

State of Florida
Department of Transportation
Research Center
605 Suwannee Street, MS 30
Tallahassee, FL 32399-0450

REQUEST FOR RESEARCH PROPOSAL

RFRP Number: RFRP-16/17-002

Title: Load and Resistance Factors Design (LRFD) Resistance Factors for Tip Grouted Drilled Shafts

Proposal Due Date & Time (On or Before): November 22, 2016 at 3:00 PM

This RFRP is open to Florida universities with an executed Master University Agreement on file with the Department.

THIS REQUEST FOR PROPOSAL DOCUMENT IS SUBJECT TO CHANGE. Notice of changes (Addenda), will be posted on the Research Center's website at <http://www.dot.state.fl.us/research-center/RFRPs.shtm> under this RFRP number. It is the responsibility of all potential proposers to monitor this site for any changing information prior to submitting your proposal.

CONTACT FOR QUESTIONS:

Patti Brannon
patti.brannon@dot.state.fl.us
850-414-4616

FDOT Research Center
605 Suwannee Street, MS 30
Tallahassee, FL 32399-0450

PRICE PROPOSAL FORM

RFRP Number: RFRP-16/17-002

RFRP Title: Load and Resistance Factors Design (LRFD) Resistance Factors for Tip Grouted Drilled Shafts

Services to be provided as specified in attached Exhibit "A", Scope of Services.

The proposer shall attach a detailed budget to support the lump sum price identified per task. The lump sum price per task shall include cost of salaries, overhead, fringe benefits, operating margins, expense and if applicable equipment. Cost for applicable travel shall be identified as a separate item. Payment for travel expenses authorized shall be in accordance with Section 112.061, Florida Statutes and shall be reimbursed as a maximum amount item. Indirect cost is limited to 10%.

	Lump Sum Price
Task 1: Literature Review	\$
Task 2: Collect Geotechnical Design Information, Load Test, and Pressure Grouting Data	\$
Task 3: Process Data and Analysis	\$
Task 4: Conclusions and Recommendations	\$
Task 5: Draft Final and Closeout Presentation	\$
Task 6: Final Report	\$ Maximum Amount
Travel	\$
Indirect Cost on Travel	\$

The Research Center has a total maximum budgetary amount of \$200,000.00 for this project. Proposals received that exceed the total maximum budgetary amount will be considered non-responsive.

University Name: _____

Address: _____

City, State, Zip: _____

Telephone: (____) _____ Fax Number: (____) _____

Contact Person: _____

E-Mail Address: _____

INTRODUCTION SECTION

1. INVITATION

The Research Center, requests written proposals from qualified Universities to provide research services for Load and Resistance Factors Design (LRFD) Resistance Factors for Tip Grouted Drilled Shafts. It is anticipated that the term of the contract will begin upon execution of the task work order and be effective through date determined by the university.

The Research Center intends to award this contract to the responsive and responsible University whose proposal is determined to be the most advantageous to the Department. For the purpose of this document, the term "University" means the prime University acting on its own behalf and those individuals, partnerships, firms, or corporations comprising the Universities team. The term "proposal" means the complete response of the University to the Request for Research Proposals (RFRP).

2. TIMELINE

Provided below is a list of critical dates and actions. These dates are subject to change. Notices of changes (Addenda) will be posted on the Research Center's website at <http://www.dot.state.fl.us/research-center/RFRPs.shtm> under this RFRP number. It is the responsibility of all potential proposers to monitor this site for any changing information prior to submitting your proposal.

