DRAFT DESIGN REPORT/ENVIRONMENTAL ASSESSMENT

August, 2011

Access 390
I-390 Exit 16
Interchange Reconstruction Project

P.I.N. 4390.17
Monroe County
Town of Brighton
City of Rochester

APPENDIX G

ITS SYSTEMS ENGINEERING
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A broad Concept of Operations was developed in March 1996 in the previously mentioned document titled Rochester Areawide Advanced Transportation Management System – Improved Mobility Areawide Guidance Evaluation. Area stakeholders and their roles and responsibilities are spelled out in this document, as well as conditions and needs. A copy of this document is available online at the following address:


The concept of operations for the Dynamic Message Signs (DMS) is as follows: NYSDOT owns and maintains the DMS field equipment and will be responsible for establishing access rights to the DMS software. Only NYSDOT will have access and control of the DMS. Access and control will be from the RTOC which is staffed 24/7 by the New York State Department of Transportation (NYSDOT).

Operation of the DMS by NYSDOT employees or contractors will be in accordance with the Policy and Guidelines for Variable Message Signs (VMS), an appendix to the Highway Incident Management Plan – Region 4. NYSDOT will operate the permanent DMS exclusively.

The concept of operations for the Closed Circuit Television (CCTV) is as follows: Each agency that owns and maintains field equipment will be responsible for establishing access rights to their respective video signal feeds and/or camera control. All operating agencies in the Regional Traffic Operations Center (RTOC) shall have video signal access and control of NYSDOT and Monroe County Department of Transportation (MCDOT) cameras.

Access to all video images will be available to the operations room via RTOC display walls or desktop computer monitors.

Operation of the CCTV system by NYSDOT personnel, NYS Police employees, and contractors will be in accordance with the Engineering Instruction 02-006 – Policy for the Design and Operation of Closed Circuit Television (CCTV) in Advanced Traffic Management Systems (September 4, 2001). This document can be obtained at following NYSDOT web address:

http://www.dot.state.ny.us/traffic/its/mov_tv_policy.pdf

Operators shall be required to certify their familiarity with and adherence to their respective agencies policies
MCDOT will typically operate CCTV at arterial intersections, NYSDOT will typically operate CCTV on freeways and NYS Police will typically operate CCTV during incidents.

The concept of operations for the Remote Traffic Microwave Sensor (RTMS) is as follows: NYSDOT owns and maintains the RTMS field equipment and will be responsible for establishing rights to the RTMS software. Only NYSDOT will have access and control of the RTMS. Access and control will be from the RTOC which is staffed 24/7 by the NYSDOT.

Operation of the RTMS is for detection and data collection. The RTMS provides presence indication and accurate measurements of volume, occupancy, speed, and classification. RTOC staff can use the data to detect and react to incidents in the vicinity. RTOC staff will provide traffic count data to The Regional Planning Group to assist in future year capital programs.

Traffic Signal Control concept of operations is as follows: Centralized control will provide signalized coordination, provide a means of vehicle data collection (vol, occupancy, etc.), and signal diagnostics. NYSDOT currently utilizes centralized software (StreetWise) which will monitor and control all signalized intersections under NYSDOT jurisdiction. Only NYSDOT traffic signal personnel will have access to control software rights. Control will include the traffic signal controllers, signal heads, detectors, and other ancillary equipment that supports traffic signal control. It also includes field masters, and equipment that supports communications with the central monitoring system. The communications link supports upload and download of signal timings and other parameters and reporting of current intersection status. It also supports all signalized intersection configurations, including those that accommodate pedestrians.

The RTOC as a center conceptually operates as stated in the Traffic Management Subsystem definition. The RTOC monitors and controls traffic and the road network. The RTOC communicates with the Roadway Subsystem to monitor and manage traffic flow and monitor the condition of the roadway, surrounding environmental conditions, and field equipment status. The RTOC coordinates with maintenance and construction management to maintain the road network and coordinate and adapt to maintenance activities, closures, and detours. Incidents are detected, verified, and incident information is provided to allied agencies, drivers, and information service providers. The RTOC also manages traffic and transportation resources to support allied agencies in responding to, and recovering from, incidents ranging from minor traffic incidents through major disasters. When required, special traffic management strategies are implemented to support large scale diversions. The RTOC communicates with other Traffic Management Centers to coordinate traffic information and control strategies in neighboring jurisdictions.
a. Identification Of The Regional ITS Architecture Being Implemented:

The Rochester region has gone through both Tier I and Tier II training on the National ITS Architecture and has a regional ITS architecture developed for the area. This architecture includes DMS, Detection, and data exchange between the RTOC and field elements, as well as shared control and information data exchange between agencies. As such, no modifications to the architecture would be necessary to incorporate this project.

