OMAHA METROPOLITAN AREA

ITS EARLY DEPLOYMENT PLANNING STUDY, STRATEGIC DEPLOYMENT PLAN

APPENDICES

E: DEPLOYMENT SCENARIOS F: PROJECT DESCRIPTIONS G: SUPPORT TECHNOLOGIES H: COST ESTIMATE ASSUMPTIONS

NOTE TO READER:

THIS IS A LARGE DOCUMENT

Due to its large size, this document has been segmented into multiple files. All files separate from this main document file are accessible from links (blue type) in the <u>table of contents</u> or the body of the document.

APPENDIX E

Deployment Scenarios

Table of Contents

INTRODUCTION		1
Short-Term D	Deployment Scenario	1
Medium-Tern	Deployment Scenario	2
Long-Term D	Deployment Scenario	2
PROJECT CATEGO	RIES	7
Category 1.	Signal Systems	7
Category 2.	Surveillance.	9
Category 3.	Area-wide Traffic Management and Information Center (ATMIC) and	
с .	Systems	10
Category 4.	Traveler Information Systems	12
Category 5.	Incident Management	8
Category 6.	Travel Demand Management	18
Category 7.	Deployment Support	20

List of Figures

Figure 1.	Short-Term Deployment Scenario	3
Figure 2.	Medium-Term Deployment Scenario	4
Figure 3.	Long-Term Deployment Scenario	5
Figure 4.	Combined Short, Medium and Long-Term Deployment Scenarios	6

INTRODUCTION

The analysis of ITS user services, Omaha area ITS goals and objectives, mapping of user services to goals and objectives, and preliminary listing of needs were presented in the "Applicable User Services" draft report submitted to the ITS Steering Committee on July 15, 1995.

Based on the applicable user services and needs identified throughout discussions with focus groups and various stakeholders, a series of ITS projects and programs were developed. Appendix F provides detailed descriptions of each project. Descriptions of the technologies which support the implementation of these projects are presented in Appendix G.

The ITS projects/programs are the basis for development of the "deployment scenarios. Various projects and programs are combined into deployment scenarios for the short, medium and long terms. The implementation of the projects/programs within a scenario will be best realized by a logical, incremental program approach.

The deployment scenarios have been developed for three time frames: short term, medium term, and long term. The phasing allows implementing projects/programs over time as technologies and funding become available.

- **Short-Term Deployment Scenario**-Projects and programs which can begin immediately and be implemented within five years. The short-term plan also provides infrastructure for some of the projects included in medium and long-term plans.
- **Medium-Term Deployment Scenario**-Projects and programs to be implemented within five to 10 years in the future.
- **Lang-Term Deployment Scenario**-Projects and programs to be implemented beyond ten years in the future.

Short-Term Deployment Scenario

While the full functionality of an ITS system for the Omaha metropolitan area may not be realized for several years, it is important to phase the implementation so that the benefits it provides can be realized throughout its development. The objectives in the short-term scenario projects are to apply proven, practical, and cost-effective ITS technologies to help solve current problems, demonstrate their effectiveness, and build on existing applications which have shown success, such as changeable message signs and motorist assist/emergency patrol services. In addition, a multi-modal approach, maximizing on the existing assets and public/private partnership is promoted.

Within the short-term scenario, the focus will be on priority corridors. A number of projects identified in the short-term scenario are recommended for expanded coverage in the medium and long-term scenarios such as Information Kiosks, Highway Advisory Radio (HAR), and Controller/Field Master improvements. For some projects identified in short-term scenario such as CATV and Information Kiosks, basic functions/features are recommended in the short-term scenario and advanced functions/features are recommended for implementation during medium to long-term scenarios.

Medium-Term Deployment Scenario

The medium-term deployment scenario will build upon the foundation established in the short-term scenario. This scenario will include a continuation of ATMS, incident management, ATIS and communication activities, as well as phased implementation of new activities which possess advanced ITS features. In the medium term, implementation of the TMIC will be a critical element.

Proven ATIS technologies and systems will improve traveler dissemination strategies, providing more useful information to the traveling public, and reducing response times for emergency situations. The following projects are recommended in the medium-term scenario. These projects include both new and expanded task for projects initiated in the short-term scenario.

Long-Term Deployment Scenario

ITS technologies have advanced significantly over the past few years. ITS currently is a major focus of national and international entities, even greater changes can be expected in the years ahead.

As technologies advance, new techniques concerning traffic operations and management, traveler information dissemination and incident management activities can be evaluated for inclusion within the Omaha metropolitan area. The most appropriate approaches will be incorporated as they are proven. Potential areas of activity include in-vehicle traveler information and advanced surveillance systems such as vehicle probes and machine vision. Long-term ITS projects can build on efforts started in the short-and medium-term scenarios and could also reflect technical advances over the next few years. Several projects included "demonstration phases" only during the previous scenarios. In this scenario, full-scale implementation is anticipated.

Seven different categories have been identified for ITS projects, as follows:

- 1. Signal Systems
- 2. Surveillance
- 3. Traffic Management and Information Center
- 4. Traveler Information Systems
- 5. Incident Management
- 6. Travel Demand Management
- 7. Deployment Support

Each of these categories are described below, while detailed descriptions of each project are included in Appendix F. Figures 1 through 4 represent many of the projects graphically. Figure 4 is provided to illustrate the combined short, medium and long-term scenarios presented in Figures 1, 2 and 3.



AREA ISOCOLIAN AREA ISOCOLIAN NAPA ISOCOLIAN SHORT-TERM DEPLOYMENT SCENARIO LEGEND IEGEND MARY CORRIDOR FREEWAY CITY STREET MS CMS (FREEWAY) MS CMS (FREEWAL TRALBLAZER) KIOSK	LEGEND MINIMUM PRIMARY CORRIDOR FREEWAY CITY STREET GHB CMS (FREEWAY) GHB CMS (ARTERIAL TRAILBLAZER) GHB CCTV KIOSK HAR	FIGURE 1	IOWA STATE UNIVERSITY NEBRASKA MOTOR CARRIERS ASSOCIATION
--	---	----------	--



Intersity of Nebraska Nebraska Nebraska Motor CARRIERS	CONS (ARTERIAL TRAILBLAZER) CONT KIOSK KIOSK KIOSK KIOSK KIOSK KIOSK KIOSK KIOSK KIOS	MEDIUM-TERM DEPLOYMENT SCENARIO LEGEND PRIMARY CORRIDOR FREEWAY CITY STREET CMS (FREEWAY)	MAPA	OMAHA METROPOLITAN AREA ITS
--	---	---	------	-----------------------------------



IOWA STATE UNIVERSITY NEBRASKA MOTOR CARRIERS	FIGURE 3 University of Nebraska Lincoln	ILEGEND PRIMARY CORRIDOR FREEWAY CITY STREET Image: CMS (FREEWAY) Image: CMS (FREEWAY) Image: CMS (ARTERIAL TRAILBLAZER) Image: CCTV Image: CCTV	MAPA UNL LONG-TERM DEPLOYMENT SCENARIO	OMAHA METROPOLITAN AREA ITS
---	--	--	--	-----------------------------------



IOWA STATE UNIVERSITY NEBRASKA MOTOR CARRIER
Meyer, Mohaddes Associates, Inc.
University of Nebraska Lincoln
FIGURE 4
ADAPTIVE TRAFFIC CONTROL
HAR
KIOSK .
CHE CHE (ADTEDIAL TOALI BLATED
CITY STREET
PRIMARY CORRIDOR
LEGEND
COMBINED SHORT, MEDIUM AND LONG-TERA DEPLOYMENT SCENARIOS
MAPA
NDOR
AREA ITS
OMAHA

PROJECT CATEGORIES

Category 1. Signal Systems

The focus of this project during the short-term scenario is to implement enhancement of the basic infrastructure for traffic control. During the medium-term scenario, in addition to basic infrastructure, a demonstration of adaptive control is proposed as well as advanced traffic controller demonstration. During the long-term scenario, implementation of adaptive control is proposed as well as advanced traffic control matter traffic control. In addition, significant communications are provided in accordance with the communications master plan discussed in Appendix D.

Signal Timing Plan Preparation

This process includes preparation of signal timing optimization plans, focusing on the analysis of subsystem identification and multi-jurisdictional interface along the arterial priority corridors. A number of priority and congested corridors have been identified through efforts related to existing conditions analysis for this project. This task will benefit from discussions among the TSCF members and their recommendations. In addition, special event signal timing plans will be prepared, including those related to snow/ice events, for "detour" routes related to *hazmat* incidents, and emergency evacuation routes. It is anticipated that signal timings will be prepared for approximately 300 intersections in the Omaha metropolitan area during the short-term, and 300 intersections during the medium-term scenario.

Local Traffic Controller and Detection Improvements

The controller improvements will be performed in conjunction with several activities in the short term such as signal timing improvements, multi-jurisdictional coordination, and traffic control system improvements. The controller improvements will be related to software/firmware upgrades for local controllers as well as field master controllers. It is anticipated that controller upgrade will be performed for approximately 150 locations in the Omaha metropolitan area in the short term. Although advanced controller technology will be explored and implemented beyond the short term, this task will include the study of ATC controllers and their applicability in the Omaha metropolitan area. NTCIP (National Transportation Controller/ITS Communications Protocol) should be considered as part of this task. Initial implementations of controller upgrade will focus on congested corridors such as Dodge Road/West Dodge Road and Center Street in Omaha and along the Avenue C Viaduct Project in Council Bluffs.

A related intersection improvement to be reviewed in the short term is the integrity/reliability of existing detection at congested and near congested intersections. This process is anticipated to focus on approximately 100 intersections in the short term. The detection improvements at congested intersections will complement controller improvements and will provide a foundation for traditional and advanced traffic control. Alternative techniques such as image processing should be considered at key intersections where total upgrade is necessary.

During the medium-term scenario, another 150 intersections are recommended for controller and detection upgrade.

Traffic Control Systems

In the short term, focus will be to review existing computerized traffic control hardware/software in Omaha and Council Bluffs. The feasibility of system upgrade should be investigated such as a central control system as well as opportunities for multi-workstation and installation of workstations at agencies that do not possess any systems currently. Furthermore, the systems should provide opportunities for data sharing via a Local Area Network (LAN) to share data internally and externally among agencies. Data to be shared may include traffic volume, cycle length, time-of-day signal timing plans, congestion information, among others. In addition, remote access and control opportunities should be investigated, so that system users and operators can access workstations remotely through notebook/laptop computers. Implementation of advanced traffic control systems will be in the medium-term to long-term scenarios where the next generation of the computerized signal systems will be studied.

Expanded workstations as well as remote control access enhancements, added features such as weather and air quality, detection and local traffic management centers for the Cities of Omaha and Council Bluffs are recommended.

In addition, this project includes upgrading various components of the entire signal systems in the metropolitan area such as:

- New/expanded management center
- New controllers (such as A'IC, NTCIP)
- 3rd/4th Generation traffic control
- · Fully integrated multi-jurisdictional interface

Some of these components will be implemented as demonstration projects in a smaller scale for the medium-term depending on the availability of appropriate technologies.

Adaptive Traffic Control

The predominant type of signal systems in the Omaha metropolitan area today are closed-loop systems Development of microprocessor-based signal system components both for central and field elements will likely result in additional changes to signal system operations and configurations. The nature of the ITS Architecture will be to accommodate all types of signal systems. To do this, the appropriate data for signal status and traffic flow used for signal system operations must be made available to the information network.

Fully adaptive control creates fully responsive, on-line traffic control systems. An example is SCOOT (Split, Cycle, and Offset Optimization Technique), developed by the UK Transport and Road Research Laboratory. SCOOT is demand-responsive and adjusts to the cycle time, phase splits and offsets in accordance with an on-line optimization process. SCATS (Sydney Coordination Adaptive Traffic System) provides another example of an fully traffic responsive traffic control system. It was developed by City of Sydney and is distributed by AWA Systems in North America. Some of the elements of the SCATS system are: detects vehicles by lane; adjusts splits/offsets/cycle lengths for each subsystem; internal background offset plan; and marriage/divorce (external offset plans to link adjacent subsystems).

In the medium term, implement a demonstration project along a highly congested priority corridor arterial such as West Dodge/Dodge corridor and/or West Center Road corridor, using real-time adaptive traffic

control such as SCOOT, SCATS or other techniques being developed by FHWA (RT-TRACS). The approximate boundaries for the recommended demonstration project are 132nd Street on the west, 60th Street on the east, West Dodge/Dodge corridor on the north and West Center Road/Center Street on the south. The demonstration project is anticipated to involve approximately 20 to 30 signalized intersections. Appropriate detection and surveillance systems should be integrated with this project.

In the long term, based on the success and results of the demonstration project, traffic adaptive control projects are recommended for implementation involving first the congested corridors, and then the remaining priority corridors.

Category 2. Surveillance

Installation of CCTV surveillance cameras is the primary focus of this task during the short- and mediumterm scenarios, while for the long-term scenario, an advanced surveillance and monitoring system is proposed.

This activity will focus on design and implementation of a comprehensive surveillance system that includes both freeway and arterial facilities. The primary components of the basic system will be to provide system detection (via traditional system loop detectors and/or other techniques), CCTV camera installation along freeways and priority corridor arterials, and expansion of weather related detection. In the short term, the focus will be on provision of system detection along freeways and primary congested corridor arterials and adequate CCTV coverage.

The system detection is anticipated to provide measurements of vehicle flow rates, speed, lane occupancy, vehicle classification, and video verification of roadway traffic. In the short term, CCTV is recommended along Dodge Road/West Dodge Road, Center Street/West Center Road, I-80 and I-680 Freeways for a total of 18 locations. Figure 1. illustrates the preliminary locations for CCTV cameras.

For the medium term, implementation of remaining system detection/CCTV coverage along priority corridors are recommended for installation at 20 additional locations (Figure 2).

For the long term, it is recommended that a comprehensive surveillance and monitoring system based on "real-time" information be implemented.

There are several techniques currently being evaluated for advanced surveillance and monitoring purposes including vehicle probes and machine vision. Several technologies are being tested for vehicle probes including Automated Vehicle Identification (AVI) tags and other smart devices. Similarly, significant enhancements in machine vision techniques of image processing are being developed. Based on their results and advances in other technologies, their applicability will be investigated for implementing an advanced surveillance/monitoring system in the Omaha metropolitan area. A related element would be integration of data from these advanced technologies with the ATMIC.

Category 3. Area-wide Traffic Management and Information Center (ATMIC) and Systems

The purpose of this task is to provide a "focal point" for monitoring, processing and disseminating information to users as part of the ATMS/ATIS core infrastructure element.

The ATMIC will provide a foundation for metropolitan area-wide ITS activities and will provide a focal point for data collection, information dissemination, traffic management, and incident response activities. The ATMIC could also provide opportunities for multi-jurisdictional cooperation, education and research, and partnerships with private sector. Detailed functional requirements, hardware and software requirements, including the platform and interface standards, should be developed based on results of the "Strategic Plan".

For the short term, development of functional requirements and design are anticipated while implementation is deferred to the medium-term scenario. Although potential locations might already exist, the technical institutional issues should be investigated. Based on determination of space, staffing, and operational requirements, a location should be identified. Another issue to be evaluated should be an interim ATMIC facility. The interim facility could simply be a location dedicated to data processing and storage where various management centers would share information with each other, agreeing on the message and dissemination method.

Prepare Functional Requirements

The focus of this task will be to prepare detailed functional requirements for input/output, database, and interface requirements, as well as feasibility analysis of location, space and resource requirements (staffing as well as O&M). This activity should be coordinated with FHWA ATMS/ATIS support infrastructure requirements being prepared by Loral, as well as guidelines being finalized by FHWA as part of the "Transportation Management Center Handbook."

