QUARTERLY PROGRESS REPORT

April, 1 2011 to June, 30 2011

In this reporting period the task order to conduct the work on the underwater inspection of bridge substructures using underwater imaging technology project (see below) was negotiated between TFHRC Hydraulics Laboratory Support Services contractor and FHWA. The task order was not awarded in this reporting period.

Contract No: DTFH61-11-D-00010 "Hydraulics Laboratory Support Services Contract".
Title: Underwater Inspection of Bridge Substructures Using Underwater Imaging Technology – Phase I.

The FHWA has a requirement for a new task order under DTFH61-11-D-00010 Contract in support of the statement of work provided below. The proposal submittals by the contractor shall be to the Contracting Officer (CO) and the Contracting Officer's Technical Representative (COTR) at:

Karen.Marshall@dot.gov, CO
Eric.Munley@dot.gov, COTR

All questions should be forwarded to the CO and the COTR.

RESEARCH OBJECTIVES

The contractor shall work with federal personnel from the Hazard Mitigation team at the Turner Fairbank Highway Research Center (TFHRC) to research the application of acoustic imaging technology to satisfy the inspection requirements of Federal Highway Administration (FHWA) 23CFR650 and the Bridge Inspection Reference Manual (BIRM) for Level I Underwater Inspections. This project has the potential to improve methods to assess the underwater condition of existing transportation structures and increase the safety of the nation's bridges. In addition, the proposed technology has the potential to reduce exposure of staff to hazards encountered while performing underwater inspections.

STATEMENT OF WORK (SOW)

Underwater inspection of bridge components (elements) is a requirement of Code of Federal Regulations (23 CFR 650). Highly trained underwater inspectors visually and physically inspect all underwater bridge substructures to insure the structural integrity of submerged bridge elements. Underwater inspections are often conducted in low visibility, high velocity, and deep water conditions. These difficult inspection conditions could result in defects going undetected. An acceptable method of underwater imaging is needed to provide an enhanced and safe inspection in challenging environments.

In addition to the routine underwater inspection benefits, the project Technical Advisory Committee (TAC) recognizes potential benefits to the following additional underwater applications:

- Rapid condition assessment (i.e. post seismic events and boat impacts)
- Active and passive scour evaluation
- Construction inspection
- Security threat assessment
- Enhancing diver safety and efficiency
- Visual representation of the entire underwater structure

This research project will evaluate the feasibility of using underwater acoustic imaging technology to produce underwater inspection results that are equal or better than current practice for Level I underwater inspection requirements. The project will conduct an objective comparative evaluation of the inspection quality, cost, time and employee safety aspects of conducting the underwater inspection using in water divers versus acoustic imaging technology.

RESEARCH TASKS

Considering the above, the work shall be performed in accordance to the following tasks:

Task 1: Technical Advisory Committee. Assemble a technical advisory committee (TAC) comprised of members of State DOTs who are contributing to the project that will provide oversight and guidance on all aspects of the project. Organize one or more meetings of this committee during the project.

Task 2: Literature Review. Perform a literature search of all types of sonar-imaging including: underwater video technology, ROV's, sector scan sonar methods, side scan sonar, multi-beam sonar and other related underwater imaging technology currently available. The operating limits of each type of sonar or underwater technology shall be discussed including strengths and weaknesses for underwater inspection, methods of deployment, and resources needed for a complete inspection. The literature search shall be summarized in a written report to the TAC.

Task 3: Develop Detailed Work Plan. The contractor shall develop a detailed work plan for the achievement of the intended project objectives. The work plan shall include a detailed description of the proposed evaluation method, major project milestones, a GANTT chart detailing the schedule and delivery of each milestone including quarterly reports, meetings with project team. The contractor shall submit the working plan to the Project Technical Manager for approval.

