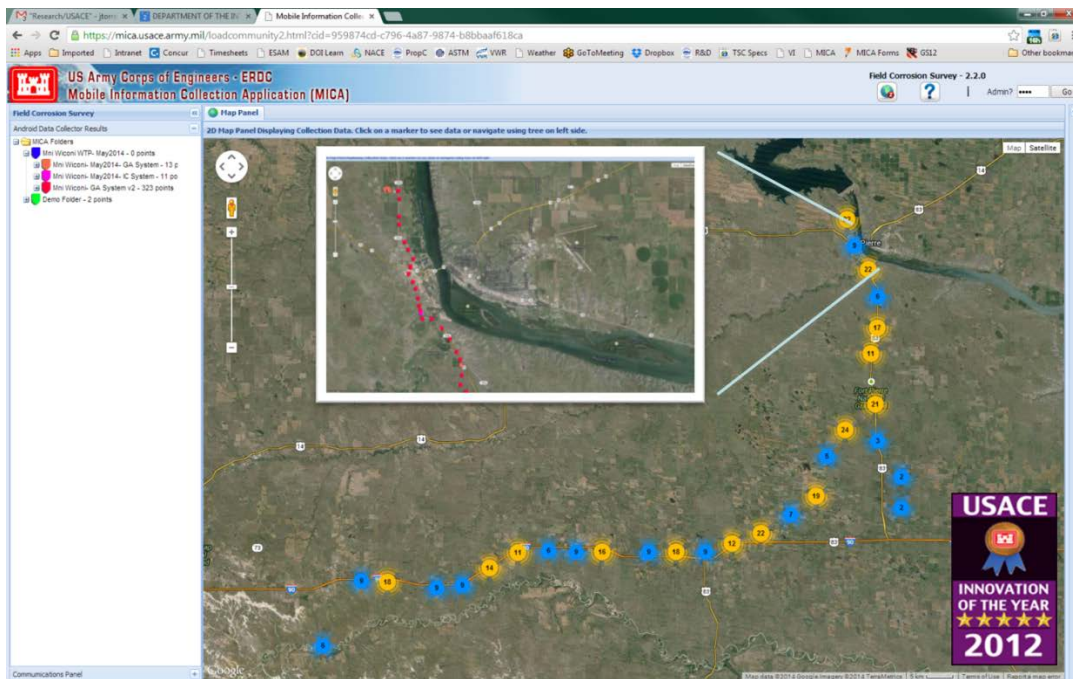# RECLAMATION
Managing Water in the West

Use of Tablet Computers for Field and Lab Work

Research and Development Office
Science and Technology Program
Final Report 2014-01-6816
Technical Memorandum MERL-2014-85

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Research and Development Office
Bureau of Reclamation
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Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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14. ABSTRACT *(Maximum 200 words)*

This scoping study evolved from a Research Jam idea with the goal of answering the questions of if and how Reclamation could effectively implement tablet computers, such as the iPad, as efficient and functional tools for field and lab work. Inquiries led to the Mobile Information Collection Application, or MICA, which was designed by USACE-ITL to collect GPS-linked form data, photos, video, sketches, and other notes. MICA was field tested on two cathodic protection systems, and proved to be a useful tool with wide functionality across Reclamation. Future work will include planning solutions for wide-spread implementation at Reclamation.

15. SUBJECT TERMS
tablet, MICA, database, field data collection

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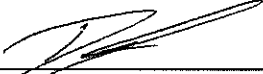P Prescribed by ANSI Std. 239-18

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Executive Summary

This scoping study evolved from a Research Jam idea with the goal of answering the questions of if and how Reclamation could effectively implement tablet computers, such as the iPad, as efficient and functional tools for field and lab work. Tablets offer a cheaper and more portable alternative to laptops, and, with the growing number of available apps, there is something available for most every task - data collection, photo storage and organization, high resolution image and drawing viewing, note-taking, literature search, and save, tap-and-transfer file sharing.

