

## REQUEST FOR QUALIFICATIONS

**TAMU RFQ 19-1149**

### **Engineering Services For Autophenotyping Greenhouse Gantry/Robot System**

**Submittal Deadline: 2:00 PM CDT on Tuesday, April 2, 2019**

**MAIL QUALIFICATIONS TO:**

Texas A&M University  
Procurement Services  
P. O. Box 30013  
College Station, TX 77842-3013

**HAND DELIVER AND/OR  
EXPRESS MAIL TO:**

Texas A&M University  
Procurement Services  
1477 TAMU Agronomy Road  
College Station, TX 77843-1477

**Show RFQ Number, Opening Date, and Time on Return Envelope**

**NOTE:** RESPONSE must be time stamped at Texas A&M University's Department of Procurement Services before the hour and date specified for receipt of response. Sealed responses will be received until the date and time established for receipt. After receipt, only the names of proposers will be made public. Other details will only be divulged after the contract award, if one is made. All questions related to the RFQ shall be in writing via e-mail to the contact provided below.

**REFER INQUIRIES TO:**

Clyde Oberg  
Assistant Director  
Texas A&M University  
Procurement Services  
E-mail: [co@tamu.edu](mailto:co@tamu.edu)

**All qualification statements shall become the property of the State of Texas upon receipt.**

## **SECTION 1 INTRODUCTION**

### **1.1 Introduction**

The College of Agriculture at Texas A&M University in College Station, TX (TAMU) is seeking proposals from qualified engineering firms to provide engineering services as detailed in Section 2 – Scope of Work.

### **1.2 Schedule of Events**

RFQ available.....Tuesday, March 19, 2019  
Deadline For Questions.....Monday, March 25, 2019 by 5:00 PM  
Responses/Addendums.....Wednesday, March 27, 2019  
RFQ Response Due.....TUESDAY, APRIL 2, 2019 at 2:00 PM  
Award of Project.....As Soon As Possible

### **1.3 Pre-Proposal Conference and Walk-Thru**

There is no Pre-Proposal Conference & Walk-Thru scheduled for this project

### **1.4 Electronic State Business Daily**

This RFQ has been posted on the Electronic State Business Daily at <http://esbd.cpa.state.tx.us/>. It is the responsibility of proposers who download this RFQ from the Electronic State Business Daily to check the website for any addenda to this RFQ. All such addenda issued by Texas A&M prior to the time that responses are received shall be considered part of the RFQ, and the Respondent shall consider and acknowledge receipt of such in their response.

## **SECTION 2 SCOPE OF PROJECT**

Texas A&M's College of Agriculture is seeking proof of qualifications for an engineering design and build firm to include the following capabilities: structural design capabilities, control system design capabilities, robotic automation design capabilities, and Level 4 FANUC system integrator capabilities for the below Current Scope as well as future projects.

The TAMU AGRILIFE Phenotyping Greenhouse requires implementation of an advanced system to record and provide quantitative physical and/or biometric characteristics of plant life. This system is required to stay current with new technology and advance the research and growth of non-destructive image analysis used in phenotyping. Two systems are required for this scope of work that include:

- Current Scope
  - 1 Abiotic Greenhouse (80'Lx30'Wx20'H) system
  - 1 Biotic Greenhouse (20'Lx30'Wx20'H) system
- Future Projects
  - 3 Biotic Greenhouse (20'Hx30'Wx20'H) systems

- Sensor driven controls design, development, and integration

**This project will include the following items for the greenhouse spaces as described:**

- **Design and Build Mechanical System** – Primary mechanical system consists of a bridge crane with mechanical manipulator/arm for recording plant characteristics. System should include a servo driven axis controller to position a 6-axis articulated long manipulator/arm mounted to a bridge crane/gantry along the length of the green house building. A fully engineered solution for all mechanical and structural designs to be integrated with TAMU architectural and engineering responsible for the Greenhouse design. Designs must meet structural and physical requirements for each space. Design approval is required by TAMU and authorized AE firm prior to build. Professional evaluations and any needed detailed studies using sound engineering principles required to establish the most functional, economical, and efficient use of materials is expected.
- **Design and Build Control System** – The system must include design and build for all required control systems. System design must comply with all TAMU facility requirements and specification. System must provide operator interfaces necessary to establish and maintain all functional aspects of the system. Necessary risk assessments will be conducted to ensure the system complies with all local, state and federal requirements. System must be designed in such a way to ensure the safety of humans while working in the environment. Multiple control zones are preferred to efficiently capture phenotyping data during human inclusion to the adjacent spaces. Operation must not interfere with human plant interactions and upkeep. The system must be configurable to adapt to the changing environment. Supplier will provide all cables and cable management from the system controller(s) to the appropriate control axis. Typical 24 conductor cable or equivalent will be supplied for end effector devices. Additional requirements identified for connections to the end effector will be addressed outside this scope of work.
- **Design and Build Sensor Manipulator/Arm** – The use of an arm to manipulate the sensor technology (supplied by TAMU) is required for this system as specified below. System must consist of multi-axis arm (robotic or equivalent) that meets space and reach constraints. For example, A servo driven 7<sup>h</sup> axis control will drive a 6-axis articulated arm along the green house width of the room. Supplier is responsible to engineer, build, test and commission the system to articulate the sensors around each plant or plant bed.
- **Phenotyping Technology Integration** – The installation of TAMU supplied sensors/scanners to the end of the manipulator will be integrated with the phenotyping application and software supplied by TAMU or TAMU supplier. The integration includes minimum requirements to articulate the arm to trigger image scanning or sensor reading in conjunction with a desired position. However, in the case of adaptive sensing or line scanning technology precise timed illumination and imaging may be required. This scope requires the simultaneous engineering required to work with TAMU or TAMU supplier to provide a robust working solution.

