

**CHECKLIST TO DESIGNATE AREAS OF EVALUATION  
FOR REQUESTS FOR PROPOSAL (RFP)**  
Research Administration University Use Only

MDOT PROJECT MANAGER <b>Steve Kahl</b>		JOB NUMBER (JN) n/a	CONTROL SECTION (CS) n/a
DESCRIPTION Development, Characterization and Applications of a Non Proprietary Ultra High Performance Concrete for Highway Bridges			
<b>MDOT PROJECT MANAGER:</b> Check all items to be included in RFP  WHITE = REQUIRED GRAY SHADING = OPTIONAL		<b>CONSULTANT:</b> Provide only checked items below in proposal	
Check the appropriate Tier in the box below			
<input type="checkbox"/> <b>TIER I</b> (\$25,000-\$99,999)	<input type="checkbox"/> <b>TIER II</b> (\$100,000-\$250,000)	<input checked="" type="checkbox"/> <b>TIER III</b> (>\$250,000)	
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Understanding of Service
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Innovations</i>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<i>Safety Program</i>
N/A	<input type="checkbox"/>	<input type="checkbox"/>	Organizational Chart
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Qualifications of Team
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Past Performance
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Quality Assurance/Quality Control
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<b>Location:</b> The percentage of work performed in Michigan will be used for all selections unless the project is for on-site inspection or survey activities, then location should be scored using the distance from the consultant office to the on-site inspection or survey activity.
N/A	N/A	<input type="checkbox"/>	Presentation
N/A	N/A	<input type="checkbox"/>	Technical Proposal (if Presentation is required)

The prime consultant must be a Michigan university. The prime consultant/vendor is responsible for the successful completion of the service and is expected to perform at least 40 percent of the services, by dollar value. The basis of payment is Actual Costs as defined in standard MDOT contracts.

If your organization is interested in providing services, please indicate your interest by submitting a proposal following the research guidelines near the top of MDOT's Request for Proposals Web page at [http://www.michigan.gov/mdot/0,1607,7-151-9625\\_32842---.00.html](http://www.michigan.gov/mdot/0,1607,7-151-9625_32842---.00.html).

**RFP SPECIFIC INFORMATION**

Problem Title: Development, Characterization and Applications of a Non Proprietary Ultra High Performance Concrete for Highway Bridges

OR Number: OR14-020

This is Best Value Selection which means the budget amount submitted with the proposal is a component of the proposal score, not the determining factor of the selection.

**PROPOSAL SUBMITTAL INFORMATION**

PROPOSAL AND BID SHEET EMAIL ADDRESS –	PROPOSAL DUE DATE	TIME DUE
<a href="mailto:mdot-rfp-response@michigan.gov">mdot-rfp-response@michigan.gov</a> with a CC to <a href="mailto:mdot-research@michigan.gov">mdot-research@michigan.gov</a>	<b>11/13/12</b>	<b>noon, EST</b>

**GENERAL INFORMATION**

Any questions relative to the Research Problem Statement must be submitted by e-mail to: [mdot-research@michigan.gov](mailto:mdot-research@michigan.gov). Questions must be received by 5 business days prior to the RFP due date at noon EST. All questions and answers will be placed on the MDOT RFP Web site as soon as possible after receipt of the questions and at least three (3) days prior to the due date listed above. The names of organizations submitting questions will not be disclosed.

MDOT is an equal opportunity employer and MDOT DBE firms are encouraged to apply. The participating DBE firm, as currently certified by MDOT's Office of Equal Opportunity, shall be listed in the Proposal.

**MDOT AND RESEARCH FORMS REQUIRED AS PART OF PROPOSAL SUBMISSION:**

- 5100D- Request for Proposal Cover Sheet
- Research Proposal Budget Form Worksheet Appendix D
- Schedule of Research Activities Form- Appendix B
- Deliverables Table- Appendix A
- Initial Implementation Plan Form- Appendix C
- 5100J- Consultant Data and Presignature sheet is required for signatory on this proposal

**NOTIFICATION  
MANDATORY ELECTRONIC SUBMITTAL**

**Proposals submitted for this project must be submitted electronically.**

**The following are changes to the Proposal Submittal Requirements:**

- Eliminated the Following Requirements:
  - Safety Program
  - Communication Plan
  - Past Performance as *a separate section*
  - Separate section for DBE Statement of goals. Include information in Qualification of Team section
  