<u>ACTION / LOCATION</u>	<u>DATE</u>	<u>LOCAL TIME</u>
DEADLINE FOR TECHNICAL QUESTIONS - (There is no deadline for administrative questions)	10-19-2016	3:00 PM
PROPOSALS DUE, ON OR BEFORE - (Technical and Price Proposal) 605 Suwannee Street, MS 30, SE063 Tallahassee, FL 32399-0450	11-22-2016	3:00 PM
PUBLIC OPENING / MEETING (Price Proposal) - 605 Suwannee Street, Room 348 Tallahassee, FL 32399-0450	12-13-2016	10:00 AM
POSTING OF INTENDED AWARD -	12-14-2016	8:00 AM

3. AGENDA FOR PUBLIC MEETINGS

Agenda – Price Proposal Opening & Intended Award Meeting

Agenda for Price Proposal Opening and Intended Award meeting for RFRP-16/17-002:

Starting Time: see "Timeline" in RFRP solicitation

- Opening remarks of approx. 2 minutes by Research Center personnel.
- Public input period – To allow a maximum of 15 minutes total for public input related to the RFRP solicitation.
- At conclusion of public input or 15 minutes, whichever occurs first, the technical evaluation scores will be summarized.
- Announce the universities that did not achieve the minimum technical score.
- Announce the universities that achieved the minimum technical score and their price(s) as price proposals are opened.
- Calculate price scores and add to technical scores to arrive at total scores.
- Announce Proposer with highest Total Score as Intended Award.
- Announce time and date the decision will be posted on the Research Center website.
- Adjourn.

4. SPECIAL ACCOMMODATIONS

Any person with a qualified disability requiring special accommodations at a pre-proposal conference, public meeting, oral presentation and/or opening shall contact the contact person at the phone number, e-mail address on the title page at least five (5) working days prior to the event. If you are hearing or speech impaired, please contact this office by using the Florida Relay Services which can be reached at 1 (800) 955-8771 (TDD).

SPECIAL CONDITIONS

1. QUESTIONS & ANSWERS

In accordance with section 287.057(23), Florida Statutes, respondents to this solicitation or persons acting on their behalf may not contact, between the release of the solicitation and the end of the 72-hour period following the agency posting the notice of intended award, excluding Saturdays, Sundays, and state holidays, any employee or officer of the executive or legislative branch concerning any aspect of this solicitation, except in writing to the contact person provided in the solicitation documents. Violation of this provision may be grounds for rejecting a response.

Any technical questions arising from this Request for Research Proposal must be forwarded, in writing to, Patti Brannon at patti.brannon@dot.state.fl.us. Questions must be received no later than the time and date reflected on the Timeline. The Research Center's written response to written inquiries will be posted on the Research Center's website at <http://www.dot.state.fl.us/research-center/RFRPs.shtm> under this RFRP number. It is the responsibility of all potential proposers to monitor this site for any changing information prior to submitting their proposal.

Questions regarding administrative aspects of the proposal process should be directed to Patti Brannon in writing at patti.brannon@dot.state.fl.us or by phone at 850-414-4616.

2. ORAL INSTRUCTIONS / CHANGES TO THE REQUEST FOR PROPOSAL (ADDENDA)

No negotiations, decisions, or actions will be initiated or executed by a proposer as a result of any oral discussions with a State employee. Only those communications which are in writing from the Department will be considered as a duly authorized expression on behalf of the Department.

Notices of changes (Addenda) will be posted on the Research Center's website at <http://www.dot.state.fl.us/research-center/RFRPs.shtm> under this RFRP number. It is the responsibility of all potential proposers to monitor this site for any changing information prior to submitting your proposal. All Addenda will be acknowledged by signature and subsequent submission of Addenda with proposal when so stated in the Addenda.

3. SCOPE OF SERVICES

Details of the services, information and items to be furnished by the University are described in Exhibit "A", Scope of Services, attached hereto and made a part hereof.

4. INTENDED AWARD

The Research Center intends to award a contract to the responsive and responsible university with the highest cumulative total points for the evaluation criteria specified herein. The Intended Award decision will be announced after final evaluation and totaling of scores at the Price Proposal opening specified in the Timeline (See Introduction Section 2 Timeline). If the Research Center is confronted with identical pricing or scoring from multiple universities, the Research Center shall determine the order of award in accordance with section 295.187(4), Florida Statutes, and Rule 60A-1.011 Florida Administrative Code.

