**Request for Research Proposal**

**RFRP-19-002**

**Epoxy Dowel Pile Splice Evaluation**

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

Details of the Services are described in Exhibit “A”, Scope of Services, attached.

The basis form of Agreement shall be a task work order issued under the Master University Agreement by the Research Center.

The maximum amount of funding available is $300,000.00 and the anticipated timeframe for the project is 30 months.

**Proposal Format Instructions:**

1. The University is encouraged to limit the proposal to no more than 30 pages. The cover page should contain the contact information for an Administrative contact and the Principal Investigator.
2. Provide an Executive Summary, written in non-technical language describing capabilities and approaches for accomplishing the services.

III. Provide a Management Plan which explains the functions and responsibilities of each key person and their experience developing and/or conducting research to support epoxy dowel pile splice evaluation.

IV. Provide a Technical Plan which demonstrates knowledge of the subject to include: Mechanics and design of prestressed concrete piling with traditional Carbon-Steel, High-Strength Stainless Steel, and Carbon-FRP stands and Glass-FRP reinforcing. Mechanics and design of adhesive bonded dowels. Design code requirements for prestressed and non-prestressed concrete elements (FDOT SDG & FRPD, AASHTO BDS, etc.). Identify any special software or equipment that will be utilized to perform the work. Discuss analysis and design approach to include: Experience using strain compatibility modeling software such as Response 2000 (Finite element software models or procedures will not be considered for final deliverable tools). Experience developing strain compatibility modeling with Mathcad worksheets.

V. Provide a Work Plan with estimated project hours by skill classification.

**Price Format Instructions:**

I. The Price information shall be submitted separately on the form provided and a detailed budget to support the lump sum amounts identified for each deliverable. Indirect cost is limited to 10%.

**Proposal Evaluation:**

A Technical Review Committee will review and evaluate each proposal submitted. The Committee will evaluate each technical proposal and assign a Technical Score based on the criteria identified below.

Executive Summary 20 points

Management Plan 15 points

Technical Plan 50 points

Work Plan 15 points

**Price Evaluation**

The Research Center will view the price information and assign points based on price evaluation formula. The criteria for price evaluation shall be based upon the following formula:

(Low Price/Proposer’s Price) x Price Points = Proposer’s Awarded Points

Price 10 points

**Technical Questions are due by 3:00 PM on November 1, 2018**

Technical questions should be submitted to [patti.brannon@dot.state.fl.us](mailto:patti.brannon@dot.state.fl.us) with the subject line

RFRP-19-002 Technical Questions

**PLEASE EMAIL PROPOSALS TO:**

Patti Brannon at [patti.brannon@dot.state.fl.us](mailto:patti.brannon@dot.state.fl.us)

Include in the subject line the following information: RFRP-19-002 Epoxy Dowel Pile Splice Evaluation

**PROPOSAL ARE DUE BY 5:00 PM ON DECEMBER 20, 2018.** Proposals received after this date and time will not be accepted.

The Research Center will notify all proposers of the final decision on January 17, 2019.

**Special Notes:**

**Proposal will be rejected if more than one proposal is received from a University.**

**The Research Center intends to award the contract to the responsible and responsive proposer whose proposal is determined to be the most advantageous to the Department.**

Any questions related to this request should be directed to Patti Brannon at [patti.brannon@dot.state.fl.us](mailto:patti.brannon@dot.state.fl.us) or (850) 414-4616.

**Exhibit A – Scope of Service**

Epoxy Dowel Pile Splice Evaluation

**Background Statement**

The Department has implemented innovative corrosion resistant materials for pile foundations within the splash zone of bridge substructures. Currently, there is minimal understanding on the performance and behavior of splicing these piles with an epoxy dowel splice. To properly develop and utilize these piles, research is required to better understand the performance and behavior such that refinements can be made to the Standard Plans (Index 455-series). This research would also verify and validate the behavior of the existing pile splice details for the traditional carbon steel piles as a comparison. The materials that would be utilized are carbon steel, high-strength stainless steel (HSSS), carbon fiber-reinforced polymer (CFRP), and glass fiber-reinforced polymer (GFRP). The flexural behavior will be the primary item for evaluation.