Prepare Design for ATMIC

The design will include PS&E for implementation of the ATMIC. Specifications for all components will be included, addressing the functional requirements as well as physical layout and hardware/software requirements.

ATMIC Implementation

During the medium term, implementation of ATMIC is recommended. This will facilitate implementation of better data fusion and data dissemination. The implementation of ATMIC is critical to the advanced traveler information system and traffic/incident management. The primary system implementation includes :

- Implementation of the designed layout for the center, including the console(s), hardware/software, and associated monitors and equipment
- "Expert system" implementation
- System integration, including full system simulation and operation, encompassing full integration of ATMS/ATIS components

The advanced traffic and incident management system will be developed over medium to long-term scenarios. It will involve concept/functional requirements analysis, design and implementation of an integrated area-wide traffic management system that provides communication and interface at local and regional level on "real-time" basis. Various elements to be considered will include:

Expert Systems

The development of an "expert system" or an interactive database would significantly enhance incident response by system operators. In the medium-term scenario, evaluation and design of an expert system is recommended as a "demonstration project" and should be closely coordinated with the ATMIC implementation. Full-scale development and implementation is recommended for the long-term scenario, which will involve preparation of database of responses and integration with the traffic control system as well as the ATMIC for information dissemination.

Integration of Freeway/Arterial Systems Along Priority Corridors

A "smart corridor" will integrate freeway and parallel arterial facilities to improve traffic operations along the corridor. The concept of "smart corridor" allows for maximizing capacity, facilitating alternate routes in event of incidents. In the medium term, a small scale demonstration project of a "smart corridor" will be implemented which includes L Street/Highway 92/Route 275 on the south, 120th Street on the west, West Center Road/Center Street on the north and 16th Street on the east (Figure 2). This will encompass integration of traffic control at signalized intersections as well as freeway facilities

In the long-term scenario, the "smart corridor" implementation will be expanded to include the area bounded by W Street in the south, 135th Street on the west, West Dodge Road/Dodge Road on the north and 16th Street on the east. Again, this will encompass integration of traffic control at signalized intersections as well as freeway facilities.

Ramp Metering

In this category, ramp metering is also included. Ramp meters consist of traffic signals on freeway onramps. The purpose of ramp metering is to control the rate at which vehicles enter the mainline freeway, such that downstream capacity is not exceeded. In turn, this allows the freeway to carry an increased volume at higher speeds. Another benefit of ramp metering is its ability to break up platoons of vehicles that have been released from a nearby intersection. The mainline, even when operating near capacity, can accommodate merging vehicles one or two at a time. However, when groups (i.e., queues) of vehicles attempt to force their way into freeway traffic, turbulence and shockwaves are created, causing the mainline flow to breakdown

In essence, ramp metering redistributes the freeway demand over time-storing any excess demand on the ramps, instead of on the freeway in the form of stop-and-go traffic. While this mode of control is used primarily to reduce the impacts of recurring congestion during peak traffic periods, ramp metering can also be implemented to combat incident-related congestion. For example, meters upstream of the incident area would operate at low metering rates, limited the number of vehicles entering the freeway. Using surface-street CMS and other driver information devices, entering vehicles would be diverted to on-ramps downstream of the incident. These downstream on-ramps would operate with relaxed metering rates (or no metering) in order to handle the increased demand.

Control modes can range from pre-timed (i.e., fixed release rates based on a pre-set schedule) to local traffic responsive (i.e., rate is calculated in response to traffic flows for adjoining mainline detectors) to system-wide control, which looks at an entire corridor and provides more equitable metering rates across the corridor. Use of the latter mode assures that no one meter is unduly restrictive (this mitigates potential queues which back into the surface street).

In the medium term, focus will be,on following activities:

- Evaluate needs. and identify locations
- · Functional/communication requirements (time-of-day/dynamic)
- Design and implementation for 10 ramps
- Integration with ATMIC for. these locations

In the long term, implementation of ramp metering is expanded to the remaining freeway ramps in the metropolitan area, as appropriate.

Category 4. Traveler Information Systems

The purpose of this category is to provide reliable, accurate, and timely information which would assist travelers throughout the Omaha metropolitan area.

The traveler information system component of the Omaha metropolitan area ITS program is extensive and critical for the success of the ITS program. There are many activities under the traveler information system component. In the short term, the implementation of activities will be based on the **basic** infrastructure needs. The implementation of a traveler information system will occur incrementally. Various tasks are included in the short, medium and long-term scenarios.

Radio Data System (RDS)

During the short-term, this will include establishing a program by which the following elements could be accomplished:

- "Traffic Information Group" consisting of broadcasters/traffic engineers and others to educate and exchange ideas with broadcasters on traffic management.
- Develop a basic procedure for information flow between the agencies and broadcasters to enhance the accuracy and reliability of the information.
- Continue existing radio traffic information services and implement upgrades required such as enhanced communication links.

The traveler information system activities will continue in the medium term with expanded coverage for some elements and implementation of advanced features for some activities.

The Radio Data System (RDS) is a subcarrier system which provides a silent data channel on existing FM radio programs, and has recently been approved as a North American broadcast standard. The objective of this activity will be to use this digital facility to provide an efficient way of conveying travel

information to the public. In turn, this will support sensible route and mode choice, and avoidance of congested or hazardous areas.

The implementation of a digital radio traffic information system is seen as a key ATIS element of ITS in the Omaha metropolitan area. At a relatively simple level, such systems can identify stations that provide traffic updates, turn up the volume when a message is being broadcast, or return the radio to receive the traffic message. These features help to increase the number of travelers that receive and act on the information. Even greater benefits may be realized through the implementation of fully digital trafficmessages. More specifically, this approach can convey a much larger volume of data digitally than spoken messages. In the medium term, an advanced digital RDS will be designed and implemented as a "demonstration project" at a smaller scale. The implementation of digital RDS is largely dependent on private vendor participation. Full-scale implementation is deferred to the long-term deployment scenario.

This approach can convey a larger volume of data than spoken messages, and the information can be recreated from its digital form in the language of the traveler's choice.

Highway Advisory Radio (HAR)

HAR is a proven and available method for dissemination of traveler information. This activity will focus on efforts to provide methods of broadcasting traffic information via HAR services in the Omaha metropolitan area. HAR service can be used to broadcast recorded messages concerning activities such as construction work and road closures. In addition, HAR can be used to advise truckers and other interstate travelers of conditions in the Omaha area. There are two types of HAR proposed for the Omaha area: "regular" (10 watt) along freeways; and "low power" (0.1 watt) along primary corridor arterials.

HAR facilities can be built rapidly onto the existing system. This will provide a valuable outlet for broadcasting data collected at the traffic management center, prior to the implementation of more advanced digital ATIS services. In the short term, the focus will be on congested corridors such as Dodge Road/West Dodge Road, Center Street/West Center Road, I-80, I-680 Freeways and North Expressway. For the short term, 8 low-power and 2 regular HAR's have been recommended (Figure 1). Communications links, voice message recording, system design, associated signing, and implementation are also included in this task. The low-power HAR's will be designed to be interconnected to form a zone. This interconnection of HAR's along with proper equipment and signing allows for synchronization of messages to achieve optimum effectiveness.

In the medium term, HAR implementation is expanded to include remaining priority corridors. In the medium-term scenario, approximately 13 low-power and 2 regular HAR's have been recommended (Figure 2). Other tasks include identification of functional requirements for real-time message generation and development of operational procedures for real-time message generation, verification and updating. A smaller demonstration project involving five HAR's is recommended for real-time message generation and sign activation.

In the long term, HAR implementation is expanded to include future priority corridors of the Omaha metropolitan area. In the long-term scenario, approximately nine low-power HAR's are recommended. In addition, region-wide implementation of real-time message generation and sign activation is recommended. (Figure 3 illustrates the HAR's for the long-term scenario.)

Changeable Message Signs (CMS)

CMS offers a valuable technique to provide motorists with real-time traffic information and, if desired, alternate route selection advisories in advance of key decision points along the freeways and along primary corridor arterials. This activity represents an important element of the ATIS component of the Omaha ITS Master Plan. CMS can provide timely, accurate and reliable information to motorists when installed at critical locations. This can be achieved without the need for special, in-vehicle equipment. Therefore, CMS is particularly valuable for the initial phases of the ATMIC operation.

This activity will focus on both freeway and primary corridor arterials. For arterials, smaller units of CMS, referred to as "Trailblazer", are proposed. The implementation program will consider any portable CMS units currently being used. Activities recommended in the short-term scenario are listed below:

- Design and implement CMS along the freeway in conjunction with the surveillance (CCTV) projects. In the short term, focus will be along I-80 between 1-680/L & Q Streets and Kennedy Expressway and along I-680 north of I-80 up to Highway 64 (Maple Street) with 10 CMS installations (Figure 1).
- Design and implement Trailblazers along primary corridor/congested arterials including Center Street/West Center Road, Dodge Road/West Dodge Road, and 72nd Street with approximately 11 installations (Figure 1).
- Prepare a comprehensive message library which will be disseminated through CMS, assisting travelers during congestion and incidents.

During the medium term, CMS implementation is expanded to include remaining priority corridors. Four regular CMS and 14 Trailblazer installations are recommended (Figure 2). In addition, real-time message generation and route guidance messages via "expert systems" are recommended at a demonstration level.

In the long-term scenario, CMS implementation is expanded to include future priority corridors. Four additional regular CMS and 10 Trailblazer installations are recommended. In addition, real-time message generation and route guidance messages via "expert systems" are recommended for implementation regionwide.

CATV

This activity will design and implement a television-based information service for the Omaha metropolitan area. Review of this information by travelers will be possible through a teletext service and a dedicated cable television channel. The cable channel will present a color-coded map of traffic speeds on the entire freeway system, and potentially priority corridor arterials, in a format suitable for relay into homes in the Omaha metropolitan area. Implementation of a television-based traffic information system is seen as important to the overall success of the ATIS component of ITS in the Omaha metropolitan area. This type of service will assist motorists in their pre-trip planning efforts, allowing them to make more informed choices. In the short-term scenario, a dedicated cable television channel could be implemented. Activities recommended for this project are listed below:

• Provide enhanced system detection throughout the priority corridors, including design and implementation of approximately 30 new system loops.

- This task should be closely coordinated with the surveillance project, since data generated by system detectors would provide a database for generating color coded congestion graphics.
- Prepare a comprehensive database of speed data collected from system detectors throughout the region.
- Develop (purchase, if current graphic technologies are satisfactory) graphics illustrating the congestion along various sections of the freeways/arterials. In the short term, the information to be displayed will be limited to priority corridors.
- Establish a relationship with private/public television entities to broadcast congestion levels.
- Design and implement communications link between the database and broadcasting entities.

An expanded coverage of the system and advanced features will be implemented in the medium and long term.

During the medium-term scenario, the CATV information system will be enhanced to provide some advanced features. Two enhancements are anticipated for CATV based information system: a) the congestion related graphical display for the CATV will include a picture inset window capable of broadcasting live images of major incidents from the proposed CCTV camera system and b) A new teletext service will supplement the cable channel, offering a number of pages of traffic information, selectable by area or information type. The teletext service is an interactive service in that depending on geographic locations, messages could be targeted to provide information relevant to specific geographic areas. The teletext service will be implemented as a demonstration project in the medium-term scenario.

In, the long-term scenario, the offering of interactive teletext service will be expanded.

Information Kiosks/Videotex Systems

This service will ultimately offer traffic and traveler information, weather conditions, transit service inquiries and route planning facilities to the residents. A videotex system comprises a dedicated computer and video terminals linked to the ATMIC or an interim data processing center via telephone lines. This type of service will provide travelers with a reliable source of pre-trip traffic and traveler information at a number of strategic locations. Receipt of this data will allow travelers to make optimal decisions with regard to travel route, time and mode.

In the short term, the system will be a semi-interactive system with limited traffic congestion information and the implementation will be limited to the top 12 major activity centers in the Omaha metropolitan area. However, similar to the CATV information system, the data generated by system detectors will be used in generating graphics for display on video monitors. A number of private entities are in the process of introducing commercial videotex services. Therefore, emphasis in this project will be placed on providing consistent travel data from the ATMIC through an interface to these systems.

Components of this task include:

- locations evaluation, functional requirements relative to congestion, route location, transit facilities, transportation centers as well as other activities
- feasibility of private sector involvement
- information database, graphical displays
- communication links
- system implementation

This service will be expanded during the medium term to add 20 new locations (Figure 2). In addition, enhancements to the basic information system will be provided. The enhancements anticipated include two-way communications between the information kiosks and the traveler information database, interactive information access, and expanded information base including weather conditions, transit service enquiries, multi-modal travel options and route planning facilities to the residents. The expanded capabilities can initially be implemented for the 10 kiosks recommended in the short-term scenario. Based on private vendor participation, the information base on the interactive kiosks will be expanded to include traveler services such as interactive "yellow pages", which would provide convenient directions to tourist and recreational attractions.

The expansion during the long-term scenario will add 21 new locations. In addition, interactive capabilities will be added to remaining information kiosks as well as the interactive "yellow pages" information base.

Computer Bulletin Board Systems (BBS)/Internet

This activity will design and implement a computer-based information service for the Omaha metropolitan area. Review of this information by travelers will be possible through a dedicated computer bulletin board service (BBS) and information provided on the Internet.

The information provided initially could be a color-coded speed map of the primary corridor freeway/arterial system. In addition, future expansion of the system can offer interactive service providing additional information to travelers. Implementation of such a system is seen as a useful component to the overall success of the ATIS program for the Omaha area, considering the growth of personal computer usage in recent years. The BBS system would consist of dedicated computer(s), modem(s), phone lines(s) and communications links to the ATMIC (interim data processing center) via telephone lines. The graphical display of the freeway/arterial system congestions status will be available on the Internet at a specific site. The availability of BBS and the "Internet Site" will be publicized.

In the short term, semi-interactive traffic congestion display information can be provided. Some of the tasks relevant to this project include:

- Provide communications links and graphical displays (similar to information kiosks) for congestion and incident information on Internet.
- Evaluate opportunities for public/private BBS relationships, including HuskerNet, Free-Net, MidNet, and others.

Based on advances anticipated in personal computing technology and communication technologies, advanced interactive displays and enhanced information database will be provided in the medium-term scenario. The enhancements will be similar to those provided with information kiosks.

In-Vehicle Traveler Information

This project is recommended for the long-term scenario. In-vehicle traveler information has two main components: a) electronic road signage and b) dynamic route guidance. The electronic road signage involves increasing driver awareness of road signs and overall highway safety via display of in-vehicle images replicating road signs. The primary components of an electronic signage system include liquid crystal, CRT, head-up displays, infrared and microwave road-to-vehicle communication devices. This system would support both static and dynamic road signs (real time VMS units), communicating the information to the in-vehicle display unit. The approach would be particularly beneficial during conditions of poor visibility, when drivers might otherwise be unable to see signs at the roadside.

Dynamic route guidance systems offer the potential to optimize individual route planning applications both pre-trip and en-route. In addition, in-vehicle systems can be used as traffic information collection sources or probes. Technical considerations of such a system include in-vehicle navigation system, communications system architecture and interface capabilities with the proposed Omaha area ATMIC. Significant private sector involvement is anticipated for development of route guidance systems.

In the long-term scenario, in-vehicle traveler information system comprising of electronic road signage and dynamic route guidance are anticipated for implementation in the Omaha metropolitan area.

