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BEST MANAGEMENT PRACTICES TO EXCHANGE INFORMATION BETWEEN THE TOC AND DISTRICT OFFICES

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16. Abstract

The objective of this study was to develop best management practices for exchange of information between the Transportation Operations Center (TOC) and the district offices and regional traffic management centers. Data collected for this study included: meetings with the Study Advisory Committee and key personnel within the Kentucky Transportation Cabinet at the central office and highway district offices; a literature review; a state website review; and telephone interviews with representatives from a few states.

Recommendations were made in the following general areas: use of CARS/511; communication between the TOC and district offices; SAFE patrol; ITS equipment; public information; incident management; detours; weather/snow & ice; coordination with regional traffic management centers; documenting complaints; and website design.

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EXECUTIVE SUMMARY

The Kentucky Transportation Cabinet (KYTC) is organized into 12 districts offices and a central office. The central office is home to the statewide Transportation Operations Center (TOC). There are also four regional traffic management centers (TMC) located in Lexington, Louisville, Northern Kentucky, and at the Cumberland Gap Tunnel. In addition, some district offices have some intelligent transportation systems (ITS) equipment such as Dynamic Message Signs (DMS) and cameras and operate in some capacity as a small TMC. Communication and coordination among all these "centers" is critical to providing accurate and timely information to motorists.

The objective of this study was to develop best management practices for exchange of information between the TOC and the district offices and regional TMCs. This report goes a step further to identify additional best practices that may improve the quality and quantity of traveler information provided by KYTC.

To understand current practices within KYTC with regard to the collection and dissemination of incident information affecting the roadway, several interviews were conducted with district and central office staff. Best practices in other states and regions were identified using a literature review, state department of transportation website review, and telephone interviews with representatives from a few transportation agencies.

Recommendations were made based on Kentucky's current practices and successful practices identified in other states or regions. Those recommendations include such topics as: use of the Condition Acquisition Reporting System (CARS)/511, communications between the TOC and district offices, SAFE patrol, ITS equipment, public information, incident management, detours, weather/snow and ice, coordination with regional TMCs, documenting complaints, and website design. Some of the key recommendations from this report include:

- Training is needed for KYTC personnel to input data into CARS
- Planned incident information should be entered into CARS by the public information officer (PIO) or other personnel at the district level
- Crash information should be entered into CARS by TOC operators
- Guidelines should be developed concerning when the district office should contact the TOC
- Shared control of ITS equipment along with better communication and coordination is needed between the TOC and regional TMCs and between the TOC and district offices
- Guidelines should be developed on how to handle incident management issues at a district level
- Improvements are needed to the website to provide more useful information to travelers

CHAPTER ONE

INTRODUCTION

The Kentucky Transportation Cabinet has a Transportation Operations Center (TOC) located at the Cabinet's central office in Frankfort that has to communicate and coordinate with several regional traffic management centers (TMC) and highway districts throughout the state. Although there are four regional centers with dedicated staffing, most of the "centers" are actually located in district offices with limited personnel and resources. The regional centers are:

- TRIMARC – located in Louisville
- ARTIMIS – located in northern Kentucky
- Lexington Traffic Management Center
- Cumberland Gap Tunnel

The regional centers are staffed by consultants and have specific hours of operation and defined duties. There are limited resources and personnel available at many of the district offices. In order to realize the full potential of the TOC, communication practices need to be established between the TOC, the regional TMCs, and all the various small "traffic management centers" located in the highway district offices.

1.1 Background

The TOC is a multi-functional center located in the Kentucky Transportation Cabinet in Frankfort. The TOC's mission is to collect and disseminate traffic and highway incident information through various media to the traveling public in the Commonwealth. The TOC is a continuously operated unit which relies on the information exchange with the 12 highway districts to perform the following functions:

- Updating the 511 website and telephone system with current incident and construction information
- Linking to the Conditions Acquisition Reporting System (CARS) to provide traffic and weather information to travelers through kiosks located at Welcome Centers
- Monitoring live video feeds from regional centers and disseminating information through variable message boards located throughout the state
- Serving as a center for weather watches and warnings, email notification of weather conditions to stakeholders, and coordination of highway snow and ice removal

A formalized procedure for this information exchange would be beneficial and supportive of the overall mission of the TOC, as well as provide improved service to the driving public.

