Des Moines Metropolitan Area ITS Strategic Plan

Executive Summary

Prepared for

Des Moines Area MPO

Iowa Department of Transportation

Federal Highway Administration

Prepared by

Center for Transportation
Research and Education
(an Iowa State University center)

Allied Signal

Booz-Allen & Hamilton

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This executive summary of the Des Moines Metropolitan Area ITS Strategic Plan was prepared by the Center for Transportation Research and Education (CTRE) at Iowa State University, AlliedSignal, and Booz-Allen & Hamilton. For more information, or for a copy of the complete project report and strategic plan, contact CTRE at 515-294-8103, or fax requests for information to 515-294-0467. Both the executive summary and the complete strategic plan are also published online at http::www.ctre.iastate.edu/

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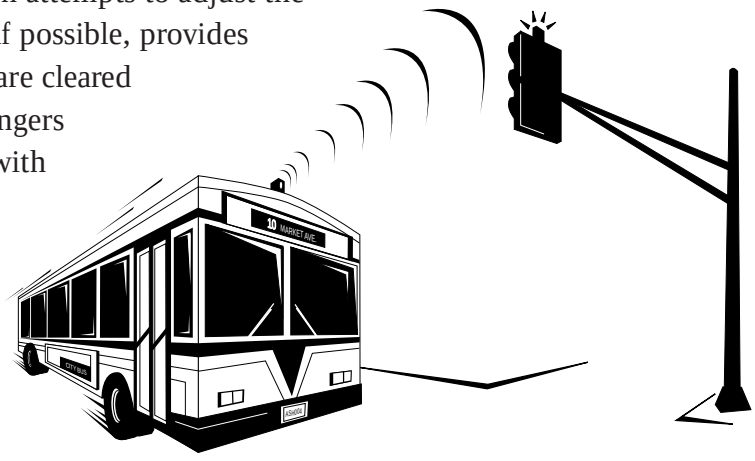
BACKGROUND

This is an executive summary of a strategic plan for deploying Intelligent Transportation Systems (ITS) technology in the Des Moines metropolitan area. The plan was developed as part of the Des Moines ITS Early Deployment Study (EDS). ITS is the use of computers, electronic communications, electronic data gathering devices (e.g., traffic detectors), and electronic information distribution mechanisms (e.g., roadside variable message signs, the Internet, cable TV, etc.) to increase the reliability, productivity, and safety of transporting people and goods. Conventional transportation improvements generally involve a physical change to the transportation infrastructure or to transportation vehicles (e.g, adding a new highway lane or modifying transit vehicles). The primary focus of ITS improvements is to facilitate the safer and more efficient use of existing or planned transportation facilities and services using information technology.

ITS uses information technology to electronically link vehicles and transportation facilities, allowing them to operate as a system rather than as two independent transportation system components. The result is safer and more efficient transportation. For example, one ITS improvement proposed for the downtown area of Des Moines is to provide the Des Moines Metropolitan Transit Authority's (Metro) buses priority treatment at traffic signals. To receive priority treatment, a bus signals an approaching traffic signal, as illustrated here. The traffic signal's computer then attempts to adjust the timing of the red, green, and yellow lights and, if possible, provides the approaching bus a green light. When buses are cleared through an intersection more quickly, bus passengers save time and the intersection is not congested with slower moving buses. Typically, the communication between a bus and traffic signals results in faster and more reliable transit service and better traffic flow through intersections. In the traffic signal prioritization system, the bus and the highway infrastructure (the traffic signal) are linked electronically, providing a "win-win" situation for transit patrons and motorists.



A traffic signal prioritization system generally provides more green time to buses at intersections. Illustration by Andy Hauk.

In metropolitan areas where ITS has already been deployed, the benefits have been quite significant. For example, as a result of the implementation of ITS to freeway management, travel times have decreased by 20 to 48 percent, speeds on congested urban freeways have increased from 16 to 62 percent, and accident rates on urban freeways have declined by 15 to 50 percent. The application of ITS to transit management has resulted in decreases in bus travel times of 15 to 18 percent and increases of 12 to 23 percent in on-time performance.

The Des Moines metropolitan area does not currently face the extreme levels of traffic congestion that forced larger urban areas like Minneapolis/St. Paul, Chicago, and Detroit to adopt ITS very early. Therefore, Des Moines can now take advantage of tried and tested ITS functions and technology and accrue similar safety and travel productivity improvements through a well planned and incremental deployment of ITS. Such a deployment will not only help prevent the development of extreme traffic congestion in the Des Moines metropolitan area but will also help manage and alleviate traveler delays and disruptions caused by the reconstruction of I-235 through Des Moines, scheduled to begin early in the next decade.

The ITS strategic plan serves as a road map for developing ITS in the Des Moines metropolitan area. The plan makes 19 specific recommendations for deployments or actions to improve traffic flow and safety on the freeways and surface streets, provide travelers with better information on weather and highway conditions, and make transit more efficient and convenient.