Highway Advisory Telephone (HAT)

This provides access to up-to-the-minute traffic conditions in the form of dial-up voice messages. New systems such as Voice Response Systems (VRS) can handle many simultaneous calls and provide real-time interface to the host database. The VRS uses digitized speech and has capabilities to monitor and log operations as well. In the short term, functional requirements of a such a system will be determined. A review of technologies will be performed to identify appropriate technology for implementation. A "lead agency" should be identified, providing the service. Public/private partnerships should be addressed especially for dissemination of information.

The implementation of a Voice Response Systems (VRS) based HAT is recommended in the medium term. These new systems can handle many simultaneous calls and provide a real-time interface to the host database.

Transit Vehicle Status Monitoring

The activity which is recommended for the medium-term scenario involves providing real-time monitoring of transit and emergency vehicles using Automated Vehicle Locator (AVL) technologies. AVL technologies include Global Positioning System (GPS), Loran C, and Radio Multi-lateration. For example, GPS receivers receive microwave radio signals from several satellites, from which it calculates the location based on radio triangulation. The location information developed can be made available via either information kiosks/videotex and/or audiotex. Videotex has been described earlier; however, audiotex information system provides real-time information via a touchtone telephone access system. Prior to interactive videotex information systems, information can be provided to customers with manual responses supported by computer data retrieval. Subsequently, enhancements can be made, where a single telephone number will be introduced for audiotex service. It is anticipated that a demonstration project will be conducted prior to full-scale implementation.

Category 5. Incident Management

In the short term, the following activities will be focused upon as part of incident management efforts:

- Improve the emergency vehicle access along the priority corridors
- Implement a "dedicated" freeway service patrol (this activity will continue for the mediumand long-term scenarios as well)
- Implement appropriate "reference markers" along the priority corridors for better identification of incident location
- Prepare a comprehensive personnel resource list as well as identification of resources such as fire hydrant location, material removal equipment, etc.
- Establish administrative traffic (incident) management teams including appropriate representatives of the responsible agencies.

In addition, the following activities will begin in the short term and continue into the medium term and long term:

- Incident management team support
- Prepare an "incident response manual"
- Conduct ongoing personnel training programs

In the medium-term scenario, the following activities will be focused upon as part of incident management efforts. Some of the efforts are continuation of activities in the short-term scenario.

- Revise the "Incident Response Manual"
- Identify and prepare equipment storage sites
- Conduct ongoing personnel training programs
- Implement accident investigation sites.

Category 6. Travel Demand Management

The purpose of this task to continue on implementation of existing travel demand management programs and creating new programs for efficient use of transportation facilities.

The travel demand management (TDM) is an extensive and critical task for reducing traffic congestion in the Omaha metropolitan area. The gamut of activities under TDM require implementation phasing to be spread from short term to long term. For the short term, the focus is recommended to be on the following activities:

- Promote land use/transportation integration policies
- Continue promoting variable work hours
- Promote rideshare management. A basic approach would be to develop a computer database in conjunction with "telephone call-in".

- Continue on development of the "reversible lane" concept for directional congestion reduction
- Study feasibility of park-and-ride facilities
- Continue the existing traffic operations monitoring program to study selected locations such as airports, major shopping centers, large employment centers (such as the top 10 activity centers) to continually monitor the traffic operations and efficiency of travel. Ground access improvements will be continued in to the medium and long term to include the top 50 activity centers in the Omaha metropolitan area.

All ITS projects should be coordinated with the existing MAPA construction and improvement program to incorporate the regional communications and ITS infrastructure needs with the construction program.

The travel demand management (TDM) activities are envisioned as on-going activities. In addition to continuation of activities began in the short term, the focus during the medium term is anticipated to be on the following activities:

- Continue on development of the "reversible lane" concept for directional congestion reduction
- Perform demonstration of "smart transit" in approximately two low-density areas of the Omaha metropolitan area
- Evaluate the need for HOV facilities along Priority Corridors initially focusing on freeways such as I-80 and I-680.
- Continue the existing traffic operations monitoring program for ground access improvements at major activity centers to study selected locations such as airports, major shopping centers, large employment centers. In the medium term, focus of improvements will be expanded to the top 30 activity centers.
- Implement approximately five park-and-ride facilities based on the results of the feasibility study performed during the short-term scenario

For the long term, the primary TDM activities will include the following:

- HOV-Design and implement any HOV facilities as appropriate. At this time, HOV facilities are not needed in the Omaha metropolitan area. However, a needs assessment was recommended for the medium-term scenario. If that assessment reveals the need, then in the long-term scenario, design and implementation of HOV facilities will be considered.
- Demand management support
- Park-and-Ride implementation (five additional sites)
- Smart transit implementation based on results of the demonstration project

Smart Cards for Transit Fare Payment

This activity, which is recommended for the medium-term scenario, involves the design, deployment and evaluation of a smart card system for transit fare payment. Smart cards will allow regular passengers to use transit services without having to pay cash or purchase travel permits. This will enhance convenience for transit users, reduce delays associated with the fare collection process, and offer financial control for the transit operator. It provides a timely service to its passengers and provides the transit operator with data from the smart cards to assess demand and ridership trends to facilitate maintenance of optimum number of transit vehicles.

This activity involves assessment of products from various vendors, development of specifications for the system, system design and implementation. The system should be implemented as a demonstration Participation of the private sector is recommended.

Category 7. Deployment Support

Several programs are proposed in this category which, by and large, continue through the entire short-, medium-, and long-term scenarios.

Signal Coordination Forum

Establish a multi-jurisdictional Traffic Signal Coordination Forum (TSCF) that regularly meets and discusses the multi-jurisdictional issues. Such an activity currently exists to some extent. This task suggests a more comprehensive approach. This committee will provide input to the signal timing development process in the short term as well assist in identification of potential traffic congestion bottlenecks and traffic signal controller equipment modifications. The TSCF should oversee the implementation of improvements that have been identified for short term and beyond. These activities should be coordinated and fully integrated with the overall advanced traffic and incident management system.

Public/Private Partnerships Program

Public/private partnerships are viewed as being essential for the successful wide-area implementation of a number of ATIS components including Information Kiosks/Videotex Systems, CATV information systems, and Bulletin Board services. These partnerships are especially important for implementation of advanced features/technologies. In the short term, establish a committee/focus group to educate, evaluate, encourage and implement public/private partnerships for information dissemination.

Education Program

A series of education programs covering a variety of aspects of ITS activities are recommended to be developed. The implementation of educational programs should be started early, is anticipated to be an on-going process, and will be implemented throughout all scenarios. Education programs may be related to issues such as incident management, travel demand management programs, traffic safety, and advanced technologies in transportation. The activities recommended include the following:

- Develop education materials (brochures, newspaper articles, teaching/training sessions), **CD**-ROMs, etc, and make available to various stakeholders and traveling public.
- Participate in community events/meet with community groups
- Disseminate information on Internet, computer bulletin boards
- Conduct seminars
- Conduct tours of traffic management facilities

Intermodal Coordination Program

-

Inter-modal coordination is essential for minimizing delay region-wide, to improve traffic operations, and to utilize existing resources efficiently. The following intermodal coordination activities are recommended to occur in the short term:

- Formulate a committee consisting of representatives from highway, air, transit, rail, etc. and evaluate/identify potential improvements in planning, design, operation and maintenance of facilities.
 - Focus on the following primary improvements.
 "Non motorized systems" (pedestrians and bicycle facilities)
 Develop a database and datasharing of alternate modes of travel for TDM purposes
 Establish an inter-modal interface program focusing on efficient travel and goods movement

Area-Wide Signing and Striping Database

This task provides a comprehensive database of existing signing and striping of the metropolitan area which could be integrated with the "route guidance" system as well as used by engineering and operations staff at various agencies. For the short term, a database for the priority corridors is recommended for development.

This task will expand the database of signing and striping information to cover all freeways, major and secondary arterials during the medium-term scenario. The database preparation may be accelerated if there is significant participation from private vendors.

APPENDIX F

Project Descriptions

,

Table of Contents

SHORT-TERM PROJECT SUMMARY SHEETS

1. SIGNAL S	SYSTEMS	
S1.1	Signal Timing Plan Development - Phase I	1
S1.2	Local Traffic Controller and Detection Improvements - Phase I	2
S1.3	Traffic Control Systems	3
2. SURVEIL	LANCE	
S2.1	CCTV Installation-Phase I	4
3. AREA-WI	DE TRAFFIC MANAGEMENT AND INFORMATION CENTER (ATMIC)	
S 3.1	Functional Requirements Study	5
S3.2	Design	6
4. TRAVELE	R INFORMATION SYSTEMS	
S4.1	Radio Data System (RDS) Development	7
S4.2	Highway Advisory Radio (HAR) - Phase I	8
S4.3	Changeable Message Signs (CMS) - Phase I	9
S4.4	Cable TV System (CATV) - Phase I	10
S4.5	Kiosks/Videotex System - Phase I	11
S4.6	Internet/Computer Bulletin Board System (BBS) - Phase I	12
S4.7	Highway Advisory Telephone (HAT) - Phase I	13
5. INCIDEN	T MANAGEMENT	
S5.1	Freeway Service Patrol (FSP) - Phase I	14
S5.2	Emergency Vehicle Access	15
S5.3	Reference Markers	16
S 5.4	Incident Management Team Development	17
6. TRAVEL	DEMAND MANAGEMENT	
S6.1	Smart Transit Service Study	18
S6.2	Ride-Sharing Database	19
S6.3	Park-and-Ride Study	20
7. DEPLOY	MENT SUPPORT	
S7.1	Traffic Management Forum - Phase I	21
S7.2	Public/Private Partnerships - Phase I	22
S7.3	Education Program - Phase I	23
S7.4	Intermodal Coordination Program - Phase I	24
S7.5	Area-wide Signing and Striping Database - Phase I	25

MEDIUM-TERM PROJECT SUMMARY SHEETS

1. SIGNAL SYSTEMS	
M1.1 Signal Timing Plan Development - Phase II	26
M1.2 Local Traffic Controller and Detection Improvements - Phase II	27
M1.3 Traffic Control Systems	28
M1.4 Adaptive Traffic Control Operational Test	29
M1.5 Advanced Traffic Controller Operational Test	30
2. SURVEILLANCE	
M2.1 CCTV Installation - Phase II	31

3. AREA-WIDE TRAFFIC MANAGEMENT AND INFORMATION CENTER (ATMIC)	
M3.1 ATMIC Implementation	32
M3.2 Expert Systems Operational Test	33
M3.3 Smart Corridor Operational Test	34
M3.4 Ramp Metering -Phase I	35
4. TRAVELER INFORMATION SYSTEMS	
M4.1 Radio Data System (RDS) Operational Test	36
M4.2 Highway Advisory Radio (HAR) - Phase II	37
M4.3 Changeable Message Signs (CMS) - Phase II	38
M4.4 Cable TV System (CATV) - Phase II	39
M4.5 Kiosks/Videotex System - Phase II	40
M4.6 Internet/Computer Bulletin Board System (BBS) - Phase II	41
M4.7 Highway Advisory Telephone (HAT) - Phase II	42
M4.8 Transit Vehicle Status Monitoring Operational Test	43
5. INCIDENT MANAGEMENT	
M5.1 Freeway Service Patrol (FSP) - Phase II	44
M5.2 Accident Investigation Sites	45
M5.3 Equipment Storage Sites	46
M5.4 Incident Management Team Support - Phase II	47
6. TRAVEL DEMAND MANAGEMENT	
M6.1 HOV Needs Study	48
M6.2 Demand Management Support - Phase I	49
M6.3 Park-and-Ride Implementation - Phase I	50
M6.4 Smart Transit Service Operational Test	51
M6.5 Smart Card	52
7. DEPLOYMENT SUPPORT	
M7.1 Traffic Management Forum - Phase II	53
M7.2 Public/Private Partnerships - Phase II	54
M7.3 Education Program - Phase II	55
M7.4 Intermodal Coordination Program - Phase II	56
M7.5 Area-wide Signing and Striping Database - Phase II	57
LONG-TERM PROJECT SUMMARY SHEETS	
1. SIGNAL SYSTEMS	

L1.1 Adaptive Traffic Control Implementation	58
L1.2 Advanced Traffic Controller Implementation	59
2. SURVEILLANCE	
L2.1 Advanced Surveillance/Monitoring System	60
3. AREA-WIDE TRAFFIC MANAGEMENT AND INFORMATION CENTER (ATMIC)	
L3.1 Expert Systems Implementation	61
L3.2 Smart Corridor Implementation	62
L3.3 Ramp Metering - Phase II	63
4. TRAVELER INFORMATION SYSTEMS	
L4.1 Radio Data System (RDS) Implementation	64
L4.2 Highway Advisory Radio (HAR) - Phase III	65
L4.3.Changeable Message Signs (CMS) - Phase III	66
L4.4 Cable TV System (CATV) - Phase III	67

L4.5 Kiosks/Videotex System - Phase III	68
L4.6 In-Vehicle Travel Information System	69
5. INCIDENT MANAGEMENT	
L5.1 Freeway Service Patrol (FSP) - Phase III	70
L5.2 Incident Management Team Support - Phase III	71
6. TRAVEL DEMAND MANAGEMENT	
L6.1 HOV Design and Implementation	72
L6.2 Demand Management Support - Phase II	73
L6.3 Park-and-Ride Implementation - Phase II	74
L6.4 Smart Transit Service Implementation	75
7. DEPLOYMENT SUPPORT	
L7.1 Traffic Management Forum - Phase III	76
L7.2 Public/Private Partnerships - Phase II	77
L7.3 Education Program - Phase III	78
L7.4 Intermodal Coordination Program - Phase III	79

PRIORITY LEVEL SHEETS

Short Term	80
Medium Term	81
Long Term	82

CATEGORY: S	Signal Systems		
PROJECT: S	1.1 Signal Timing	Plan Development - Phase I	
DESCRIPTION:	Develop signal tim signals in the prior jurisdictional inter	ing optimization plans for approximat ity corridors. Analyze subsystem ide faces along the priority corridor arteri	ely 300 traffic ntification and multi- als.
APPLICABLE USER SERVICE:	Traffic Control		
COSTS			
Study/Design	\$414,000	Additional Annual Agency	
Implementation:		Personnel/Operations:	\$73,000
Communications:		Duration	2 years
- Capital	None	No added maintenance is assumed	
- Annual Lease	None	Service Life (Years):	5
STAFFING REQUI	REMENTS: To sover a	supervise the work and implementation nd above existing staff.	n of timing plans
- Engineering Superv	r isor .25	- Field Supervisor	.25
- Staff Engineer	.5	- Field Technician	.5
BENEFITS			
Annual User Benefits:	\$16,000,000	Benefit/Cost Ratio: 89	
Other:			
FUNDING SOURCE	ES: CMAQ), NHS through State DOT	
PUBLIC/PRIVATE	PARTNERSHIP:	Not common for this project.	
INSTITUTIONAL	CONSIDERATION	S: Cycle length, time-of-day plan a be discussed at the signal coordina all jurisdictions involved.	and end times are to tion forums among
COMMENTS:	Important project,	since the benefit is high and noticeabl	e by users.