Task 4: Develop an Objective Test Plan. The contractor shall develop an objective test plan for the comparisons between actual diver inspections that satisfy the FHWA requirements and the technology(s) being considered. The test plan shall evaluate inspection quality, efficiency (cost and time), reliability, employee safety and final results. The test plan shall include multiple field evaluations at specified sites with low visibility, high current, and deep water conditions within one hundred mile radius of Sacramento California. The contractor shall submit the test plan to the Project Technical Manager for approval. The test plan should include the following:

a) Testing shall at a minimum include one or more scanning or multi-beam techniques comparing: completed inspection costs per site for each method including a breakdown of the cost of hardware, reliability of the technology, operating restrictions, computer

needs/demands, output size and storage options, system packages, staffing levels, equipment mobilization needs, and ability to satisfy the BIRM.

b) The acoustic imaging technologies proposed for field testing shall be based on the results of the literature study and applicability to underwater bridge inspection. The selected technology must be capable of rendering a high quality underwater acoustic image of a resolution adequate to capture cracks in concrete.

c) Testing shall encompass a range of all types of water conditions: low flow(0-1fps), medium flow(1<3fps), high flow(3<8fps), salt and fresh water, low visibility(<3ft), deep(>100ft) and shallow(<6ft) channel depths, etc. Testing will be done on different types of structures including single and multi element concrete and steel sub-structures and timber structures. Additional testing in high turbulent flows (>8fps) and in depths 100ft to 190ft may be directed by the contract manager.

d) All diving inspections shall be done with surface supplied diving gear and conducted in compliance with the following regulations: 29 CFR 1910 Subpart T--Commercial Diving Operations, 46 CFR 197 Subpart B—Commercial Diving Regulations, 8 CCR 152/153 Diving Operations, Association of Diving Contractors International CONSENSUS STANDARDS For Commercial Diving and Underwater Operations, and in accordance with industry accepted diving practices for decompression and no-decompression diving operations including contaminated water diving.

e) The person responsible for leading all field diving operations will be a qualified NBIS Team Leader. The Team Leader shall be present on site for all of the underwater inspections. The divers shall be a qualified underwater inspector satisfying FHWA 23CFR650 inspector requirements.

Task 5: Supply Manpower and Materials. The contractor shall be responsible for supplying the manpower, purchasing or leasing all equipment, technology, materials, hardware, supplies, systems, computers, required imaging software, any required tooling or special fittings, and vehicles necessary for the testing of underwater imaging technology and diver inspections. The contractor shall provide test site access for four TAC members during testing operations.

Task 6: Quarterly Progress Reports. The contractor shall provide quarterly progress reports to the Project Technical Manager.

Task 7: Interim Field Testing Report. Upon completion of the first phase field inspections, the contractor shall submit an interim report to present its field results to the Technical Advisory Committee. The report shall be submitted in hard copy and electronic version and include test results from each dive site, technique(s) used, photos, videos, resource needs for each site, computer imaging, etc.

DELIVERABLES

The project timeline and expected deliverables are outlined in Table I below.

Table I - Project Time frame and expected deliverables

Time period (beginning month to ending month) (All times are based from the effective date of the contract)						
1 → 3	3 → 4	4 → 5	5 → 6	1 → 4	6 → 11	11 → 12
Draft Work Plan	Final Work Plan	Draft Test Plan	Final Test Plan	Literature Search Results	Field Testing – Phase I	Interim Field Report
The draft work plan shall be submitted in hard copy and electronic version to the project technical manager for review and approval.	The final work plan shall incorporate changes identified by the TAC. The final work plan shall be submitted to the project technical manager in hard copy and electronic versions	The draft work plan shall be submitted in hard copy and electronic version to the project technical manager for review and approval	The final work plan shall incorporate changes identified by the TAC. The final work plan shall be submitted to the project technical manager in hard copy and electronic versions.	The summarized findings of the literature search shall be documented in a written document to the TAC upon completion of the task. The results shall be incorporated into the final report.	This deliverable is the actual field diving inspection work	This report will summarize the preliminary results of the field testing activity. The report shall be submitted to the Project Technical Manager in hard copy and electronic format. The report shall include the items identified in the Scope of Work

PERIOD OF PERFORMANCE

All work on this task order shall be completed 12 months from the effective date of the contract. Approximate start date: 5/1/2011.