CHAPTER TWO

CURRENT COMMUNICATION PRACTICES BETWEEN THE TOC AND DISTRICT OFFICES

2.1 Data Collection

Twelve interview sessions were held (one in each of the 12 highway district offices) beginning September 26, 2008 and ending December 22, 2008. The Chief District Engineer in each district office was contacted and asked to participate in the session. They were encouraged to invite anyone in the district who would routinely communicate with the TOC (such as the public information officer, incident management coordinator, etc.). An average of nine people attended the district office interviews, with a high of 13 attending in Districts 5 and 9 and a low of five attending in Districts 8 and 11. The interview sessions typically lasted between about an hour and a half to two hours and included 45 questions. The interview questions are given in Appendix A. The main purpose of the session was to better understand the current methods used by the TOC and district offices to communicate and work together. A secondary objective was to better understand different aspects of how each district is organized and operated. The interview included questions relating to district personnel and organization, information provided to the public, operation of ITS equipment, incident management, regional TMCs, communication between the TOC and district offices, snow and ice removal, CARS, press releases, and detouring traffic.

In addition to the district interview sessions, interviews were conducted with Jeff Bibb, Director of Incident Management for the Kentucky Transportation Cabinet and Nancy Albright, Director of the Division of Maintenance. The information collected during these interviews supplemented the district interview sessions by providing more insight into the TOC operations, CARS, and Cabinet's snow and ice activity.

2.2 Findings

2.2.1 Information to the Public

All districts, except Districts 7 and 11, had a public information officer (PIO) at the time of their interview. Both of those districts have an acting public information officer. Communication between district personnel and the PIO varies greatly within each district office. Many have a good working relationship and information is shared freely while other PIOs do not receive the needed information or do not receive information in a timely manner.

There are some minor discrepancies in what each district wants to communicate to the public, but in general the districts desire to notify the public of any roadway closure (whether planned or emergency), and lane blockages that affect traffic for an extended period of time. This information is typically distributed over email in the form of a press release to the media, but the phone or fax machine is used to distribute the information in a few instances. All the districts are

relationship with the TOC. The Cumberland Gap Tunnel center is located in District 11 and tends to be more autonomous although it does have some communication and coordination with the district office and TOC.

2.2.5 Communication between the District Offices and the TOC

The TOC is typically receiving information from the districts for planned incidents from the PIO. The working relationship within the district with the PIO varies from district to district. Typically, district personnel communicate road closures and blockages to the PIO who reports this information to the TOC by emailed press releases. Updates to the information are typically provided when the PIO is made aware of the updates.

Most districts are reporting highway incidents to the TOC, although the situation in which incidents are reported and how they are reported vary greatly from district to district. Some districts are assuming that all highway incidents are reported to the TOC by the Kentucky State Police or other responding agencies.

Districts receive email notifications from the TOC regarding district snow and ice activity, highway incidents, and the highway hazard email. The email distribution list varies from district to district and many, if not all of these lists, need to be updated. The TOC communicates by phone with the district offices in some incident situations when coordination is needed.

Each district is supposed to provide the TOC with an emergency duty roster. There have been some issues with contacting the appropriate people within the district offices. District 2 uses a "floater phone" for on-call personnel. This allows the TOC to call one number any time to contact the appropriate district personnel. Communication typically occurs over cell phones, but a radio system is available and is used in some of the district offices.

2.2.6 Snow and Ice Activities

During snow and ice emergencies, personnel from the central office Division of Maintenance are available within the TOC. The person or persons communicate regularly with the district offices performing snow and ice activities. Communication occurs by email and phone on a regular basis until the snow and ice activity is complete. Most district offices are very satisfied with the current method snow and ice activities are handled through the TOC. There are a few districts which desire to receive more advanced weather information and notification of other district activity.