CATEGORY:	Signal Systems				
PROJECT :	S1.2 Local Traffic C	Controller and Detection Improvements	- Phase I 🛛 👔		
DESCRIPTION:	DESCRIPTION: Upgrade traffic controllers at approximately 150 intersections in the priority corridors. Upgrade detection at approximately 100 intersections in the priority corridors.				
APPLICABLE WSER SERVICE:	Traffic Control				
COSTS:					
Study/Design	\$483,000	Additional Annual Agency Personnel:	None		
Implementation: Communications:	\$4,428,000	Annual Operations & Maintenance:	None		
- Capital	None	Service Life (Years):	10		
- Annual Lease	None				
STAFFING REQU	J IREMENTS: It is staff	assumed that this project does not require ing.	any added		
BENEFITS Annual User Benefits: \$3,000,000 Benefit/Cost Ratio: 3.8 Other:					
FUNDING SOURCES: CMAQ, STP, NHS					
PUBLIC/PRIVATE PARTNERSHIP: Not common for this project.					
INSTITUTIONAL CONSIDERATIONS: None.					
COMMENTS: This project is important since it provides the infrastructure for efficient and reliable traffic signal operation.					

CATEGORY: Signal Systems

PROJECT: S1.3 Traffic Control Systems

DESCRIPTION:	Review existing computerized traffic control hardware in Omaha and Council Bluffs and investigate the feasibility of traffic control system upgrade. Install communications for data sharing via local area network within and among agencies.			
APPLICABLE USER SERVICE:	Traffic Control			
COSTS				
Study/Design	\$127,000	Additional Annual Agency Personnel:	\$177,000	
Implementation:	\$670,000	Duration:	5 years	
Communications:		Annual Operations & Maintenance:	\$40,000	
- Staffing/Design - Capital - Annual Lease	\$234,000 \$2,125,000 None	(for the centers only) Duration: Service Life (Years):	5 years 10	
STAFFING REQUIREMENTS It is assumed that Council Bluffs requires 35% of the staffing and Omaha will require 65%.				
- Engineering Supervi	sor .38	- Field Supervisor .3	8	
-Staff Engineer	1.5	- Field Technician 1.	5	
BENEFITS				
Annual User Benefits:	\$3,000,000	Benefit/Cost Ratio: 4.8		
Other:				
FUNDING SOURCES: STP, CMAQ				
PUBLIC/PRIVATE PARTNERSHIP: Not common for this project, although for communications there might be an opportunity to share the cost with other interested parties, such as other public agencies and/or private entities.				
INSTITUTIONAL CONSIDERATIONS: LAN configuration and protocols between agencies should be discussed. In addition, the project implementation should be discussed as to whether an agency should lead it or separate agencies would implement their own.				
COMMENTS: The communications and system upgrade is very important as it provides the infrastructure for many other improvements.				

1

CATEGORY: Surveillance

PROJECT: S2.1 CCTV Installation - Phase I

DESCRIPTION:	Install CCTV cameras along freeways and congested arterials in the priority corridors at approximately 18 locations.			
APPLICABLE USER SERVICE:	Traffic Control, Incident Management			
COSTS				
Study/Design	\$ 98,000 A	nnual Operations & Maintenance:	\$72,000	
Implementation:	\$911,000			
Communications:				
- Capital	None S	Service Life (Years):	20	
- Annual Lease	\$ 60,000			
STAFFING REQUI	REMENTS: No addi	tional stafftng assumed.		
BENEFITS				
Annual User Benejits:	\$1,500,000	Benefit/Cost Ratio: 6		
Other:				
FUNDING SOURCE	S: CMAQ STP,IV	HS Act		
PUBLIC/PRIVATE PARTNERSHIP: Possible opportunity subject to institutional considerations.				
INSTITUTIONAL CONSIDERATIONS: The privacy issue should be discussed as well as opportunities for public/private partnerships for other public or private interested parties to access the view.				
COMMENTS:	Important and basic e verification of acciden significantly.	element in surveillance capabilities. ts and incidents will reduce the resp	Visual onse time	

N

Area-wide Traffic Management and Information Center (ATMIC) CATEGORY : **PROJECT:** S3.1 Functional Requirements Study

PROJECT:	S3.1 Functional Requirements Study
DESCRIPTION:	Define detailed requirements for input/output, database, and interface

	functions at ATM space, and resour maintenance.	rce requirements, such as staffing, operations, and
APPLICABLE USER SERVICE:	En-Route Driver Information, Pub Information	Information, Route Guidance, Traffic Control, Pre-Trip lic Transportation Management, En-Route Transit
COSTS		
Study/Design	\$69,000	Additional Annual Agency Personnel: None
Implementation:	None	Annual Operations & Maintenance: None
Communications:	None	This is a study only
- Annual Lease	None	i ms is a study omy.
STAFFING REQUI No additional staffing	REMENTS: grequired.	
BENEFITS		
Annual User Benefits		Benefit/Cost Ratio:
Other:	ATMIC pro for data col managemen	ovides foundation for area-wide ITS activities and focal point lection, information dissemination, and traffic and incident t.
FUNDING SOURC	ES: STP, CM	AQ
PUBLIC/PRIVATE PARTNERSHIP:	During the co the media, sh	ourse of the study, possible role for private entities, such as ould be identified which may lead to subsequent partnerships
INSTITUTIONAL	The function	al requirements study should be performed to include

INSTITUTIONAL CONSIDERATIONS:	staffing, lead agency, and operating/maintaining agency are discussed. Potential lead agencies at this time could be the City of Omaha or NDOR.
COMMENTS:	The study does not obligate the agencies to proceed with a center. It provides an insight as to whether it is needed.

CATEGORY: Area-wide Traffic Management and Information Center (ATMIC)

PROJECT: S3.2 Design

DESCRIPTION:	Design ATMIC, including PS&E for implementation. Specifications for all components will be included, addressing the functional requirements and physical layout and hardware/software.		
APPLICABLE USER SERVICE:	En-Route Driver Information, Route Guidance, Traffic Control, Pre-Trip Information, Public Transportation Management, En-Route Transit Information		
COSTS			
Study/Design	\$250,000	Additional Annual Agency Personnel:	\$24,000
Implementation:	None	Duration:	11/2 yrs.
Communications:		Annual Operations & Maintenance:	None
- Capital	None	This is design only.	
- Annual Lease	None		
STAFFING REQU	IREMENTS: This ir	ncludes involvement during the design p	rocess,
- Engineering Super	visor .1	- Field Supervisor .1	
- Staff Engineer	.25	- Field Technician	
BENEFITS:	<u> </u>		<u> </u>
Annual User Benefits	:	Benefit/Cost Ratio:	
Other:	ATMIC provides foundation for area-wide ITS activities and focal point for data collection, information dissemination, and traffic and incident management.		
FUNDING SOURC	ES: STP, CMAQ		
PUBLIC/PRIVATE PARTNERSHIP:		Potential private entities such as the media should be involved during the design phase.	
INSTITUTIONAL	CONSIDERATIONS:	Requires a lead agency to supervise the design. In addition, all agencies private entities involved should prove during the design process.	se and coordinat as well as ide input
COMMENTS:			

CATEGORY: Traveler Information Systems

PROJECT: S4.1 Radio Data System (RDS) Development

DESCRIPTION:	Initiate development of RDS by: (1) forming a "Traffic Information Group" composed of representatives of broadcast media, emergency response services, and roadway agencies to educate and exchange ideas on traffic management; (2) develop basic procedure for information flow between agencies and broadcasters; and (3) upgrade communications links.				
APPLICABLE USER SERVICE:	En-Route Driver Information, Route Guidance, Incident Management, Pre- Trip Information				
COSTS					
Study/Design	\$23,000	Additional Annual Agency Personnel:	None		
Implementation:	None	Annual Operations & Maintenance:	None		
Communications:					
- Capital	None	Service Life (Years):	5		
- Annual Lease	None				
- Engineering Supervi - Staff Engineer	- Engineering Supervisor - Field Supervisor - Staff Engineer - Field Technician				
BENEFITS			,		
Annual User Benejits:	\$480,000	Benefit/Cost Ratio: 80			
Other:	4				
FUNDING SOURCES	: IVHS Act				
PUBLIC/PRIVATE PA	ARTNERSHIP:	Strong possibility with media and/or entities in information dissemination	other private industry.		
INSTITUTIONAL CONSIDERATIONS:	Discussion among agencies are required for consistency and accuracy of information. In addition, the type of arrangement with media and/or other private entities should carefully be looked at.				
COMMENTS:	Very cost-effective approach to inform users.				

CATEGORY: Traveler Information Systems

PROJECT: S4.2 Highway Advisory Radio (HAR) - Phase I

DESCRIPTION:	Install two lo-watt and eight 0.1 watt HAR units serving the higher volume roadways in the priority corridors, including the I-80/680/480 freeways, Dodge Street/West Dodge Road, and Center Street/West Center Road. Communications links, voice message recordings, system design, associated signing, and implementation are included.			
APPLICABLE USER SERVICE:	En-Route Driv	En-Route Driver Information, Route Guidance, Incident Management		
COSTS:				
Study/Design	\$92,000	Additional Annual Agency Personnel:	(\$29,000 first 3 years and implementation, then 25% - \$7,000)	
Implementation:	\$240,000	Annual Operations & Maintenance:	\$5,000	
Communications:				
- Capital	None	Service Life (Years):	20	
- Annual Lease	\$24,000			
STAFFING REQUIR	EMENTS:			
- Engineering Superv	isor .1	- Field Supe	rvisor .1	
- Staff Engineer	.2 - Field Technician .2			
BENEFITS				
Annual User Benefits:	\$480,000	Benefit/Cost Ratio: 5.9		
Other:				
FUNDING SOURCES	S: STP, CM	AQ		
PUBLIC/PRIVATE PARTNERSIHP: Strong possibility with private entities interested in disseminating traveler information.				
INSTITUTIONAL CONSIDERATIONS: Credibility of the information is at stake in terms of information accuracy, timeliness, and applicability.				
COMMENTS: This project's effectiveness will be enhanced when followed by Phase II and III. It increases route diversion, reducing traffic demand and recovery times at congested locations.				
CATEGORY: Trav	eler Information Sy	ystems		
--	---	-------------------------------------	----------------------	--
PROJECT: S4.3	PROJECT: S4.3 Changeable Message Signs (CMS) - Phase I			
DESCRIPTION:	Design and install CMS at 10 locations on freeways and 11 locations on arterials in the priority corridors, including preparation of a comprehensive "message" program.			
APPLICABLE USER SERVICE:	PPLICABLE En-Route Driver Information, Route Guidance, Incident Management SER SERVICE: En-Route Driver Information, Route Guidance, Incident Management			
COSTS				
Study/Design	\$ 230,000	Additional Annual Agency Personnel:	\$ 36,000	
Implementation:	\$2,593,000	Annual Operations & Maintenance:	\$100,000	
Communications:				
- Capital	None	Service Life (Years):	20	
- Annual Lease	\$50,000			
STAFFING REQUIREMENTS				
- Engineering Supervis	.2	- Field Supervisor .1		
 Staff Engineer 	.3	• Field Technician .2		
BENEFITS				
Annual User Benefits:	\$1,100,000	Benefit/Cost Ratio: 2.1		
Other:				
FUNDING SOURCES:	CMAQ, STP			
PUBLIC/PRIVATE PARTNERSHIP: Not common in this project, although CMS offers opportunity for potential advertising.				
INSTITUTIONAL CO	INSTITUTIONAL CONSIDERATIONS: Effectiveness of CMS is an issue dependent on the accuracy of the message and its timeliness.		endent on the iness.	
COMMENTS: Important since several programs are dependent upon CMS, such as incident management.				

CATEGORY: Traveler Information Systems

PROJECT: S4.4 Cable TV (CATV) System - Phase I

DESCRIPTION:	Design and implement a CATV system to provide traffic information to the metropolitan area. Phase I includes: (1) design and installation of approximately 30 system loops in the priority corridors; (2) design and installation of communications links to broadcast media; (3) development of display graphics; and (4) preparation of speed detectors.				
APPLICABLE USER SERVICE:	Incident Management, F	Pre-Trip Information			
COSTS					
Study/Design	\$ 133,000	Additional Annual Agency Personnel:	\$38,000		
Implementation:	\$1,037,000	Annual Operations & Maintenance:	\$50,000		
Communicati	Communications:				
 Study/Design 	\$ 97,000				
- Capital	\$885,000	Service Life (Years):	10		
- Annual Lease	None				
STAFFING REQU	IREMENTS				
- Engineering Supe	ervisor .1	- Field Supervisor .2			
- Staff Engineer	.2	- Field Technician .3			
BENEFITS					
Annual User Benefit	s: \$480,000	Benefit/Cost Ratio: 1.1			
Other:					
FUNDING SOURC	CES: STP, CMAQ				
PUBLIC/PRIVATE PARTNERSHIP: Strong public/private opportunity exists where a vendor provides funding in exchange with access/use of the CATV facilities.					
INSTITUTIONAL	CONSIDERATIONS:	Lead agency is required to supervise and implementation of this program.	e the design		
COMMENTS:	Increases route diver congested locations.	rsion, reducing traffic demand and recover	ery times at		

CATEGORY: Traveler Information Systems

PROJECT: S4.5 Kiosks/Videotex System - Phase I

DESCRIPTION:	Design and implement information at approxi- area. Phase I includes communication links, a	a kiosk/videotex system to provide traf mately 12 major activity centers in the design and installation of graphical dis and database.	fic metropolitan plays,
APPLICABLE USER SERVICE:	Incident Management,	Pre-Trip Information, En-Route Transi	t Information
COSTS			
Study/Design	\$41,000	Additional Annual Agency Personnel:	\$16,000
Implementation:	\$228,000	Annual Operations & Maintenance:	\$60,000
Communications:			
- Capital	None	Service Life (Years):	20
- Annual Lease	\$24,000		
STAFFING REQUIR	EMENTS		
· Engineering Superv	isor .1	- Field Supervisor	
- Staff Engineer	.2	- Field Technician	
BENEFITS			
Annual User Benefits:	\$210,000	Benefit/Cost Ratio: 1.6	
Other:			
FUNDING SOURCES	S: STP, CMAQ		
PUBLIC/PRIVATE P	ARTNERSHIP:	Strong possibility.	
INSTITUTIONAL CO	ONSIDERATIONS:	Identification of location, content of sequencing, etc. are key factors for s program.	the database, uccess of this
COMMENTS:	Increases route divers congested locations.	ion, reducing traffic demand and recover	ery times at

CATEGORY: Trav	eler Information Sy	vstems	
PROJECT: S4.6	Internet/Computer B	Sulletin Board System (BBS) - Phase	I
DESCRIPTION:	Design and implement metropolitan area. Phy graphical displays and	nt a computer-based traffic information s hase I includes the design and installation d communications links	system for the on of
	Supriour displays all		
APPLICABLE USER SERVICE:	Incident Management	t, Pre-Trip Information	
COSTS			
Study/Design Implementation	\$41,000 \$228.000	Additional Annual Agency Personnel: Annual Operations & Maintenance	\$19,000 \$25,000
Communications:		F a manifoldanoo	
- Capital	None	Service Life (Years):	5
- Annual Lease	None		
STAFFING REQUIRE	MENTS		
- Engineering Supervis	sor .1	- Field Supervisor	
- Staff Engineer	.25	- Field Technician	
BENEFITS			
Annual User Benefits:	\$210,000	Benefit/Cost Ratio: 1.8	
Other:			
FUNDING SOURCES	STP, CMAQ		
PUBLIC/PRIVATE PA	PUBLIC/PRIVATE PARTNERSHIP: Strong possibility either independently or as part of other traveler information systems projects.		tly or as part projects.
INSTITUTIONAL CO	NSIDERATIONS:	Requires lead agency for consistency coordination.	' and
COMMENTS:	Increases route divers congested locations.	sion, reducing traffic demand and recove	ery times at