HOW THE PLAN WAS DEVELOPED

A few large metropolitan areas were pioneers in the use of ITS to manage traffic and transit services. The benefits observed in these urban areas compelled the U.S. Department of Transportation (DOT) to promote more widespread deployment of ITS. To involve more urban areas in planning and developing ITS, the U.S. DOT developed a program of financial support to assist metropolitan areas in developing ITS strategic plans. The Des Moines Area Metropolitan Planning Organization (MPO) requested and received funding to conduct a Des Moines area plan and, with matching funds from the MPO and the Iowa DOT, contracted with the Center for Transportation Research and Education (CTRE) at Iowa State University, Allied Signal, and Booz-Allen & Hamilton to develop the plan. At the time, Des Moines was the smallest urban area undergoing such a strategic plan, implying that there were no prior plans to identify systems appropriate for urban areas the size of Des Moines.

The plan was developed under the direction of a steering committee. Committee members represent the ITS stakeholders in the Des Moines metropolitan area. They included the following:

Des Moines Area Metropolitan Planning Organization
- Tom Kane, Executive Director

Iowa Department of Transportation
- Marty Sankey, I-235 Coordinator
- Timothy Crouch, Traffic Control Engineer
- Michael Audino, Director, Field Services Division

Iowa State Highway Patrol
Steve Marsh, Captain
Federal Highway Administration
James Hogan, Design and Traffic Operations Engineer
City of Des Moines, Traffic and Transportation Department
Gary Fox, Office Director
City of Des Moines, Police Department
Bob Lohrman, Enforcement Officer
Polk County Engineering Department
Mark Wandro, Assistant County Engineer
Des Moines Metropolitan Transit Authority
Donna Grange, Paratransit Director
City of West Des Moines, Public Works Department
Duane Wittstock, City Engineer
City of West Des Moines, Police Department
Bob Rushing, Captain
City of Windsor Heights, Fire Department
Al Hunter, Fire Chief
Iowa Motor Truck Association
Scott Weiser, President
Greater Des Moines Chamber of Commerce
Kent Sovern, Vice President for Governmental Affairs
Des Moines International Airport
William Flannery, Aviation Director

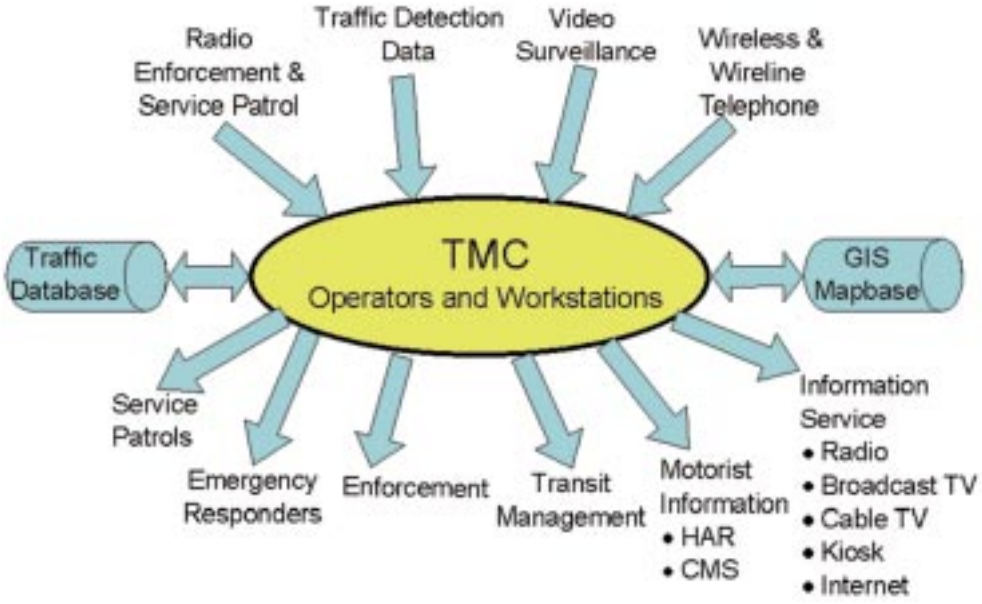
TRAFFIC MANAGEMENT AND TRAVELER INFORMATION

A core element of ITS infrastructure is a transportation management center (TMC). As illustrated on the following page, the TMC collects and processes information on the performance of the transportation system and initiates strategies for managing the transportation system.

For example, if a motorist at the site of a crash on I-235 makes a 911 call by cellular telephone, that call is switched to the TMC. The TMC operator then initiates a series of activities to manage the incident, ensure that the appropriate assistance reaches the crash site as fast as is warranted, and ensure that the disruption to traffic is minimized by clearing the crash site as fast as possible. After receiving the call, the operator may pan a video surveillance camera to the site to visually inspect the accident and to capture a video and/or images of the site to be sent to the local agency responsible for responding to the crash. Having observed the accident, the TMC operator can dispatch the appropriate response, ranging from a service patrol vehicle to ambulances, fire trucks, and a hazardous materials response team. The responders are better prepared because they know the specific location of

the accident and also have images from the site so they can interpret the severity of the crash.