2.2.7 CARS / 511

None of the districts currently have any personnel entering data into CARS. They are relying on the TOC to enter this data based on press releases issued by the PIO in each district. The districts need access and training to use CARS. The TOC has been entering data into CARS based upon the press releases received from each district PIO. However, this information is

- Incident management meetings should be held on a regular basis (such as quarterly) where district personnel can discuss issues with local responders
- Detour plans should be followed (with appropriate signing)
- TOC should receive all press releases and email from the district PIOs
- Cabinet policy for how to respond to requests by police and other incident responders for assistance (including traffic control and scene clean-up) should be developed
- Information should be provided concerning when other districts are out for snow and ice activity
- Current roads included on the 511 system should be expanded
- Accuracy of the location information (including milepoints) provided on the 511 system must be checked
- Each district should have an Incident Management Coordinator

CHAPTER THREE

PRACTICES IN OTHER STATES AND REGIONS

3.1 Literature Review

A review of literature was conducted to determine information available which describes the status of TOCs in other states and the method of communicating information to drivers. A summary of information obtained from the literature review is provided in Appendix B. Limited detailed information was available through the literature. More detailed information was obtained through a review of state websites and telephone interviews. The remaining sections of this chapter highlight the results of those activities.

3.2 Review of State Websites

Twenty-seven state websites were reviewed to determine how they displayed information to the public. Typical information noted were the types of information provided and how it was provided. Following is a brief summary of the types of information noted. In some instances, the name of the website is given.

Alabama
The Alabama Department of Transportation website provides links to a construction bulletin and emergency road closures. The construction bulletin provides a list of projects giving the county, route, description, and estimated completion date. The emergency road closure list gives the county, route, status, location, reason, and time the information was last modified. A link is given to provide extreme weather information, specifically hurricanes. A project has been implemented on a section of I-65 providing estimated travel times to drivers via DMS.

Arizona
The Arizona Department of Transportation website has an interactive map which provides information for incidents, weather, and construction. The impact level is estimated. Real time camera images and weather sensor data are provided. The information is given statewide, by region, and by county. Active events are summarized by length (next one hour through next two weeks).

Arkansas
A phone number is given that motorists can call day and night to receive the latest information on weather-related road conditions. A recorded message with highway conditions is updated frequently during adverse weather. An interactive map displays active lane closures and width restrictions on major routes. A test report provides a listing of these locations. An interactive map also displays the latest reported weather-related road conditions on major routes during inclement weather periods with an alternative of a text report giving a tabular report of routes and conditions.

Iowa (511 Traveler Information)
Iowa 511 provides an interactive map and information related to crashes, alerts, difficult driving conditions, fair driving conditions, road work, permit status, traffic speed information, and major delays. The location is provided along with a description of the alert and the last update time.

Kansas/Missouri (KC Scout)
Kansas City Scout (KC Scout) is a traffic and management system addressing traffic impacts on the freeways in the bi-state (Kansas and Missouri) Kansas City metropolitan area. The system uses closed circuit television cameras, DMS, vehicle detector stations, highway advisory radio, and a dynamic website. A map is provided which gives information related to incidents, scheduled closures, emergency closures, special events, and freeway speeds. Cameras and DMS can be viewed.

Louisiana (511 Project)
Louisiana 511 provides an interactive map and information related to crashes, closures, alerts, and road work. Information given for each incident include the location, description, estimated time to completion, anticipated delays, and the date when the information was last updated.

Maryland (CHART)
CHART (Coordinated Highways Action Response Team) is a joint effort of the Maryland Department of Transportation, Maryland Transportation Authority and the Maryland State Police, in cooperation with other federal, state and local agencies. Its mission is to improve "real-time" operations of Maryland's highway system through teamwork and technology. The website provides live traffic video, real-time traffic maps, and weather. There is a statewide operations center which functions continuously. Traveler information provided include interactive mapping, incident reports, route restrictions/lane closures, live traffic cameras, local weather station data, speed sensor data, and highway message signs.

Minnesota (Minnesota Guidestar)
Minnesota Guidestar was implemented in 1991. It was initially focused on the Twin Cities metropolitan area. More recently, a network of nine Transportation Operation and Communication Centers (TOCCs) has been implemented. The goal is to establish an integrated statewide communication and transportation network serving rural and the smaller urban areas. The TOCCs are regional centers for 24-hour incident and emergency response, including cellular 911 calls, multi-agency dispatching and fleet management, interagency communications, collection and dissemination of road conditions and closures, and traffic management. An example of a current project is a computer aided dispatch (CAD)/CARS project focusing on developing an automated data exchange between the state patrol dispatch system and the statewide reporting system to increase information on 511 phone and web systems without added entry of events by dispatchers. Active, planned, and weather related closures are listed by county.

Pennsylvania (Traffic Information)
Statewide traveler information is provided along with links to current and planned construction. Data are provided by district along with the Philadelphia Regional Construction Advisory. The links to the traveler information are to: traffic cameras, travel advisory/news releases, interstate road conditions, current weather, and winter guides. The interstate travel advisory includes the date, location, and description.