PROJECT: S4.7 Highway Advisory Telephone (HAT) Study - Phase I

DESCRIPTION:	Define the functional requirements and investigate the feasibility of a HAT system to serve the metropolitan area. Study includes the identification of appropriate HAT technologies, lead agency for providing service, and private partners.		
APPLICABLE USER SERVICE:	Incident Manag	gement, Pre-Trip Information	
COSTS			
Study/Design	\$58,000	Additional Annual Agency Personnel:	\$11,000
Implementation:	None	Duration:	2 years
Communications:		Annual Operations & Maintenance:	None
- Capital	None		
- Annual Lease	None	Service Life (Years):	5
STAFFING REQUI	REMENTS		
- Engineering Supervisor .1 Field Supervisor			
- Staff Engine&	- Staff Engine & .1 - Field Technician		
BENEFITS			
Annual User Benejits		Benefit/Cost Ratio:	
Other:	Determines feasibility of HAT, which may increase traffic information dissemination and private sector involvement in ITS deployment		
FUNDING SOURCE	ES: STP, CMA	Q	
PUBLIC/PRIVATE PARTNERSHIP: Strong possibility independently or as part of other ITS projects.			
INSTITUTIONAL	CONSIDERATION	NS: Lead agency for consistency and coorequired.	ordination is
COMMENTS:	Increases route congested locat	diversion, reducing traffic demand and recoverions.	ery times at

CATEGORY: Incident Management

PROJECT: S5.1 Freeway Service Patrol (FSP) - Phase I

DESCRIPTION:	Implement a FSP to operate during weekday peak periods over approximately 20 miles of freeways in the priority corridors.		
APPLICABLE USER SERVICE:	Incident Managemen	t	
COSTS			
Study/Design	None	Additional Annual Agency Personnel:	\$75,000
Implementation:	\$200,000	Annual Operations & Maintenance:	\$100,000
Communications:	Included in O&M .4	driver @ 50% time is assumed	
		Service Life (Years):	5
STAFFING REQUIRE	EMENTS		
- Drivers	4	- Field Supervisor .1	
- Staff Engineer	.2	- Drivers .2	
BENEFITS			
Annual User Benefits:	\$970,000	Benefit/Cost Ratio: 4.2	
Other:	Very well received	l by the public.	
FUNDING SOURCES:	HES		
PUBLIC/PRIVATE PARTNERSHIP: Strong possibility to involve private tow truck companies.			
INSTITUTIONAL CO	NSIDERATIONS:	Lead agency is required for coordin addition, public education is necessa project.	ation. In ry for this
COMMENTS: Several of the existing FSP programs use private tow truck companies. This project improves public relations and reduces duration of incidents.			companies. of incidents.

CATEGORY: Incident Management

PROJECT: S5.2 Emergency Vehicle Access

DESCRIPTION:	Construct emergency vehicle access ramps at approximately five locations on the freeways in the priority corridors.		
APPLICABLE USER SERVICE:	Incident Management		
COSTS			
Study/Design	\$5,000 NDOR staff will implement this project. It is assumed that no additional staff is required.		ct. It is uired.
Implementation:	\$45,000	Annual Operations & Maintenance:	\$2,000
Communications:			
- Capital	None	Service Life (Years):	20
- Annual Lease	None		
STAFFING REQUIR - Engineering Superv - Staff Engineer	EMENTS isor	- Field Supervisor - Field Technician	
BENEFITS Annual User Benefits: Other:	\$66,000	Benefit/Cost Ratio: 8.3	
FUNDING SOURCES	S: HES		
PUBLIC/PRIVATE P	ARTNERSHIP:	Not common for this project.	
INSTITUTIONAL CO	ONSIDERATIONS:	Lead agency should be identified for of these facilities.	r maintenance
COMMENTS:	Identified as an imp Group. This project	ortant project by the Incident Manageme reduces incident response times.	ent Focus

CATEGORY: Incident Management			
PROJECT: S5.3	Reference	Markers	1
<u>.</u>			
DESCRIPTION:	Install refer	rence markers at 0.2-mile intervals on the freewate ramps in the priority corridors.	ays and
APPLICABLE USER SERVICE:	Incident M	anagement	
COSTS			
Study/Design	\$10,000	NDOR staff will implement this pro additional staffing has been assumed	ject. No
Implementation:	\$80,000	Annual Operations & Maintenance:	\$5,000
Communications:			
- Capital	None	Service Life (Years):	20
- Annual Lease	None		
STAFFING REQUIRE	EMENTS		
- Engineering Supervisor - Field Supervisor			
- Staff Engineer		- Field Technician	
BENEFITS			
Annual User Benefits:	\$91,000	Benefit/Cost Ratio: 8.3	
Other:			
FUNDING SOURCES	: HES		
PUBLIC/PRIVATE PA	ARTNERSH	IP: Not applicable.	
INSTITUTIONAL CO	NSIDERAT	TONS: Consistency with other similar signagencies should be considered.	ns and adjacent
COMMENTS:	Identified a Group. Thi	as an important project by the Incident Managem s project reduces incident response times.	ient Focus

CATEGORY: Deployment Support

PROJECT: S7.1 Traffic Management Forum - Phase I

DESCRIPTION:	Establish a Traffic M signals in the metropo- jurisdictional issues. signal timing plan dev systems.	anagement Forum composed of agencies withtraffic olitan area, which meets regularly to discuss multi- Activities during Phase I focus on coordination of velopment, equipment upgrades, and traffic signal	
APPLICABLE USER SERVICE:	Traffic Control		
COSTS:	No cost has been assu	med.	
STAFFING REQUIR	E MENTS: No addition	onal staffing has been assumed.	
BENEFITS			
Annual User Benefits:		Benefit/Cost Ratio:	
Other:	Facilitates the deployment of ITS technologies and the establishment of an ATMIC.		
FUNDING SOURCES	S: Not needed.		
PUBLIC/PRIVATE PA	ARTNERSHIP:	Not applicable.	
INSTITUTIONAL CO	DNSIDERATIONS:	Consensus building will be a key issue at this Forum. A lead agency should be identified which could possibly rotate, per members' wishes.	
COMMENTS:	This forum is conside and signal coordinatio	red an important arena to discuss traffic management n issues.	

нH

,

77

CATEGORY: Deployment Support			
PROJECT: S7.4	1 Intermodal Coordi	nation Program - Phase I	
DESCRIPTION:	Form a committee c identify ITS applica	consisting of representatives of various mutions for improving intermodal coordinati	odes to ion.
APPLICABLE USER SERVICE:	Travel Service Info Trip Information, P	Travel Service Information, Demand Management and Operations, Pre- Trip Information, Public Transportation Management, Freight Mobility	
COSTS			
Study/Design: Implementation: Communications:	\$230,000 None	Additional Annual Agency Personnel: Annual Operations & Maintenance:	\$6,000 None
- Capital	None	Service Life (Years):	5
- Annual Lease	None		
- Staff Engineer BENEFITS		- Field Technician	
Other:	Facilitates ITS de	eployment.	
FUNDING SOURCES	: CMAQ		
PUBLIC/PRIVATE PA	ARTNERSHIP:	Private service providers and various organizations should be involved in t	s user his program.
INSTITUTIONAL CC)NSIDERATIONS:	A lead agency is required to establish program.	h this
COMMENTS:			

I

CATEGORY:	Deployment	Support
------------------	------------	---------

PROJECT: S7.5 Area-wide Signing and Striping Database - Phase I

I

IDESCRIPTION:	Development of sig	ning and striping database for priority co	rridors.
QPPLICABLE USER SERVICE:	Route Guidance		
COSTS			
Study/Design	\$138,000	Additional Annual Agency Personnel:	\$10,000
Implementation:	\$316,000	Duration:	2 years
(Communications:		Annual Operations & Maintenance:	\$13,000
- Capital	None		
- Annual Lease	None	Service Life (Years):	10
STAFFING REQUIE	REMENTS		
- Engineering Superv	- Engineering Supervisor - Field Supervisor		
- Staff Engineer	.2	- Field Technician	
BENEFITS			
Annual User Benefits:		Benefit/Cost Ratio:	
Other:	Essential for in-vehicle traveler information system in long-term and supports traffic control and incident management.		
FUNDING SOURCE	S: HES		
PUBLIC/PRIVATE P	ARTNERSHIP:	Access to this database may be of in private organizations.	terest to many
INSTITUTIONAL CONSIDERATIONS: Formatting, extent of the content of the database, and compatibility with other agency databases will be key considerations for the success of this program.			the database, databases will s of this
COMMENTS:			

l

CATEGORY: Signal Systems

PROJECT: Ml.1 Signal Timing Plan Development - Phase II

DESCRIPTION:	Develop signal timing optimization plans for approximately 300 traffic signals in the priority corridors. Analyze subsystem identification and multi-jurisdictional interfaces along the priority corridor arterials.			
APPLICABLE USER SERVICE:	Traffic Control			
COSTS Study/Design Implementation: Communications:	\$414,000	Additional Annual Agency Personnel/Operations: No added maintenance is assumed	\$73,000	
- Capital - Annual Lease	None	Service Life (Years):	5	
STAFFING REQUIRE - Engineering Supervi - Staff Engineer	MENTS sor .25 .5	- Field Supervisor - Field Technician	.25 .5	
BENEFITS Annual User Benefits: Other:	\$5,400,000	Benefit/Cost Ratio: 89		
FUNDING SOURCES	: CMAQ, NHS th	hrough State DOT		
PUBLIC/PRIVATE PARTNERSHIP: Not common for this project.				
INSTITUTIONAL CON	NSIDERATIONS:	Cycle length, time-of-day plan a to be discussed at the signal coor when multi-jurisdictions are invo	nd end times are dination forums lved.	
COMMENTS:	Important project, s	ince the benefit is high and very notic	eable by users.	

i

CATEGORY: Signal Systems

PROJECT: MI.2 Local Traffic Controller and Detection Improvements - Phase II

DESCRIPTION:	Upgrade traffic con intersections in the	Upgrade traffic controllers and detection for an additional 150 intersections in the priority corridors and other key locations.		
APPLICABLE USER SERVICE:	Traffic Control			
COSTS				
Study/Design	\$483,000	Additional Annual Agency Personnel:	None	
Implementation: Communications:	\$4,428,000	Annual Operations & Maintenance:	None	
- Capital	None	Service Life (Years):	10	
- Annual Lease	None			
STAFFING REQUI	REMENTS It is assust staffing.	umed that this project does not require	any added	
BENEFITS Annual User Benefits Other:	: \$1,200,000	Benefit/Cost Ratio: 4.5		
F'UNDING SOURCH	ES: CMAQ, STP, 1	NHS		
PUBLIC/PRIVATE	PARTNERSHIP:	Not common for this project.		
INSTITUTIONAL (CONSIDERATIONS:	None.		
COMMENTS:	Important project, and reliable traffic	as this project provides the infrastructu signal operation.	re for efficient	

CATEGORY: Signal Systems

PROJECT: Ml.3 Traffic Control Systems

DESCRIPTION:	Upgrade traffic cont	trol systems in Omaha and Council Bluffs	s, including
	hardware/software, local traffic management centers, additional workstations for other jurisdictions, and enhanced data sharing capabilities.		
APPLICABLE USER SERVICE:	Traffic Control		
COSTS			
Study/Design	\$92,000	Additional Annual Agency Personnel:	\$177
Implementation:	\$316,000	Duration:	10 years
communications:		Annual Operations & Maintenance:	\$40
- Design	\$205,000	Duration:	10 years
- Capital - Annual Lease	\$1,940,000 None	Service Life (Years)	10
STAFFING REQUIREMENTS.38. Field Supervisor.38· Engineering Supervisor.38. Field Technician1.5· Staff Engineer1.5. Field Technician1.5		8 5	
BENEFITS			
Annual User Benefits:	\$1,200,000	Benefit/Cost Ratio: 5.7	
Other:			
FUNDING SOURCE	S: STP, CMAQ		
PUBLIC/PRIVATE PARTNERSHIP: Not common for this project, although for communications there might be an opportunity to share the cost with interested parties.			
INSTITUTIONAL CONSIDERATIONS: System protocols for data sharing and database should be discussed. Coordination between agencies should include management, engineering as well as operations and maintenance staff for compatibility and consistency purposes.			d database etween t, engineering ce staff for ses.
COMMENTS: The communications and system upgrade is very important as it provides the infrastructure for many other improvements.			

CATEGORY: Signal Systems

PROJECT: MI.4 Adaptive Traffic Control Operational Test

DESCRIPTION:	Conduct operational test of adaptive traffic control system involving approximately 25 intersections along a highly congested priority corridor arterial such as Dodge Street/West Dodge Road and/or Center Street/West Center Road. Project includes design, implementation, and evaluation,		
APPLICABLE USER SERVICE:	Traffic Control		
COSTS			
Study/Design	\$69,000	Additional Annual Agency Personnel	\$60,000
Implementation:	\$601,000	Duration:	3 years
Communications: - Design - Capital	\$75,000 \$625,000	No Annual Operations & Maintenance has been assumed.	Ę
- Annuai Lease	None	Service Life (Years):	5
STAFFING REQUIR - Engineering Supervi - Staff Engineer	EMENTS isor .25 .5	- Field Supervisor .2 - Field Technician .2	2 25
BENEFITS Annual User Benefits: Other:	\$3,800,000	Benefit/Cost Ratio: 10	
FUNDING SOURCES	: IVHS Act		
PUBLIC/PRIVATE P	PUBLIC/PRIVATE PARTNERSHIP: Possible, especially in the area of information dissemination.		
INSTITUTIONAL CO	INSTITUTIONAL CONSIDERATIONS: Public education is an important element in this project as drivers' expectations of the traffic sign operation changes.		ment in this ne traffic signal
COMMENTS:			

CATEGORY: Signal S ystems

PROJECT: MI.5 Advanced Traffic Control Operational Test

DESCRIPTION:	Conduct operational test of advanced traffic control featuring advanced controllers such as ATC and NTCIP; 3rd/4th generation traffic control; fully integrated multi-jurisdictional interfaces; and expanded management center. Project includes design and implementation involving approximately 20 intersections.		
APPLICABLE USER SERVICE:	Traffic Control		
COSTS			
Study/Design Implementation: Communications:	\$55,000 \$506,000	Additional Annual Agency Personnel: Duration: Annual Operations & Maintenance:	\$28,000 2 years \$25,000
- Capital - Annual Lease	None None	Service Life (Years):	5
STAFFING REQUIRI - Engineering Supervi - Staff Engineer	E MENTS Sor .1 .25	- Field Supervisor .1 - Field Technician .1	
BENEFITS Annual User Benefits: Other:	\$160,000	Benefit/Cost Ratio: 0.9	
FUNDING SOURCES	: IVHS Act		
PUBLIC/PRIVATE PARTNERSHIP: Possibility will be to attract vendors and/or entities interested in using some of the ATC features such as air quality measurement, etc.			
INSTITUTIONAL CONSIDERATIONS:			
COMMENTS:			

CATEGORY: Surveillance

PROJECT: M2.1 CCTV Installation - Phase II

DESCRIPTION:	Install additional CCTV cameras at approximately 20 locations to extend CCTV detection on freeways and congested arterials in the priority corridors.		
APPLICABLE USER SERVICE:	Traffic Control, Incid	dent Management	
COSTS			
Study/Design	\$110,000		
Implementation:	\$1,021,000	Annual Operations & Maintenance:	\$90,000
Communications:			
- Capital	None	Service Life (Years):	20
- Annual Lease	\$60,000		
STAFFING REQUIRE	EMENTS No addition	onal staffmg assumed.	
BENEFITS			
Annual User Benefits:	\$1,500,000	Benefit/Cost Ratio: 4.5	
Other:			
FUNDING SOURCES	S: CMAQ, STP, IV	HS Act	
PUBLIC/PRIVATE P	ARTNERSHIP:	Possible opportunity subject to in considerations.	stitutional
INSTITUTIONAL CONSIDERATIONS: The privacy issue should be discussed as well as opportunities for public/private partnerships for other public or private interested parties to access the view.			
COMMENTS: Important and basic element in surveillance capabilities. Visual verification of accidents and incidents will reduce the response time significantly.			