TMC information flow



The TMC collects information from a number of sources, including information over the radio from enforcement personnel and service patrol operators and telephone communication from motorists. The TMC also receives data from traffic counters (detectors) mounted on the side of the road and on bridges over highways, and visual images from cameras mounted high over freeways and congested surface streets. The appropriate response, along with images of crashes and incidents, is then reported to the appropriate officials. Depending on the conditions, information can be communicated to motorists through low-power information radio stations (Highway Advisory Radio (HAR)), electronic message signs (Changeable Message Signs (CMS)), and broadcast radio, and to travelers via broadcast radio and television, the government access channel on cable television, public traveler computer kiosks, and the Internet. In addition, on the Interstate system in the Des Moines metropolitan area, the TMC may control traffic signals on freeway entrance ramps to meter a more orderly flow of traffic onto Interstate highways, as shown in the photo at left.

A ramp meter releases traffic to the freeway to avoid a breakdown in mainline traffic flow. Photo courtesy of Federal Highway Administration.

Very conservative estimates of potential benefits to be realized from ITS deployments recommended in the strategic plan were made using traffic data and crash statistics from the base year 1993 (traffic volumes and crashes have increased significantly since then). Conservatively, it is believed that these systems would reduce traffic crashes on the Des Moines Interstate system by 100 per year (50 each in the morning and afternoon peak travel periods). Conservatively, speeds would increase by 14 percent (most metropolitan areas experience 20 to 48 percent increase in speed), and motorist travel hours would be reduced by about 250,000 hours per year (an estimated value of $2.8 million per year). Due to faster crash and incident clearance, delays would be reduced by 400,000 hours per year (an estimated value of $4.0 million per year). The estimated quantitative benefits do not include the benefits travelers receive when they can make more informed decisions regarding whether to travel, the route to take, the time of departure, the mode selected, and the estimated arrival time; the safety benefits resulting from accident responders being more informed and responding more quickly; or the benefits to motor carriers and shippers of a more reliable transportation system. These benefits will be particularly critical when I-235 is being reconstructed and construction activities impact the flow of traffic across the metropolitan area.

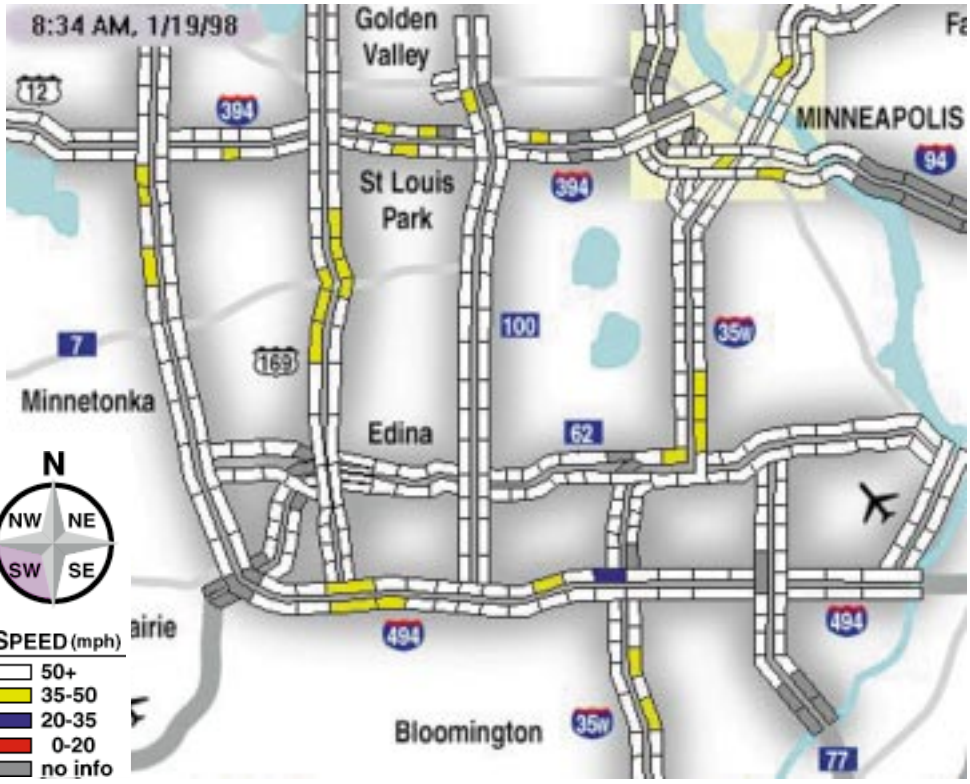
I-235 acts as the major traffic artery across the Des Moines meteropolitan area. Recently, traffic volumes on I-235 increased over 100,000 vehicles per day. I-235 serves both long-distance trips across the metropolitan area and circulation within the metropolitan area. Although the Iowa DOT plans to minimize the disruption of normal commuting patterns during I-235 reconstruction, travel conditions across the urban area are likely to be affected and traffic is likely to be diverted to parallel streets. During reconstruction, the TMC can act as a command center for providing travelers with the best information on current conditions and the need to take alternative routes.