Rhode Island (CARS 511)
The transportation management center is staffed 24 hours a day, seven days a week. Drivers can call 511 or use the TMC website to obtain traveler information. Equipment used in the process include: closed circuit video equipment, DMS, variable message signs, and highway advisory radio. The website provides users with reports for in-progress incidents, camera images, HAR recordings and scripts, and 511 updates. Links are provided to the amber alert webpage and congestion mapping. The 511 automated system can be used to obtain information for a specific city and route.

South Carolina (Getting Around in South Carolina)
The website provides travel advisories, traffic information, construction projects, weather conditions, and incident information. Interactive maps are provided to give access to road conditions, incident response, active construction projects and traffic cameras.

South Dakota
The South Dakota traffic, weather, and ski center links to real-time and interactive traffic information and traffic snapshots, including weather, road conditions, construction reports, crashes and incidents, maps, and traffic and weather cams on major US routes such as interstates, turnpikes, and parkways and high volume secondary routes.

Tennessee (TDOT SmartWay)
TDOT SmartWay is Tennessee's intelligent transportation system which uses advanced information technologies to improve the safety and operation of highways and other transportation modes. Links are provided for weather-related road conditions, construction/incidents, camera images, and message signs. Tips are provided for users to navigate the SmartWay system. Links are provided for additional traffic information in specific cities. A map of Tennessee is provided which allows a user to click on a specific county to view a list of active events (construction/incident/road conditions) in that county. For each event, the information provided includes the location, type of event (with a description and current activities), and the beginning and ending date (along with the date the information was last revised).

3.3 State Interviews

The review of various state websites provided general information concerning how states provide and present traffic information to the public. To obtain more specific information concerning their organization and communication practices, several states were contacted. The states were selected based on information obtained from the literature and website reviews and suggestions from the advisory committee. The interview questions are included in Appendix C. Following is a summary of the telephone interviews from eleven states.

Kansas

The Kansas Department of Transportation (KDOT) is divided into six districts. These districts have control of their own DMS. Kansas does not use CARS but instead has a proprietary custom-made software package. District personnel input data related to construction, maintenance, and winter weather conditions. Crash data is entered only after personnel have been dispatched for traffic control. In some instances the crash is over before KDOT is notified.

KDOT does have a 511 phone system which recognizes both voice and touch-tone commands. Information is also provided via website. Route specific information is available through both the phone system and website. Kansas City has a system called Kansas City Scout which provides text message alerts to subscribers. To market the traveler information systems, KDOT uses news releases, public service announcements, television, radio, and web advertising.

Florida

The Florida Department of Transportation (FDOT) has eight districts which includes the Florida Turnpike. The operations function within FDOT is located within the districts. There is no central transportation operations center. Each region does or will have at least one regional TMC. In the future, the district offices will collect data and provide it to a central dissemination system for access by the public. The ITS sections in the district offices maintain control over the cameras and DMS through the regional TMCs. They determine the orientation of the cameras and the message that gets posted on the signs.

Crash data are entered by personnel at the regional TMCs based on data from cameras, sensors, and service patrol operators. Data are also obtained from the Florida Highway Patrol, but that information is not utilized unless verified. Planned construction information is collected and disseminated by the district public information office.

Florida utilized CARS in the past with their Central Florida and Statewide systems but was unsatisfied with the level of support offered by the consultant when changes were needed. Drivers can obtain information on crashes and construction projects impacting traffic thru the 511 phone system and website. Drivers can obtain some limited travel time information also. The 511 phone system does make use of voice responsive technology. In addition, FDOT provides motorists with the ability to register two phone numbers and up to 10 routes of interest. When a motorist calls the system, the system recognizes the phone number and provides information on the routes of interest. This personalized system also allows motorists to receive text messages and email alerts.

activities daily and remove information on cancelled projects. Any maintenance activities involving shoulder work or lane closures are included.