I

CATEGORY: Area-wide Traffic Management and Information Center (ATMIC)

DESCRIPTION:	Implement ATMIC i	ncluding center layout and system integration.	
APPLICABLE USER SERVICE:	En-Route Driver Information, Route Guidance, Traffic Control, Pre-Trip Information, Public Transportation Management, En-Route Transit Information		
COSTS			
Study/Design	\$46,000	Additional Annual Agency Personnel: \$145,000	
Implementation:	\$273,000	Annual Operations & Maintenance: \$50,000	
Communications:			
- Capital	None	Service Life (Years); 20	
- Annual Lease	\$24,000		
STAFFING REQUIREMENTS • Engineering Supervisor .5 • Field Supervisor .5		- Field Supervisor .5	
- Statt Engineer	1.0	- Field Technician 1.0	
BENEFITS Annual User Benefits: Other:	\$1,900,000	Benefit/Cost Ratio: 7.3	
FUNDING SOURCES	STP		
PUBLIC/PRIVATE PARTNERSHIP: Possible for information dissemination purposes. Also it is possible for private entities to operate and maintain operations and maintenance.			
INSTITUTIONAL CO	INSTITUTIONAL CONSIDERATIONS: Requires lead agency for implementation as well as operations and maintenance.		
COMMENTS: M3.2 (Expert Systems Operational Test) provides input to this project.			

PROJECT: M3.1 ATMIC Implementation

CATEGORY: Area-wide Traffic Management and Information Center (ATMIC)

PROJECT: M3.2 Expert Systems Operational Test

DESCRIPTION:	Design and implement operational test to evaluate the effectiveness of expert systems to support the incident management function of the ATMIC.			
APPLICABLE USER SERVICE:	Incident Management			
COSTS				
Study/Design	\$69,000	Addition& Annual Agency Personnel:	\$16,000	
Implementation:	\$114,000	Duration:	2 years	
Communications:		Annual Operations & Maintenance:	None	
- Capital	None			
- Annual Lease	None	Service Life (Years):	5	
STAFFING REQUIREMENTS• Engineering Supervisor.1• Staff Engineer.2• Field Technician				
BENEFITS Annual User Benefits: \$300,000 Benefit/Cost Ratio: 5.4 Other:				
FUNDING SOURCES: IVHS Act, CMAQ				
PUBLIC/PRIVATE PARTNERSHIP: There might be a role for private entities, especially relative to dissemination element of this program.				
INSTITUTIONAL CO	INSTITUTIONAL CONSIDERATIONS: Several agencies should be involved during this project. Lead agency is required.			
COMMENTS: The project should be coordinated with M3.1, ATMIC, as it provides a component for system integration.				

CATEGORY: Area-wide Traffic Management and Information Center (ATMIC)

PROJECT: M3.3 Smart Corridor Operational Test

DESCRIPTION:	Design and implement operational test to evaluate the effectiveness of the concept of integration of freeway and arterial traffic control and information systems. Approximately 30 intersections in the I-80 corridor are included.		
APPLICABLE USER SERVICE:	En-Route Driver Information, Route Guidance, Traffic Control, Incident Management, Pre-Trip Information		
COSTS			
Study/Design:	\$ 207,000	Additional Annual Agency Personnel:	\$123,000
Implementation:	\$1,898,000	Duration:	4 years
Communications:		Annual Operations & Maintenance:	\$50,000
- Design	\$180,000		
- Capital	\$1,500,000	Service Life Years):	5
- Annual Lease	None		
STAFFING REQUIRE	EMENTS		
- Engineering Supervisor .5 - Field Supervisor .25		5	
- Staff Engineer	1.0	- Field Technician .7.	5
BENEFITS			
Annual User Benefits:	\$7,500,000	Benefit/Cost Ratio: 6.8	
Other:			
FUNDING SOURCES	IVHS Act, CMAQ	2	
PUBLIC/PRIVATE PA	PUBLIC/PRIVATE PARTNERSHIP: Possibility in the area of communications and motorist information system.		
INSTITUTIONAL CO	INSTITUTIONAL CONSIDERATIONS: NDOT, City of Omaha, police departments, 911, fire departments and others should reach consensu on various elements of the program.		
COMMENTS:	This operational test provides the basis for L3.2, Smart Corridor Implementation Project.		

CATEGORY:Area-wide Traffic Management and Information Center (ATMIC)PROJECT:M3.4 Ramp Metering - Phase I

DESCRIPTION:	Design and implement ramp metering to address recurrent and non- recurrent congestion on freeways in priority corridors. Phase I provides metering on approximately 10 ramps to support incident management.		
APPLICABLE USER SERVICE:	Traffic Control, Inci-	dent Management	
COSTS:			
Study/Design	\$83,000	No additional personnel is assumed.	
Implementation:	\$759,000	Additional maintenance and operations is ass be borne by NDOR.	umed to
Communications:			
 Capital 	None	Service Life (Years): 20	
- Annual Lease	None		
Annual User Benefits: Other:	\$1,100,000	Benefit/Cost Ratio: 11	
FUNDING SOURCES	: STP, NHS		
PUBLIC/PRIVATE PA	ARTNERSHIP:	Not common for this project.	
INSTITUTIONAL CO	INSIDERATIONS:	Public education and effective design of the systems is important.	e
COMMENTS:	This project reduces locations.	traffic demand and recovery times at incident	

CATEGORY: Traveler Information Systems			
PROJECT: M4.1	Radio Data System	(RDS) Operational Test	
DESCRIPTION:	Design and implement RDS.	nt operational test to evaluate the effective	veness of
APPLICABLE USER SERVICE:	En-Route Driver Information, Route Guidance, Incident Management, Pre-Trip Information		
COSTS			······
Study/Design Implementation: Communications:	\$69,000 \$127,000	Additional Annual Agency Personnel: Annual Operations & Maintenance:	\$8,000 \$20,000
- Capital	None	Service Life (Years):	5
- Annual Lease	None		
STAFFING REQUIRE - Engineering Supervis - Staff Engineer	MENTS For .05 .1	- Field Supervisor - Field Technician	
BENEFITS Annual User Benefits: Other:	\$150,000	Benefit/Cost Ratio: 1.9	
FUNDING SOURCES:	IVHS Act		· · · · ·
PUBLIC/PRIVATE PA	RTNERSHIP:	Strong possibility with media.	
INSTITUTIONAL CONSIDERATIONS: Discussion among agencies are required for consistency and accuracy of information. In addition, the type of arrangement with media should carefully be looked at.			
COMMENTS: Very cost-effective approach to inform users.			

1

CATEGORY: Traveler Information Systems

PROJECT: M4.2 Highway Advisory Radio (HAR) - Phase II

DESCRIPTION:	Install approximately two 10-watt and 13 0.1-watt HAR units to serve remaining priority corridors not included in Phase I. Also, define functional requirements and develop operational procedures for real-time message generation. Conduct operational test of real-time message generation involving approximately five HARs.			
APPLICABLE USER SERVICE:	En-Route Driver Information, Route Guidance, Incident Management			
COSTS:				
Study/Design	\$37,000	Additional Annual Agency Personnel:	(\$38,000 first 3 years for design and implementation, then \$8,000 per year)	
Implementation:	\$342,000	Annual Operations & Maintenance:	\$19,000	
Communications: - Capital - Annual Lease	None None	Service Life (Years):	20	
STAFFING REQUI	REMENTS			
· Engineering Super	visor .1	- Field Su	pervisor .1	
- Staff Engineer	.3	- Field Te	chnician .3	
BENEFITS				
Annual User Benefits	s: \$190,000	Benefit/Cost Ratio:	2.44	
Other:				
FUNDING SOURCES: STP, CMAQ				
PUBLIC/PRIVATE PARTNERSHIP: Strong possibility with private entities interested in disseminating traveler information.				
INSTITUTIONAL CONSIDERATIONS	INSTITUTIONALCredibility of the information is at stake in terms of information accuracy, timeliness, and applicability.			
COMMENTS: This project's effectiveness will be enhanced in concert with Phases I and III. This project increases route diversion, reducing traffic demand and recovery times at congested locations.				

CATEGORY: Tra	Traveler Information Systems			
PROJECT: M4	M4.3 Changeable Message Signs (CMS) - Phase II			
DESCRIPTION:	Design and install CMS at approximately four locations on freeways and 14 locations on arterials to serve remaining priority corridors not included in Phase I. Also, conduct operational test to evaluate the effectiveness of real-time message generation and route guidance via expert systems.			
APPLICABLE USER SERVICE:	En-Route Driver Information, Route Guidance, Incident Management			
COSTS:				
StudylDesign	\$173,000	Additional Annual Agency Personnel:	\$29,000	
Implementation:	\$1,645,000	Annual Operations & Maintenance:	\$90,000	
Communications:				
- Capital	None	Service Life (Years):	20	
- Annual Lease	\$50,000			
STAFFING REQUIREMENTS:				
- Engineering Superv	r isor .1	- Field Supervisor	.1	
- Staff Engineer	.2	- Field Technician	2	
BENEFITS				
Annual User Benejits:	\$540,000	Benefit/Cost Ratio: 1.4		
Other:				
FUNDING SOURCE	S: STP, CMAQ			
PUBLIC/PRIVATE PARTNERSHIP: Not common in this project, although CMS offers opportunity for potential advertising.				
INSTITUTIONAL C	ONSIDERATIONS:	ONS: Effectiveness of CMS is an issue dependent on the accuracy of the message and its timeliness.		
COMMENTS:	High priority since incident managemen	several programs are dependent upon C	MS, such as	

CATEGORY: Traveler Information Systems					
PROJECT:	PROJECT: M4.4 Cable TV (CATV) System - Phase II				
	·····				
DESCRIPTION:	DESCRIPTION: Enhance CATV system implemented in Phase I to provide congestion display graphics and conduct operational test to evaluate teletext service.				
APPLICABLE Incident Management, Pre-Trip Information USER SERVICE:					
COSTS:					
Study/Design	\$17,000	Additional Annual Agency Personnel:	\$8,000		
Implementation: Communications:	\$127,000	Annual Operations & Maintenance:	\$40,000		
- Design	\$72,000				
- Capital	\$600,000	Service Life (Years):	10		
- Annual Lease	None				
STAFFING REQUIREMENTS:					
- Engineering Sup	pervisor .05	- Field Supervisor			
- Staffs Engineer	.2	- Field Technician			
BENEFITS					
Annual User Benef	its: \$460,000 . Bei	nefit/Cost Ratio: 2.6			
Other:					
FUNDING SOURCES: STP, CMAQ					
PUBLIC/PRIVATE PARTNERSHIP: Strong public/private opportunity exists where a vendor provides funding in exchange with access/use of the CATV facilities.					
INSTITUTIONAL CONSIDERATIONS: Lead agency is required to supervise the design and implementation of this program,					
COMMENTS: This project increases route diversion, reducing traffic demand and recovery times at congested locations.					

CATEGORY:	Traveler Information Sy	7s terns		
PROJECT:	M4.5 Kiosks/Videotex System - Phase II			
DESCRIPTION:	Expand kiosk/videotex system to include 20 additional locations. Enhance capabilities of 10 kiosks implemented in Phase I to include two-way communications, interactive information access, and expanded information database including transit service.			
APPLICABLE USER SERVICE:	Incident Management, Pre-Trip Information, En-Route Transit Information			
COSTS:				
Study/Design	\$102,000	Additional Annual Agency Personnel:	\$20,000	
Implementation:	\$380,000	Annual Operations & Maintenance:	\$120,000	
Communications:	NT		20	
- Capital	None	Service Life (Years):	20	
- Annual Lease	\$14,000			
STAFFING REQUIREMENTS:				
- Engineering Sup	ervisor .1	- Field Supervisor		
- Staff Engineer	.2	- Field Technician .I		
BENEFITS				
Annual User Benefi	i ts: \$200,000	Benefit/Cost Ratio: 0.9		
Other:				
FUNDING SOUR	CES: STP, CMAQ			
PUBLIC/PRIVAT	E PARTNERSHIP:	Strong possibility.		
INSTITUTIONAL	CONSIDERATIONS:	Identification of location, content of sequencing, etc. are key factors for the this program.	the database, he success of	
COMMENTS:	This project increated recovery times at	ases route diversion, reducing traffic dema congested locations.	nd and	

PROJECT: M4.6 Internet/Computer Bulletin Board System (BBS)	5) - Phase II
---	---------------

DESCRIPTION:	Enhance BBS system implemented in Phase I to include interactive displays and expanded information database.				
APPLICABLE USER SERVICE:	PLICABLE Incident Management, Pre-Trip Information ER SERVICE: Incident Management, Pre-Trip Information				
COSTS:					
Study/Design	\$17,000	Additional Annual Agency Personnel:	\$8,000		
Implementation:	\$14,000	Annual Operations & Maintenance:	\$12,000		
Communications:					
- Capital	None	Service Life (Years):	10		
- Annual Lease	None				
STAFFING REQUIR	EMENT:				
- Engineering Supervisor .05 - Field Supervisor					
- Staff Engineer	.1	- Field Technician			
BENEFITS					
Annual User Benefits:	Annual User Benefits: \$180,000 Benefit/Cost Ratio: 7.2				
Other:					
FUNDING SOURCES	STP, CMAQ				
PUBLIC/PRIVATE PARTNERSHIP: Strong possibility either independently or as part of other traveler information systems projects.					
INSTITUTIONAL CONSIDERATIONS: Requires lead agency for consistency and coordination.					
COMMENTS: This project increases route diversion, reducing traffic demand and recovery times at congested locations.					

l

CATEGORY: Traveler Information Systems					
PROJECT: M4.7	7 Highway Advisory	Telephone (HAT) - Phase II			
DESCRIPTION:	Implement HAT sys including software d	tem defined in short-term study (Project evelopment.	S4.7),		
APPLICABLE USER SERVICE:	Incident Managemen	t, Pre-Trip Information			
COSTS:					
Study/Design	\$115,000	Additional Annual Agency Personnel:	\$13,000		
Implementation:	\$127,000	Annual Operations & Maintenance:	\$14,000		
Communications:					
- Capital	None	Service Life (Years):	10		
- Annual Lease	None				
STAFFING REQUIRE	MENTS:				
- Engineering Supervisor .05 - Field Supervisor					
- Staff Engineer	.2	- Field Technician			
BENEFITS					
Annual User Benefits:	\$91,000 Be	nefit/Cost Ratio: 1.4			
Other:		,			
FUNDING SOURCES	FUNDING SOURCES: STP, CMAQ				
PUBLIC/PRIVATE PARTNERSHIP: Strong possibility independently or as part of other ITS projects.					
INSTITUTIONAL CONSIDERATIONS: Lead agency for consistency and coordination is required.					
COMMENTS	This project increase recovery times at con	s route diversion, reducing traffic deman ngested locations.	nd and		

l

CATEGORY:	Traveler	Information	Systems
-----------	----------	-------------	---------

PROJECT: M4.8 Transit Vehicle Status Monitoring Operational Test

DESCRIPTION:	Design and implement operational test to evaluate the feasibility of real- time transit vehicle status monitoring using automated vehicle locator technologies.			
APPLICABLE USER SERVICE:	Pre-Trip Information, Public Transportation Management, En-Route Transit Information			
COSTS:				
Study/Design	\$35,000	Additional Annual Agency Personnel:	\$23,000	
Implementation:	\$316,000	Duration:	3 years	
Communications: - Capital - Annual Lease	None None	Annual Operations & Maintenance: Service Life (Years):	\$35,000 10	
STAFFING REQUIREMENTS: • Engineering Supervisor .1 • Field Supervisor .05				
- Staff Engineer	.2	- Field Technician .1		
BENEFITS				
Annual User Benefits:		Benefit/Cost Ratio:		
Other:	Improves schedule compliance by 10 to 25 percent, and reduces operating expenses by 2 to 9 percent.			
FUNDING SOURCES	DING SOURCES: Section 3 Capital Program ISTEA, Planning and Research Fund ISTEA			
PUBLIC/PRIVATE PARTNERSHIP: Not common, although the system data could be shared with other public/private entities.				
INSTITUTIONAL CONSIDERATIONS:				
COMMENTS:	MENTS: Essential for deployment of transit management and information user services.			

