 1 inch.

Following vibro-compaction treatment, cone penetration (CPT) testing should be performed at the 2 locations previously explored within the building footprint (SCPT-1 and CPT-2), to a depth of 40 feet each. Using this data, liquefaction analyses should be performed to confirm the necessary densification. Follow-up testing should indicate tip stress values of at least 70 tons per square foot (tsf) throughout the treated zone to limit risk of future liquefaction under the design earthquake.

### **6.3 Site Preparation**

The following recommendations are provided regarding general site preparation and earthwork:

1. Drainage should be implemented and maintained prior to and during construction to divert water away from the construction area. Surface and subsurface water conditions that occur during construction will determine the need for and extent of drainage measures.
2. Strip surface vegetation and topsoil, where encountered, and dispose of outside the building footprint.
3. After the stripping operation is complete and site drainage has been established, the stripped surface in areas to receive fill should be densified with a heavy roller prior to placement of new fill. This is because of the loose condition of the near-surface sands. Moisture conditioning by the addition of water or drying of soils should be expected to be required prior to densification. The surface should be densified to at least 95 percent of the modified Proctor maximum dry density (ASTM D 1557) to a depth of at least 10 inches.
4. Following densification, the densified surface should be proofrolled under the observation of the geotechnical engineer (S&ME) by making repeated passes with a fully-loaded dump truck or earth-moving pan. The proofrolling should be conducted only during dry weather. Areas of rutting or pumping soils indicated by the proofroll may require selective undercutting or further stabilization prior to any new fill placement or slab or pavement construction, as determined by the geotechnical engineer.
5. Although not expected to occur on a widespread basis at this site, where any soft, clayey or silty soils are exposed by the stripping operation, they should also be proofrolled, but not until they have first been stabilized. Areas of rutting or pumping soils, as indicated by the proofroll, may require selective undercutting or further stabilization prior to fill placement, as determined by the geotechnical engineer. Stabilization may take the form of removal and replacement, plowing and drying, or other means as determined by the geotechnical engineer.
6. Following the construction of the fill embankment, pavement areas should be proofrolled at final soil subgrade elevation under the observation of the geotechnical engineer (S&ME). If any areas of instability are observed during the proofroll, further stabilization should be performed, as determined by the geotechnical engineer.

### **6.4 Borrow Materials, Fill Placement and Compaction Recommendations**

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

1. Prior to fill placement, 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 the fill soils used to build up the pad for the structure and pavements meet the following minimum requirements: plasticity index of 6 percent or less; clay/silt fines content of not greater than 15 percent. Typically this would include USCS soil classifications SW, SP, SW-SC, SW-SM, SP-SC, and SP-SM. Based upon our laboratory test data, the soils observed within our borings HA-1 through HA-4 appear to meet these criteria to a depth of 4 feet, so it should be anticipated that near-surface on-site soils (other than the topsoil) that are excavated during construction are likely to be of suitable soil type to re-use as structural backfill, but these soils may be wet if borrowed from at or below the water table.

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 should not exhibit pumping or rutting under equipment traffic. Loose lifts of fill should be no more than 10 inches thick prior to compaction. Structural fill should extend at least 5 feet from the edge of structures and pavements before either sloping or being allowed to exhibit a lower level of compaction.
3. Where present, the subsurface water level should be maintained at least 2 feet below any surface to be densified prior to beginning compaction. This is to reduce the risk of the compaction operations drawing water up to the surface and deteriorating it.
4. 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 in large area fills, with a minimum of 2 tests per lift. At least one field density test should be conducted for each 150 cubic feet of fill placed in confined areas such as isolated undercuts and in trenches, with a minimum of 1 test per lift.

## 6.5 Design and Construction of Shallow Foundations

The soil profile encountered appears generally suitable to support the assumed building loads considering static loading conditions.

1. Provided the earthquake-related settlement risks can be accepted with loss of building serviceability, or mitigated through structural design, the proposed building may be supported on shallow foundations using isolated spread foundations. A net available bearing pressure of up to 2,000 psf is recommended for design of individual wall or column footings that are extended to bear upon compacted structural fill compacted as recommended in Section 6.4 of this report.
2. Lateral capacity of foundations includes a soil lateral pressure and coefficient of friction as described in IBC Section 1806. Foundations will be embedded in material similar to those described as "Class 4" in Table 1806.2. Where footings are cast neat against the sides of excavations in natural soils, an allowable lateral bearing pressure of 150 psf per foot depth below natural grade may be used in computations. An allowable coefficient of friction of 0.3, multiplied by the dead load, may be used for computation of sliding resistance. An increase of one-third in the allowable lateral capacity may be considered for load combinations, including wind or earthquake, as permitted by IBC Section 1605.3.2, unless otherwise restricted by design code provisions.
3. It should be anticipated that where footings bear directly on fill, the previously placed fill soils exposed in the bottom of the footings at the time of excavation may need to be re-tamped to increase their density prior to the placement of reinforcing steel and foundation concrete.
4. Even if smaller dimensions are theoretically allowable from a bearing pressure consideration, the minimum individual spread footing widths should be at least 24 inches, and minimum wall

footing width should be 16 inches, to avoid punching shear. Spread footings should be embedded to a minimum depth of 12 inches, or the depth specified on the drawings, whichever is greater.

5. Have a representative of the geotechnical engineer (S&ME) observe each cleaned footing excavation prior to reinforcing steel and concrete placement to observe that the required level of soil compaction and/or bearing capacity is present at the bearing surface.
  - A. Dynamic Cone Penetrometer (DCP) testing should be performed in column footing excavations to evaluate the available bearing capacity.
  - B. In cases where the DCP testing indicates insufficient bearing capacity for support of the applied bearing pressure, the foundation bearing soils may need to be undercut and replaced with stronger material. We recommend that open-graded coarse gravel such as SCDOT No. 57 or No. 67 stone be used as the backfill material to replace undercut soils. The exact depth of the recommended undercut should be a case-by-case decision made at the time of construction based upon the results of the DCP testing, as evaluated by the Geotechnical Engineer.
  - C. Where sandy fill soils are exposed at the foundation bearing elevation, it is likely that the bearing surface may need to be surface-densified in place using small, hand-operated compaction equipment in order to improve the density of the immediate bearing soil surface. Again, this will need to be a case-by-case decision made at the time of construction based upon the results of the DCP testing, as evaluated by the Geotechnical Engineer.
  - D. Have the Geotechnical Engineer observe any undercut areas in footings prior to backfilling, in order to confirm that unsuitable soils have been removed and that the exposed subgrade is suitable for support of footings and backfill.
6. For the purposes of settlement estimation, we have assumed that the structures will be constructed such that approximately 1 foot of net surface elevation increase is required to reach final soil subgrade design elevations.
  - A. Assuming a column load of 30 kips, an applied uniform area load of 175 psf (125 psf for the anticipated fill soil and 50 psf for the slab on grade), and a 2,000 psf bearing pressure, the estimated static post-construction settlement of an individual spread footing is estimated to be  $\frac{3}{4}$  inch or less.
  - B. Assuming a wall load of 3.0 kips per foot, an applied uniform area load of 175 psf, and a 2,000 psf bearing pressure for isolated strip foundations, the estimated static post-construction settlement of a wall footing measuring approximately 1  $\frac{1}{2}$  feet wide is estimated to be  $\frac{3}{4}$  inch or less.
  - C. Differential settlements between adjacent, similarly loaded walls and columns are typically on the order of 50 percent of the total post-construction settlement value under static loading, or in this case, about  $\frac{1}{2}$  inch.

## 6.6 Grade Slab Support and Construction

The following recommendations are given for the support and construction of soil-supported grade slabs:

1. Soils similar to those penetrated by the borings are anticipated to provide adequate support to proposed soil-supported grade slabs, assuming preparation and compaction of the subgrade as

recommended above. A modulus of subgrade reaction ( $k$ ) of 200 lbs/in<sup>3</sup> (pci) is recommended for use for reinforcing design.

2. A vapor barrier such as "Visqueen," or equivalent, should be placed over the subgrade prior to placing concrete to limit moisture infiltration into finished spaces.
3. Place a layer of at least 4 inches of compacted granular materials below the floor slab. Granular materials used may consist of clean, coarse, well-graded sandy soils meeting USCS Classification SW and having a silt-clay fines content of 5 percent or less by weight, or, granular materials may consist of a crushed, well-graded gravel blend such as SCDOT Graded Aggregate Base Course (GABC), or an open-graded, manufactured washed gravel such as SCDOT No. 57 or No. 67 stone.
  - A. If sand or washed gravel is used as the underslab layer, then the contractor should plan on using a pump truck to place the floor slab concrete since these materials are cohesionless and are difficult to drive vehicles on.
  - B. If GABC is used, then either a pump truck or direct discharge from concrete batch trucks may be appropriate depending upon the circumstances.
  - C. If sand or GABC is used, this underslab fill layer should be compacted to at least 95 percent of the modified Proctor maximum dry density (ASTM D 1557).
4. Have the geotechnical engineer observe a proofroll of all slab subgrades prior to concrete placement. Softened soils may need to be undercut or stabilized before concrete placement.

## 6.7 Pavement Section Design and Construction Recommendations

We anticipate the new pavement subgrades to be constructed at or slightly above the existing grade elevations, with the higher ground being nearest the new corporate hangar structure, and tapering downward toward the edge of the new pavements.

### 6.7.1 *Traffic Volumes and Pavement Thickness Computations*

Traffic volumes for the proposed corporate hangar were not provided to us in preparation for our geotechnical exploration. Therefore, assumptions were made regarding the possible traffic demands for new pavements associated with this structure, as follows:

- ◆ Regular light aircraft traffic; low applied load;
- ◆ Regular light passenger automobile traffic; low applied load;
- ◆ Occasional fuel truck, repair truck, or delivery truck; moderate applied load;
- ◆ No tractor-trailers, trash dumpster trucks, or other heavy traffic.