**The scope of work for this project includes the following design elements and specifications:**

**Operability and Possible Sequence:**

1. Design and validation of all screens required for safe operation, configuration and troubleshooting of the system.
2. Supplier responsibility to engineer build, test and install the system to articulate the sensors around all plants as specified by TAMU
3. Full coverage of plants during inspection and all associated integration with data capture technology
4. Safe Entry
  - a. Operator selects button on HMI screen to ask permission to enter one of multiple (2-4) zones.
  - b. Interlock switch will unlock once robot is out of the zone.
  - c. Operator slides open the door to enter zone.
5. Setup of plant layout and configuration can be completed using the Human Machine interface (HMI)
6. Possible Sequence
  - a. The end truck moves the gantry/crane in the center of a plant aisle.
  - b. The arm scans the plants on the left side of the aisle.
  - c. The arm starts low and works its way to the top of the plant while scanning.
  - d. The arm moves to the next plant moving along the length of the gantry.
  - e. The arm continues until all the plants on the left side are scanned.
  - f. The arm articulates the scanner so that it could scan the plants on the right side of the aisle.
  - g. The arm continues this sequence of operation moving in a horizontal position until all plants on the right side of the aisle are scanned.
  - h. Once all the plants are scanned. The end truck moves the gantry/crane to the next aisle and repeats steps 2-7.

**Controls:**

1. TAMU Network compatible. IP Addresses supplied by TAMU.
2. Use of Allen Bradley PLC controller – ControlLogix series and PanelView display screens for Human Machine interface (HMI)
3. System design must comply with all TAMU facility requirements and controls specifications.

**Safety:**

1. Supplier must be RIA certified and complete a risk assessment based on RIA 2012 standards
2. System designed in such a way to ensure the safety of humans while working in the environment.
3. Use of robotic solutions must be Fanuc utilizing DCS integrated safety architectures.
4. Appropriate Lockout Tagout safety signage will be supplied
5. All Arc-Flash calculations and associated labelling will be completed and provided
6. All Safety access points require request to enter functions with appropriate interlocks and labelling.

### **Facility and Environmental:**

1. 2 Systems covering greenhouse spaces Abiotic #1 is 80'L x 30'W x 20'H. Biotic #1 is 20'L x 30'W x 20'H.
2. Plants are densely configured in rows with approximately 1' – 3' of space between plants.
3. Individual plant dimensions will be up to 36 inches in diameter and up to 4 meters in height
4. TAMU will provide an area suitable for Supplier to stage and commission the systems
5. Supplier required to coordinate with TAMU AgriLife team to meet all location, size, capabilities, configuration and layout to meet the site conditions and constraints.
6. Design considerations should be given for extreme humidity conditions.

### **Floor:**

1. Concrete, solid slab, minimum 2000 psi.
2. Floor is not cracked or chipped
3. Minimum floor depth of 6 inches
4. Level and flat +/- 0.5 inches across 10 feet square

### **Safety:**

1. TAMU Network compatible. IP Addresses supplied by TAMU.
2. Use of Allen Bradley PLC controller – ControlLogix series and PanelView display screens for Human Machine interface (HMI)

### **Project Management**

1. Included Project management incorporating activities related to the execution of the system beyond the aspects of design, integration and debug.
2. System project kick-off, design review and wrap-up meetings, component and system timeline management, customer communications and coordination with third parties integral to the performance of the system, all contribute to this critical element.

### **Documentation:**

1. Fully documented control drawings and manuals will be provided by supplier. As built documentation will be supplied to TAMU in both bound and electronic form.
2. Documentation for arm path of motion including simulation and reach studies
3. Operational, troubleshooting, setup and maintenance functions included in manuals

### **Support and Training:**

1. Required support for installation supervision, start up and commissioning is to be included
2. System operator training:
  - a. Operator training is performed by supplier at TAMU facility. Includes four (4) people for four (4) 'dayshift' days and teaches them the typical operation processes, including recovering from typical interruptions.
3. Maintenance overview training for basic functions and recovery
4. Additional requirements for training related to robots will be reviewed and addressed outside this scope.