CATEGORY:	Incident Manageme	ent		
PROJECT:	M5.1 Freeway Service	e Patrol (FSP) - Phase II		
DESCRIPTION:	DESCRIPTION: Expand FSP to operate during weekday peak periods over approximately 40 miles of the freeways in the priority corridors.			
APPLICABLE USER SERVICE:	Incident Manager	ment		
COSTS				
Study/Design	None	Additional Annual Agency Personnel:	\$157,000 (includes Phase I staffing)	
Implementation:	\$200,000	Annual Operations & Maintenance:	\$200,000 (includes Phase I O&M)	
Communications:	Included in O&M	Service Life (Years):	5	
STAFFING REQUIREMENTS				
- Drivers	8	- Field Su	pervisor .1	
- Staff Engineer	.4	- Drivers	.3	
BENEFITS				
Annual User Bener	fits: \$2,000,000	Benefit/Cost Rati	io: 4.9	
Other:	Very well rece	eived by the public.		
FUNDING SOUR	RCES: HES			
PUBLIC/PRIVATE PARTNERSHIP: Strong possibility to involve private tow truck companies.				
INSTITUTIONAL CONSIDERATIONS: Lead agency is required for coordination. In addition, public education is necessary for this project.				
COMMENTS:	Several of the ex This project imp	kisting FSP programs use proroves public relations and r	rivate tow truck companies. reduces duration of incidents.	

CATEGORY: Incident Management

PROJECT: M5.2 Accident Investigation Sites

DESCRIPTION:	Design and construct accident investigation sites at approximately eight locations along the freeways in the priority corridors.			
APPLICABLE USER SERVICE:	Incident Management	t		
COSTS				
Study/Design:	\$80,000	Additional Annual Agency Personnel:	\$23,000	
Implementation:	\$720,000	Duration:	4 years	
Communications:		Annual Operations & Maintenance:	\$40,000	
- Capital	None	Service Life (Years):	20	
- Annual Lease	None		_	
STAFFING REQUIRE	MENTS			
- Engineering Supervis	sor .05	- Field Supervisor .1		
- Staff Engineer	.1	- Field Technician .25		
BENEFITS				
Annual User Benefits: \$1.000.000 Benefit/Cost Ratio: 7.1				
Other:	· , ,			
FUNDING SOURCES	HES			
PUBLIC/PRIVATE PARTNERSHIP: Not common for this project.				
INSTITUTIONAL CONSIDERATIONS: Lead agency is required for implementation and maintenance.				
COMMENTS: This project reduces duration of incidents.				

CATEGORY: Incident Management

PROJECT: M5.3 Equipment Storage Sites

DECODIDITION	Design and sometimes		I
DESCRIPTION:	Design and construct equipment storage sites at approximately three strategic locations along the freeways in the priority corridors		
APPLICABLE	Incident Managemen	t	
USER SERVICE;			
COSTS			
Study/Design	\$60,000	Additional Annual Agency Personnel: \$15,000	
Implementation:	\$540,000	Annual Operations & Maintenance: \$60,000	
Communications:			
- Capital	None	Service Life (years): 20	
- Annual Lease	None		
STAFFING REQUIR	EMENTS		
- Engineering Superv	isor	- Field Supervisor .05	
- Staff Engineer	.1	- Field Technician .1	
BENEFITS			
Annual User Benefits:	\$500,000	Benefit/Cost Ratio: 8.5	
Other:			
FUNDING SOURCES	S: HES		
PUBLIC/PRIVATE P	ARTNERSHIP:	Not common for this project.	
INSTITUTIONAL CO	ONSIDERATIONS:	Lead agency is required for design, implementation and maintenance.	
COMMENTS:	Storage sites should to priority corridors.	be identified at strategic locations with balanced acc This project reduces incident response times.	cess

CATEGORY: Incident Managemet

PROJECT: MS.4 Incident Management Team Support - Phase II

DESCRIPTION:	Continue activities of the incident management team established in Phase I and update incident management manual.		
APPLICABLE USER SERVICE:	Incident Management	t	
COSTS			
Study/Design and		Additional Annual Agency Personnel:	None
Implementation:	\$90,000	Annual Operations & Maintenance:	None
Communications:			
- Capital	None	Service Life (Years):	5
- Annual Lease	None		
STAFFING REQUIREMENTS • Engineering Supervisor • Staff Engineer • Field Technician			
BENEFITS			
Annual User Benefits:		Benefit/Cost Ratio:	
Other:	Improves effectiveness of incident management.		
FUNDING SOURCES	: HES		
PUBLIC/PRIVATE PARTNERSHIP:Coordination with private service providers and possible partnership is applicable in this project such as hospitals.			oviders and this project
INSTITUTIONAL CO	DNSIDERATIONS:	Team approach and clear roles and references of the formation of the second sec	esponsibilities access of this
COMMENTS: Establishment of this program is already underway. Essential for effective and coordinated incident management.			

CATEGORY: Travel Demand Management

PROJECT: M6.1 HOV Needs Study

DESCRIPTION:	Evaluate the need for HOV facilities in the priority corridors.				
APPLICABLE USER SERVICE:	Demand Management and Operations				
COSTS					
Study/Design	\$50,000	Additional Annual Agency Personnel:	\$11,000		
Implementation:	None	Duration:	1 year		
Communications:		Annual Operations & Maintenance:	None		
- Capital	None	Service Life (Years):	5		
- Annual Lease	None				
STAFFING REQUIRI	STAFFING REQUIREMENTS				
- Engineering Supervisor .1		- Field Supervisor			
- Staff Engineer	.1 - Field Technician				
BENEFITS					
Annual User Benefits:		Benefit/Cost Ratio:			
Other:	<i>Other:</i> Determines the feasibility of HOV facilities which may reduce vehicle demand in priority corridors.				
FUNDING SOURCES	: NHS, STP				
PUBLIC/PRIVATE PARTNERSHIP:		Not common for this project.			
INSTITUTIONAL CONSIDERATIONS:		This project requires a lead agency and coordination between agencies along all priority corridors.			
COMMENTS:					

CATEGORY: T	ravel Demand	Management		
PROJECT: N	A6.2 Demand M	Ianagement Support - Phase I		
DESCRIPTION:	Continue on maintenance demand man	Continue on-going travel demand management activities including maintenance of rideshare database and studies to identify feasible travel demand management programs.		
APPLICABLE USER SERVICE:	Demand Ma Matching an	Demand Management and Operations, Pre-Trip Information, Ride Matching and Reservation		
COSTS				
Study/Design	\$65,000	Additional Annual Agency Personnel:	None	
Implementation:	None	Annual Operations & Maintenance:	None	
Communications:				
- Capital	None	Service Life (Years):	5	
- Annual Lease	None			
STAFFING REQU	IREMENTS			
Engineering Supervisor Field Supervisor				
- Staff Engineer		- Field Technician		
BENEFITS				
Annual User Benefit	ts:	Benefit/Cost Ratio:		
Other:	Reduces	Reduces vehicular traffic demand at congested locations.		
FUNDING SOURC	ES: CMAQ			
PUBLIC/PRIVATE PARTNERSHIP: Strong possibility, especially with large employers				
INSTITUTIONAL	CONSIDERATI	IONS: Lead agency required.		
COMMENTS:	This project Phase II. Th demand mar	's effectiveness is enhanced when continued as P is project is essential to effective deployment of nagement user services.	roject L6.2, ITS travel	

CATEGORY: Travel Demand Management				
PROJECT: M6.3	B Park-and-Ride Imp	lementation - Phase I		
	Design and implayed	the second wide for ilities at a second size of	1 f	
DESCRIPTION:	Design and implement park-and-ride facilities at approximately five locations in the priority corridors.			
APPLICABLE USER SERVICE:	Demand Management	and Operations		
COSTS				
Study/Design	\$50,000	Additional Annual Agency Personnel:	\$16,000	
Implementation:	\$450,000	Duration:	2 years	
Communications:		Annual Operations & Maintenance:	\$50,000	
- Capital	None	Service Life (Years):	20	
-Annual Lease	None			
STAFFING REQUIRE	MENTS			
- Engineering Supervisor .05		- Field Supervisor		
- Staff Engineer	.1	- Field Technician .2		
BENEFITS				
Annual User Benefits:	\$360,000	Benfit/Cost Ratio: 3.3		
Other:			_	
FUNDING SOURCES: CMAQ				
PUBLIC/PRIVATE PARTNERSHIP:		Arrangements are possible with private entities so that existing/proposed lots could be used for multi-purposes.		
INSTITUTIONAL CONSIDERATIONS:		Maintenance of park-and-ride lots will be an issue for consideration.		
COMMENTS:	When right-of-way i demand management	s available, this could be a cost-effectiv	e measure for	
CATEGORY: Travel Demand Management

PROJECT: M6.4 Smart Transit Service Operational Test

DESCRIPTION:	Design and implement operational test of smart transit service in approximately two lower density areas in the metropolitan area where this service is determined to be feasible. Operational test and evaluation will be performed for six months during each project.				
APPLICABLE USER SERVICE:	Demand Management and Operations, Public Transportation Management, Personalized Public Transit				
COSTS					
Study/Design	\$30,000	Additional Annual Agency Personnel:	\$29,000		
Implementation:	\$270,000	Duration:	2 years		
Communications:		Annual Operations & Maintenance:	\$30,000		
- Capital	None	Service Life (Years):	5		
- Annual Lease	None				
STAFFING REQUIR	EMENTS				
- Engineering Supervi	sor .1	- Field Supervisor .1			
- Stafjc Engineer	.2	- Field Technician .2			
BENEFITS					
Annual User Benefits:		Benefit/Cost Ratio:			
Other:	Demonstrates the feasibility of mode of transit operations which may increase use of transit in lower density areas.				
FUNDING SOURCES	FUNDING SOURCES: MATC (with 50% local match)				
PUBLIC/PRIVATE PARTNERSHIP: Possible with transit service and systems providers.					
INSTITUTIONAL CONSIDERATIONS:					
COMMENTS: Good source of funding already earmarked.					

CATEGORY: Trave	el Demand Manager	ment	
PROJECT: M6.5	Smart Card		
DESCRIPTION:	Design and implement operational test to evaluate the benefits of a smart card system for payment of transportation services, such as transit and parking.		
APPLICABLE USER SERVICE:	Electronic Payment	Services	
COSTS			
Study/Design	\$69,000	Additional Annual Agency Personnel:	\$16,000
Implementation:	\$632,000	Duration:	5 years
Communications:	No Annual Operations & Maintenance is assumed.		
- Capital	None	Service Life (Years):	5
- Annual Lease	None		
STAFFING REQUIRE	MENTS		
- Engineering Supervis	sor .1	- Field Supervisor	
- Staff Engineer	.2	- Field Technician	
BENEFITS			
Annual User Benejits:		Benefit/Cost Ratio:	
Other:	Improves efficien	cy of transit operations.	
FUNDING SOURCES	S: Section 3 Capit	al Program of ISTEA	
PUBLIC/PRIVATE PARTNERSHIP: Strong possibility for private entities to design and manage this program.			
INSTITUTIONAL CO	NSIDERATIONS:	Public acceptability and agreements provider agencies.	among service
COMMENTS:	This technology is al	ready being used around the country.	

PROJECT: M7.1 Traffic Management Forum - Phase II

DESCRIPTION:	Continue activities of Phase I. Activities in control, and advance signal coordination.	The Traffic Management Forum established in n Phase II focus on the ATMIC, adaptive traffic d traffic controllers as well as on-going discussions of
APPLICABLE USER SERVICE:	Traffic Control	
COSTS:	No cost has been assi	umed.
STAFFING REQUIRI	EMENTS: No additi	onal staffing has been assumed.
BENEFITS		
Annual User Benefits:		Benefit/Cost Ratio:
Other:	Facilitates the deplo ATMIC.	oyment of ITS technologies and implementation of
FUNDING SOURCES	Not needed.	
PUBLIC/PRIVATE PA	ARTNERSHIP:	Not applicable.
INSTITUTIONAL CO	NSIDERATIONS:	Consensus building will be a key issue at this Forum. A lead agency should be identified which could possibly rotate, per members' wishes.
COMMENTS:	This forum is conside and signal coordination	ered an important arena to discuss traffic management on issues.

PROJECT: M7.2 Public/Private Partnerships - Phase II

DESCRIPTION:	Continue activities of the public/private partnership committee established in Phase I. Activities in Phase II focus on RDS, kiosks/videotex, CATV, HAT and BBS systems; rideshare database; and park-and-ride facilities.
APPLICABLE USER SERVICE:	Incident Management, Demand Management and Operations, Pre-Trip Information, Ride Matching and Reservation
COSTS:	No cost has been assumed.
STAFFING REQUIRI	EMENTS: No additional staffing has been assumed.
BENEFITS:	
Annual User Benefits:	Benefit/Cost Ratio:
Other:	Facilitates the deployment of ITS technologies.
FUNDING SOURCES	: Not needed.
PUBLIC/PRIVATE PA	ARTNERSHIP:
INSTITUTIONAL CO	NSIDERATIONS: A lead agency is required to start this program.
COMMENTS:	This program is important as it should identify a market for the strategic deployment business plan and facilitate various partnerships.