These assumed values are not warranted to represent the actual traffic imposed during the design life of the pavement. Because of the light traffic conditions expected, the pavement section thickness design at this site is governed by the subgrade conditions more so than the applied traffic. We calculated a theoretical available 18-kip Equivalent Single Axle Load (ESAL) volume for each pavement section modeled, using AASHTO design methods as adopted by SCDOT. The pavement section thicknesses evaluated are shown in Table 6-1.

*6.7.2 Design Characteristics for Pavements using SCDOT Methods*

We assume that new pavement subgrades will be constructed atop compacted structural fill soils compacted to at least 95 percent of the modified Proctor maximum dry density. We have performed our analyses assuming that a CBR value of at least 15 percent will be available from subgrade soils compacted to 95 percent, which is similar to the CBR test results obtained from the composite sample that we collected on site. If soils exhibiting a CBR value of less than 15 percent at 95 percent compaction are to be used on this project, these recommendations may require revision.

For flexible pavements, the pavement thickness computations were made using the AASHTO method, assuming an initial serviceability of 4.2 and a terminal serviceability index of 2.0, and a reliability factor of 95 percent. 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).

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 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 1.0 was assigned, based upon the assumption that the sub-base soils will consist of granular soils.

If reinforced joint design with appropriate load transfer devices (such as steel dowels) is not provided, then the rigid pavement section thickness design would need to be reconsidered using a higher load transfer coefficient, which may result in an increase in the pavement section thickness to maintain a similar ESAL capacity.

**Table 6-1: Recommended Minimum Pavement Sections**

Design Methodology	Pavement Area	Theoretical Allowable Traffic Load (ESALs)	HMA Surface Course Type C (inches)	HMA Intermediate Course Type C (inches)	4,000 psi Doweled Joint Concrete Pavement (inches)	Compacted SCDOT Graded Aggregate Base Course [GABC] (inches)
AASHTO/ SCDOT	Light-Duty Flexible (Asphalt)	262,000	2.0	---	---	8
	Light-Duty Rigid (Concrete)	170,900	---	---	5.0	8

*6.7.3 Design Characteristics for Pavements using FAA Methods*

Section 315.c of the FAA AC 150/5320-6E design guide states that “Hot mix asphalt surfacing should meet the requirements of FAA Item P-401. A minimum thickness of 4 inches (102 mm) of hot mix surfacing is required.”

Section 315.d(2) of this same design guide states that “The standard aggregate base course for flexible pavement design is Item P-209, Crushed Aggregate Base Course”. Section 315.d(3) states that “For traffic mixtures with airplanes exceeding 100,000 pounds (45 400 kg), a stabilized base course is required as described in paragraph 317.”

Table 6-2 “Minimum Aggregate Base Course Thickness” of FAA AC 150/5320-6E shows that for light, single-gear aircraft (weighing less than 50,000 pounds), the minimum P-209 base thickness is 4 inches. However, this minimum thickness is based upon a subgrade soil California Bearing Ratio (CBR) of 20 percent. The CBR value measured at this site was 15 percent. In our judgment, having only 4 inches of base course would be insufficient due to the weaker subgrade. However, it is our opinion that the base course thickness could be increased to 6 inches and the resulting pavement section would perform properly if the asphalt thickness is 4 inches.

There are some slight gradation variations in the specified sieve ranges of the base course aggregate particles between an SCDOT base course and an FAA P-209 base course, as shown in the table below. The acceptable SCDOT gradations are slightly finer than the FAA P-209 gradation; however, it is our opinion that the slightly finer gradation of the SCDOT sieve requirements for base does not have a significant detrimental effect upon the performance of the base.

Also, the FAA standard (209-3.5) requires that the base course only be compacted to 100 percent of the standard Proctor maximum dry density (ASTM D 698) for support of aircraft under 60,000 pounds, whereas the SCDOT method requires that base course be compacted to at least 100 percent of the modified Proctor maximum dry density (ASTM D 1557/SC-T-140).

**Table 6-2: Requirements for Gradation of Aggregate Base**

Sieve Size	FAA P-209 Design Range Percentage Passing by Weight	SCDOT 305 Macadam Design Range Percentage Passing by Weight	SCDOT 305 Marine Limestone Base Course Design Range Percentage Passing by Weight
2 inch	100	100	100
1-1/2 inch	95-100	95-100	95-100
1 inch	70-95	70-100	70-100
3/4 inch	55-85	---	---
1/2 inch	---	48-75	50-85
No. 4	30-60	30-60	30-60

Sieve Size	FAA P-209 Design Range Percentage Passing by Weight	SCDOT 305 Macadam Design Range Percentage Passing by Weight	SCDOT 305 Marine Limestone Base Course Design Range Percentage Passing by Weight
No. 30	---	11-30	17-38
No. 40	10-30	---	---
No. 200	0-8	0-12	0-20

(taken from FAA AC 150/5370-10G Section 209-2.2 and SCDOT Standard Specifications for Highway Construction, 2007, Section 305.2.5.5)

Section 401-1.1 of FAA AC 150/5370-10G states in a design guide instruction that *"For courses other than the surface course, such as stabilized base courses, binder courses and/or truing and leveling courses; for pavements designed to accommodate aircraft gross weights of 12,500 pounds (5670 kg) or less; and for pavements intended to be used for roads, shoulder pavements, blast pads, and other pavements not subject to full aircraft loading, specification Item P-403 may be used"*. Therefore, we considered the requirements of P-403 for this project, rather than P-401.

Section P-403-1.1, in a design guide instruction, also states that *"Where a state highway department material specification is used in lieu of this specification, the state specification must have a demonstrated satisfactory performance record under equivalent loadings and exposure. [...] When state highway specifications are approved, include all applicable/approved state specifications in the contract documents. Update any references to State Department of Transportation (DOT), State Materials Laboratory, etc., to "Owner," "Engineer," etc. as appropriate for project. The use of state highway department specifications requires a modification to [these] standards."*

Based upon this research, it is our opinion that SCDOT Type B Surface Course HMA should meet the requirements of FAA P-403.

**Table 6-3: Recommended Minimum Pavement Sections**

Design Methodology	Pavement Area	Theoretical Allowable Traffic Load (ESALs)	HMA Surface Course Type B (inches)	HMA Intermediate Course Type B (inches)	Compacted SCDOT Graded Aggregate Base Course [GABC] (inches)
FAA	Light-Duty Flexible (Asphalt)	958,000	4*	---	6

\*placed in two, 2-inch layers.

#### 6.7.4 *Base Course and Pavement Section Construction*

The following recommendations are provided for base course and pavement section construction. These recommendations assume that the SCDOT design methodology requirements shall apply; recognize that FAA requirements may vary.

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, joint-reinforced Portland cement concrete that will achieve a minimum compressive strength of at least 4,000 psi at 28 days after placement, as measured 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 5 test cylinder specimens be cast per every 50 cubic yards of concrete placed or at least once per placement event to observe achievement of the design compressive strength. We also recommend that an S&ME concrete technician be requested to be present on site to observe concrete placement activities.

#### 6.7.5 *Permanent Drainage*

Control of subsurface water is important to continued satisfactory performance of pavements. Where possible, pavements should be crowned or sloped to promote positive drainage from the surface. Where



crowning or sloping is not feasible, site drainage plans should result in water levels being maintained at least 2 feet below the pavement surface.

## **7.0 Limitations of 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 subsurface exploration. The nature and extent of variations of the soils at the site to those encountered at our boring and sounding locations may not become evident until construction. If variations appear evident, then we should be provided the opportunity to re-evaluate the recommendations of this report. In the event that any changes in the nature, design, or location of the structure 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.