- Implemented the Following Changes:
  - All proposals require an Organization Chart
  - Resumes must be a maximum of two pages
  - Only Key (lead) staff resumes may be submitted
  - Tier III proposal reduced from 19 to 14 pages
  - Forms 5100D, 5100I, and 5100G combined – 5100D
  - Forms 5100B and 5100H combined – 5100B
  - RFP's will be posted on a weekly basis -- on Mondays

**The following are Requirements for Electronic Submittals:**

- Proposals must be prepared using the most current guidelines
- The proposal must be bookmarked to clearly identify the proposal sections (See Below)
- For any section not required per the RFP, the bookmark must be edited to include “N/A” after the bookmark title.  
**Example:** Understanding of Service – N/A
- Proposals must be assembled and saved as a single PDF file
- PDF file must be 5 megabytes or smaller
- PDF file must be submitted via e-mail to [MDOT-RFP-Response@michigan.gov](mailto:MDOT-RFP-Response@michigan.gov)
- MDOT's requisition number and company name must be included in the subject line of the e-mail. The PDF shall be named using the following format:
  - Requisition#XXX\_Company Name.PDF
- MDOT will not accept multiple submittals
- Proposals must be *received* by MDOT on or before the due date and time specified in each RFP

**If the submittals do not comply with the requirements, they may be determined unresponsive.**

The Consultant's will receive an e-mail reply/notification from MDOT when the proposal is received. Please retain a copy of this e-mail as proof that the proposal was received on time. **Consultants are responsible for ensuring the MDOT receives the proposal on time.**

**\*\*Contact Contract Services Division immediately at 517-373-4680 if you do not get an auto response\*\***

**Required Bookmarking Format:**

- I. Request for Proposal Cover Sheet Form 5100D
  - A. Consultant Data and Signature Sheet, Form 5100J (if applicable)
- II. Understanding of Service
  - A. Innovations
- III. Qualifications of Team
  - A. Structure of Project Team
    - 1. Role of Firms
    - 2. Role of Key Personnel
  - B. Organization Chart
  - C. Location
- IV. Quality Assurance / Quality Control Plan
- V. Resumes of Key Staff
- VI. Pricing Documents/Bid Sheet (if applicable)

**2/14/12**

# Michigan Department of Transportation

## SCOPE OF SERVICE FOR RESEARCH SERVICES

**TITLE:** Development, Characterization and Applications of a Non Proprietary Ultra High Performance Concrete for Highway Bridges

**OR#:**OR14-020

**University Only**

**LOCATION:** Statewide

**WORK DESCRIPTION:** Research on Development, Characterization and Applications of a Non Proprietary Ultra High Performance Concrete for Highway Bridges

**ANTICIPATED START DATE:** 3/30/13

**ANTICIPATED COMPLETION DATE:** 3/30/15

### **MDOT RESEARCH PROJECT ADMINISTRATION MANAGER:**

Michael Townley, P.E.  
8885 Ricks Road  
Lansing, Michigan 48917  
E-MAIL: [mdot-research@michigan.gov](mailto:mdot-research@michigan.gov)

### **GENERAL INFORMATION:**

#### **1. PROBLEM TO ADDRESS:**

Ultra high performance concrete (UHPC) is a specially formulated concrete that is capable of achieving extremely high performance. When properly reinforced with steel or polymer based fibers, the material is capable of achieving the following properties:

1. High compressive strength, near 15,000 psi.
2. High tensile strength several times that of regular concrete, capable of carrying sustained tensile stresses of at least 250 psi.
3. Pseudo-ductility, with tensile softening strains of up to an order of magnitude greater than that of regular concrete.
4. Significant energy absorption prior to fracture.
5. Extremely small crack widths, small enough to effectively eliminate ingress of chlorides.
6. Enhanced durability, primarily enabled by the very small crack widths and the extremely high density of the material.

7. Self-consolidating properties, which simplify construction.

As of 2011, the primary commercially available UHPC on the US market was available through LaFarge and marketed as Ductal®. Ductal® is a proprietary material that is much more expensive than regular concretes. Construction using Ductal® and other similar materials available through European suppliers requires specially certified contractors and costly construction processes, such as pressure or heat treatment, which are impractical to achieve in the field. High material cost coupled with complicated and costly construction procedures have all but eliminated widespread adoption of UHPC in the US.