This project will implement portions of the following Market Packages:

ATMS-01, Network Surveillance-
RTOC-to-Roadway subsystem and
RTOC-to-Traffic Operations Personnel terminator as identified in the Regional Architecture.

ATMS-03, Surface Street Control-
RTOC-to-Roadway subsystem,
RTOC-to-Traffic Operations Personnel terminator as identified in the Regional Architecture,
Roadway to Driver terminator,
Roadway-to-Pedestrian terminator, and
Roadway-to-Traffic terminator.

ATMS-06, Traffic Information Dissemination-
RTOC-to-Roadway subsystem,
Roadway-to-Driver terminator,
RTOC-to-Traffic Operations Personnel,
Maintenance and Construction management-to-RTOC (existing link),
RTOC-to-MC Emergency Management subsystem, and
RTOC-to-TIG (511) subsystem as identified in the Regional Architecture.

ATMS-08, Traffic Incident Management System-
RTOC-to-Roadway subsystem,
Maintenance and Construction management-to-RTOC (existing link),
RTOC-to-TIG (511.org) subsystem as identified in the Regional Architecture.
RTOC-to-Other Traffic Management terminator as identified in the Regional Architecture,
RTOC-to-MC Emergency Management subsystem.
The contact person for maintaining the Rochester Regional ITS Architecture is Daniel McCusker of the New York State Department of Transportation and can be reached at (585)753-7779.

b. **Identification of Participating Agencies Roles and Responsibilities:**

The lead agency for this project is the New York State Department of Transportation. NYSDOT will administer and partially finance the construction, testing, operations, and evaluation of the system. MCDOT and the New York State Police (NYSP) are participating agencies by virtue of their presence in the RTOC and the integration of the projects CCTV into the existing video system.

The Network Surveillance market package will augment the current CCTV system by deploying cameras along the project corridor. Operation of the CCTV will be performed by all parties within the RTOC by use of existing controllers. All parties will be capable of full pan, tilt, and zoom control of the CCTV system to monitor the highway system.

Use of CCTV will allow the RTOC to verify/detect incidents as well as traffic conditions and disseminate this information to the media and Emergency Management. The additional CCTV will also be fed to the Monroe County Emergency Management Operations Center for a view of current network conditions. Maintenance and Construction Management will keep the RTOC informed of current asset restrictions electronically via email and the Condition Acquisition Reporting System (CARS).

The life cycle for the CCTV system is approximately 10 years. This life cycle was taken from *Advanced Transportation Management System Elemental Cost Benefit Assessment by Perrin, Joseph, Rodrigo Disegni, and Bhargava Rama*. The system deployment will be operated and maintained by NYSDOT. The existing CCTV system is currently a shared resource among the partnered agencies at the RTOC.

The Traffic Information Dissemination market package will consist of deploying DMS along the project corridor. The RTOC will communicate with these DMS to reach the motorist on the highway system. Traffic Operations Personnel will have the ability to send and receive data to the DMS in order to provide end users with information. The RTOC will update travel information on the NYSDOT Travel Gateway (www.511ny.org) which is our Information Service Provider.

The Surface Street Control market package will consist of adding each signalized intersection to a centralized control software. Traffic signal personnel will have the ability to correct or optimize signal timing allowing for
better traffic flow through the intersection. Traffic control related diagnostics will also allow for optimized signal function and allow for greater reaction time to repair faulty intersection controllers. Traffic Operations personnel will also be able to monitor each signalized intersection and dispatch signal crews to a particular intersection if a fault is detected.

c. Requirements Definitions:

The following section is a high level statement of the functionality of the system as designed and operational. The National ITS Architecture was an information source for extracting market and equipment packages that fit the design of deployment project. There are some functions that fit in more than one market package and therefore will not be repeated. These functions do not have added weight; they just fit more than one need.