## Appendices

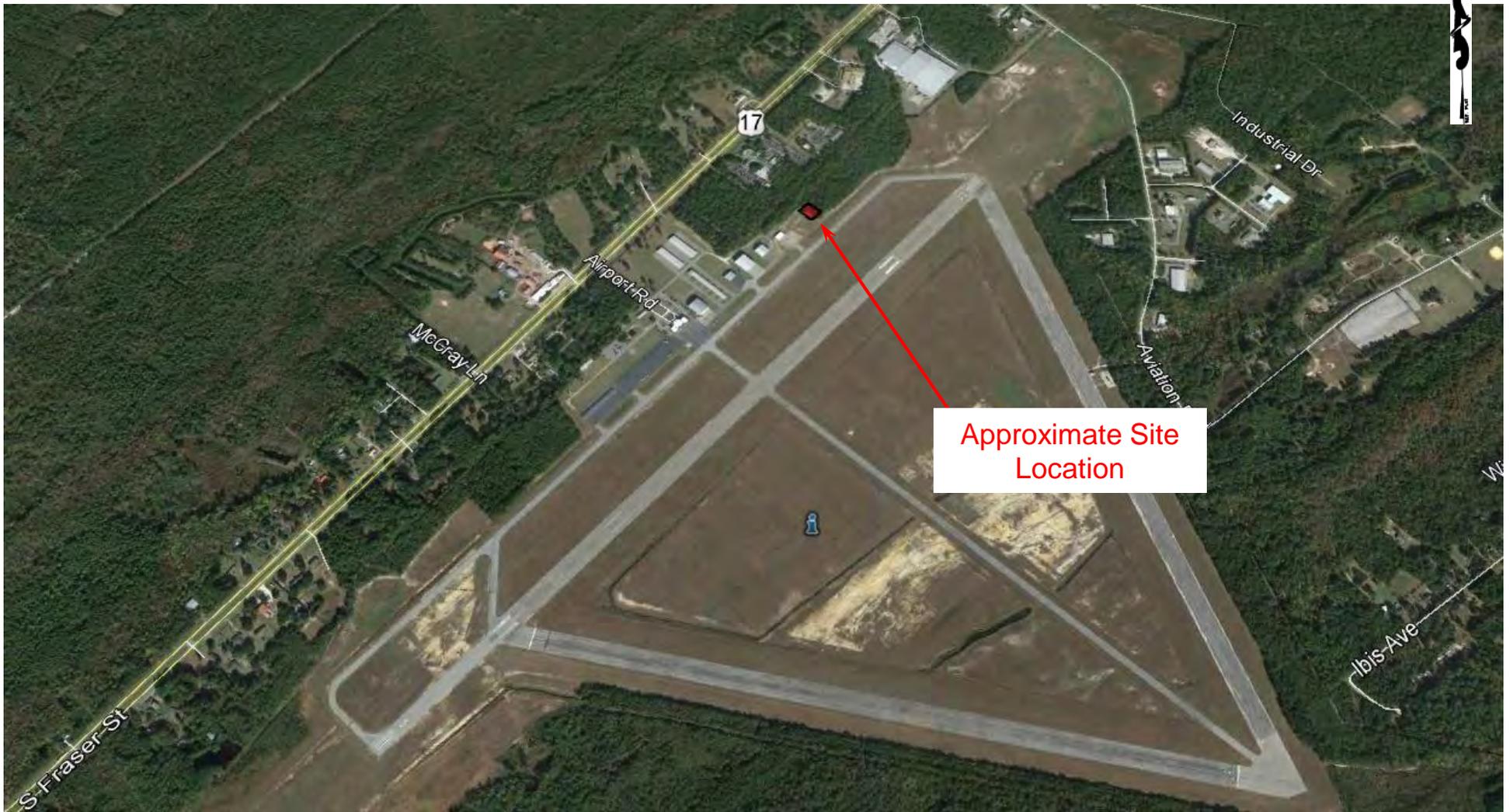


## **Appendix I**

Site Vicinity Plan

Boring Location Sketch

Shear Wave Velocity Profile



SCALE:	Not To Scale
SOURCE:	Google Earth
DATE:	May, 2016
DRAWN BY:	RFQ #16-083 CDJ



Georgetown County, South Carolina

**SITE VICINITY PLAN**  
**Georgetown County Airport Corporate Hangar**  
**Georgetown, South Carolina**

FIGURE NO

**1**

1463-16-022

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**LEGEND**

-  Hand Auger Locations
-  CPT Sounding Locations

SCALE:	Not To Scale
SOURCE:	Google Earth
DATE:	May, 2015
DRAWN BY:	RFQ #16-083 CDJ



Georgetown County, South Carolina

**Boring Location Sketch**  
**Georgetown County Airport Corporate Hangar**  
**Georgetown, South Carolina**

FIGURE NO

**2**

1463-16-022

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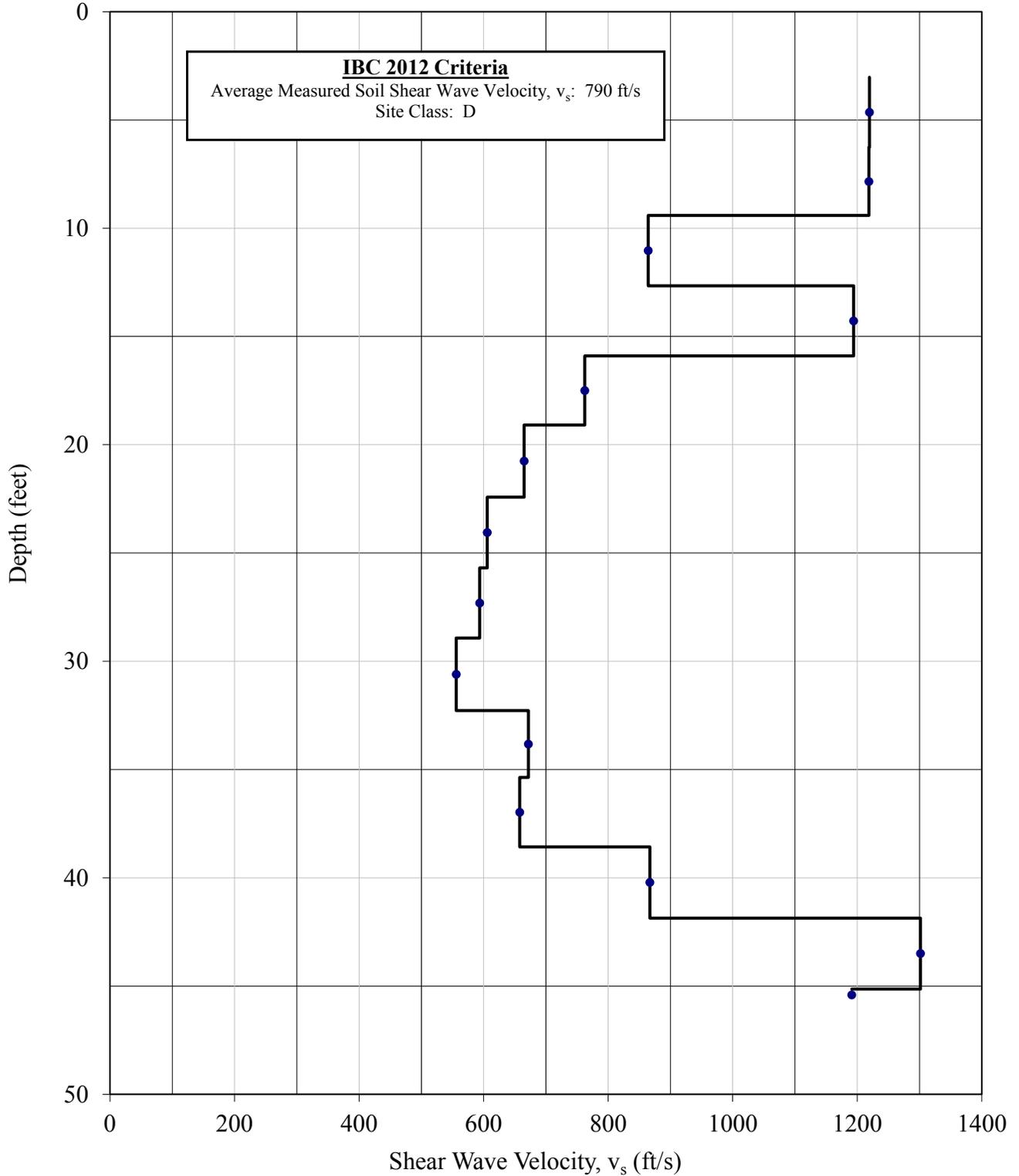


# Shear Wave Velocity Calculations

Georgetown County Airport Corporate Hangar  
Georgetown, SC

Sounding ID: **SCPT-1**  
Date: 05/20/16

Project Number: **1463-16-022**



\* Site Class based on 2012 International Building Code - Table 1613.5.2 - SITE CLASS DEFINITIONS



## **Appendix II**

Summary of Exploration Procedures

CPT Soil Classification Legend

CPT Logs

Soil Classification Chart

Hand Auger Boring Logs

## ❖ Summary of Exploration Procedures

The American Society for Testing and Materials (ASTM) publishes standard methods to explore soil, rock and ground water conditions in Practice D-420-98, "*Standard Guide to Site Characterization for Engineering Design and Construction Purposes.*" The boring and sampling plan must consider the geologic or topographic setting. It must consider the proposed construction. It must also allow for the background, training, and experience of the geotechnical engineer. While the scope and extent of the exploration may vary with the objectives of the client, each exploration includes the following key tasks:

- ◆ Reconnaissance of the Project Area
- ◆ Preparation of Exploration Plan
- ◆ Layout and Access to Field Sampling Locations
- ◆ Field Sampling and Testing of Earth Materials
- ◆ Laboratory Evaluation of Recovered Field Samples
- ◆ Evaluation of Subsurface Conditions

The standard methods do not apply to all conditions or to every site. Nor do they replace education and experience, which together make up engineering judgment. Finally, ASTM D 420 does not apply to environmental investigations.

## ❖ Reconnaissance of the Project Area

We walked over the site to note land use, topography, ground cover, and surface drainage. We observed general access to proposed sampling points and noted any existing structures.

Checks for Hazardous Conditions - State law requires that we notify the Palmetto Utility Protection Service (PUPS) before we drill or excavate at any site. PUPS is operated by the major water, sewer, electrical, telephone, CATV, and natural gas suppliers of South Carolina. PUPS forwarded our location request to the participating utilities. Location crews then marked buried lines with colored flags within 72 hours. They did not mark utility lines beyond junction boxes or meters. We checked proposed sampling points for conflicts with marked utilities, overhead power lines, tree limbs, or man-made structures during the site walkover.

## ❖ Boring and Sampling

### Electronic Cone Penetrometer (CPT) Soundings

CPT soundings consist of a conical pointed penetrometer which is hydraulically pushed into the soil at a slow, measured rate. Procedures for measurement of the tip resistance and side friction resistance to push generally follow those described by ASTM D-5778, "*Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils.*"

A penetrometer with a conical tip having a 60 degree apex angle and a cone base area of 10 cm<sup>2</sup> was advanced into the soil at a constant rate of 20 mm/s. The force on the conical point required to penetrate the soil was measured electronically every 50 mm penetration to obtain the *cone resistance*  $q_c$ . A friction sleeve is present on the penetrometer immediately behind the cone tip. The force exerted on the sleeve was measured electronically at a minimum of every 50 mm

penetration and divided by the surface area of the sleeve to obtain the *friction sleeve resistance value*  $f_s$ . A pore pressure element mounted immediately behind the cone tip was used to measure the pore pressure induced during advancement of the cone into the soil.