An alternative UHPC has the potential for removing all obstacles preventing widespread use of UHPC in the State of Michigan and in the US. In addition to the basic properties listed above, this new material would have new critical advantages:

8. It is nonproprietary and made up of components that are available on the US market.

9. Does not require expensive heat or pressure treatment. The non-proprietary UHPC would be mixed with conventional equipment, which allows the material to be commercially made and delivered the same way as regular concrete. The advanced material properties of UHPC would likely be optimized for lower cost, albeit with slightly lower performance.

The objective of this research is to optimize for cost using commercially available materials in the State of Michigan, characterize the mechanical properties of the new UHPC and define appropriate applications, primarily focusing on exploiting the unique properties of the new material for accelerated bridge construction. It is NOT an objective to reverse engineer the key components of proprietary mixes.

## **2. RESEARCH OBJECTIVES:**

1. Survey and identify potential applications for UHPC, particularly in Precast Bridge Element System (PBES). Examples where the use of UHPC may be most beneficial include: roadway barriers, slabs, slab connections, PBES connections, and pavement joints.
2. Investigate whether the new UHPC material can be made using locally available components. Can the cost be reduced through optimization?
3. Characterize properties of the UHPC, focusing on tensile strength, compressive strength, modulus of elasticity, and durability by laboratory testing and a field demonstration project.
4. Applications for use of UHPC will be developed in conjunction with MDOT staff and their feasibility will be identified through the use of finite element analysis or simulation technology.
5. Select the most promising application and conduct limited tests to show proof of concept. Provide for a batch scale up test for MDOT staff to observe the batching, mixing, placement, curing, and sampling characteristics.
6. Develop design, operational, and maintenance guidance on the UHPC chosen applications, such as development length for steel reinforcement, wet concrete properties, and rehabilitation limitations to be considered (hydro demolition, removal methods).
7. Develop use guidance on UHPC with cost/benefit analysis procedure and clearly stated assumptions. Define what criteria would classify a concrete mixture as UHPC.

### **3. IMPLEMENTATION BENEFIT TO MDOT:**

Non-proprietary UHPC can be used on selected PBES projects for proof of concept, and design guides updated to indicate appropriate use. Develop as necessary special provision to ensure alignment and consistency with use.

With its unique properties, UHPC has drawn national and international attention in recent years as a material that has the potential for dramatically increasing the service life of bridges and other transportation infrastructure components. As such, deployment of UHPC in the state of Michigan can result in significant future savings in maintenance and replacement costs associated with MDOT's infrastructure. In other words, there is the potential for substantial direct and indirect savings in the long term. UHPC is a new material with strong potential for building structures that are significantly more durable than is currently possible with conventional materials. Therefore, every structure built at the moment is an opportunity lost to start building a longer lasting infrastructure that is considerably cheaper to maintain in the long run. Therefore, this research is deemed urgent because of the expected long term cost reduction associated with its immediate deployment.

### **4. RISKS OR OBSTACLES TO RESEARCH:**

The properties and performance of the non-proprietary UHPC may be substantially less than desired. By incorporating appropriate design considerations and selecting the best use for the UHPC, a higher performing product can be realized.

### **5. DESIRED QUALIFICATIONS IN AN INVESTIGATOR(S):**

Prior experience and research into UHPC, (regardless of proprietary status). Knowledge of MDOT specifications and construction methods. Advanced knowledge of concrete materials and testing. Facilities and experience in materials characterization and optimization. Robust finite element analysis capability.

### **CONSULTANT RESPONSIBILITIES:**

1. Literature review
2. Survey and identify UHPC applications for PBES
3. Development, optimization, and characterization of UHPC (lab and field testing)
4. Finite element analysis of optimal UHPC applications in PBES
5. Design guide and final report

Failure of any of the above will be found in noncompliance with the contract.

### **DELIVERABLES:**

1. Non-proprietary UHPC mix that can be easily made with conventional methods;
2. Design guide on use of UHPC;
3. Final report with recommendations on best applications for the UHPC on PBES components

Failure of any of the above will be found in noncompliance with the contract.

### **MDOT RESPONSIBILITIES:**

Distribution of survey to other state highway agencies, information on current practice and specifications for concrete mixes, selection of best fit applications for UHPC in PBES components.

## **COORDINATION PROCEDURES**

Work will be completed in compliance with the Research Implementation Manual

## **CONSULTANT PAYMENT**

All billings for services must be directed to the Department and follow the current Research Implementation Manual. This document contains instructions and forms that must be followed and used for billing. Payment may be delayed or decreased if the instructions are not followed.

