

OHIO DEPARTMENT OF TRANSPORTATION OFFICE OF TRAFFIC ENGINEERING RESEARCH IMPLEMENTATION PLAN



Title: The Columbus Metropolitan Freeway Management System (CMFMS) Effectiveness Study: Part 2 - The After Study

State Job Number: 134152

PID Number: 77017

Research Agency: Ohio State University

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Study Start Date: 2/1/2004

Study Completion Date: 3/31/2006

Study Duration: 26 Months

Study Cost: \$122,625

Study Funding Type: 80/20 Federal/State from SP&R Part 2

STATEMENT OF NEED:

The increasing number of ITS systems deployed around the nation is creating a need to determine the benefits of these systems; thus, justifying their cost expenditures. The Ohio Department of Transportation, in conjunction with the City of Columbus and the Federal Highway Administration, installed and implemented an intelligent Columbus Metropolitan Freeway Management System (CMFMS) in greater Columbus, Ohio area. The CMFMS system will increase traffic throughput, decrease accidents number, decrease incidents clearing time, decrease traffic flow breakdowns, and provide travelers with road information. Although traffic conditions are monitored for dynamic feedback, the freeway management system does not have an overall requirement to measure and evaluate the effectiveness of the CMFMS.

RESEARCH OBJECTIVES:

The objective of this study was to evaluate the effectiveness of implementing the CMFMS by collecting the before/after data then performing comparison analysis between the two conditions. The before-data was collected by employing a brief period prior to CMFMS was turned on; the collected data came from loop detectors and through the use of archived Central Ohio transit Agency (COTA) automatic vehicle location (AVL) data. The after-data provided quantitative and qualitative results such as travel times, speed data, traffic volume, vehicle queue length and duration for recurring and non-recurring incidents. A performance monitoring methodology was developed to continually assess the instrumented freeways performance and the reliability of the surveillance system. A traffic conditions assessment was extended to non-instrumented facilities by utilizing floating car data collection methodology.

RESEARCH TASKS:

1. Assess the initial loop detector data logged by CMFMS and modify the CMFMS, if necessary, to collect data for this study.
2. Collect the before-data of travel time runs, accidents, ODOT service patrol (FIRST) data, ramp delays, and CMFMS traffic flow information.
3. Collect the after-data in the same categories and calibrate the CMFMS.
4. Quantify and compare the before and after conditions.
5. Develop strategies for improvement and future data collection.

RESEARCH DELIVERABLES:

- Modifications to the CMFMS to enable desired level of data collection and transfer.
- Database of before and after conditions to be analyzed.
- Documentation of loop detector performance and system calibration.
- Detailed description and comparison of before and after pictures of the CMFMS to quantify the benefits of the system.
- Detailed list of recommendations and description of methodologies.
- Final report documenting all findings.

RESEARCH RECOMMENDATIONS:

1. The developed methodology for evaluating the CMFMS can immediately be transferred to evaluate any freeway management system.
2. Several problems were diagnosed from the collected data found or verified through extensive field visits, e.g., the detector mapping problems, while other problems were only identified with the data, e.g., detector sensitivity and spacing correction factors. These correction factors should be applied immediately to improve the performance of the system.
3. Other problems became evident in our supplemental data collection, e.g., the ramp meters being off even though the main line was congested. So some system fine-tuning is necessary.
4. Many of the diagnostics were feasible only because of the fine temporal resolution of the data. Although most current off-line applications do not utilize such high resolution data, given the steady decrease in data storage costs it would be wise to collect and archive the data at the highest resolution possible (e.g., we currently can store an entire year of event data for under \$1,000). Without such archival activities, future applications will similarly be limited to lower resolution data.
5. Finally, we believe that it would be of benefit for ODOT to develop the skills either in house or collaboratively with other agencies to conduct these evaluations on a continuing basis, and in the process, develop even more powerful diagnostic tools.

PROJECT PANEL COMMENTS:

The results and conclusions of this project have exceeded expectations.

IMPLEMENTATION STEPS & TIME FRAME:

This research found some opportunities to solve the immediate problems with the CMFMS which have been fixed already; the system was also calibrated. Other found problems will require funding for professional services; the ITS group is actively seeking to program a new project in the near future.

EXPECTED BENEFITS:

Planners will be able to improve the performance of the existing CMFMS, avoid problems that occurred previously and determine the system's worth to the community.

EXPECTED RISKS, OBSTACLES, & STRATEGIES TO OVERCOME THEM:

The above mentioned implementation steps are low risk, but the ITS technology will change the longer the Department waits to fix these problems. Equipment replacement will overcome the changing technology.

OTHER ODOT OFFICES AFFECTED BY THE CHANGE:

The offices affected by the implementation are District No. 6 and the Office of Technical Services.

PROGRESS REPORTING & TIME FRAME:

There will be a quarterly report sent to the R&D Office showing all implementation activities with their respective completion in percent. An annual summary report will be provided by the program office for three years after implementation is complete to measure implementation costs and benefits for research performance purposes.

TECHNOLOGY TRANSFER METHODS TO BE USED:

- The final report was distributed to all other 49 state departments of transportation in addition to national libraries and repositories. It is also posted on the R&D website.

IMPLEMENTATION COST & SOURCE OF FUNDING:

There are about 25 sites found to have problems, each site will cost about \$10,000 to fix. ITS funds will pay for the professional services project needed to fix the found problems.

Approved By: (attached additional sheets if necessary)

Office Administrator:

Signature: Dave Holstein Office: OTE Date: 12/28/2007

Division Deputy Director:

Signature: Tony Vogel Division: DHO Date: 1/2/2007