5. QUALIFICATIONS

5.1 General

The Department will determine whether the Proposer is qualified to perform the services being contracted based upon their proposal demonstrating satisfactory experience and capability in the work area. The Proposer shall identify necessary experienced personnel and facilities to support the activities associated with this proposal.

5.2 Qualifications of Key Personnel

Those individuals who will be directly involved in the project should have demonstrated experience in the areas delineated in the scope of work. Individuals whose qualifications are presented will be committed to the project for its duration unless otherwise accepted by the Research Center.

6. METHOD OF COMPENSATION

For the satisfactory performance of the services describe in attached Exhibit A, Scope of Service, the University shall be paid as described in the attached Exhibit B, Method of Compensation.

7. CONTRACT DOCUMENT

The Master University Agreement will serve as the contracting document. The Research Center will issue a task work order to the University receiving the award.

8. REVIEW OF PROPOSER'S FACILITIES & QUALIFICATIONS

After the proposal due date and prior to contract execution, the Research Center reserves the right to perform or have performed an on-site review of the University's facilities and qualifications. This review will serve to verify data and representations submitted by the University and may be used to determine whether the University has an adequate, qualified, and experienced staff, and can provide overall management facilities.

Should the Research Center determine that the proposal has material misrepresentations or that the size or nature of the University's facilities or the number of experienced personnel (including technical staff) are not adequate to ensure satisfactory contract performance, the Research Center has the right to reject the proposal.

9. PROTEST OF REQUEST FOR PROPOSAL SPECIFICATIONS

Any person who is adversely affected by the contents of this Request for Research Proposal must file the following with the Department of Transportation, Clerk of Agency Proceedings, Office of the General Counsel, 605 Suwannee Street, Mail Station 58, Tallahassee, Florida 32399-0450:

1. A written notice of protest within seventy-two (72) hours after the posting of the solicitation, (the notice of protest may be Faxed to 850-414-5264), and
2. A formal written protest in compliance with Section 120.57(3), Florida Statutes, within ten (10) days of the date on which the written notice of protest is filed.

Failure to file a protest within the time prescribed in section 120.57(3), Florida Statutes, or failure to post the bond or other security required by law within the time allowed for filing a bond shall constitute a waiver of proceedings under Chapter 120, Florida Statutes.

10. RESERVATIONS

The Research Center reserves the right to accept or reject any or all proposals received and reserves the

right to make an award without further discussion of the proposals submitted. Therefore, the proposals should be submitted initially in the most favorable manner. It is understood that the proposal will become a part of the Research Center's official file, without obligation to the University.

11. ADDITIONAL TERMS & CONDITIONS

No conditions may be applied to any aspect of the RFRP by the proposer. Any conditions placed on any aspect of the proposal documents by the proposer may result in the proposal being rejected as a conditional proposal. The only recognized changes to the RFRP prior to proposal opening will be a written Addenda issued by the Department.

12. RESPONSIVENESS OF PROPOSALS

12.1 Responsiveness of Proposals

Proposals will not be considered if not received by the Research Center **on or before** the date and time specified as the due date for submission. All proposals must be typed or printed in ink. A responsive proposal is an offer to perform the scope of services called for in this Request for Research Proposal in accordance with all requirements of this Request for Research Proposal and receiving seventy (70) points or more on the Technical Proposal. Proposals found to be non-responsive shall not be considered. Proposals may be rejected if found to be irregular or not in conformance with the requirements and instructions herein contained. A proposal may be found to be irregular or non-responsive by reasons that include, but are not limited to, failure to utilize or complete prescribed forms, conditional proposals, incomplete proposals, indefinite or ambiguous proposals, and improper and/or undated signatures.

12.2 Multiple Proposals

Proposals may be rejected if more than one proposal is received from a University. Such duplicate interest may cause the rejection of all proposals in which such University has participated. Subcontractors may appear in more than one proposal.