The estimated cost of the traffic management and traveler information system is between $12.5 million and $25 million over the next 15 years. The difference between the low and high estimates is principally the difference in costs of communication systems; actual costs will probably be somewhere in the middle of the two extremes. If the communication system is built by a communications company and access to communications capacity is provided to TMC operators in exchange for access to Interstate highway right-of-way for burying fiber optic cable, the cost of the system will be dramatically less than the cost of a system specially built for traffic management purposes alone. The cost estimates for the Des Moines metropolitan area, based on cost per mile of freeway under traffic management, are less than half the costs typically experienced in larger urban areas like Minneapolis/St. Paul.

Specific Traffic Management and Traveler Information Recommendations

The study group recommends the following actions regarding traffic management and traveler information systems:

- Develop a Transportation Management Center (TMC).
- Populate the metropolitan area's roadways with traffic surveillance and traffic management assets (such as Highway Advisory Radio transmitters, Changeable Message Signs, and traffic detectors), starting at high-incident and high-crash frequency locations.
- Develop an incident management plan for freeways and freeway-design standard highways (such as new U.S. Highway 65).
- Create an electronic communication system that provides metropolitan agencies responsible for responding to incidents with real-time data on incidents and real-time video images of incidents to allow for more efficient and swift management and clearance of incidents.
- Establish a traveler information system broadcast over the government access cable television channel, which scrolls through maps showing traffic speeds, locations of incidents, road conditions, and real-time video images.
- Develop a real-time traveler information system distributed over the Internet and at computer kiosks at public locations. (An example from Minnesota's system is shown below.)



Minnesota's real-time traveler information system on the Internet includes a graphic display of traffic speeds along highways in the Minneapolis/St. Paul area. Image courtesy of the Minnesota Department of Transportation, Traffic Net web pages.

INTER-JURISDICTIONAL TRAFFIC SIGNAL COORDINATION

Coordination of traffic signals involves timing signals so that traffic leaving one traffic signal along an arterial street and traveling at or below the posted speed limit will reach the next signal while it is green, then reach the next signal while it is green, and so on. Allowing traffic to flow smoothly along an arterial while minimizing stops for signals requires coordinating the signal timing from one signalized intersection to the next. Uncoordinated traffic signals along arterial streets cause unnecessary delays and inefficient stopping and starting, resulting in extra energy consumption and air pollution and reducing the effective capacity of the arterial street. Traffic signal coordination is a tremendously cost-effective transportation strategy. For example, a program in California in which over 3,000 existing traffic signals were simply retimed to allow coordination resulted in a 58-to-1 benefit-to-cost ratio. An Iowa study involving both new equipment and traffic signal retiming at 19 sites in 16 Iowa cities resulted in an average benefit-to-cost ratio of 14.2-to-1.

One of the most common problems with traffic signal coordination in metropolitan areas with multiple jurisdictions is coordinating signals across the boundaries of governmental jurisdictions. In some cases, the equipment used by neighboring cities is not technically compatible to allow coordination across jurisdictional boundaries. Coordination of traffic signals on arterial streets that cross multiple jurisdictions is a critical problem in the Des Moines area and one that may be overcome through the application of interjurisdictional cooperation and ITS technology.

A notable example of multiple interjurisdictional cooperation to coordinate across jurisdictional boundaries is a project conducted in western San Bernardino County, California, in which six jurisdictions coordinated 113 signals on eight arterial streets operated by six different governmental jurisdictions (local governments and the California DOT). Similar to the jurisdictions in Des Moines, the jurisdictions operated signal systems based on different equipment technical standards. When the signals were coordinated between jurisdictions and along affected arterial streets, average travel speeds increased by 15 percent, stops decreased by 12 percent, and fuel consumption declined by 12 percent.

