RESEARCH NOTES

November 2006

CCIT Task Order 10

1. Why was this research undertaken?
California Center for Innovative Transportation (CCIT) Task Order (TO) 10 was awarded primarily to allow the CCIT staff to enhance the operation and upgrade the functionalities of the Berkeley Highway Lab (BHL) during Fiscal Year 2004-2005 (FY 04-05). BHL is a 2.7-mile freeway testbed on Interstate 80 in Berkeley and Emeryville. It features, among other equipment, 168 loop detectors and 8 bird-eye view video cameras. Applications of BHL include microtraffic studies, simulation calibration and validation, and field-testing of detection equipment and other hardware. Because of the amount of information available, it is also a good site for any type of ITS or traffic management pilot project.

A specific goal of TO 10 was the integration of BHL with the UC Irvine's Advanced Transportation Management Systems (ATMS) Testbed into an "Integrated California Testbed". Testbed facilities provide transportation researchers throughout the state of California and beyond with the necessary infrastructure to conduct investigations in a real traffic environment. The integration of the two facilities provides a more streamlined and accountable management structure. CCIT's aim in managing BHL is to operate and maintain the equipment, facilitate and promote the use of the testbed by the transportation community, and constantly improve it by modernizing the equipment, improving traffic detection capabilities, and expanding the range of available applications.

2. What was done as part of this research?
During FY 04-05, two important restructuring efforts took place at BHL. The first one was the integration of BHL and the University of California, Irvine Testbed under the common California ATMS Testbed designation. The most tangible materialization of the integration was the creation of a unique website that is a common gateway for researchers interested in using Testbed capabilities. The website contains a detailed description of the facilities and makes data collected by the traffic sensors available for download.

The second effort that was completed is the transfer of BHL management from a loosely coordinated, project-based framework to a more centralized, resource-based structure operated by CCIT. The purpose of this effort is to establish a distinction between the management of the facility as a resource on one hand, and its utilization by research projects on the other hand. In this new scheme, CCIT acts as a service provider to the research community by offering access to BHL. This in turn allows Caltrans to fund the management, operations and, maintenance, development, and promotion of the Testbed independently from the research projects. The separation between the operator and the users is consistent with the vision of an integrated California ATMS Testbed that is accountable to the state for its budget and its performance. TO 10 allowed Operational and maintenance activities in response to the needs of these projects. A key mission of CCIT in managing BHL is to improve its capabilities and keep abreast with technological developments in the field of ITS. Three such efforts can be mentioned as part of TO 10:

- Upgrade of the video capabilities: the video backhaul and the recording method were significantly improved during FY 04-05. The resulting operational process is documented in the final report.
- Online downloads: All loop data and recorded video data were made available for download on the ATMS Testbed web page as part of this Task Order. http://www.atmstestbed.net.
- WiMax investigation: WiMax is a promising wireless communication standard for urban areas. WiMax or a similar technology may soon become attractive options for public transportation agencies to backhaul their ITS field elements data. As part of a different BHL management contract, CCIT is evaluating and deploying WiMax to serve as a backhaul for BHL data. A subcontract was correspondingly awarded to Glocol, inc., under TO 10.

Overview of BHL cameras

3. What can be concluded?

The following projects are examples of how BHL's functionalities can be used with the completion of TO-10:

- Traffic analysis and development of portable detector diagnostic tool: this project completed the hand-off of BHL management to CCIT, and performed analysis of micro-traffic data at the BHL. A byproduct of the analysis is a framework to allow diagnostic of loop detector stations from a portable laptop.
- NGSIM project: this federally-funded project used BHL to collect video footage that was processed to extract digitized trajectories of individual vehicles. While the end-goal of the project is to calibrate micro-traffic simulation models, the resulting data is overall one of the richest set of traffic data ever collected.
- EVII: EVII was an early deployment of DSRC connectivity led by PATH. While the project didn't directly employ BHL equipment, the site was chosen because of the simplified access to the roadside cabinets that BHL has permitted over the years.
- Pilot deployment of travel times on Changeable Message Signs (CMS): This CCIT project deployed the first automated system to display travel times on CMSs in California. The BHL was chosen as a test site because of the richness of the monitoring data. That data was used in particular to evaluate the impact of the signs on average driver speed.

4. What do researchers recommend?

The integration of BHL and the ATMS Testbed as the California integrated Testbed is an important milestone. For the upcoming years, the Testbed must continue to offer researchers across the state state-of the art equipment and facilities to conduct work that can ultimately improve the efficiency and safety of highway operations.

5. Implementation Strategies

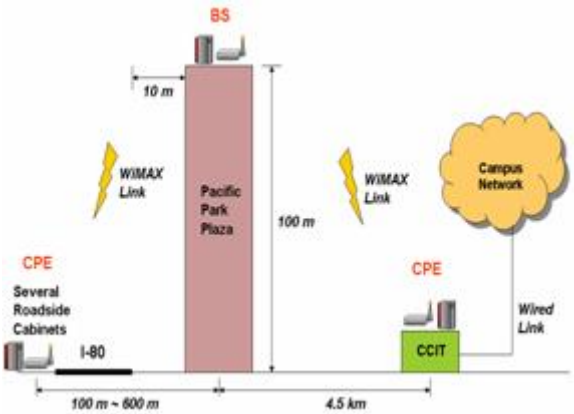
TO 10 laid out plans to deploy WiMAX technology at BHL. The plan will be implemented in the next few months, adding a critical component to BHL and demonstrating the potential of WiMAX for public transportation agencies.

Contacts

Project Manager: J.D. Margulici (jd@calccit.org)
California Center for Innovative Transportation
University of California at Berkeley
2105 Bancroft Way, Berkeley, CA 94720-3830
Telephone: (510) 642-5929; Fax: (510) 642-0910

Project Monitor: Fred Yazdan
(fred.yazdan@dot.ca.gov)
Caltrans, Division of Research and Innovations
Office of technology Applications; Advanced Testbed Program Branch
6681 Marine Way, Irvine, CA 92618
Telephone: (949) 936-3462; Fax: (949) 936-3461

View of I-80 W toward Richmond



Aerial view of the covered I-80 area in BHL