GDOT has a 511 phone system and website. The phone system recognizes both voice and touch-tone commands from the caller. There is also a live operator available if the caller needs to report an incident or request assistance at the roadside. Travel information can be obtained on the web by region, interstate, and route. On the phone system, the route is needed although information is provided on commonly used segments, such as "I-75 in South Atlanta". GDOT has a service called, "My Navigator", on their website which allows a user to provide three profiles. Users can receive alerts via text messages, email, or pages based on the route, time of day, day of week, and other options. GDOT has issued about eight million alerts in five years. They are also considering a phone number recognition system for 511 that would allow a caller to receive specific information based on the caller's profile. Traveler information services are marketed through television, radio, web advertising, the 511 crew (costumed marketers), brochures, wallet cards, DMS, press releases, a launch event, transit artwork, and AAA coordination.

Minnesota

Minnesota has nine transportation regions which correspond to the highway patrol regions. Each region inputs CARS data for their area. Incidents are input by the highway patrol which is stationed at the same location in each region. A few of the regions have DMS and cameras and have control over these devices. Maintenance personnel have the capability of data input but this is not done on a regular basis.

Minnesota uses CARS and a 511 autovoice system. The state had the Twin Cities Regional Transportation Center which covers the state's major metro area. One item placed on their webpage, which obtains the most use, is a Traffic Flow map. The map gives congestion and travel time information in the metro area based on data from loop detectors. The state patrol and transportation maintenance personnel are stationed in the Transportation Center. Camera views are also provided. Surveys have found that the 511 autovoice system gets limited use.

Tennessee

There are four regions in Tennessee with each having a TMC. The first was established in Nashville in 2003 with the last to be placed in Chattanooga. The regional TMCs have a setup similar to Kentucky's TOC. The information in the urban areas can be observed from the numerous cameras in the urban areas and reported. There is a problem with obtaining incident information in rural areas. The DMS are in each of the four major urban areas and not in rural areas. Information provided on the DMS and control of the cameras are with each region.

Tennessee let a request for proposals (RFP) and First Data was selected to develop the system rather than CARS. The 511 system was developed by Vanderbilt University. An issue with the 511 system is updating the road system and insuring that there is no confusion with the routes. The routes on the system are primarily interstates along with some other major routes.

This was part of their Traffic Statewide Operations Plan (TSOP). Each region places all the planned and incident information into the system. Most regions have either DMS or variable message signs at permanent locations and they are responsible for placing messages on these signs. Some regions also have highway advisory radio (HAR) and most have cameras with control maintained by the region.

They do not have a statewide 511 system but are working on implementing such a system. There is a hotline available to obtain conditions on interstates.

The relationship with the state police varies by region. In urban areas, an incident can be seen on a camera with information placed onto RCRS. Information is shared with police but the police cannot enter information into RCRS and they do not have access to the police CAD.

The current system applies to the interstate system with consideration of adding other roadways to the system. There are plans to increase the number of DMS and cameras to give statewide coverage.

Each region had developed an ITS plan for their region. The state uses an Incident Command System to respond to statewide emergencies such as a major snow and ice event.

Various criteria have been established for the use of RCRS. For example, an estimate completion time is input for a closure. At one hour before the estimated re-opening time, an email is sent to the person who entered the data to check on the status.

In a couple of the regional centers, email and text information can be sent to a driver who places their driving profile into the system. Various methods are being considered to deliver information to drivers.

Oregon

Oregon developed their software and is in the final phase of updating the software to better coordinate their four operation centers. They have a 511 system.

They are centralized into four operation centers scattered across the state. There are five regions and 15 districts in the state. They do not have operation centers in each district since it would be difficult to have the needed expertise in each district. The four operation centers control DMS and cameras.

Construction personnel input their data into the system. Maintenance can input their data into the system but typically report the data to the operation center that inputs the data.

The state police has two dispatch centers in the state which are located in two of their operation centers. The police CAD is automatically sent to their operation center but it must be verified by their operator before being placed in their system. Many crashes are not investigated by the state police. The information is obtained by the operation center through interaction with the police

CHAPTER FOUR

RECOMMENDATIONS FOR BEST MANAGEMENT PRACTICES

The following recommendations are made after reviewing the results obtained from the district interviews and the review of practices in other states.