Payment to the Consultant for services rendered shall not exceed the maximum amount unless an increase is approved in accordance with the contract with the Consultant.

Direct expenses, if applicable, will not be paid in excess of that allowed by the Department for its own employees in accordance with the State of Michigan's Standardized Travel Regulations. Supporting documentation must be submitted with the billing for all eligible expenses on the project in accordance with the Reimbursement Guidelines. The only hours that will be considered allowable charges for this contract are those that are directly attributable to the activities of this project.

The use of overtime hours is not acceptable unless prior written approval is granted by the MDOT project manager. Reimbursement for overtime hours that are allowed will be limited to time spent on this project in excess of forty hours per person per week. Any variations to this rule should be included in the priced proposal submitted by the Consultant and must have prior written approval by the MDOT project manager.

Compensation for services will be reimbursed on actual cost basis.

## **PROPOSAL INFORMATION AND SCORING**

Formal proposals are required and shall include the information as outlined in these Guidelines. This section is the information required in the proposal that will be used to score the qualifications of each consultant's proposal. The section numbering correlates to the score sheet. Therefore, the consultant should format their proposals consistent with the outline provided.

### **1. UNDERSTANDING OF SERVICE: 40 POINTS**

Describe understanding of the service intended to be proposed. This information is to be based on the scope of services.

**Problem Statement and Background Summary-** demonstrates good understanding of problem, looks objectively at problem, specifies problem limits and restricts scope appropriately, and cites relevant literature.

**Research Plan-** cites specific objectives clearly, technical approach responds to all written and implied requirements, difficult areas are identified and details to overcome are given, represents novel idea or technical approach, plan is feasible, and effort is consistent with scope of problem.

**Products and Implementation-** proposal clearly defines products to be delivered at completion, includes practical, realistic implementation plan.

**MDOT Involvement-** MDOT involvement is not excessive and is clearly defined and quantified.

## 2. **QUALIFICATIONS OF TEAM: 30 POINTS –**

Describe the structure of the project team including the roles of all key personnel and subcontractors. For each subcontractor describe role in service and include what percent of the task that the subcontractor is expected to provide. Provide résumés for each of the key staff of the prime and subcontractor.

**Facilities-** proposer has adequate access to equipment and/or laboratory required in study.

**Staffing-** personnel availability is clearly defined, shows a depth of qualified personnel, proposer has ability to manage a project of this size an sufficient resources to complete study, qualifications are directly related to the requirements of the project, plans for specific key personnel assignment included, and there is a reasonable balance between subcontractor and prime contractor.

**Required Statistical Qualification-** In general, MDOT’s research is in the category of applied research. Regardless what is the primary field of an applied research project, statistical analysis tools are the typical ones for handling the data to conduct applied research. For this reason, the research team must have the needed statistical knowledge and experiences for conducting applied research. The required knowledge level for a research team in statistical analyses, if defined in the RFP under the heading possible investigators, is classified into one of the following four categories:

- Level I: Master Degree or higher in Statistics and working experience in statistical analyses is required
- Level II: Undergraduate degree in Statistics and working experience in statistical analyses is required
- Level III: At least one college series of statistics courses and working experience in statistical analyses is required
- Level IV: at least one college statistics course and working experiences under statisticians is required
- Level V: No statistical analysis

Proposals not documenting statistical training and experience levels required in the RFP may be classified as non-responsive.

## 3. **RELEVANT PAST PERFORMANCE: 30 POINTS**

The project manager will contact references and review relevant performance evaluations from the past 5 years.

**Record of past accomplishment-** proposer satisfactorily completed past projects, was cooperative and flexible, and ended past projects according to the original budget and time schedule.

**4. QUALITY ASSURANCE/QUALITY CONTROL (QAQC) PLAN: 5 POINTS**

The proposer provided an outline of a QA/QC process. The QA/QC Manager is experienced with MDOT standards and practices.

**5. LOCATION: 5 POINTS**

The percentage of work hours performed in Michigan will be used for all selections unless the project is for on-site inspection or survey activity. The combination of location and percentage of work performed in Michigan should not exceed 5 points.