**Project Objectives**

The objective of this research project is to quantify the effectiveness of the current pile splice details and develop cost-effective versions for corrosion-resistant piles.

This research should provide a better understanding of the performance and behavior of spliced bearing piles along with providing a refined design that will be incorporated within the FDOT ***Standard Plans*** (Index 455-series). Without this research, the performance of a spliced pile will be unknown and may limit the implementation of corrosion resistant piles where splicing is required.

Experimental testing will be performed at the FDOT Structures Research Center (SRC). Coordination with the FDOT Project Manager (PM) will occur during Tasks 3 and 4 to ensure the specimen design, fabrication, and test setup is within the capabilities of the FDOT SRC. Any required prestressed concrete components shall be fabricated at an FDOT approved production facility.

**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.fdot.gov/research/Program_Information/Research.Performance/kickoff.meeting.pdf>

The project manager, principal investigator, and research performance coordinator shall attend. Other parties may be invited, if appropriate.

**Anticipated Tasks and Deliverables:**

Task 1 – Literature review

Perform an extensive literature review of epoxy dowelled spliced prestressed concrete pile systems that have been tested for mechanical performance under flexural loading.

Deliverable 1 – Upon completion of Task 1, the University will submit to the Research Center at [research.center@dot.state.fl.us](mailto:research.center@dot.state.fl.us) a written report of the literature review.

Task 2 - Development of GFRP Epoxy Dowel Pile Splice Designs

This task will focus on the development of GFRP Epoxy Dowel Pile Splice Designs as alternatives to the 18”x18” CFRP version of both the “Drivable Unforeseen” and “Drivable Preplanned” pile splices shown on ***Standard Plans*** Index [455-102](http://www.fdot.gov/design/standardplans/current/IDx/455-102.pdf) and [455-118](http://www.fdot.gov/design/standardplans/current/IDx/455-118.pdf) . These pile splices should develop the same flexural capacity as the 18”x18” pile splices shown on Index [455-002](http://www.fdot.gov/design/standardplans/current/IDx/455-002.pdf) and [455-018](http://www.fdot.gov/design/standardplans/current/IDx/455-018.pdf).

Deliverable 2 – Upon completion of Task 2, the University will submit to the Research Center at [research.center@dot.state.fl.us](mailto:research.center@dot.state.fl.us) a report to include:

* Design calculations for the GFRP Epoxy Dowel Pile Splice capacities;
* Detailed drawings depicting the design for incorporation into the testing phase under Task 3 and 4.

Task 3 - Development of Full-Scale Test Specimen Configuration and Loading Procedure

Development of full-scale test specimen configuration and loading procedure to evaluate Epoxy Dowelled Pile Splices. Specimens should represent the GFRP Epoxy Dowel Rebar splices developed under Task 2 and the three “Drivable Preplanned” pile splices shown under ***Standard Plans*** Index [455-002](http://www.fdot.gov/design/standardplans/current/IDx/455-002.pdf) (ASTM A416-PC Piles with ASTM A615 Dowel Rebar) and [455-102](http://www.fdot.gov/design/standardplans/current/IDx/455-102.pdf) (CFRP-PC Piles with CFRP Dowel Rebar, HSSS-PC Piles with SS Dowel Rebar). A minimum of 2 tests must be performed for each 18”x18” pile splice configuration (total of 10 minimum). Coordination with the FDOT Project Manager (PM) will occur for the selection of all specimen designs.

Deliverable 3 – Upon completion of Task 3, the University will submit to the Research Center at [research.center@dot.state.fl.us](mailto:research.center@dot.state.fl.us) a report to include:

* Written procedures for installing, testing and evaluating pile splice flexural capacity.
* Detailed design and construction drawings of the test specimens, with construction specifications.
* Detailed drawings depicting the design for loading and instrumentation to monitor and record the flexural response of each splice configuration.
* Provide detailed calculations which predict the capacity of each pile splice.