Interjurisdictional traffic signal coordination will be particularly important during the reconstruction of I-235 when traffic is diverted from I-235 to parallel arterial streets. At that time it will be most important that these arterial streets move traffic as efficiently as possible. For the Des Moines EDS study, a simulation model was run to determine which roads will be impacted the most by traffic diverted from I-235 and thus most need traffic

signal coordination. The simulation model showed that the most heavily affected roadways include the following:

- Hubbell Avenue from E 33rd Street to Grand Avenue (Des Moines)
- Grand Avenue from Fleur Drive to 19th Street (Des Moines, West Des Moines)
- Grand Avenue from 2nd Street to Hubbell Avenue (Des Moines)
- University Avenue from I-235 to 86th Street (Des Moines, Windsor Heights, Clive)
- Ashworth Road from 63rd Street to 35th Street (West Des Moines)
- NE 14th Street from University Avenue to I-35/80 (Des Moines)
- 56th Street from University Avenue to Grand Avenue (Des Moines)
- Hickman Road from Euclid Avenue to 86th Street (Des Moines, Urbandale, Iowa DOT)
- I-35/80 from NE 14th Street to Merle Hay Road (Iowa DOT)
- Delaware Avenue from University Avenue to Broadway (Des Moines)

Specific Inter-jurisdictional Traffic Signal Cooperation Recommendations

The study group recommends the following actions regarding inter-jurisdictional traffic signals:

- Where ramp meters are found to be feasible, coordinate ramp meters and traffic signals at the ramp terminals with traffic signals on adjacent streets.

- Execute an interjurisdictional traffic signal coordination memorandum of agreement between agencies operating traffic signals in the Des Moines metropolitan area.

- Conduct an engineering study of the physical equipment requirements to coordinate traffic signals across jurisdictions, particularly along I-235 reconstruction diversion routes.

- Implement a traffic signal coordination plan by traffic signal operating agencies.

SERVICE PATROLS

Many major urban areas in the United States operate service patrols. These programs usually consist of a fleet of light-duty trucks equipped with two-way radios for communicating with a transportation control center. The trucks are usually equipped with emergency signs and devices, gasoline, antifreeze and other consumables, and light duty tools. Often the trucks are equipped to push vehicles. Service patrols usually operate along defined routes, although some are dispatched on demand. A recent Institute of Transportation Engineers publication identified 35 metropolitan areas with

service patrols. There are probably several others with undocumented service patrols, including the privately operated service patrol in Des Moines.

In the Des Moines metropolitan area, a service patrol is operated by a private "Good Samaritan," Alexander "Big Boy" Motor Sports, a Des Moines commercial automobile repair center. The Des Moines area service, known as the Rescue Truck, is a pickup truck equipped with an air compressor, generator, small tools, jumper cables, a warning light bar, and rotating amber warning light, etc. The operator of the truck is trained to assist in emergencies and has first-aid training. The Rescue Truck, shown here, circulates on Des Moines area freeways, providing help to distressed motorists during the morning and afternoon peak travel periods.

Alexander Sports' privately operated Rescue Truck helps distressed motorists during peak travel periods on Des Moines area freeways.

Benefit-cost studies conducted in other metropolitan areas have documented that the benefits of service patrols greatly exceed their costs. In studies for the Charlotte, Chicago, Denver, Hayward (California), Houston, Los Angeles, and Minneapolis-St. Paul metropolitan areas and for the Ontario provincial emergency patrol, benefit-to-cost ratios ranged from 2.3-to-1 to 36-to-1. All of these studies included the savings accrued by swiftly clearing incidents and reducing delays caused by incidents.

In the Des Moines area similar benefits can be expected through a service patrol and are being accrued through the existing privately operated service patrol. Given the size of the Des Moines metropolitan area, the optimal number of service patrol vehicles operating during the morning and afternoon traffic peak periods is probably two.

The Rescue Truck is a very popular and positive charitable activity conducted by a private organization. Further, the spirit that started the service should be encouraged. However, the Rescue Truck is providing service generally reserved for enforcement officers (e.g., pushing vehicles off of the right-of-way and routinely directing traffic in and around incident sites).

The study team recommends that a legal opinion be developed to institutionalize the relationship between private service patrols and public offices and to promote a strong and formal working relationship between them.

In the long run, and once a Transportation Management Center (TMC) is established in Des Moines, a more direct linkage between private philanthropic activities and traffic management activities should be established. For example, a relationship should be established between the TMC and private service patrol providers regarding operating procedures, communications, and responding to the TMC's directions. Therefore, a private-public partnership is recommended between public traffic management stakeholders and private service patrol operators.

Specific Service Patrol Recommendations

The study group recommends the following actions regarding service patrols:

- Develop a legal opinion regarding the legal framework for operating private service patrols.
- Develop a memorandum of agreement between private service patrol operators and public agencies establishing operating procedures and relationships.

PUBLIC TRANSPORTATION SYSTEM

Two diverse ITS functions are recommended for the enhancement of public transportation services in the Des Moines metropolitan area. One function is traffic signal prioritization at traffic signals in the downtown area of Des Moines, and the second function is to allow passengers to pay for transit services using magnetic strip cards instead of cash (coins and bills).

Traffic Signal Prioritization for Buses

Traditionally traffic signals change from green to yellow to red in each direction following a schedule, known as a timing plan. Starting at one approach to an intersection, the time from when the signal shows green through the time taken to show green for all other approaches to the intersection and back to green at the starting approach is known as a cycle. Traditional traffic signal timing plans are often flexible enough to include or exclude a traffic movement in a cycle. For example, if there are no cars in a left-hand turn bay, the time available for left-turn movements will not be used by signaling a left-turn arrow; instead, through traffic on the same approach may then receive more green time.