Use of CARS / 511

- Provide access to and training with CARS for all district offices
- Utilize programs at the regional TMCs that automatically populate data into CARS
- Public Information Officers (PIOs) in each district should enter planned incident information into CARS
- Expand the 511 system to include more highways in Kentucky

Communication between the TOC and District Offices

- Update the Email distribution lists for each district
- Update the Emergency duty rosters for each district
- Consider using a "floater phone" system to communicate with district office personnel
- Provide training to the districts on the use of the radio system to communicate directly with the TOC
- District personnel should tour the TOC and meet with operators in order to build a better working relationship with them
- Have a meeting between the TOC and the district offices to discuss the needs and wants of the districts and how communication should occur
- TOC should promote their activities and inform the districts about the type of information they can provide
- TOC should provide highway watch information to the districts
- Provide guidelines describing when the district office should contact the TOC

SAFE Patrol

- SAFE patrol should be available to assist the district offices with traffic control and incident management
- Provide district personnel information on SAFE patrol officers in their district including names and contact information

ITS Equipment

- Provide appropriate training to allow the districts to utilize the overhead DMS
- Provide additional guidelines to the districts for use of the DMS
- Improve coordination and communication between the TOC and regional TMCs and between the TOC and the district offices to allow shared control of the DMS and cameras

Coordination with Regional Traffic Management Centers

- Improve the communication between the Lexington Traffic Management Center and the TOC.
- Consider adding a staffed TMC in a district in the western and/or southeastern portions of the state

Documenting Complaints

- Each district should track their findings and actions related to the Highway Hazard email

Website Recommendations

- Provide correct milepoint information on non-interstate roadways and parkways
- Expand the system to include more roadways
- Provide a table listing all the incidents by county
- Provide a method to access cameras and DMS statewide (and a connection to the regional TMCs' ITS equipment)
- Place incident and construction data from the regional TMCs on the statewide map
- Provide personalized information for specific routes

Implementation

- Establish a task force made up of representatives from the TOC, regional TMCs, and district offices (including PIOs) to establish procedures necessary to implement the recommendations

APPENDIX A: District Interview Questions

1) Which district office personnel work or may have need to work with the TOC and what are their specific responsibilities (with regard to communicating with the TOC)?

2) Where do these individuals fit into the organization of the district office?

(If not identified with the previous question, identify the Public Information Officer and incident management coordinator, if one is available in that district.)

3) What types of training have been provided with regard to their work relating to the TOC?

4) What types of planned events and incidents does the district office want to provide information to the public?

5) How does the district office inform the public of planned events or incidents affecting the roadway?

6) What types of equipment or resources are available in your district to inform the public of planned events or incidents affecting the roadway?

7) If dynamic message signs are available, what policies or guidelines are being followed to ensure appropriate messages are displayed?

8) Do you have control over ITS equipment (signs, cameras, etc.) in your district? If so, please explain how this control is accessed and how it works.

9) Do district personnel have the necessary capabilities and training to use these resources?

10) How (and from whom) does the district obtain information on local planned events or incidents?

11) What type of relationship does the district have with local responders and how does communication usually occur?

12) Does your district have an incident management plan?

13) What type of relationship does the district have with the local SAFE patrol operators and how does communication usually occur?

14) If there is a regional TMC (TRIMARC, ARTIMIS, Lexington, or CGT) in this district, what type of relationship does the district have with that center and how does communication usually occur?

36) Is your district familiar with the detour maps for all segments of interstates and parkways?

37) What type of information does your district receive from the TOC?

38) How does the district receive this information?

39) What information would you desire to receive from the TOC that you are currently not receiving?

40) What type of support (people, training, equipment) do you need from the TOC or central office to perform your duties?

41) How does the district respond to the highway hazard email?

42) Is there a specific person with the responsibility of handling the highway hazard emails?

43) What information does the district get from the highway hazard email?

44) How does the district document what is done in response to the email?

45) Is an update on the response to the highway hazard sent back to the TOC?

APPENDIX B. Review of Literature

Deeter, D.; To, H.; Zarean, M.; and Register, D.; "Rural ITS Toolbox," U.S. Department of Transportation, ITS Joint Program Office, FHWA-OP-01-130, October 2001.

This document was intended to support agencies and groups in the process of rural or statewide ITS deployment by identifying successful rural ITS projects and statewide applications from across the nation. Tools referenced are categorized on the basis of seven Rural ITS Development Tracks identified in another report. The seven tracks are: emergency services, tourism and travel information, traffic management, rural transit and mobility, crash prevention and security, operation and maintenance, and surface transportation and weather. Information designed to help planners evaluate the appropriateness of a given ITS application is provided for each tool. This information includes: needs addressed by the tool, a concise description of the tool, deployment examples, lessons learned from each deployment, benefits, implementation issues, institutional issues encountered, references, and other potential uses for the tool. For example, tools within the traffic management development track include: automated lane indication systems, closed circuit television, GIS applications, integrated signal systems, pager activation of warning beacons, route diversion systems, vehicles as traffic probes, incident management systems, parking management systems, work zone safety systems, and low cost detection.