Task 4 – Fabricate Test Samples and Test Splices

Fabricate test samples and test splices in accordance with the details and procedures developed under Task 3. Observe, document and process pile splice tests completed at the FDOT Structures Research Center. Prestressed concrete components will be fabricated at an approved FDOT production facility and delivered to the FDOT SRC. Splicing the piles will performed at the FDOT SRC.

Deliverable 4 – Upon completion of Task 4, the University will submit to the Research Center at [research.center@dot.state.fl.us](mailto:research.center@dot.state.fl.us) a written report with the test results and observations of the pile splice performance.

Task 5 – Develop a Design Procedure for Epoxy Dowel Pile Splice Flexural Capacity

Evaluate the results from Task 4 and develop a revised design procedure used in Task 2 that is calibrated according to the observed test capacities. The design procedure will include all splice reinforcing materials that were evaluated in the testing. The design procedure shall also be incorporated into a Mathcad worksheet that can be modified by FDOT for future design modifications.

Deliverable 5 – Upon completion of Task 5, the University will submit to the Research Center at [research.center@dot.state.fl.us](mailto:research.center@dot.state.fl.us) a written design calculation procedure that accounts for the flexural capacity of the 18”x18” pile splice for the different constituent reinforcing materials. A Mathcad worksheet that can be modified in the future by FDOT for the design of splices for other square pile sizes.

Task 6 –Develop designs for GFRP Epoxy Dowel Pile Splice

Develop designs using the GFRP Epoxy Dowel Pile Splice for each standard square pile size: 12”, 14”, 18”, 24” and 30” in ***Standard Plans*** Index 455-100 series.

Deliverable 6 – Upon completion of Task 6, the University will submit to the Research Center at research.center@dot.state.fl.us the following:

* Detailed drawings depicting the final GFRP Epoxy Dowel Pile Splice details, for later incorporation by FDOT into the ***Standard Plans***.
* Detailed calculations which predict the capacity of each pile splice.

Task 7– Develop recommendations for improvement to the current Epoxy Dowel Pile Splices

Develop recommendations for improvement to the current Epoxy Dowel Pile Splices considering maximizing flexural capacity, improving constructability, and minimizing cost.

Deliverable 7– Upon completion of Task 7, the University will submit to the Research Center at [research.center@dot.state.fl.us](mailto:research.center@dot.state.fl.us) a written report on the evaluation of the current pile splice details on ***Standard Plans*** Index [455-002](http://www.fdot.gov/design/standardplans/current/IDx/455-002.pdf) and [455-102](http://www.fdot.gov/design/standardplans/current/IDx/455-102.pdf) and any recommendations for improvement.

Task 8 – Draft Final Report and Closeout Teleconference

Deliverable 8a – 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](mailto:research.center@dot.state.fl.us)

The draft final report will contain all deliverable reports as well as executive summary, and conclusions based on the project findings.

The draft final and final reports must follow the Guidelines for University Presentation and Publication of Research available at <http://www.fdot.gov/research/docs/T2/University.Guidelines.2016.pdf>

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

Deliverable 8b – 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.fdot.gov/research/Program_Information/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 9 – Final Report

Deliverable 9 - Upon Department approval of the draft final report, the university will submit the Final Report in PDF and Word formats electronically to the Research Center at [research.center@dot.state.fl.us](mailto:research.center@dot.state.fl.us)

The Final Report is due by the end date of the task work order.

**Deliverables Schedule**

*Note: This document will be used by the Research Center to monitor principal investigator performance and activity on the project. The PI should give careful consideration to the time needed to complete tasks and deliverables against current workload. Failure to submit deliverables in a timely manner may result in cancelation of the task work order.*

Remember to include the kickoff teleconference, submittal of draft final report, closeout teleconference and final report. The Research Center must at a minimum receive a deliverable every 6-months on a project. Progress reports are not considered deliverables.