12.3 Other Conditions

Other conditions which may cause rejection of proposals include, but are not limited to, evidence of collusion among Universities, obvious lack of experience or expertise to perform the required work, failure to perform or meet financial obligations on previous contracts. University's whose proposals, past performance, or current status do not reflect the capability, integrity, or reliability to fully and in good faith perform the requirements of the Contract may be rejected as non-responsive. The Research Center reserves the right to determine which proposals meet the requirements of this solicitation, and which Proposers are responsive and responsible.

13. PROPOSAL FORMAT INSTRUCTIONS

13.1 General Information

This section contains instructions that describe the required format for the proposal. All proposals submitted shall contain two parts and be marked as follows:

PART I TECHNICAL PROPOSAL NUMBER RFRP-16/17-002
(One Separately Sealed Package for Technical)

PART II PRICE PROPOSAL NUMBER RFFP-16/17-002
(One Separately Sealed Package for Prices)

THE SEPARATELY SEALED PACKAGES MAY BE MAILED TOGETHER IN ONE ENVELOPE OR BOX.

13.2 Technical Proposal (Part I) (5 copies)
(Do not include price information in Part I)

The Proposer must submit one (1) original and five (5) copies of the technical proposal which are to be divided into the sections described below. Since the Department will expect all technical proposals to be in this format, failure of the Proposer to follow this outline may result in the rejection of the proposal. The technical proposal must be submitted in a separate sealed package marked "TECHNICAL PROPOSAL NUMBER RFRP-16/17-002".

1. EXECUTIVE SUMMARY

The Proposer shall provide an Executive Summary to address their understanding of the problem, knowledge of the technology, its background and current practices. Proposer shall also address recent work, development and publications that could be used in this project.

2. PROPOSED RESEARCH APPROACH

The Proposer shall provide a plan for the scientific and practical approach to the resolution of the problem, this should include, but not be limited to, data collection procedures, data reduction, statistical evaluations, analytical procedures, cooperative features, and innovative concepts.

3. QUALIFICATION OF STAFF AND RESOURCES

The Proposer should provide the names, experience and expertise of proposed staff, as well as a resume for each individual proposed and a description of the functions and responsibilities of each key person relative to the task to be performed. The approximate percent of time to be devoted exclusively for this project and to the assigned tasks should also be indicated. A Deliverables Schedule (attached) that identifies the submittal date of each deliverable must be included.

The Proposal should address equipment and computer capabilities to include laboratory, computing equipment, software and other resources available.

4. MANAGEMENT

The Proposer should provide a plan for adequate management, coordination and communication to efficiently provide reliable results, control costs and maintain the proposed deliverables schedule.

13.3 Price Proposal (Part II) (2 copies)

The price proposal information is to be submitted in a separate sealed package marked "PRICE PROPOSAL NUMBER RFRP-16/17-002". The Price Proposal information shall be submitted on the forms provided in the Request for Research Proposal.

13.4 Presenting the Proposal

The proposal shall be limited to a page size of eight and one-half by eleven inches (8½" x 11"). Foldout pages may be used, where appropriate, but should not exceed five (5) percent of the total number of pages comprising the proposal. Type size shall not be less than 10 point font. Bindings and covers will be at the Proposer's discretion.

Unnecessarily elaborate special brochures, art work, expensive paper and expensive visual and other presentation aids are neither necessary nor desired.

It is recognized that existing financial reports, documents, or brochures, such as those that delineate the Proposer's general capabilities and experience, may not comply with the prescribed format. It is not the intent to have these documents reformatted and they will be acceptable in their existing form.

14. COSTS INCURRED IN RESPONDING

This Request for Research Proposal does not commit the Research Center or any other public agency to pay any costs incurred by a university in the submission of a proposal or to make necessary studies or designs for the preparation thereof, nor to procure or contract for any articles or services.