### **CPT Soil Stratification**

Using ASTM D-5778 soil samples are not obtained. Soil classification was made on the basis of comparison of the tip resistance, sleeve resistance and pore pressure values to values measured at other locations in known soil types, using experience with similar soils and exercising engineering judgment.

Plots of normalized tip resistance versus friction ratio and normalized tip resistance versus penetration pore pressure were used to determine soil classification (Soil Behavior Type, SBT) as a function of depth using empirical charts developed by P.K. Robertson (1990). The friction ratio soil classification is determined from the chart in the appendix using the normalized corrected tip stress and the normalized corrected tip stress and the normalized friction ratio.

At some depths, the CPT data fell outside of the range of the classification chart. When this occurred, no data was plotted and a break was shown in the classification profile. This occasionally occurred at the top of a penetration as the effective vertical stress is very small and commonly produced normalized tip resistances greater than 1000.

To provide a simplified soil stratigraphy for general interpretation and for comparison to standard boring logs, a statistical layering and classification system was applied the field classification values. Layer thicknesses were determined based on the variability of the soil classification profile, based upon changes in the standard deviation of the SBT classification number with depth. The average SBT number was determined for each successive 6-inch layer, beginning at the surface. Whenever an additional 6-inch increment deviated from the previous increment, a new layer was started, otherwise, this material was added to the layer above and the next 6-inch section evaluated. The soil behavior type for the layer was determined by the mean value for the complete layer.

### **Hand Auger Borings with Dynamic Cone Penetrometer Testing**

Auger borings were advanced using hand operated augers. The soils encountered were identified in the field by cuttings brought to the surface. Soil consistency was qualitatively estimated by the relative difficulty of advancing the augers. Dynamic Cone Penetrometer (DCP) testing was performed in conjunction within the borings in general accordance with ASTM STP 399, "*Dynamic Cone for Shallow In-Situ Penetration Testing*". At selected intervals, the augers were withdrawn and soil consistency measured with a dynamic cone penetrometer. The conical point of the penetrometer was first seated 1-3/4 inches to penetrate any loose cuttings in the boring, then driven two additional 1-3/4 inch increments by a 15 pound hammer falling 20 inches. The number of hammer blows required to achieve this penetration was recorded. When properly evaluated by qualified professional staff, the blow count is an index to the soil strength. Hand auger borings were backfilled with soil cuttings after termination of drilling.

### **Water Level Determination**

Water levels in the boreholes were measured during the onsite exploration by measuring depths from the existing grade to the current water level using a tape.

## **Backfilling of Borings**

Once subsurface water levels were obtained, boring spoils were backfilled into the open bore holes. Bore holes were backfilled to the existing ground surface. The SCPT/CPT holes are only 2 inches in diameter and were not backfilled.

## CPT Soil Classification Legend

Zone	Color	Q <sub>t</sub> /N	Description
1		2	Sensitive, Fine Grained
2		1	Organic Soils-Peats
3		1.5	Clays-Clay to Silty Clay
4		2	Silt Mixtures-Clayey Silt to Silty Clay
5		3	Sand Mixtures-Silty Sand to Sandy Silt
6		4.5	Sands-Clean Sand to Silty Sand
7		6	Gravelly Sand to Sand
8		1	Very Stiff Clay to Clayey Sand*
9		2	Very Stiff, Fine Grained*

(\*) Heavily Overconsolidated or Cemented

Robertson's Soil Behavior Type (SBT), 1990			
Group #	Description	I <sub>c</sub>	
		Min	Max
1	Sensitive, fine grained	N/A	
2	Organic soils - peats	3.60	N/A
3	Clays - silty clay to clay	2.95	3.60
4	Silt mixtures - clayey silt to silty clay	2.60	2.95
5	Sand mixtures - silty sand to sandy silt	2.05	2.60
6	Sands - clean sand to silty sand	1.31	2.05
7	Gravelly sand to dense sand	N/A	1.31
8	Very stiff sand to clayey sand (High OCR or cemented)	N/A	
9	Very stiff, fine grained (High OCR or cemented)	N/A	

Soil behavior type is based on empirical data and may not be representative of soil classification based on plasticity and grain size distribution.

Relative Density and Consistency Table			
SANDS		SILTS and CLAYS	
Cone Tip Stress, qt (tsf)	Relative Density	Cone Tip Stress, qt (tsf)	Consistency
Less than 20	Very Loose	Less than 5	Very Soft
20 - 40	Loose	5 - 15	Soft to Firm
40 - 120	Medium Dense	15 - 30	Stiff
120 - 200	Dense	30 - 60	Very Stiff
Greater than 200	Very Dense	Greater than 60	Hard

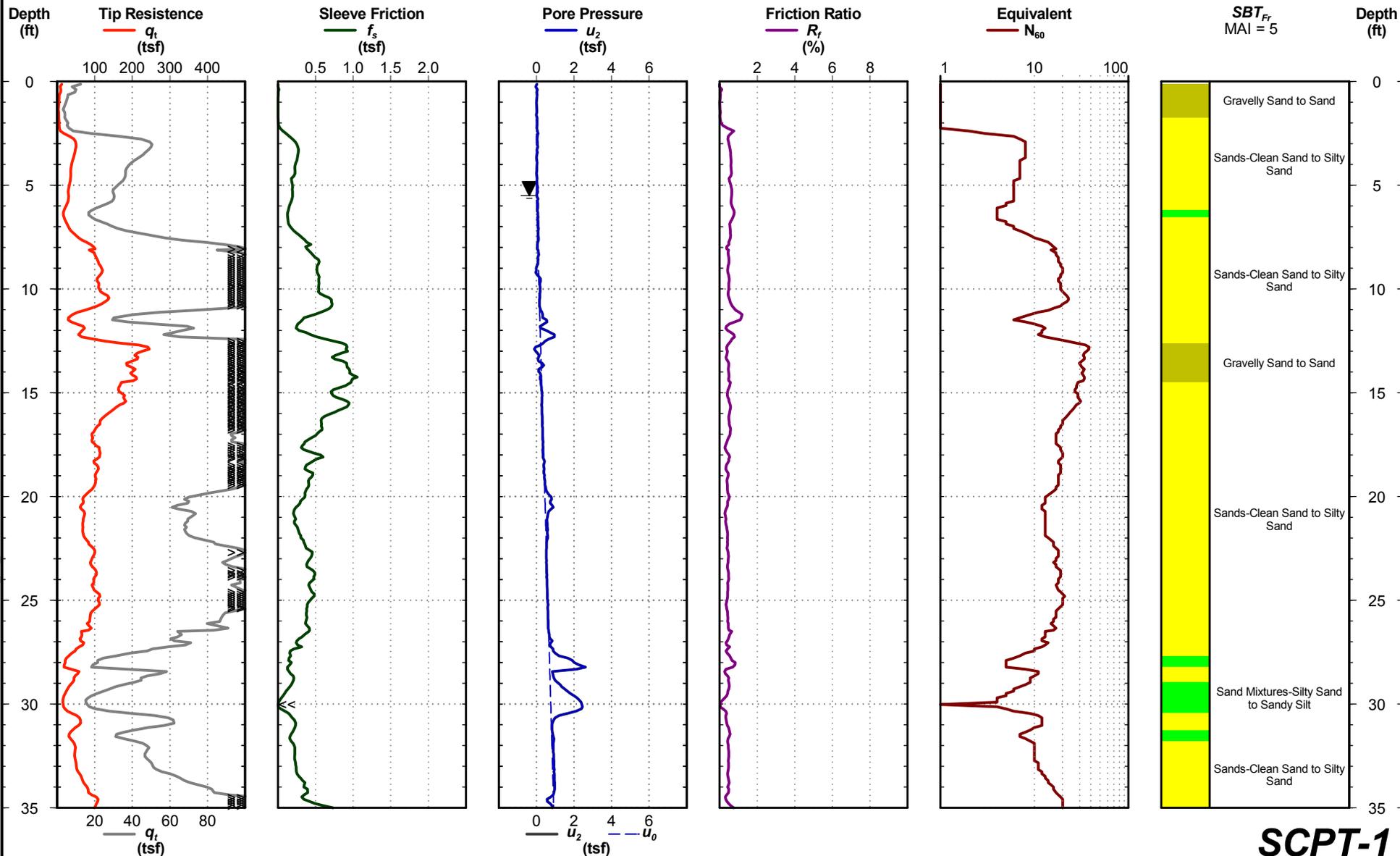


# Cone Penetration Test

# SCPT-1

Date: May. 20, 2016  
 Estimated Water Depth: 5.5 ft  
 Rig/Operator: Andy | Matt

Total Depth: 47.5 ft  
 Termination Criteria: Maximum Reaction Force  
 Cone Size: 1.44