**Electrical**

1. Power Supply: 480 VAC, 3 Phase, 60Hz +/- 1 Hz
2. The nominal voltage of the power supplied to the robot should not vary more than +10% to -10%.

**Pneumatic – (If required):**

1. Pressure 80 PSI.
2. Estimated consumption 15 CSFM

**Payment Terms:**

1. Texas A&M University's standard Payment Term Policy is N 30.

**Transportation and Delivery:**

1. FOB – Supplier Location
2. Supplier shall provide delivery timing in weeks

**Warranty:**

1. A (12) month parts and labor warranty shall be provided commencing with the system start up at the TAMU facility.

**Options:**

1. Option for stainless steel beam and/or rails shall be supplied.

**TAMU to provide the following:**

- 1) Rigging services for removal of system and transportation vehicle upon arrival as well as placement of robotic system per agreed-upon system layout.
- 2) Will perform main electrical connections to building electrical systems, as well as anchoring to the floor where applicable
- 3) Will be responsible to supply a suitable number of parts to perform system programming and cycle optimization for each part type and fault conditions.
- 4) Labor assistance as needed during on-site support
- 5) Pallets and parts for testing and runoff.
- 6) TAMU to supply plant foliage sensors/scanners and associated control system

## **SECTION 3 SUBMITTAL REQUIREMENTS**

### **3.1 Statement of Qualifications Content**

Statement of Qualifications shall contain the following information in the same order set forth below. Respondents must present all information, in adequate detail, necessary to demonstrate how they best satisfy the evaluation criteria for establishing the most qualified firm to provide the requested services.

Interested respondents shall present for consideration one original and three (3) copies of response document including, as a minimum, all of the following:

- 3.1.1 Statement to indicate interest and availability to provide the required services and include credentials to perform requested services.
- 3.1.2 Provide a general overview of the organization and its professional staffing. Please include information regarding any previous experience

with a university or similar campus setting with comparable scope and complexity.

- 3.1.3 Provide credentials and/or certification of all team members who will be assigned to this project. Identify all individuals by name and title who will provide support to the project including their locations, position, specific responsibilities, educational background, experience, and technical capabilities.
- 3.1.4 List and description of services provided.
- 3.1.5 List and description of any pending litigations.
- 3.1.6 References related to services as outlined in this RFP. References shall include all contact information (name, address, phone number, fax number, e-mail address, etc.)
- 3.1.7 Two (2) hard copies (one original in the two) and two (2) virus free Flash Drive copies of the complete response is required. The Flash Drive copy must either be in Microsoft Office software or Adobe Portable Document Format (PDF). All image files must be in one of the following formats: .jpg, .gif, .bmp, or .tif. We prefer image files to already be inserted as part of a document such as Word. Individual image files on the CD must be clearly named and referenced in your proposal.

Any additional information that is submitted shall be included in the bound document with the information described above.

### 3.2 HUB Subcontracting Plan

It is the policy of the State of Texas and Texas A&M University (TAMU) to encourage the use of Historically Underutilized Businesses (HUBs) in our prime contracts, subcontractors, and purchasing transactions. The goal of the HUB Program is to promote equal access and equal opportunity in TAMU contracting and purchasing.

Subcontracting opportunities are anticipated for this Request for Qualifications and therefore a HUB Subcontracting Plan (HSP) shall be required of the successful vendor only.

An informational copy of the HSP is provided as Appendix C

For information regarding the TAMU HUB Program and HUB Subcontracting Plan requirements, please contact Clyde Oberg at 979-845-1042 or via email at [co@tamu.edu](mailto:co@tamu.edu)

### 3.3 Submittal Instructions

**Respondent shall provide one (1) original, two (2) copies and two (2) virus free Flash Drive copies of the complete RFP response as specified above.**

All Flash Drive copies must either be in Microsoft Office Software or Adobe Portable Document Format (PDF). All image files must be in one of the following formats: .jpg, .gif, .bmp, or .tif. We prefer image files to already be inserted as part of a document such as a PDF. Individual image files on the Flash Drives must be clearly named and referenced in your proposal response. Please create a text file in your root directory titled "table of contents.txt" that contains a brief explanation of the files and their layout found on the disc.



**NOTE:** The original signature on ONE (1) hard copy will serve as the official signature of record for all Flash Drive copies.