Modern, intelligent signals have surpassed traditional traffic signals and have the intelligence to adapt their timing plans in real time to better accommodate current traffic conditions. The ability to make real-time adjustments to traffic signal timing plans can be used to expedite the flow of buses through an intersection.

Traffic signal timing plans can be adjusted by an approaching vehicle by two methods, preemption and prioritization. The first method is to preempt the normal timing plan and provide a green signal in the direction the vehicle is traveling. This is usually done during emergencies for police cars, fire trucks, and ambulances, the idea being that during an emergency all traffic can be interrupted to provide unimpeded travel by the emergency vehicle. In the City of Des Moines as well as other cities in central Iowa, traffic signals are preempted in emergency conditions. Signals requesting preemption are sent to the traffic signal from a roof-mounted emitter on the emergency vehicle.

The second method for adjusting signals in real time is through the use of a similar roof-mounted emitter to request the traffic signal to grant priority to an approaching vehicle. A priority request may result in the traffic signal extending green time to the approaching vehicle so that it can traverse the intersection without being stopped, or it may involve borrowing green time from another approach to provide an early start for the green in the direction of the vehicle so that it is not stopped at the intersection's approach. Although the emitter on the roof of the vehicle is the same, the preemption and priority treatment at intersections are not the same.

It is more efficient to give buses priority treatment at intersections for two reasons. First, one bus during rush hour typically carries more passengers than 30 cars carry. Thus by providing buses priority, the people-moving capacity of the intersection is increased. Second, buses accelerate and decelerate more slowly than an automobile. Thus they impose a disproportionately higher delay on other vehicles in the traffic stream when they are stopped at a traffic signal. When buses have priority treatment at intersections, motorists experience less delay. Prioritizing traffic signals for buses therefore benefits both bus passengers and other motorists.

Typically, buses routed on arterial streets spend 30 percent of their run time at red traffic signals. Prioritizing traffic signals for buses normally reduces their traffic signal delays by 50 percent. As a result, if the entire route contains signals that prioritize for buses, a 15 percent reduction in travel time is expected. Although the current recommendation is to deploy signal prioritization just in downtown Des Moines, prioritization capabilities could

later be deployed throughout the metropolitan area as signal systems are upgraded. Even with prioritization granted to buses just downtown, however, a reasonable estimate of travel time savings of five minutes per bus per day for buses equipped with an emitter results in an annual travel time savings equivalent to $10,000 per bus. The $10,000 saving greatly outweighs the capital cost of the system. In other metropolitan areas, similar system prioritization has been found to be very cost beneficial. For example, evaluations conducted in 20 European cities found that travel time savings exceeded the capital costs after three to 18 months of operation.

Electronic Fare Payment

Electronic payment of bus fare is usually conducted with a card that is slid through or passed near a card reader when a passenger enters the bus. Simple card systems have a magnetic strip on one side, similar to a common credit card. At the time of the card's purchase, electronic payment cards contain a specific amount of money for fares or they allow a passenger to ride over a specific period of time (e.g., one month). This form of electronic payment acts like an electronic purse, and the customer can use the card until the amount of money or time is used.

It is recommended that initially the Metro implement a system in which the Metro vends electronic payment cards that can be used only to purchase transit services. Later, as use of electronic payment cards by transit patrons becomes widespread, the Metro should look for other services that could be purchased with the same card (e.g., parking in downtown public garages) and work with financial institutions to migrate to a card with even greater functionality. For example, a card with more functionality might be used as a credit card and an ATM card, thus allowing completely cashless commerce. Ultimately, this should lead to the use of smart cards. A smart card contains a computer chip, allowing it to carry more information than a magnetic strip card can carry and allowing calculations to be performed directly on the card itself rather then requiring a host computer to perform the calculations. One smart card can carry more information than an entire wallet of magnetic strip cards, including personal information like health records, public assistance records, driving records, etc.

To be able to process electronic payment using magnetic strip cards, the Metro will have to upgrade its fare boxes. It is feasible to upgrade most existing fare boxes; later they can be further upgraded to be compatible with smart cards.

Electronic payment has many benefits. Some of the benefits include the following:

- Customers will experience the convenience of not having to pay with cash.
- Metro will have improved ability to market transit services or travel to a particular locations (e.g., a shopping mall) through discounted fares.
- Human services agencies may more easily subsidize client transportation costs by partially or totally paying for transit fares.
- Metro will have improved passenger count accuracy by electronically recording when and where patrons pay for services.
- Metro will have improved payment security and funds management.
- Metro will have ability to eventually integrate with other forms of electronic payment and commerce.

Specific Public Transportation Recommendations

The study group recommends the following actions regarding public transportation:

- Develop traffic signal prioritization capabilities for Metro buses in downtown Des Moines, eventually migrating prioritization capabilities to signals outside of downtown.