Percentage of Work To Be Done in Michigan Score	
95% to 100%	5
80% to 94%	4
50% to 79%	3
25% to 49%	2
10% to 24%	1
Less than 10%	0

**6. PRICE: 40 POINTS**

Cost score is based on the lowest cost proposed divided by the current proposer cost multiplied by 40. Lowest bid shall receive 40 points.

**TOTAL POINTS: 150**

**Research Proposal Budget Form Worksheet**

Project Title \_\_\_\_\_  
 Research Organization \_\_\_\_\_  
 Date \_\_\_\_\_

									FY1	FY2	FY3	FY4	TOTAL	
<b>SALARIES &amp; WAGES -- MUST COMPLY WITH OMB CIRCULAR A-21</b>														
Specify number of hours to be worked and hourly rate for each individual below: Examples of role of individual are Principal Investigator, Technician, Grad Student, etc. Annual wage increases must not exceed 2%														
(role of individual)														
Name of individual														
Enter FY	FY1 rate	FY1 hrs	FY2 rate	FY2 hrs	FY3 rate	FY3 hrs	FY4 rate	FY4 hrs						
rate & hrs									\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
(role of individual)														
Name of individual														
Enter FY	FY1 rate	FY1 hrs	FY2 rate	FY2 hrs	FY3 rate	FY3 hrs	FY4 rate	FY4 hrs						
rate & hrs									\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
(role of individual)														
Name of individual														
Enter FY	FY1 rate	FY1 hrs	FY2 rate	FY2 hrs	FY3 rate	FY3 hrs	FY4 rate	FY4 hrs						
rate & hrs									\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
(role of individual)														
Name of individual														
Enter FY	FY1 rate	FY1 hrs	FY2 rate	FY2 hrs	FY3 rate	FY3 hrs	FY4 rate	FY4 hrs						
rate & hrs									\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
(role of individual)														
Name of individual														
Enter FY	FY1 rate	FY1 hrs	FY2 rate	FY2 hrs	FY3 rate	FY3 hrs	FY4 rate	FY4 hrs						
rate & hrs									\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
(role of individual)														
Name of individual														
Enter FY	FY1 rate	FY1 hrs	FY2 rate	FY2 hrs	FY3 rate	FY3 hrs	FY4 rate	FY4 hrs						
rate & hrs									\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
(role of individual)														
Name of individual														
Enter FY	FY1 rate	FY1 hrs	FY2 rate	FY2 hrs	FY3 rate	FY3 hrs	FY4 rate	FY4 hrs						
rate & hrs									\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Sub-Total Salary &amp; Wages</b>									\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	

<b>FRINGE BENEFITS -- MUST COMPLY WITH OMB CIRCULAR A-21</b>										
Indicate Employee, appropriate negotiated rate for each and description of who the rate applies to. ( e.g. - Sam Smith, 25%, Summer Faculty. The rate is negotiated between the university and it's cognizant agency										
Name										
(Rate Description)										
(% rate)	FY1	FY2	FY3	FY4	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Name										
(Rate Description)										
(% rate)	FY1	FY2	FY3	FY4	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Name										
(Rate Description)										
(% rate)	FY1	FY2	FY3	FY4	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Name										
(Rate Description)										
(% rate)	FY1	FY2	FY3	FY4	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Name										
(Rate Description)										
(% rate)	FY1	FY2	FY3	FY4	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Name										
(Rate Description)										
(% rate)	FY1	FY2	FY3	FY4	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Name										
(Rate Description)										
(% rate)	FY1	FY2	FY3	FY4	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>Sub-Total Fringe Benefits</b>					\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>SUBCONTRACTOR -- MUST COMPLY WITH OMB CIRCULAR A-21</b>										
A copy of the subcontractor's budget must be attached. An MDOT approved subcontract is required for subcontractor costs in excess of \$25,000 prior to payment of invoices that contain subcontractor work. List all subcontractors on a separate line.										
Subcontractor Name & Amt.										\$0.00
Subcontractor Name & Amt.										\$0.00
<b>Sub-Total Subcontractor</b>					\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
<b>TRAVEL -- MUST COMPLY WITH OMB CIRCULAR A-21</b>										
Must be in accordance with IDS contract requirements.										
<b>In-State Travel (Destinations within Michigan)</b>										
Provide a separate table itemizing costs.										\$0.00
<b>Out-of-State Travel (Prior approval required)</b>										
Provide a separate table itemizing costs.										\$0.00
<b>Sub-Total Travel</b>					\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00