**For planning purposes February 2019 should be used as the anticipated start date of the project.**

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| --- | --- | --- |
| Deliverable # / Description as provided in the scope (included associated task #) | Anticipated Date of Deliverable Submittal (month/year) | TO BE COMPLETED BY RESEARCH CENTER (performance monitoring) |
| Deliverable 1 -Literature Review |  |  |
| Deliverable 2- Development of a GFRP Epoxy Dowel Pile Splice Designs |  |  |
| Deliverable 3 - Development of Full-Scale Test Specimen Configuration and Loading Procedure |  |  |
| Deliverable 4 – Fabricate Test Samples and Test Splices |  |  |
| Deliverable 5 – Develop a Design Procedure for Epoxy Dowel Pile Splice Flexural Capacity |  |  |
| Deliverable 6 –Develop designs for GFRP Epoxy Dowel Pile Splice |  |  |
| Deliverable 7– Develop recommendations for improvement to the current Epoxy Dowel Pile Splices |  |  |
| Deliverable 8a – Draft Final Report |  |  |
| Deliverable 8b – Closeout Meeting/Presentation |  |  |
| Deliverable 9 – Final Report |  |  |

RFRP-19-002

Epoxy Dowel Pile Splice Evaluation

PRICE PROPOSAL

Task 1 Deliverable (Lump Sum Amount) $

Task 2 Deliverable (Lump Sum Amount) $

Task 3 Deliverable (Lump Sum Amount) $

Task 4 Deliverable (Lump Sum Amount) $

Task 5 Deliverable (Lump Sum Amount) $

Task 6 Deliverable (Lump Sum Amount) $

Task 7 Deliverable (Lump Sum Amount) $

Task 8a and 8b Deliverable (Lump Sum Amount) $

Task 9 Deliverable (Lump Sum Amount) $

Proposer must attach a detailed budget to support the lump sum amount identified per task. If applicable, the following information must be included.

**Use of Subcontractor(s)**

If a subcontractor is to work on the project, describe the work the subcontractor will perform. A scope of work and budget must be provided for the subcontractor.

**Use of Graduate Student(s) and other Research Assistants**

Describe the work any student(s) will perform.

**Equipment**

Florida Administrative Code states “for statewide financial reporting purposes, all tangible personal property with a value or cost of $1,000 or more and having a projected useful life of one year or more must be capitalized. Any hardback book with a value or cost of $25 or more and having a useful life of one year or more that is circulated to students or the general public, and any hardback book with a value or cost of $250 or more that is not circulated must be capitalized. A review of the items on the Exception Property should be performed to ensure items to not fall within this category.

*Universities must adhere to the Department’s $1,000 threshold for equipment or items of lesser value appearing on the Exception Property listing. The university must provide a copy of the purchase invoice/property description/serial number and date of receipt for the equipment with the applicable task invoice.*

A description of the equipment to be purchased must be included with a copy of the quotes obtained. Justification of specific requirements for the project and why the equipment should be purchased instead of leasing (leasing of equipment is preferred) is required for all equipment.

**Expenses**

Describe any expense items to be purchased, if applicable.

**Travel**

***Standard Research Center policy is that travel to conferences is not an allowable expenditure*.**

Describe travel that will take place, including justification of the need for travel, if applicable. Include the traveler’s name/position, location(s), purpose and duration.

*If travel is budgeted, the following text must appear, as worded:*

All travel shall be in accordance with Section 112.061, Florida Statutes. Bills for travel expenses specifically authorized in the agreement shall be submitted using the Department’s Travel Form No. 300-000-06, unless the university provides proof of the Department of Financial Services approval to use an alternate travel form. The Department shall not compensate the University for lodging/hotel in excess of $150.00 per day (excluding taxes and fees).

The maximum amount of travel is limited to $(insert amount). The maximum amount of indirect cost on travel is limited to $(insert amount).