- Adopt electronic payment system for transit services with the ability to upgrade to smart card technology in five years.

COMMERCIAL VEHICLE OPERATIONS

ITS improvements have the same positive impact on truck and bus transportation that they have on motorist traffic. For example, the ability to quickly clear incidents benefits all members of the traffic flow, including trucks and buses. Commercial vehicle operations (CVO) applications of ITS are those functions that specifically support the safer and more productive operation of motor carriers and passenger carriers. Most ITS-CVO functions are under the purview of federal and state officials. For example, one of the principal applications of ITS-CVO is to check the size and weight of trucks on the freeway mainline at freeway speeds, allowing trucks within acceptable limits to bypass weigh stations without stopping to be checked and weighed on a static scale.

Because of Des Moines' long distance from East and West Coast markets, Des Moines area shippers stand to benefit significantly from reduced shipping costs and improved motor carrier safety resulting from the implementation of ITS-CVO applications. The Des Moines Area MPO and local governments in the Des Moines metropolitan area do not have authority over ITS-CVO functions; however, they can and should encourage state and federal governments to adopt ITS-CVO applications identified in the national ITS program plan.

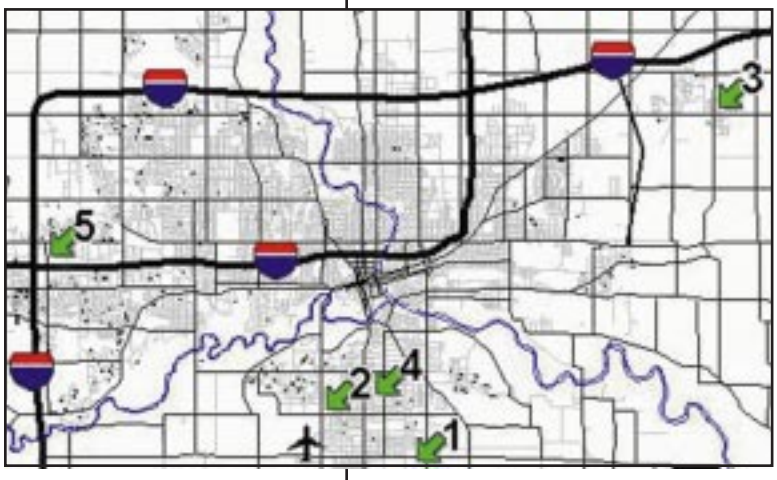
Three areas of ITS-CVO where Des Moines area agencies and organizations can contribute directly to ITS-CVO efforts are the following:

- Providing commercial traveler information to allow commercial vehicle drivers to make more informed decisions regarding travel in, around, and through the Des Moines metropolitan area.
- Developing ITS functions and services to support international trade from the Des Moines area.
- Using ITS technology to more quickly and accurately determine the characteristics of mitigation strategies for incidents involving hazardous materials.

Commercial Traveler Information

Commercial vehicle operations have been quick to adopt advanced technology. Many motor carriers have adopted automatic vehicle location systems, satellite and cellular communication systems, and computer-aided dispatching systems. Although motor carriers may have very accurate information regarding deployment of their fleets and the condition of their equipment, they may not have accurate information regarding current conditions of highways, traffic conditions, local weather forecasts, the location of local services to support the health of the driver and maintenance of the vehicle, and other driver-related amenities (e.g., the location and condition of rest areas). These types of information could be delivered to drivers and motor carriers through the Internet and, as part of the Des Moines early deployment study, a prototype Internet commercial traveler information system was constructed as a World Wide Web page.

During the early deployment study, interviews were conducted with truck service center staff members, trucking company employees, and truck operators. Through the interviews, information was collected on the myriad of unique needs of commercial vehicle operators. For example, a commercial vehicle operator traveling through central Iowa may need an emergency dental procedure and may not have time to seek out a dentist and make an appointment. As a result of the interviews, Des Moines area dentists who accept emergency walk-in patients were identified and their names and locations placed on the prototype Web page, which could be accessed from any point with Web access. Users could click on the icon for walk-in dentists and find out how to contact the dentist office. Several other types of information were included in the prototype.



Location of Des Moines-area dentists who take walk-in patients, as shown on the prototype Web page for CVOs.

It is recommended that the prototype system migrate from a prototype system to a permanent system. The permanent system could reside on the Iowa Motor Truck Association's Internet server (when it becomes available).

ITS Services to Support International Commerce

The focus of land-based international trade to and from the Des Moines metropolitan area has been on I-35. This is because I-35 is the most direct route to the Mexican border through the international port at Laredo, Texas. Roughly 40 percent of the value of all surface trade between Mexico and the United States crosses the border at one of the three Laredo area bridges. Because of the increasing importance of I-35 to international trade with Mexico, I-35 is being promoted as an international trade corridor, and the North American Superhighway Coalition (NASCo) is requesting that congress provide a special designation for the highway.