## **SECTION 4 EVALUATION CRITERIA**

### **4.1 Selection Criteria**

The successful firm will be selected based on the following criteria:

<b>Evaluation Criteria</b>	<b>Possible Points</b>
Qualifications	30
Demonstrated Experience	25
Organizational Plan	25
Ability to Provide the Manpower and Other Resources Required to Complete Projects in a Timely Fashion (On Time)	20
<b>TOTAL POINTS</b>	<b>100</b>

### **4.2 Selection**

The University will select the responder or respondents based on the responders' demonstrated competence and qualifications for the type of services to be performed. The University shall be the sole judge in evaluating a respondent's demonstrated competence and qualifications. Upon identification of the most qualified response(s), the University will attempt to negotiate an agreement for the work with the potential provider(s).

## **SECTION 5 GENERAL INFORMATION**

### **5.1 Submittal Deadline and Location**

5.1.1 All responses must be received prior to **2:00 p.m. CDT on Tuesday, April 2, 2019**. Response envelope or box must indicate firms name, the submittal deadline date, and RFQ number.

5.1.2 Responses are to be submitted to:



**U. S. POSTAL SERVICE:**

Texas A&M University  
Procurement Services  
Attn: TAMU RFQ 19-0897  
P. O. Box 30013  
College Station, TX 77842-3013

**HAND DELIVER AND/OR  
EXPRESS MAIL TO:**

Texas A&M University  
Procurement Services  
Attn: TAMU RFQ 19-0897  
1477 TAMU Agronomy Road  
College Station, TX 77843-1477

***Late responses properly identified will be returned to respondent unopened. Late responses will not be considered under any circumstances.***

***Telephone and/or facsimile (Fax) responses to this RFQ are not acceptable.***

**5.2 Questions**

Any questions regarding this Request for Qualifications are to be directed **in writing** to Clyde Oberg, Assistant Director at [co@tamu.edu](mailto:co@tamu.edu) **by Monday, March 25th, 2019, 5:00 p.m.**

Texas A&M specifically requests that respondents restrict all contact and questions regarding this RFQ to the above named individual. Responses to any submitted questions are due back to bidders by Wednesday, March 27, 2019 at the close of the business day.

**5.3 Non-Disclosure**

The final project and all documents related shall be the property of Texas A&M and may not be released to others without the written permission from the Texas A&M Department of Procurement Services.

**5.4 Inquiries and Interpretations**

Responses to inquiries which directly affect an interpretation or change to this RFQ will be issued in writing by addendum (amendment) and mailed and or faxed to all parties recorded by Texas A&M as having received a copy of the RFQ. All such addenda issued by Texas A&M prior to the time that proposals are received shall be considered part of the RFQ, and the respondent shall consider and acknowledge receipt of such in their response.

Only interpretations or clarifications which are made by formal written addendum shall be binding. Oral and other interpretations or clarification will be without legal effect.

**5.5 Open Records**

Texas A&M considers all information, documentation and other materials requested to be submitted in response to this solicitation to be of a non-confidential and/or non-proprietary nature and therefore shall be subject to public disclosure under the Texas Public Information Act (Texas Government code, Chapter 552) after an agreement is entered into.

Respondents are hereby notified that Texas A&M strictly adheres to all Statutes, court decisions and the opinions of the Texas Attorney General regarding the disclosure of RFQ information.

**5.6** By signing the RFQ submission, Respondent represents and warrants that:

- (i) The Qualifications and all statements and information prepared and submitted in response to this RFQ are current, complete, true and correct;
- (ii) It is not given, nor intends to give at any time hereafter, any economic opportunity, future employment, gift, loan, gratuity, special discount trip, favor or service to a public servant in connection with the submitted Qualifications or any subsequent proposal. Failure to sign below, or signing a false statement, may void the Response or any resulting contracts at the Owner's option, and the Respondent may be removed from all future proposal lists at this state agency;
- (iii) The individual signing this document and the documents made part of the RFQ is authorized to sign such documents on behalf of the Respondent and to bind the Respondent under any contract which may result from the submission of the Response;
- (iv) No relationship, whether as a relative, business associate, by capital funding agreement or by any other such kinship exists between Respondent and an employee of The Texas A&M University System;
- (v) Respondent has not been an employee of the A&M System within the immediate twelve (12) months prior to the RFQ response;
- (vi) No compensation has been received for participation in the preparation of this RFQ (ref. Section 2155.004 Texas Government Code);
- (vii) All services to be provided in response to this RFQ will meet or exceed the safety standards established and promulgated under the Federal Occupational Safety and Health law (Public Law 91-596) and its regulations in effect as of the date of this solicitation;
- (viii) Respondent complies with all federal laws and regulations pertaining to Equal Employment Opportunities and Affirmative Action;
- (ix) To the best of its knowledge, no member of the Board of Regents of The Texas A&M University System, or the Executive Officers of the Texas A&M University System or its member institutions or agencies, has a financial interest, directly or indirectly, in the Project.

APPENDIX A – TAMU Insurance Requirements

APPENDIX B – TAMU HUB Subcontracting Plan