There are many current Reclamation iPad users, and many suggestions were made during the Research Jam as to what functionality users would most like to have from their tablets. Accessibility to email and the Bison Connect features was high on the list. Also, some combination of collection of GPS locations, form data, photos, video, and notes for tasks ranging from field inspections of infrastructure to emergency response.

In addition to answering general-use questions, a second goal of this study was to develop a Reclamation-specific app for corrosion fieldwork that combined all of the functionality mentioned above into a single easy-to-navigate app. The corrosion staff performs cathodic protection system testing and surveys - this is system maintenance that should be performed annually but is often neglected due to lack of training of field staff. The app would have to provide an easy interface for field staff to perform an annual CP system survey, including GPS-located photos and form date at each test site, and automatically transmit data for inclusion in a central database. The ability for real-time data collection allows TSC corrosion staff based in Denver to monitor progress online and to aid colleagues in the field during testing, as well as to perform analysis more quickly and efficiently with no transposing of the data from hand notation to digital format. Avenues for app development were investigated, including internal development, commercial purchase, hack-a-thon challenge, and collaboration with a university, but all proved to have obstacles to implementation.

Fortunately, a collaboration meeting co-hosted by the Research Offices of Reclamation and the US Army Corps of Engineers (USACE), introduced a tool developed by the USACE Information Technology Laboratory (USACE-ITL) that proved to be ideal for field data collection across a variety of Reclamation departments, as well as tailorable to specific tasks. The Mobile Information Collection Application, or MICA, was designed to collect form data, photos, video, sketches, and other notes, all linked to a GPS point, and is capable of real-time data updating to a central web-based server. It was originally designed for emergency management situations, for example it was deployed following Hurricane Sandy, to pull the functions of a GPS device, camera, phone, and paper notebook all onto one device. Additionally, by eliminating paper forms and collecting all relevant information digitally, the data/photos/video/etc. can be automatically organized to a given GPS point, which can then be updated in real-time to a central web-based server and mapped. Information can then be analyzed and decisions made in a much more timely manner than if data had to be transcribed by hand.

MICA is not only useful for emergency management. As part of the FY14 work, it was used to collect data on the cathodic protection system of the Mni Wiconi Core Pipeline in

Pierre, SD. This was well over 100 miles of steel pipe with impressed current cathodic protection and additional PVC pipe with metallic fittings and a galvanic anode cathodic protection system. The MICA form interface was used to create custom data-entry forms for cathodic protection system testing. Data was collected at over 300 test stations and rectifiers (cover image), with photos and test data GPS-located and uploaded to a map each evening to track progress. MICA was also used to test the Navajo Indian Irrigation Project Block 8 cathodic protection system, near Farmington, NM, and for a corrosion inspection at Little Oso Dam in Pagosa Springs, CO. The GPS coordinates at each test site can now be used to guide yearly testing, saving time in locating hard-to-find test stations, and data is already organized electronically, ready for analysis. A few bugs were discovered in the software, and the USACE-ITL staff were very responsive with solutions.

Now that MICA has proven to be a useful tool for data collection, the next step is to implement its use widely across Reclamation. To that end, the following tasks are being proposed for funding in FY15:

Task 1: Develop a long-term storage/analysis/access solution at Reclamation for data collected using MICA. USACE supports data for one year on its servers, after which it must be removed to the responsible agency. This solution will likely link to current GIS/Tessel databases and user interfaces hosted by Reclamation. The Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE) from DOD could also be a good starting point for framing a database, and we have added team members to lead this effort. USACE-ITL has committed to helping Reclamation create a plan for transition of data from USACE servers.

Task 2: MICA Training. Involve other interested parties at Reclamation in pilot studies and provide training to generate task-specific forms, use the app in the field, and manage the data collected. USACE has offered to provide on-site training and additional webinars in support of this effort, as needed.

Task 3: Develop Long-Term Implementation Plan. This portion of the project will detail how the cost for MICA might be covered in the future and how the app can be distributed to users. Guidance for purchase or loaning of the tablet devices will also be investigated.

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Keywords: tablet, MICA, database, field data collection

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