15. MAIL OR DELIVER PROPOSAL TO: (DO NOT FAX OR SEND BY E-MAIL)

**Florida Department of Transportation
Attention: Patti Brannon
Research Center
605 Suwannee Street, MS 30
Tallahassee, FL 32399-0450
Phone # (850) 414-4616**

It is the proposer's responsibility to assure that the proposal (Technical and Price proposal) is delivered to the proper place **on or before** the Proposal Due date and time (See Introduction Section 2 Timeline). Proposals which for any reason are not so delivered will not be considered.

By submitting a proposal, the University represents that it understands and accepts the terms and conditions to be met and the character, quality and scope of services to be provided.

All proposals and associated forms shall be signed and dated in ink by a duly authorized representative of the Proposer.

Each University shall fully acquaint itself with the conditions relating to the performance of the services under the conditions of this Request for Research Proposal. This may require an on-site observation.

16. MODIFICATIONS, RESUBMITTAL AND WITHDRAWAL

Proposers may modify submitted proposals at any time prior to the proposal due date. Requests for modification of a submitted proposal shall be in writing and must be signed by an authorized signatory of the proposer. Upon receipt and acceptance of such a request, the entire proposal will be returned to the proposer and not considered unless resubmitted by the due date and time. Proposers may also send a change in a sealed envelope to be opened at the same time as the proposal. The RFRP number, due date and time should appear on the envelope of the modified proposal.

17. PROPOSAL OPENING

All proposal openings are open to the public. Technical Proposals will be opened by the Research Center at the date, time and location in the Timeline (See Introduction Section 2 Timeline). Price Proposals, which have a corresponding responsive Technical Proposal, will be opened by the Research Center at the date, time and location in the Timeline (See Introduction Section 2 Timeline).

18. PROPOSAL EVALUATION

18.1 Evaluation Process:

A Technical Review Committee (TRC) will be established to review and evaluate each proposal submitted in response to this Request for Research Proposal (RFRP). The TRC will be composed of at least three (3) persons who collectively have experience and knowledge in the program areas and service requirements for which the commodities and/or contractual services are sought.

The Research Center will distribute to each member of the TRC a copy of each technical proposal. The TRC members will independently evaluate the proposals on the criteria and point system established in the section below entitled "Criteria for Evaluation" in order to assure that proposals are uniformly rated. Due to the

complexity of certain procurements, the TRC members are authorized to consult with subject matter experts for the purpose of gathering information, if needed. The independent evaluations will be sent to the Research Center and averaged for each university. Proposing firms must obtain an average score of seventy (70) points or higher on the Technical Proposal to be considered responsive. Should a Proposer receive fewer than seventy (70) points for their average Technical Proposal score, the Price Proposal will not be opened.

During the process of evaluation, the Research Center will conduct examinations of proposals for responsiveness to requirements of the RFRP. Those determined to be non-responsive will be automatically rejected.

18.2 Price Proposal

The Proposer shall complete the Price Proposal form and submit as part of the Price Proposal Package. Any proposal in which this form is not used or in which the form is improperly executed may be considered non-responsive and the proposal will be subject to rejection. The university's completed form shall become a part of the contract upon award of the contract.

The Research Center will open Price Proposals in accordance with Section 17, Proposal Openings. The Research Center will review and evaluate the price proposals and prepare a summary of its price evaluation. The Research Center will assign points based on price evaluation criteria identified herein.

18.3 Criteria for Evaluation

Proposals will be evaluated and graded in accordance with the criteria detailed below.

a. Technical Proposal (100 Points)

Technical evaluation is the process of reviewing the Proposer's response to evaluate the experience, qualifications, and capabilities of the proposers to provide the desired services and assure a quality product.

The following point system is established for scoring the technical proposals:

	<u>Point Value</u>
1. Understanding of the Problem	20
2. Proposed Research Approach	40
3. Qualification of Staff and Resources	20
4. Management	20

c. Price Proposal (5 Points)

Price evaluation is the process of examining a prospective price without evaluation of the separate cost elements and proposed profit of the potential provider. Price analysis is conducted through the comparison of price quotations submitted.