CPT REPORT - DYNAMIC CPT DATA.GPJ S&ME 2008\_06\_24.GDT\_8/30/16

# SCPT-1

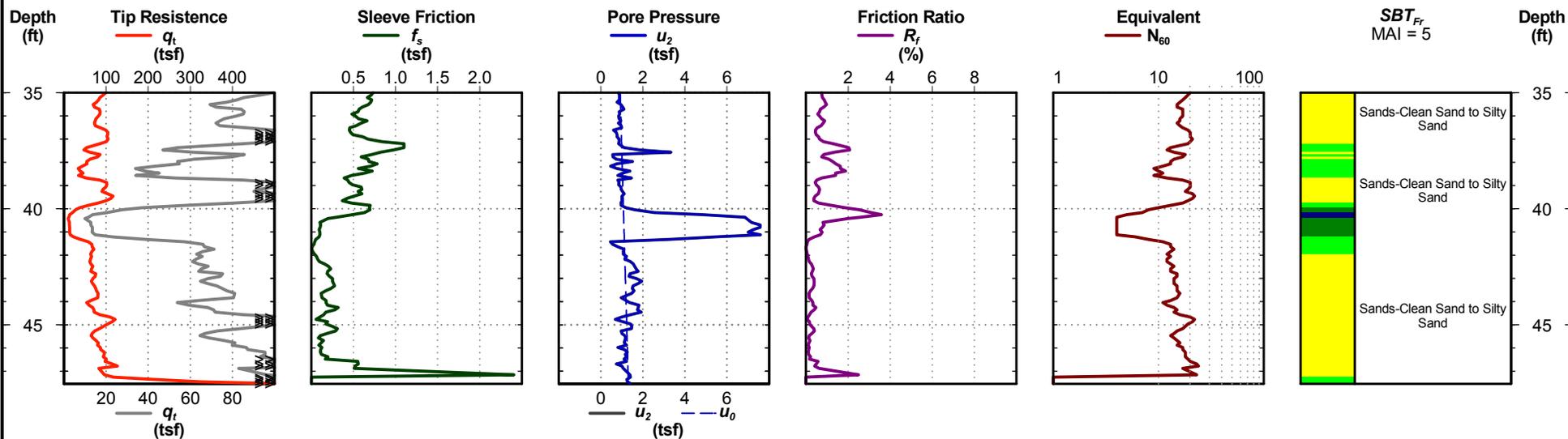


# Cone Penetration Test

# SCPT-1

Date: May 20, 2016  
 Estimated Water Depth: 5.5 ft  
 Rig/Operator: Andy | Matt

Total Depth: 47.5 ft  
 Termination Criteria: Maximum Reaction Force  
 Cone Size: 1.44



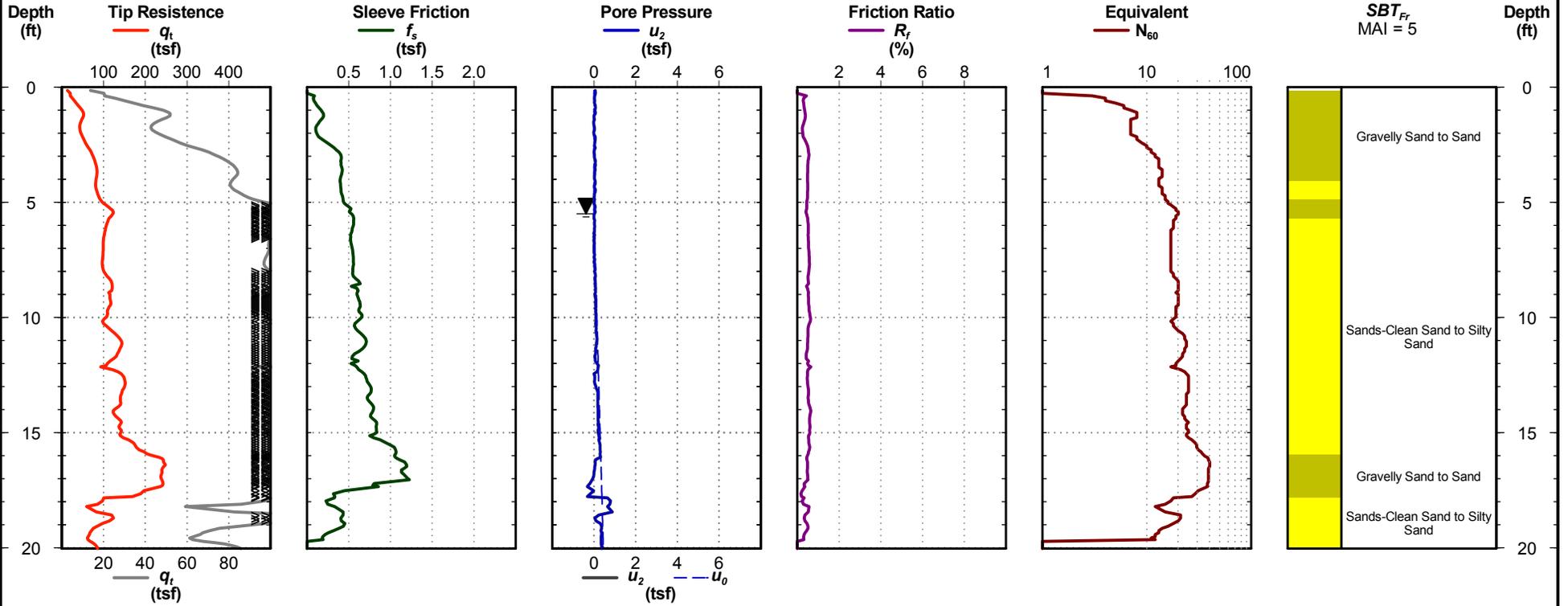


# Cone Penetration Test

# CPT-2

Date: May. 20, 2016  
 Estimated Water Depth: 5.5 ft  
 Rig/Operator: Andy | Matt

Total Depth: 20.0 ft  
 Termination Criteria: Target Depth  
 Cone Size: 1.44

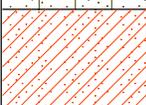
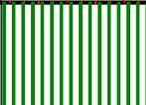
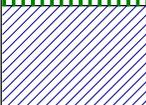
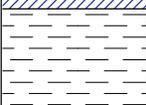


CPT REPORT - DYNAMIC CPT DATA.GPJ, S&ME 2008.06.24.GDT, 8/30/16

# CPT-2

# SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS		
			GRAPH	LETTER			
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		<b>GW</b>	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES		
		(LITTLE OR NO FINES)		<b>GP</b>	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES		
		GRAVELS WITH FINES		<b>GM</b>	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES		
		(APPRECIABLE AMOUNT OF FINES)		<b>GC</b>	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES		
	SAND AND SANDY SOILS	CLEAN SANDS	(LITTLE OR NO FINES)		<b>SW</b>	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
			(LITTLE OR NO FINES)		<b>SP</b>	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES	
		SANDS WITH FINES	(APPRECIABLE AMOUNT OF FINES)		<b>SM</b>	SILTY SANDS, SAND - SILT MIXTURES	
			(APPRECIABLE AMOUNT OF FINES)		<b>SC</b>	CLAYEY SANDS, SAND - CLAY MIXTURES	
		FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		<b>ML</b>	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
						<b>CL</b>	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	<b>OL</b>				ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY		
SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50			<b>MH</b>	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS		
				<b>CH</b>	INORGANIC CLAYS OF HIGH PLASTICITY		
				<b>OH</b>	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS		
HIGHLY ORGANIC SOILS				<b>PT</b>	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS		



PROJECT: <b>Georgetown County Airport Corporate Hangar Georgetown, South Carolina 1463-16-022</b>		<b>HAND AUGER BORING LOG: SCPT-1</b>		
DATE STARTED: <b>5/16/16</b>	DATE FINISHED: <b>5/16/16</b>	NOTES: <b>Elevation Unknown</b>		
SAMPLING METHOD: <b>Hand Augers</b>	PERFORMED BY: <b>C. Jones</b>			
WATER LEVEL: <b>Not Encountered</b>				
Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
		TOPSOIL and Rootmat- Approximately 3 inches.		
1		POORLY GRADED SAND (SP) - Mostly fine sand, tan, gray, yellow, dry to moist.		
2				
3				
4		Boring terminated at 4 ft Target Depth		



DCP INDEX IS THE DEPTH (IN.) OF PENETRATION PER BLOW OF A 10.1 LB HAMMER FALLING 22.6 IN., DRIVING A 0.79 IN. O.D. 60 DEGREE CONE.

PROJECT: <b>Georgetown County Airport Corporate Hangar Georgetown, South Carolina 1463-16-022</b>		<b>HAND AUGER BORING LOG: CPT-2</b>		
DATE STARTED: <b>5/16/16</b>	DATE FINISHED: <b>5/16/16</b>	NOTES: <b>Elevation Unknown</b>		
SAMPLING METHOD: <b>Hand Augers</b>	PERFORMED BY: <b>C. Jones</b>			
WATER LEVEL: <b>Not Encountered</b>				
Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL
		TOPSOIL and Rootmat- Approximately 3 inches.		
1		POORLY GRADED SAND (SP) - Mostly fine sand, tan, gray, yellow, brown, dry to moist.		-
2				-
3		----- White, tan.		-
4		Boring terminated at 4 ft Target Depth		-



DCP INDEX IS THE DEPTH (IN.) OF PENETRATION PER BLOW OF A 10.1 LB HAMMER FALLING 22.6 IN., DRIVING A 0.79 IN. O.D. 60 DEGREE CONE.

PROJECT: <b>Georgetown County Airport Corporate Hangar Georgetown, South Carolina 1463-16-022</b>		<b>HAND AUGER BORING LOG: HA-1</b>					
DATE STARTED: <b>5/16/16</b>		DATE FINISHED: <b>5/16/16</b>		NOTES: <b>Elevation Unknown</b>			
SAMPLING METHOD: <b>Hand Augers</b>		PERFORMED BY: <b>C. Jones</b>					
WATER LEVEL: <b>Not Encountered</b>							
Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL	DYNAMIC CONE PENETRATION RESISTANCE (blows/1.75 in.)		DCP VALUE
					10	20 30 60 80	
		TOPSOIL - Approximately 3 inches.					
1		POORLY GRADED SAND WITH SILT (SP-SM) - Mostly fine sand, few low plasticity fines, tan, light yellow, dry to moist, loose to medium dense.					
2							13
3							14
4							11
		Boring terminated at 4 ft Target Depth					9



DCP INDEX IS THE DEPTH (IN.) OF PENETRATION PER BLOW OF A 10.1 LB HAMMER FALLING 22.6 IN., DRIVING A 0.79 IN. O.D. 60 DEGREE CONE.