Network Surveillance Market Package

- The field element shall collect, process, digitize, and send traffic sensor data (speed, volume, and occupancy to the center for further analysis and storage, under RTOC control.
- The field element shall return sensor system operational status to the RTOC.
- The center shall monitor, analyze, and store traffic sensor data (speed, volume, occupancy) collected from field elements under remote control of the RTOC.
- The RTOC shall respond to control data from RTOC personnel regarding sensor, data collection, analysis, storage and distribution.
- The field element shall collect, process, and send traffic images to the center for further analysis and distribution.
- The field element shall return CCTV system operational status to the controlling center.
- The field element shall return CCTV system fault data to the controlling center for repair.
- The RTOC shall monitor, analyze, and distribute traffic images from CCTV systems under remote control of the center.
- The RTOC shall collect and store CCTV surveillance system operational status.
- The RTOC shall collect and store CCTV surveillance system fault data and send to a maintenance center for repair.
- The new CCTV cameras shall be integrated with the CCTV system (American Dynamics 1024 Switcher).
- The new CCTV camera field cabinets shall have excess space allocated to accommodate future devices that will enable the cameras to be fully functional with TCP/IP video equipment installed at the RTOC as part of a completed MCDOT IP video project (4ITV.09/.10).
Traffic Information Dissemination Market Package

- The field element shall include dynamic message signs for dissemination of traffic and other information to drivers, under RTOC control; the DMS shall be those that display variable text messages.
- The field element shall provide operational status for the driver information systems equipment DMS to the RTOC.
- The field element shall provide fault data for the driver information systems equipment DMS to the RTOC for repair.
- The RTOC shall remotely control dynamic message signs for dissemination of traffic and other information to drivers.
- The RTOC shall collect operational status for the driver information systems equipment DMS.
- The RTOC shall collect fault data for the driver information systems equipment DMS for repair.

Traffic Incident Management Market Package

- The RTOC shall support remote control of dynamic message signs equipment normally under control of the RTOC.
- The RTOC shall provide the capability to remotely monitor CCTV systems from the MC Emergency Operations Center.
- The RTOC shall support requests from the MC Emergency Management Center to remotely control sensor and surveillance equipment located in the field.
- The RTOC shall provide road network conditions and traffic images to the MC Emergency Management Center to support the detection, verification, and classification of incidents.
- The RTOC shall provide video control commands to the field equipment to detect and verify incidents.

Surface Street Control Market Package

- The field element shall control traffic signals at intersections and on main highways for urban and rural areas, under center control.
- The field element shall collect pedestrian images and pedestrian sensor data, and respond to pedestrian crossing requests via display, audio signal, or other manner.
The field element shall provide the capability to notify the traffic management center that a pedestrian has requested right-of-way and when the request was or will be granted (request for right-of-way).

The field element shall monitor operation of traffic signal controllers and report to the center any instances in which the indicator response does not match that expected from the indicator control information.

The field element shall monitor operation of traffic signal controllers and report to the center any instances in which the indicator response does not match that expected from known indicator preemptions.

The field element shall return traffic signal controller operational status to the controlling center.

The field element shall return traffic signal controller fault data to the maintenance center for repair.

d. ITS Standards and Testing:

ITS Standards that apply to the project are identified as follows:

- NTCIP C2F: NTCIP Center-to-Field Standards Group.
- NTCIP 1101 Simple Transportation Management Framework (STMF).
- NTCIP 1102 Base Standard: Octet Encoding Rules (OER).
- NTCIP 1201 Global Object Definitions.
- NTCIP 1203 Object Definitions for Dynamic Message Signs.
- NTCIP 1205 Data Dictionary for Closed Circuit Television (CCTV).
- NTCIP 2001 Class B Profile.
- NTCIP 2101 Point-to-Multi-Point Protocol Using RS-232 Subnetwork Prof.
- NTCIP 1209 Data Element Definitions for Transportation Sensor Systems (TSS).
- NTCIP 2104 Ethernet SubNetwork Profile.
- NTCIP 2202 Internet (TCP/IP and UDP/IP) Transport Profile.
- NTCIP 2301 Application Profile for Simple Transportation Management Framework.

Testing of the central and field devices included in this project will be performed during the construction phase. Specifications will be developed to ensure that conformance to the above standards is achieved.

Content for this section of the FDR was taken from National ITS Architecture – Version 6.1 as provided on the World Wide Web at: http://itsarch.iteris.com/itsarch/.