The criteria for price evaluation shall be based upon the following formula:

$$\underline{(\text{Low Price} / \text{Proposer's Price}) \times \text{Price Points} = \text{Proposer's Awarded Points}}$$

19. POSTING OF INTENDED DECISION/AWARD

19.1 The Research Center's decision will be posted on the Research Center's website at <http://www.dot.state.fl.us/research-center/RFRPs.shtm> on date and time in the Timeline, and will remain posted for a period of seventy-two (72) hours. Any proposer who is adversely affected by the Research Center's recommended award or intended decision must file the following with the Department of Transportation, Clerk of Agency Proceedings, Office of the General Counsel, 605

Suwannee Street, Mail Station 58, Tallahassee, Florida 32399-0450:

1. A written notice of protest within seventy-two (72) hours after posting of the Intended Award, (the notice of protest may be Faxed to 850-414-5264), and
2. A formal written protest and protest bond in compliance with Section 120.57(3), Florida Statutes, within ten (10) days of the date on which the written notice of protest is filed. At the time of filing the formal written protest, a bond (a cashier's check or money order may be accepted) payable to the Department must also be submitted in an amount equal to one percent (1%) of the estimated contract amount based on the contract price submitted by the protestor.

Failure to file a protest within the time prescribed in Section 120.57(3), Florida Statutes, or failure to post the bond or other security required by law within the time allowed for filing a bond shall constitute a waiver of proceedings under Chapter 120, Florida Statutes.

19.2 - Inability to Post:

If the Research Center is unable to post as defined above, the Research Center will notify all proposers by electronic notification by mail and/or telephone. The Research Center will provide notification of any future posting in a timely manner.

19.3 - Request to Withdraw Proposal:

Requests for withdrawal will be considered if received by the Research Center, in writing, within seventy-two (72) hours after the price proposal opening time and date. Requests received in accordance with this provision will be granted by the Research Center upon proof of the impossibility to perform based upon obvious error on the part of the proposer.

20. AWARD OF THE CONTRACT

The Research Center will issue a task work order from the master university agreement receiving the award. Services will be authorized to begin upon Department execution of the task work order.

Exhibit A – Scope of Service

Background Statement

Drilled Shaft Tip Grouting (DSTG) is a procedure that started being used in Florida in the late 1990's and is becoming more commonly used by designers and contractors to reduce the required drilled shaft lengths. The main purpose of DSTG has been to increase the end bearing capacity by improving the strength and settlement behavior properties of the material underneath the tip of the shaft through grouting. Since the result is an increase in the total capacity of the drilled shafts this has allowed a reduction of the drilled shaft sizes.

There is an additional potential benefit that has not been fully evaluated yet. During grouting, the shaft is subjected to grouting pressures against a steel plate, at the bottom, similar to the mechanism that occurs during a bottom cell load testing. Since the grouting pressures and movements are measured during the process, it is possible to have an approximate estimate of the bearing capacity mobilized during the grouting process. Therefore DSTG would provide a way to proof or verify approximately the capacity of the shafts, giving an additional quality control feature that shafts which are not tip grouted or tested do not. In order to improve the quality control and the measurements taken during the grouting process, the Department now requires that a coarse aggregate layer be placed underneath the bottom plate (for shafts tipped in limestone and some of the stronger types of Intermediate Geomaterial) and that strain gauges be included near the bottom of the shaft. The coarse aggregate reduces the possibility of plugging at the grout delivery ports which could yield a false estimate of load being transferred to the bearing material. The strain gauges at the bottom of the shafts will allow the Engineer to determine whether the stress being computed from the grouting process is actually being transferred uniformly across the shaft's cross sectional area.

There is a consensus among geotechnical engineers that a foundation with DSTG is safer and more reliable than drilled shafts alone. However, neither the Department nor AASHTO considers this benefit and the drilled shafts are designed with the same resistance factors. Drilled shafts are a very expensive foundation alternative and having higher factors should produce reduced lengths; thereby, reducing the overall foundation cost which could result in an increased use of these foundations. The current practice of ignoring the benefit that the additional quality control post-grouting provides and using the same resistance factors for grouted and non-grouted shafts is conservative. This research will try to establish more realistic resistance factors that reflect the additional reliability provided by the measurements performed during the drilled shaft grouting process. The findings of this project would be implemented into the Structure Design Guidelines.