PROJECT: <b>Georgetown County Airport Corporate Hangar Georgetown, South Carolina 1463-16-022</b>			<b>HAND AUGER BORING LOG: HA-2</b>						
DATE STARTED: <b>5/16/16</b>		DATE FINISHED: <b>5/16/16</b>		NOTES: <b>Elevation Unknown</b>					
SAMPLING METHOD: <b>Hand Augers</b>		PERFORMED BY: <b>C. Jones</b>							
WATER LEVEL: <b>Not Encountered</b>									
Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL	DYNAMIC CONE PENETRATION RESISTANCE (blows/1.75 in.)				DCP VALUE
					10	20	30	60 80	
		TOPSOIL - Approximately 3 inches, gravel fragments.							
1		POORLY GRADED SAND WITH SILT (SP-SM) - Mostly fine sand, few low plasticity fines, tan, yellow, dry to moist, medium dense.							20+
2									16
3									15
4		Boring terminated at 4 ft Target Depth							12



DCP INDEX IS THE DEPTH (IN.) OF PENETRATION PER BLOW OF A 10.1 LB HAMMER FALLING 22.6 IN., DRIVING A 0.79 IN. O.D. 60 DEGREE CONE.

PROJECT: <b>Georgetown County Airport Corporate Hangar Georgetown, South Carolina 1463-16-022</b>			<b>HAND AUGER BORING LOG: HA-3</b>							
DATE STARTED: <b>5/16/16</b>		DATE FINISHED: <b>5/16/16</b>		NOTES: <b>Elevation Unknown</b>						
SAMPLING METHOD: <b>Hand Augers</b>		PERFORMED BY: <b>C. Jones</b>								
WATER LEVEL: <b>Not Encountered</b>										
Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL	DYNAMIC CONE PENETRATION RESISTANCE (blows/1.75 in.)					DCP VALUE
					10	20	30	60	80	
		TOPSOIL and Rootmat- Approximately 3 inches.								
1		POORLY GRADED SAND WITH SILT (SP-SM) - Mostly fine sand, few low plasticity fines, tan, gray, brown, dry to moist, loose to medium dense.								10
2										12
3										11
4		Boring terminated at 4 ft Target Depth								13



DCP INDEX IS THE DEPTH (IN.) OF PENETRATION PER BLOW OF A 10.1 LB HAMMER FALLING 22.6 IN., DRIVING A 0.79 IN. O.D. 60 DEGREE CONE.

PROJECT: <b>Georgetown County Airport Corporate Hangar Georgetown, South Carolina 1463-16-022</b>			<b>HAND AUGER BORING LOG: HA-4</b>								
DATE STARTED: <b>5/16/16</b>		DATE FINISHED: <b>5/16/16</b>		NOTES: <b>Elevation Unknown</b>							
SAMPLING METHOD: <b>Hand Augers</b>		PERFORMED BY: <b>C. Jones</b>									
WATER LEVEL: <b>Not Encountered</b>											
Depth (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	ELEVATION (feet)	WATER LEVEL	DYNAMIC CONE PENETRATION RESISTANCE (blows/1.75 in.)					DCP VALUE	
					10	20	30	60	80		
		TOPSOIL and Rootmat- Approximately 4 inches.									
1		POORLY GRADED SAND WITH SILT (SP-SM) - Mostly fine sand, few low plasticity fines, tan, gray, brown, dry to moist, loose.									8
2		----- Roots encountered.									9
3											9
4		Boring terminated at 4 ft Target Depth									9



DCP INDEX IS THE DEPTH (IN.) OF PENETRATION PER BLOW OF A 10.1 LB HAMMER FALLING 22.6 IN., DRIVING A 0.79 IN. O.D. 60 DEGREE CONE.



## **Appendix III**

Summary of Laboratory Procedures

Laboratory Test Results

## ❖ Summary of Laboratory Procedures

### Examination of Recovered Soil Samples

Soil and field records were reviewed in the laboratory by the geotechnical professional. Soils were classified in general accordance with the visual-manual method described in ASTM D 2488, "*Standard Practice for Description and Identification of Soils (Visual-Manual Method)*".

Representative soil samples were selected for classification testing to provide grain size and plasticity data to allow classification of the samples in general accordance with the Unified Soil Classification System method described in ASTM D 2487, "*Standard Practice for Classification of Soils for Engineering Purposes*". The geotechnical professional also prepared the final boring and sounding records enclosed with this report.

### Moisture Content Testing of Soil Samples by Oven Drying

Moisture content was determined in general conformance with the methods outlined in ASTM D 2216, "*Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil or Rock by Mass*." This method is limited in scope to Group B, C, or D samples of earth materials which do not contain appreciable amounts of organic material, soluble solids such as salt or reactive solids such as cement. This method is also limited to samples which do not contain contamination.

A representative portion of the soil was divided from the sample using one of the methods described in Section 9 of ASTM D 2216. The split portion was then placed in a drying oven and heated to approximately 110 degrees C overnight or until a constant mass was achieved after repetitive weighing. The moisture content of the soil was then computed as the mass of water removed from the sample by drying, divided by the mass of the sample dry, times 100 percent. No attempt was made to exclude any particular particle size from the portion split from the sample.

### Liquid and Plastic Limits Testing

Atterberg limits of the soils was determined generally following the methods described by ASTM D 4318, "*Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils*." Albert Atterberg originally defined "limits of consistency" of fine grained soils in terms of their relative ease of deformation at various moisture contents. In current engineering usage, the *liquid limit* of a soil is defined as the moisture content, in percent, marking the upper limit of viscous flow and the boundary with a semi-liquid state. The *plastic limit* defines the lower limit of plastic behavior, above which a soil behaves plastically below which it retains its shape upon drying. The *plasticity index* (PI) is the range of water content over which a soil behaves plastically. Numerically, the PI is the difference between liquid limit and plastic limit values.

Representative portions of fine grained Group A, B, C, or D samples were prepared using the wet method described in Section 10.1 of ASTM D 4318. The liquid limit of each sample was determined using the multipoint method (Method A) described in Section 11, or the one-point method (Method B) described in Section 13. The liquid limit is by definition the moisture content

where 25 drops of a hand operated liquid limit device are required to close a standard width groove cut in a soil sample placed in the device.

#### Multi-Point Method

After each test, the moisture content of the sample was adjusted and the sample replaced in the device. The test was repeated to provide a minimum of three widely spaced combinations of N versus moisture content. When plotted on semi-log paper, the liquid limit moisture content was determined by straight line interpolation between the data points at N equals 25 blows.

#### One-Point Method

The procedure for the one-point method is the same as the multi-point method except that the number of blows required to close the groove is 20 to 30. If less than 20 or more than 30 blows are required, the water content of the soil is adjusted and the procedure is repeated. The liquid limit is determined in accordance with Section 14.

The plastic limit was determined using the procedure described in Sections 15 through 17 of ASTM D 4318. A selected portion of the soil used in the liquid limit test was kneaded and rolled by hand until it could no longer be rolled to a 3.2 mm thread on a glass plate. This procedure was repeated until at least 6 grams of material was accumulated, at which point the moisture content was determined using the methods described in ASTM D 2216

### **Grain Size Analysis of Samples**

The distribution of particle sizes greater than 75 mm was determined in general accordance with the procedures described by ASTM D 421, *Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants*, and D 422, *Standard Test Method for Particle Size Analysis of Soils*, except that the hydrometer portion of the test standard was not utilized. During preparation samples were divided into two portions. The material coarser than the No. 30 U.S. sieve size fraction was dry sieved through a nest of standard sieves as described in Article 6. Material passing the No. 30 sieve was independently passed through a nest of sieves down to the No. 200 size.

### **Percent Fines Determination of Samples**

A selected specimen of soils was washed over a No. 200 sieve after being thoroughly mixed and dried. This test was conducted in general accordance with ASTM D 1140, *Standard Test Method for Amount of Material Finer Than the No. 200 Sieve*. Method A, using water to wash the sample through the sieve without soaking the sample for a prescribed period of time, was used and the percentage by weight of material washing through the sieve was deemed the "percent fines" or percent clay and silt fraction.

### **Compaction Tests of Soils Using Modified Effort**

Soil placed as engineering fill is compacted to a dense state to obtain satisfactory engineering properties. Laboratory compaction tests provide the basis for determining the percent compaction and water content needed to achieve the required engineering properties, and for controlling construction to assure the required compaction and water contents are achieved. Test procedures generally followed those described by ASTM D1557, *Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 lbf/ft<sup>3</sup>)*.

The relationship between water content and the dry unit weight is determined for soils compacted in either 4 or 6 inch diameter molds with a 10 lbf rammer dropped from a height of 18 inches, producing a compactive effort of 56,000 lbf/ft<sup>3</sup>. ASTM D 1557 provides three alternative procedures depending on material gradation:

Method A

- All material passes No. 4 sieve size
- 4 inch diameter mold
- Shall be used if 20 percent or less by weight is retained on No. 4 sieve
- Soil in 5 layers with 25 blows per layer

Method B

- All material passes 3/8 inch sieve
- 4 inch diameter mold
- Shall be used if 20 percent by weight is retained on the No. 4 sieve and 20 percent or less by weight is retained on the 3/8 Inch sieve.
- Soil in 5 layers with 25 blows per layer

Method C

- All material passes 3/4 inch sieve
- 6-inch diameter mold
- Shall be used if more than 20 percent by weight is retained on the 3/8 inch sieve and less than 30 percent is retained on the 3/4inch sieve.
- Soil in 5 layers with 56 blows per layer

Soil was compacted in the mold in five layers of approximately equal thickness, each compacted with either 25 or 56 blows of the rammer. After compaction of the sample in the mold, the resulting dry density and moisture content was determined and the procedure repeated. Separate soils were used for each sample point, adjusting the moisture content of the soil as described in Section 10.2 (Moist Preparation Method). The procedure was repeated for a sufficient number of water content values to allow the dry density vs. water content values to be plotted and the *maximum dry density* and *optimum moisture content* to be determined from the resulting curvilinear relationship

### **Laboratory California Bearing Ratio Tests of Compacted Samples**

This method is used to evaluate the potential strength of subgrade, subbase, and base course material, including recycled materials, for use in road and airfield pavements. Laboratory CBR tests were run in general accordance with the procedures laid out in ASTM D 1883, "*Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.*" Specimens were prepared in standard molds using two different levels of compactive effort within plus or minus 0.5 percent of the optimum moisture content value. While embedded in the compaction mold, each specimen was inundated for a minimum period of 96 hours to achieve saturation. During inundation, the specimen was surcharged by a weight approximating the anticipated weight of the pavement and base course layers. After removing the sample from the soaking bath, the

soil was then sheared by jacking a piston having a cross sectional area of 3 square inches into the end surface of the specimen. The piston was jacked 0.5 inches into the specimen at a constant rate of 0.05 inches per minute.