ITS Toolbox for Rural and Small Urban Areas, New York State Department of Transportation, December 1998.

A compendium of systems, devices and strategies that can enhance safety, provide information, and make public transportation available in the small urban and rural areas in New York was developed. Tools were identified in the following eight ITS categories: incident detection, traffic management, safety, road/weather information systems, detection services, transit, traveler/tourism information, and planning/outreach. Tools under traffic management were: low-cost route diversion system, variable message signs, closed circuit television for detection, automated lane indication, GIS for traffic analysis, integrated signal system, and vehicles as traffic probes.

Minnesota Guidestar, Office of Traffic, Safety and Operations.

Minnesota's Department of Transportation and State Patrol have implemented a network of nine Transportation Operation and Communication Centers (TOCCs). The goal of these centers is to establish an integrated statewide communication and transportation operations network serving rural and the smaller urban areas outside the Twin Cities metro area. The individual TOCCs act as regional centers for 24-hour incident and emergency response, multi-agency dispatching and fleet management, interagency communications, collection and dissemination of road conditions and closures, and traffic management. Tools used to improve operator effectiveness include:

Standards for Traffic Management Center to Center Communications, ITE/AASHTO, 2003.

This publication contains the concept of operations and requirements for center-to-center (C2C) communications between advanced traffic management system centers and other centers. The C2C communications can be used to: provide event information to other centers, provide traffic and travel data to other centers, help coordinate operations within the defined C2C network, and provide remote control of traffic control devices.

"Statewide ITS Architecture Development, A Case Study, Arizona's Rural Statewide ITS Architecture," U.S. Department of Transportation, September 1999.

The objective was to build a statewide ITS infrastructure to improve both the safety and efficiency of the state's transportation system. An emphasis was placed on rural needs since Arizona is predominately rural. Major lessons learned were: during pre-development create manageable regional coalitions, create a wide net of stakeholders, create and maintain agency and public buy-in, and utilize resources.

Statewide/Rural Intelligent Transportation Systems, 2002 Summary Report, ITS Joint Program Office, U.S. Department of Transportation, April 2004.

This report presented the results of a major nationwide data gathering effort to track the deployment of ITS technology in statewide and rural areas in the United States. A summary is given of a 2002 survey of all state departments of transportation. The scope of this summary was expanded to include medium sized cities as well as statewide/rural deployments. Data were collected in the following five areas: crash prevention and security, traffic management, operation and maintenance, surface transportation weather, and traveler and tourism information. Traffic management in rural areas included: technologies for surveillance; information dissemination; and traffic control including closed circuit television, dynamic message signs, traffic surveillance, road closure systems, route diversion systems, and TMCs. The key functions of the TMCs were: incident management, information dissemination, surveillance, and special event traffic management. Data provided by the TMC include: en-route traveler information, emergency management, disaster management coordination, network performance monitoring, environmental monitoring, and corridor management. Information disseminated by traveler information systems include: road closure, work zones, incidents, road surface, weather, detours, road restrictions, congestion, alternative routes, and closed circuit television images. Technologies used to disseminate traveler information include: internet, statewide conditions reporting system, highway advisory radio, dynamic message signs, automated telephone, e-mail, fax, television, kiosk, cellular telephone, and staffed telephone.

APPENDIX C: State Survey

1) Does your state use CARS as a method of obtaining information to provide to the public? If not, what method is used?

2) Does your state use a 511 autovoice system? If not what method is used?

3) How is the state's transportation system divided into regions?

4) How is information provided from the various regions to the central TOC?

5) Is crash information (including updates) input by the state police agency and local police or do the police inform the state or regional TOC of crashes?

6) Who is responsible for data for planned construction activities?

7) Who maintains control over DMS and cameras?

8) Can drivers obtain data by region or route on the website or phone?

9) Are maintenance activities included?

10) How are drivers informed of the information which can be obtained?

11) Do they have a method for a driver to select routes and have information provided for incidents on those specific routes?