Project Objective

The purpose of this research is to derivate LRFD soil resistance factors that designers can use when drilled shafts are post-grouted. This will be accomplished through field data collection, load test data analysis and reduction, and comprehensive statistical analysis. The final report should produce resistance factors that designers can use that take into account the actual quality control the drilled shaft post-grouting technique offers.

Project Kickoff Teleconference

The principal investigator will schedule a kickoff meeting that shall be held within the first 30 days of task work order execution. The kickoff meeting will consist of a webinar at least 30 minutes in length. The purpose of the meeting is to review the tasks, deliverables, deployment plan, timeline, and expected/anticipated project outcomes and their potential for implementation and benefits. The principal investigator shall prepare a presentation following the template provided at [http://www.dot.state.fl.us/research-center/Program Information/Research.Performance/kickoff.meeting.pdf](http://www.dot.state.fl.us/research-center/Program%20Information/Research.Performance/kickoff.meeting.pdf). The project manager, principal investigator, and research performance coordinator shall attend. Other parties may be invited, if appropriate.

Task 1, Literature Review

Collect and review existing literature and references dealing with Drilled Shaft Tip Grouting, benefits and improvements from this method, analysis and current design practices to estimate the capacity of post-

grouted shafts. Also, identify limitations observed during the utilization of this method of improvement and how practitioners have addressed the issues encountered to improve the quality of the method.

Deliverable 1: Upon completion of Task 1, the university will submit to the Research Center at research.center@dot.state.fl.us a report that includes (a) literature, references and any information reviewed during this task; (b) a review of the current practice on analysis and design of tip grouted drilled shafts and (c) limitations of the tip grouting method and how practitioners are trying to address the issues and improving the quality of the method.

Task 2, Collect Geotechnical Design Information, Load Test, and Pressure Grouting Data

Collect geotechnical design reports that includes soil boring information and load bearing capacity estimates for post-grouted drilled shafts. Collect field data, such as drilled shaft construction records, shaft post-grouting records, and load testing records, including rapid tests (statnamic or similar), conventional static, Osterberg load cell, etc. Drilled shaft post grouting data includes grout pressures, volumes, and shaft displacements and may include strain gauge data as well. Collect information not only from Florida sources but from other states as well.

Deliverable 2: Upon completion of Task 2, the university will submit to the Research Center at research.center@dot.state.fl.us a report that includes the geotechnical information that was obtained, reviewed and considered pertinent and of value for further analysis on the research, including but not limited to soil borings, load bearing capacity estimates, drilled shaft construction records, shaft post-grouting records, and load testing records.

Task 3, Process Data and Analysis

Process data from design load bearing estimates, load test data after post-grouting and data from measurements collected during drilled shaft post-grouting. Establish correlations and resistance factors for the estimated drilled shaft grouted design capacity. Evaluate the added benefit of measuring directly or indirectly an axial load during the pressure grouting process. The axial loading applied during grouting may be estimated based on the data collected during shaft grouting (pressures, strain gauges, displacement, grouting volumes, etc.). Analyze and derivate statistical parameters, and estimate resistance factors. Evaluate the influence of factors such as the type of soils and geology that is being grouted, shaft movements allowed, re-grouting, etc.

Deliverable 3: Upon completion of Task 3, the university will submit to the Research Center at research.center@dot.state.fl.us a report that includes (a) the methodology used to process the data obtained, (b) the analysis performed to establish correlations that will assist in the determination of improved soil resistance factors, (c) the estimation of increased soil resistance factors due to the direct measurement or approximate estimates of the load applied during the grouting process and (d) factors that may affect the benefit of the drilled shaft tip grouting and their effect on the soil resistance factors.