The CBR is defined as the load required to penetrate a material to a predetermined depth, compared to the load required to penetrate a standard sample of crushed stone to the same depth. The CBR value was usually based on the load ratio for a penetration of 0.10 inches, after correcting the load-deflection curves for surface irregularities or upward concavity. However, where the calculated CBR for a penetration of 0.20 inches was greater than the result obtained for a penetration of 0.10 inches, the test was repeated by reversing the specimen and shearing the opposite end surface. Where the second test indicated a greater CBR at 0.20 inches penetration, the CBR for 0.20 inches penetration was used.

**CBR (California Bearing Ratio) of Laboratory  
Compacted Soil**

ASTM D 1883



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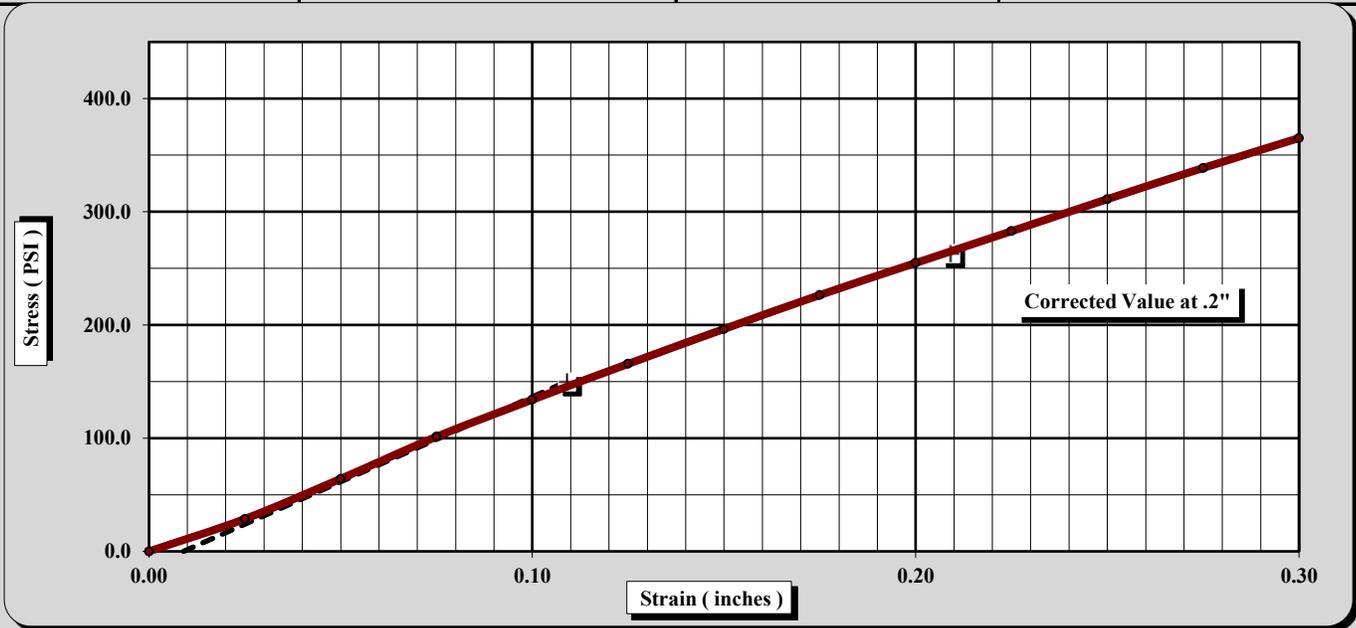
<b>Project #:</b>	<b>1463-16-022</b>	<b>Report Date:</b>	<b>5/24/2016</b>
<b>Project Name:</b>	<b>Georgetown County Airport Corporate Hangar</b>	<b>Test Date(s)</b>	<b>5/19/2016</b>
<b>Client Name:</b>	<b>Georgetown County Dept of Public Services</b>		
<b>Client Address:</b>	<b>108 Screven Street; Georgetown, SC 29440</b>		

<b>Boring #:</b>	<b>HA-1 to HA-4</b>	<b>Sample #:</b>	<b>Bulk</b>	<b>Sample Date:</b>	<b>5/16/2016</b>
<b>Location:</b>	<b>Hand Auger Borings</b>	<b>Lab #</b>	<b>3847</b>	<b>Depth:</b>	<b>1'-3"</b>

**Sample Description:** Brown Poorly Graded Sand with Silt (SP-SM)

<b>ASTM D1557 Method A</b>	<b>Maximum Dry Density:</b>	<b>109.1 PCF</b>	<b>Optimum Moisture Content:</b>	<b>9.1%</b>
<b>Compaction Test performed on grading complying with CBR spec.</b>			<b>% Retained on the 3/4" sieve:</b>	<b>0.0%</b>

Uncorrected CBR Values		Corrected CBR Values	
<b>CBR at 0.1 in.</b>	<b>13.4</b>	<b>CBR at 0.1 in.</b>	<b>15.0</b>
<b>CBR at 0.2 in.</b>	<b>17.0</b>	<b>CBR at 0.2 in.</b>	<b>17.5</b>



CBR Sample Preparation:

*The entire gradation was used and compacted in a 6" CBR mold in accordance with ASTM D1883, Section 6.1.1*

Before Soaking		After Soaking	
Compactive Effort (Blows per Layer)	56	Final Dry Density (PCF)	99.0
Initial Dry Density (PCF)	103.8	Average Final Moisture Content	14.4%
Moisture Content of the Compacted Specimen	9.4%	Moisture Content (top 1" after soaking)	18.3%
Percent Compaction	95.2%	Percent Swell	0.3%

Soak Time:	96 hrs.	Surcharge Weight	20.0	Surcharge Wt. per sq. Ft.	102.0
Liquid Limit	--	Plastic Index	NP	Apparent Relative Density	--

Notes/Deviations/References: Liquid Limit: ASTM D 4318, Classification: ASTM D 2487

Chelsea Jones  
Technical Responsibility

CDJ  
Signature

Staff Professional  
Position

6/2/2016  
Date

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### Sieve Analysis of Soils



ASTM D 422

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<b>Project #:</b>	<b>1463-16-022</b>	<b>Report Date:</b>	5/24/2016
<b>Project Name:</b>	Georgetown County Airport Corporate Hangar	<b>Test Date(s):</b>	5/19/2016
<b>Client Name:</b>	Georgetown County Dept of Public Services		
<b>Client Address:</b>	108 Screven Street; Georgetown, SC 29440		
<b>Boring #</b>	HA-1 to HA-4	<b>Sample #:</b>	Bulk
		<b>Sample Date:</b>	5/16/2016
<b>Location:</b>	Hand Auger Borings	<b>Lab #:</b>	3847
		<b>Depth:</b>	1'-3'
<b>Sample Description:</b>	Brown Poorly Graded Sand with Silt (SP-SM)		

Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

**Particle Size Analysis / Without Hydrometer Analysis** | *Material Excluded:*

Tare No.	<b>Pink</b>	Tare Wt.	<b>83.5</b>	Mass of Sample after Wash + Tare Wt.	<b>143.7</b>
Total Sample Wet Wt. + Tare Wt.			<b>152.4</b>	Mass of Sample after Wash	<b>60.2</b>
Total Sample Dry Wt. + Tare Wt.			<b>147.3</b>	Mass passing #200	<b>3.6</b>
<b>Total Sample Dry Weight</b>			<b>63.8</b>	<b>% Passing #200 (D1140)</b>	<b>5.6%</b>

Sieve Size		Retained Weight	% Retained Between Sieves	% Retained	% Passing	SPECS
Standard	mm.	Cumulative	Individual	Cumulative Total Sample		
2.0"	50.00	0.0	0.0%	0.0%	100.0%	
1.5"	37.50	0.0	0.0%	0.0%	100.0%	
1.0"	25.00	0.0	0.0%	0.0%	100.0%	
3/4"	19.00	0.0	0.0%	0.0%	100.0%	
1/2"	12.50	0.0	0.0%	0.0%	100.0%	
3/8"	9.50	0.0	0.0%	0.0%	100.0%	
#4	4.75	0.0	0.0%	0.0%	100.0%	
#10	2.000	0.0	0.0%	0.0%	100.0%	
#30	0.600	0.0	0.0%	0.0%	100.0%	
#40	0.425	0.4	0.6%	0.6%	99.4%	
#60	0.250	7.6	11.3%	11.9%	88.1%	
#100	0.150	50.9	67.9%	79.8%	20.2%	
#200	0.075	60.1	14.4%	94.2%	5.8%	
<b>Pan</b>	<b>&lt;0.075</b>	<b>60.2</b>		<b>% Passing #200 (D1140) =</b>		<b>5.8%</b>
<b>D2487</b>	Maximum Particle Size	<b>0.600 mm</b>	Medium Sand	< 2.00 mm and > 0.425 mm (#40)		<b>0.6%</b>
Gravel	< 75 mm and > 4.75 mm (#4)	<b>0.0%</b>	Fine Sand	< 0.425 mm and > 0.075 mm (#200)		<b>93.6%</b>
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	<b>0.0%</b>	% Silt & Clay	< 0.075 mm		<b>5.8%</b>