Most ITS improvements to promote trade along the corridor and to and from the Des Moines metropolitan area are largely dependent on state and federal implementation of ITS. These include electronic screening, as opposed to manual screening, of commercial carriers at border crossing facilities, and electronic screening at domestic points of inspection (weigh stations). It is recommended that Des Moines metropolitan area interests support the state of Iowa and other states in the regional adoption of national ITS plans and programs to support commercial travel along the I-35 corridor (and on all highway facilities) and federal efforts to tie together the state programs and to streamline border crossing operations.

A number of more direct actions can be taken at the metropolitan level to promote international trade in the Des Moines metropolitan area. These include developing services and facilities to support international (as well as domestic) trade at accessible locations. Such services and facilities include a location where carriers and vehicle operators can perform their compliance checks for international commerce (inspection by customs officials) and forward credentials to the border, equipment support facilities for over-the-road trucking (e.g., truck repair facilities), signal-mode and intermodal transfer facilities, warehousing, a free-trade zone with space for light-duty assembly, etc. While these improvements to attract more international trade to the Des Moines metropolitan area should be explored, very few of them depend on ITS improvements.

Hazardous Materials Response

The efficiency and effectiveness of first responders to hazardous materials spills or near spills can be greatly improved if responders know the properties of the materials involved. All hazardous materials carriers are required to

Accidents involving carriers of hazardous materials require special handling. Photo courtesy of Federal Highway Administration.

display placards on the outside of their vehicles with appropriate symbols. The purpose of the symbols is generally to warn someone approaching that hazardous materials are on board. In many cases, the placards do not provide the chemical composition data required to respond to a hazardous material spill.

The National Institute of Occupational Safety and Health (NIOSH) has supported the development of Operation Respond Emergency Information System (OREIS). Using OREIS, once a hazardous materials spill has occurred (as in the photo at left) or the potential for such a spill has developed, emergency responders identify the equipment by the carrier's vehicle number (power unit or/and trailer number) displayed on the outside of the vehicle. The vehicle number is then keyed into a personal computer running OREIS software. Using a telephone modem, the computer is linked to the carrier's computer database and extracts information regarding the composition of the load. With knowledge of the materials on board, the computer operator can then go into other databases to determine the appropriate response to mitigate the spill, and the appropriate actions are then transmitted to the first response team.

Most large railroads (including the Union Pacific) and a growing list of trucking firms participate in OREIS. The Des Moines Fire Department's Hazardous Materials Response team is the first response team for hazardous materials spills in Polk County and all surrounding counties and could subscribe to this service for less than $500.

Specific Commercial Vehicle Operations Recommendations

The study group recommends the following actions regarding commercial vehicle operations:

- Encourage the adoption of the national ITS systems architecture for commercial vehicle operations by Iowa and other states in the region.
- Migrate the prototype commercial traveler Web page to the Iowa Motor Truck Association server for maintenance and upgrading.
- Implement the Operation Respond Emergency Information System at the Des Moines Fire Department's Hazardous Materials Response team headquarters.

ITS DEPLOYMENT SUPPORT: NEW ANALYSIS MODEL RECOMMENDATIONS

Supporting decision making regarding ITS requires more sophisticated decision-making tools than those currently available to Des Moines agencies. Two computer tools are recommended for development. The first is a more precise travel demand model. The Des Moines Area MPO's current travel demand model estimates travel volumes for the entire day, and the model does not estimate the time of day trips are made. Therefore, it is recommended that the travel demand model be improved so that peak travel demand estimates can be made. The second recommendation is that a high fidelity traffic simulation model be generated for Des Moines so that designers of the reconstructed I-235 and other transportation improvements can estimate the impacts of modifications to the transportation system.

IMPLEMENTING THE PLAN

ITS can provide Des Moines area travelers and goods transporters with enhanced transportation productivity, reliability, and safety. Implementing the ITS strategic plan will require strong leadership from public and private stakeholders. Unlike improvements to physical transportation infrastructure like a new bridge, a widened roadway, a new overpass, or a new fleet of buses, ITS improvements do not provide very visible signs of improvement that the general public can see, understand, and appreciate. At the same time, ITS improvements often compete for funding with physical infrastructure. Therefore, if ITS is to be deployed, influential individuals and/or organizations must champion ITS improvements.

The Des Moines Area MPO Policy Board has formally adopted the position that the MPO will serve as champion for the deployment of ITS in the Des Moines metropolitan area. In partnership with the MPO's member governments, the Iowa DOT, and the U.S. DOT, the MPO will champion ITS deployment in the metropolitan area. To guide the deployment of the plan, the Des Moines EDS steering committee has become a standing committee and will now help steer the deployment of ITS.

Individuals or organizations with an interest in the deployment of ITS in the Des Moines metropolitan area should contact the Executive Director of the Des Moines Area MPO at the address below.

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