Task 4: Conclusions and Recommendations

Evaluate, discuss and recommend resistance factors that could be used for drilled shafts using post-grouting. Prepare a summary of practical recommendations and limitations that designers should consider when specifying drilled shaft tip grouting and the modified soil resistance factors. Include the effect of soils and geology in the recommendations. Include in this task an evaluation and discussion of the potential cost benefits of implementing the findings of this research.

Deliverable 4: Produce a report that includes (a) the evaluations performed on this task to evaluate and establish the recommended soil resistance factors; (b) practical recommendations and limitations that designers should consider when specifying drilled shaft tip grouting; (c) modified soil resistance factors. Include the effect of soils and geology in the recommendations, and (d) the evaluation and discussion of the potential cost benefits of the implementation of the results of this research.

Task 5: Final Draft and Closeout Teleconference

This task will contain 2 deliverables: the draft final report and the closeout teleconference. The draft final report and closeout teleconference should be identified in the budget as one task with a specific dollar amount.

Deliverable 5a: Ninety (90) days prior to the end date of the task work order, the university will submit a draft final report to research.center@dot.state.fl.us

The draft final report will contain (insert description of information the report will contain).

The draft final and final reports must follow the Guidelines for University Presentation and Publication of Research available at <http://www.dot.state.fl.us/research-center/docs/T2/University.Guidelines.2015.pdf>

The report must be well-written and edited for technical accuracy, grammar, clarity, organization, and format.

Deliverable 5b: Thirty (30) days prior to the end date of the task work order, the principal investigator will schedule a closeout teleconference. The principal investigator shall prepare a PowerPoint presentation following the template provided at [http://www.dot.state.fl.us/research-center/Program Information/Research.Performance/closeout.meeting.reqs.pdf](http://www.dot.state.fl.us/research-center/Program%20Information/Research.Performance/closeout.meeting.reqs.pdf). At a minimum, the principal investigator, project manager, and research performance coordinator shall attend. The purpose of the meeting is to review project performance, the deployment plan, and next steps.

Task 6 Final Report

Deliverable 6: Upon Department approval of the draft final report, the university will submit the Final Report on two (2) CDs. Both CDs shall contain the report in PDF and Word formats. CDs must be labeled in a professional manner and include contract number, task work order number, project title, and date.

The final report is due by the end date of the task work order and should be mailed to the Florida Department of Transportation, Research Center, 605 Suwannee Street, MS 30, Tallahassee, FL 32399-0450.

Exhibit B Method of Compensation

1.0 Purpose

This Exhibit defines the limits of compensation to be made to the University for the services set forth in Exhibit "A" and the method by which payment shall be made.

2.0 Compensation

For the satisfactory performance of services detailed in Exhibit "A", the University shall be paid up to a Maximum Amount to be determined by the Department. The Maximum Amount shall consist of the following amounts:

Task 1 Deliverable	\$Lump Sum Amount to be determined by the Department
Task 2 Deliverable	\$Lump Sum Amount to be determined by the Department
Task 3 Deliverable	\$Lump Sum Amount to be determined by the Department
Task 4 Deliverable	\$Lump Sum Amount to be determined by the Department
Task 5 Deliverable	\$Lump Sum Amount to be determined by the Department
Task 6 Deliverable	\$Lump Sum Amount to be determined by the Department
Travel	\$Maximum Amount to be determined by the Department
Indirect Cost on Travel	\$Maximum Amount to be determined by the Department

3.0 Progress Payments

The University shall submit an invoice upon approval of each task deliverable in a format acceptable to the Research Center. Lump Sum payment shall be made to the Vendor for the satisfactory completion of each task and approval by the Department of each task deliverable.

Invoices shall be submitted to the Florida Department of Transportation, Research Center, 605 Suwannee Street, MS 30, Tallahassee, FL 32399-0450 or electronically to the Research Center at research.center@dot.state.fl.us

4.0 Tangible Personal Property

This task work order does not include the purchase of Tangible Personal Property, as defined in Section 273.02 Florida Statute.