Notes / Deviations / References:

Chelsea Jones  
Technical Responsibility

CDJ  
Signature

Staff Professional  
Position

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Date

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### Sieve Analysis of Soils



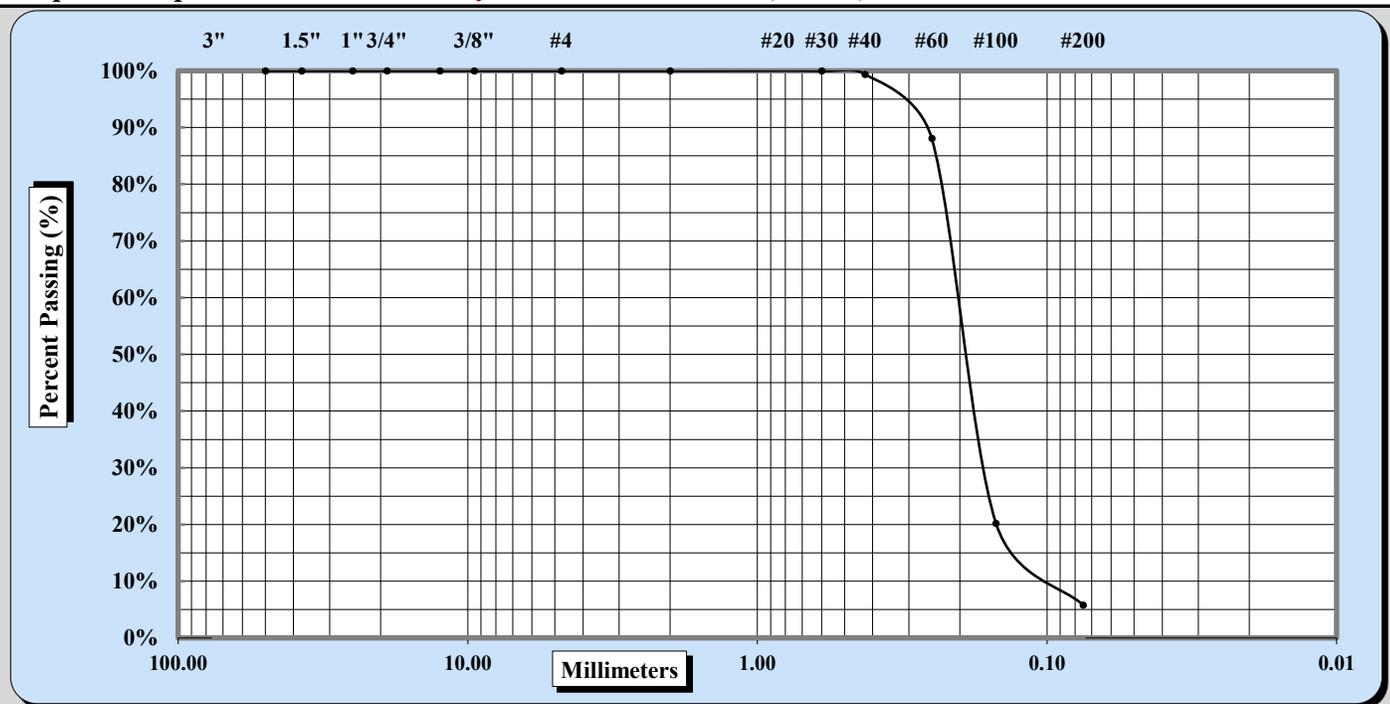
ASTM D 422

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<b>Project #:</b>	<b>1463-16-022</b>	<b>Report Date:</b>	5/24/2016
<b>Project Name:</b>	Georgetown County Airport Corporate Hangar	<b>Test Date(s):</b>	5/19/2016
<b>Client Name:</b>	Georgetown County Dept of Public Services		
<b>Client Address:</b>	108 Screven Street; Georgetown, SC 29440		
<b>Boring #</b>	HA-1 to HA-4	<b>Sample #:</b>	Bulk
		<b>Sample Date:</b>	5/16/2016
<b>Location:</b>	Hand Auger Borings	<b>Lab #:</b>	3847
		<b>Depth:</b>	1'-3'

**Sample Description:** Brown Poorly Graded Sand with Silt (SP-SM)



Cobbles	< 300 mm (12") and > 75 mm (3")	Fine Sand	< 0.425 mm and > 0.075 mm (#200)
Gravel	< 75 mm and > 4.75 mm (#4)	Silt	< 0.075 and > 0.005 mm
Coarse Sand	< 4.75 mm and > 2.00 mm (#10)	Clay	< 0.005 mm
Medium Sand	< 2.00 mm and > 0.425 mm (#40)	Colloids	< 0.001 mm

Maximum Particle Size	0.600 mm	Coarse Sand	0.0%	Fine Sand	93.6%
Gravel	0.0%	Medium Sand	0.6%	Silt & Clay	5.8%
Liquid Limit	--	Plastic Limit	NP	Plastic Index	--
Specific Gravity	--	Cc =	1.112	Cu =	1.538
		Moisture Content			8.0%
Coarse Sand	0.0%	Medium Sand	0.6%	Fine Sand	93.6%
Description of Sand & Gravel Particles:		Rounded	<input type="checkbox"/>	Angular	<input checked="" type="checkbox"/>
Hard & Durable	<input checked="" type="checkbox"/>	Soft	<input type="checkbox"/>	Weathered & Friable	<input type="checkbox"/>

Notes / Deviations / References:

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### Liquid Limit, Plastic Limit, and Plastic Index



ASTM D 4318  AASHTO T 89  AASHTO T 90

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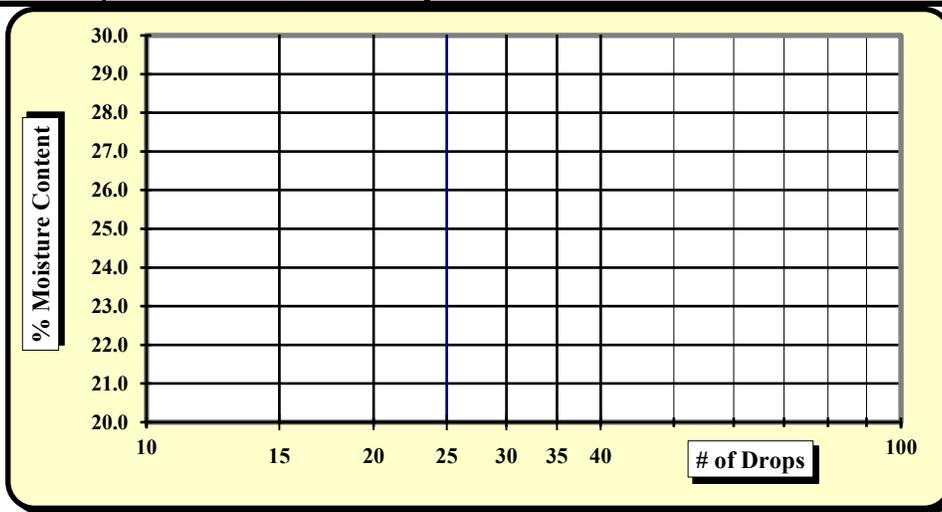
**Project #:** 1463-16-022 **Report Date:** 5/24/2016  
**Project Name:** Georgetown County Airport Corporate Hangar **Test Date(s)** 5/19/2016  
**Client Name:** Georgetown County Dept of Public Services  
**Client Address:** 108 Screven Street; Georgetown, SC 29440

**Boring #:** HA-1 to HA-4 **Sample #:** Bulk **Sample Date:** 5/16/2016  
**Location:** Hand Auger Borings **Lab #:** 3847 **Depth:** 1'-3'

**Sample Description:** Brown Poorly Graded Sand with Silt (SP-SM)

Type and Specification	S&ME ID #	Cal Date:	Type and Specification	S&ME ID #	Cal Date:
Balance (0.01 g)	00401	2/18/2015	Grooving tool	11368	5/1/2015
LL Apparatus	18801	5/1/2015			
Oven	17745	5/6/2015			

Pan #	Tare #:	Liquid Limit						Plastic Limit		
		1	2	3	4	5	6	7	8	9
A	Tare Weight									
B	Wet Soil Weight + A								NP	
C	Dry Soil Weight + A									
D	Water Weight (B-C)									
E	Dry Soil Weight (C-A)									
F	% Moisture (D/E)*100									
N	# OF DROPS							Moisture Contents determined by ASTM D 2216		
LL	LL = F * FACTOR									
Ave.	Average									



One Point Liquid Limit			
N	Factor	N	Factor
20	0.974	26	1.005
21	0.979	27	1.009
22	0.985	28	1.014
23	0.99	29	1.018
24	0.995	30	1.022
25	1.000		

NP, Non-Plastic   
 Liquid Limit   
 Plastic Limit **NP**  
 Plastic Index   
 Group Symbol **SP-SM**

Multipoint Method   
 One-point Method

Wet Preparation  Dry Preparation  Air Dried

Notes / Deviations / References:

ASTM D 4318: Liquid Limit, Plastic Limit, & Plastic Index of Soils

Chelsea Jones  
 Technical Responsibility

CDJ  
 Signature

Staff Professional  
 Position

6/2/2016  
 Date

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