CATEGORY: Dep	loyment Support			
PROJECT: M7.	3 Education Progra	am - Phase II		
DESCRIPTION:	Continue developme users, operators, offi adaptive traffic contr transit, and smart car	ent and implementation of ITS education p cials, and public. Phase II focuses on A rol, advanced traffic controllers, park-and rd.	orograms for TMIC, d-ride, smart	
APPLICABLE USER SERVICE:	Traffic Control, Dem Public Transit, Electr	and Management and Operations, Person conic Payment Services	nalized	
COSTS:				
Study/Design and		Additional Annual Agency Personnel:	\$11,000	
Implementation:	\$287,000	Annual Operations & Maintenance:	None	
Communications:				
- Capital	None	Service Life (Years):	5	
- Annual Lease	None			
STAFFING REQUIR	EMENTS:			
- Engineering Supervi	sor .1	- Field Supervisor		
- Staff Engineer	.1	- Field Technician		
BENEFITS				
Annual User Benefits:		Benefit/Cost Ratio:		
Other:	Increases technical deployment.	knowledge of responsible agencies and	promotes ITS	
FUNDING SOURCES	: CMAQ			
PUBLIC/PRIVATE PARTNERSHIP: It is possible for certain private entities to sponso materials, etc.				
INSTITUTIONAL CO	NSIDERATIONS:	This program should be developed c stakeholders' input and include a wid audience.	arefully with le range of	
COMMENTS:	Very important as it ITS deployment and	is considered a key element relative to a lusers' acceptance.	the success of	

PROJECT: M7.4 Intermodal Coordination Program - Phase II

DESCRIPTION:	Continue activities of Phase I.	Continue activities of intermodal coordination committee established in Phase I.		
APPLICABLE USER SERVICE:	Travel Service Infor Trip Information, Pu	Travel Service Information, Demand Management and Operations, Pre- Trip Information, Public Transportation Management, Freight Mobility		
COSTS				
Study/Design:	\$115,000	Additional Annual Agency Personnel:	\$11,000	
Implementation:	None	Annual Operations & Maintenance:	None	
Communications:				
- Capital	None	Service Life (Years):	5	
- Annual Lease	None			
STAFFING REQUIREMENTS - Field Supervisor - Engineering Supervisor .1 - Field Supervisor - Staff Engineer .1 - Field Technician				
BENEFITS Annual User Benfits: Other	BENEFITS Annual User Benfits: Benefit/Cost Ratio:			
FUNDING SOURCES	S· CMAO			
TUNDING SOURCE				
PUBLIC/PRIVATE PARTNERSHIP: Private service providers and various user organizations should be involved in this program.				
INSTITUTIONAL CONSIDERATIONS: A lead agency is required to establish this program.				
COMMENTS:				

n

CATEGORY: De	CATEGORY: Deployment Support				
PROJECT: M	7.5 Area-wide Signing	g and Striping Database - Phase II			
DESCRIPTION:	Expand signing and freeways and arteri	d striping database developed in Phase I to als in the metropolitan area.	o include all		
APPLICABLE USER SERVICE:	Route Guidance				
COSTS					
Study/Design Implementation: Communications:	\$138,000 \$32,000	Additional Annual Agency Personnel: Duration: Annual Operations & Maintenance:	\$19,000 2 years None		
- Annual Lease	None	Service Life (Years):	10		
- Staff Engineer BENEFITS	.2	- Field Technician .1			
Annual User Benefits: Other:	Essential for in-	Benefit/Cost Ratio: vehicle traveler information system in lon	g-term and		
FUNDING SOURCE	ES: HES				
PUBLIC/PRIVATE PARTNERSHIP: Access to this database may be of interest to many private organizations.					
INSTITUTIONAL CONSIDERATIONS: Formatting, extent of the content of the database, and compatibility with other agency databases will be key considerations for the success of this program.					
COMMENTS:					

57

CATEGORY: S	Signal Systems			
PROJECT: 1	L1.1 Adaptive Traffic (Control Implementation		
DESCRIPTION: Implement adaptive traffic control based on results of operational test (Project M1.4). Implementation begins in most congested priority corridors and then proceeds to remaining priority corridors.				
APPLICABLE USER SERVICE:	Traffic Control			
COSTS: Study/Design: Implementation: Communications: - Design	\$253,000 \$2,404,000 \$159,000	Additional Annual Agency Personnel:\$18,000Annual Operations & Maintenance:\$410,000		
- Capital - Annual Lease	\$1,325,000 \$120,000	Service Life (years): 10		
STAFFING REQU - Engineering Super - Staff Engineer	STAFFING REQUIREMENTS:- Engineering Supervisor.3- Staff Engineer1.0- Field Technician1.0			
BENEFITS: Annual User Benefits Other:	s: \$14,000,000	Benefit/Cost Ratio: 13		
FUNDING SOURC	CES: IVHS Act			
PUBLIC/PRIVATE PARTNERSHIP: Possible, especially in the area of information dissemination.				
INSTITUTIONAL CONSIDERATIONS: Public education is an important element in this project as drivers' expectations of the traffic signal operation changes.				
COMMENTS:				

CATEGORY: Signal Systems

PROJECT: L1.2 Advanced Traffic Control Implementation

DESCRIPTION:	Implement advan operational test (Implement advanced traffic controller technology based on results of operational test (Project M1.5) to ultimately include all priority corridors.		
APPLICABLE USER SERVICE:	Traffic Control			
COSTS:				
Study/Design:	\$128,000	Additional Annual Agency Personnel:	\$56,000	
Implementation:	\$1,265,000	Annual Operations & Maintenance:	\$140,000	
Communications:				
- Capital	None	Service Life (Years):	10	
- Annual Lease	None			
STAFFING REQU	IREMENTS:			
- Engineering Super	visor .1	- Field Supervisor .1		
- Staff Engineer	.5	- Field Technician .5		
BENEFITS	······			
Annual User Benefits	: \$750,000	Benefit/Cost Ratio:. 1.8		
Other:				
FUNDING SOURC	ES: IVHS Act			
PUBLIC/PRIVATE	PUBLIC/PRIVATE PARTNERSHIP: Possibility will be to attract vendors and/or entities interested in using some of the ATC features such as air quality measurement, etc.			
INSTITUTIONAL CO	ONSIDERATIONS:			
COMMENTS:				

CATEGORY: Surveillance

PROJECT: L2.1 Advanced Surveillance/Monitoring Systems

DESCRIPTION:	Design and implement advanced surveillance and monitoring system to support ATMIC functions and public transportation management and information systems.			
APPLICABLE USER SERVICE:	En-Route Driver Information, Route Guidance, Traffic Control, Incident Management, Pre-Trip Information, Public Transportation Management, En-Route Transit Information, Personalized Public Transit			
COSTS:				
Study/Design:	\$276,000	Additional Annual Agency Personnel:	\$31,000	
Implementation:	\$2,530,000	Annual Operations & Maintenance:	\$280,000	
Communications:				
- Capital	None	Service Life (Years):	10	
- Annual Lease	None			
STAFFING REQUIRI	EMENTS:			
- Engineering Supervi	isor .2	- Field Supervisor	.2	
- Staff Engineer	1.0	- Field Technician	1.0	
BENEFITS:				
Annual User Benefits:	\$3,400,000	Benefit/Cost Ratio: 4.4		
Other:				
FUNDING SOURCES	S: CMAQ, STP, I	VHS Act		
PUBLIC/PRIVATE PARTNERSHIP: Possible opportunity subject to institutional considerations.				
INSTITUTIONAL, C	ONSIDERATIONS:	ONS: The privacy issue should be discussed as well as opportunities for public/private partnerships for other public or private interested parties to access the view.		
COMMENTS: This project will significantly improve the capabilities of the ATMIC.				

CATEGORY: Area-wide Traffic Management and Information Center (ATMIC)				
PROJECT: L3.1 Expert Systems Implementation				
DESCRIPTION:	Design and implem on results of operati	ent expert system to support ATMIC functional test (Project M3.2).	ctions based	
APPLICABLE USER SERVICE:	En-Route Driver Information, Route Guidance, Traffic Control, Incident Management, Pre-Trip Information, En-Route Transit Information			
COSTS:				
Study/Design: Implementation: Communications:	\$138,000 \$1,265,000	Additional Annual Agency Personnel: Annual Operations & Maintenance:	\$35,000 \$140,000	
- Capital - Annual Lease	None None	Service Life (years):	10	
STAFFING REQUIREMENTS: - Engineering Supervisor .1 - Field Supervisor .1 - Field Supervisor .1				
BENEFITS: Annual User Benefits: Other:	\$3,400,000	Benefit/Cost Ratio: 8.5		
FUNDING SOURCES:	CMAQ, IVHS A	Act		
PUBLIC/PRIVATE PARTNERSHIP: There might be a role for private entities, especially relative to dissemination element of this program.				
INSTITUTIONAL CONSIDERATIONS: Several agencies should be involved during this project. Lead agency is required.				
COMMENTS:	This project should	follow M3.2		

CATEGORY: Area-wide Traffic Management and Information Center (ATMIC)			IC)
PROJECT: L3.2	2 Smart Corridor Im	plementation	
			¥
DESCRIPTION:	Design and implement expansion of the smart corridor based on results of the operational test (Project M3.3). Expansion involves integration of freeway and arterial traffic control in priority corridors including 1-680 and West Dodge Road.		
APPLICABLE USER SERVICE:	En-Route Driver Infor Management, Pre-Trip	rmation, Route Guidance, Traffic Cont Information	rol, Incident
COSTS:			
Study/Design:	\$552,000 A	Additional Annual Agency Personnel:	\$31,000
Implementation:	\$5,060,000 A	Annual Operations & Maintenance:	\$550,000
Communications:			
- Design		~	10
- Capital		Service Life (Years):	10
- Annual Lease			
STAFFING REQUIRI	EMENTS:		
- Engineering Supervi	sor .2	- Field Supervisor	.2
- Staff Engineer	1.0	- Field Technician 1.	.0
BENEFITS:			
Annual User Benefits:	\$8,100,000	Benefit/Cost Ratio: 5.4	
Other:			
FUNDING SOURCES	: IVHS Act, CMAQ	2	
PUBLIC/PRIVATE PARTNERSHIP: Possibility in the area of communications and motorist information system.			
INSTITUTIONAL CONSIDERATIONS: NDOT, City of Omaha, police departments, 911, fire departments and others should reach consensus on various elements of the program.			
COMMENTS:			

CALLUCKI, AIC	a-wide Traffic Manag	gement and Information Center (ATMIC)
PROJECT: L3.3	8 Ramp Metering - P	Phase II
DESCRIPTION:	Design and impleme corridors to include	ent expansion of ramp metering on freeways in priority approximately 15 additional ramps.
APPLICABLE USER SERVICE:	Traffic Control, Inci	ident Management
COSTS:		
Study/Design:	\$124,000	No additional personnel is assumed.
Implementation:	\$1,139,000	Annual Operations & Maintenance is assumed to be borne by NDOR.
Communications:		
- Capital	None	Service Life (Years): 20
- Annual Lease	\$18,000	
BENEFITS: Annual User Benefits:	\$880,000	Benefit/Cost Ratio: 5.2
Other:		
FUNDING SOURCES	SE STP, NHS	
PUBLIC/PRIVATE P	ARTNERSHIP:	Not common for this project.
INSTITUTIONAL CO	ONSIDERATIONS:	Public education and effective design of the systems is important.
COMMENTS:	This project reduces locations.	traffic demand and recovery times at congested

CATEGORY: Traveler	Information	Systems
---------------------------	-------------	---------

PROJECT:	L4.1 Radio	Data System	(RDS)	Implementation
-----------------	------------	-------------	-------	----------------

DESCRIPTION:	Design and implement area-wide RDS based on results of operational test (Project M4.1).			
APPLICABLE USER SERVICE:	En-Route Driver Information, Route Guidance, Incident Management, Pre-Trip Information			
COSTS				
Study/Design:	\$92,000	Additional Annual Agency Personnel:	\$19,000	
Implementation:	\$152,000	Annual Operations & Maintenance:	\$25,000	
Communications:				
 Capital 	None	Service Life (Years):	10	
- Annual Lease	None			
STAFFING REQUIRE	EMENTS			
- Engineering Supervisor .1 - Field Supervisor				
- Staff Engineer	.25	- Field Technician		
BENEFITS				
Annual User Benefits:	\$360,000	Benefit/Cost Ratio: 4.3		
Other:				
FUNDING SOURCES	: IVHS Act			
PUBLIC/PRIVATE PA	ARTNERSHIP:	Strong possibility with media.		
INSTITUTIONAL CONSIDERATIONS: Discussion among agencies are required for consistency and accuracy of information. In addition, the type of arrangement with media should carefully be looked at.				
COMMENTS: Very cost-effective approach to inform users. This project increases route diversion, reducing traffic demand and recovery times at congested locations.				

CATEGORY: Traveler Information Systems

PROJECT: L4.2 Highway Advisory Radio (HAR) - Phase III

DESCRIPTION:	Design ar additional generation	Design and implement expansion of HAR to include approximately nine additional 0. 1-watt HAR units and area-wide real-time message generation.			
APPLICABLE USER SERVICE:	En-Route	Driver Inform	ation, Route Guio	lance, Incident Management	
COSTS					
Study/Design:	\$31,000	Additional A Personnel:	Annual Agency	(\$29,000 first 2 years, then \$6,000 per year)	
Implementation:	\$285,000	Annual Ope Maintenanc	rations & e:	\$31,000	
Communications:					
- Capital	None	Service Life	e (Years):	20	
- Annual Lease	\$21,000				
STAFFING REQU - Engineering Sup - Staff Engineer	IREMENTS ervisor	.1 .2	- Field - Field	Supervisor .1 Technician .2	
BENEFITS Annual User Benefi Other:	ts: \$220,0	00 .	Benefit/Cost Ra	tio: 2.2	
FUNDING SOUR	CES: STP,	CMAQ			
PUBLIC/PRIVATI	E PARTNERS	HIP:	Strong possibility disseminating tra	y with private entities interested in veler information.	
INSTITUTIONAL	CONSIDERA	TIONS:	Credibility of the of information ac applicability.	e information is at stake in terms occuracy, timeliness, and	
COMMENTS:	This proje This proje recovery 1	ect's effectiven ect increases ro times at conges	ess will be enhan ute diversion, rec ted locations.	iced to follow after Phase I and II. ducing traffic demand and	

CATEGORY: Tra	CATEGORY: Traveler Information Systems			
PROJECT: L4.	.3 Changeable Messag	e Signs (CMS) - Phase III		
DESCRIPTION:	Design and impleme CMS installations at locations, and area-w	nt expansion of CMS system to include approximately four freeway and ten arte- vide real-time message generation	additional erial street	
APPLICABLE USER SERVICE:	En-Koute Driver Info	ormation, Route Guidance, Incident Man	agement	
COSTS				
Study/Design:	\$169,000	Additional Annual Agency Personnel:	\$29,000	
Implementation:	\$1,555,000	Annual Operations & Maintenance:	\$160,000	
Communications:				
- Capital	None	Service Life (years):	20	
- Annual Lease	\$2 1,000			
STAFFING REQUIR	REMENTS			
- Engineering Superv	v isor .1	- Field Supervisor .1		
- Staff Engineer	.2	- Field Technician .2	1	
BENEFITS				
Annual User Benefits:	\$310,000	Benefit/Cost Ratio: 0.8		
Other:				
FUNDING SOURCE	S: STP, CMAQ			
PUBLIC/PRIVATE PARTNERSHIP: Not common in this project, although CMS offers opportunity for potential advertising.				
INSTITUTIONAL C	NSTITUTIONAL CONSIDERATIONS: Effectiveness of CMS is an issue dependent on the accuracy of the message and its timeliness.			
COMMENTS: Important since several programs are dependent upon CMS, such as incident management.				

CATEGORY: Trav	veler Information S	ystems			
PROJECT: L4.4 Cable TV (CATV) System - Phase III					
DESCRIPTION:	SCRIPTION: Design and implement enhancement of CATV system to provide interactive teletext service.				
APPLICABLE USER SERVICE:	Incident Managemen	nt, Pre-Trip Information			
COSTS					
Study/Design:	\$17,000	Additional Annual Agency Personnel:	\$8,000		
Implementation:	\$137,000	Annual Operations & Maintenance:	\$15,000		
Communications:					
- Capital	None	Service Life (Years):	10		
- Annual Lease	None				
STAFFING REQUIR	EMENTS				
- Engineering Supervi	sor .05	- Field Supervisor			
- Staff Engineer	.1	- Field Technician			
BENEFITS					
Annual User Benefits:	\$540,000	Benefit/Cost Ratio: 11			
Other:					
FUNDING SOURCES	: STP, CMAQ				
PUBLIC/PRIVATE PARTNERSHIP: Strong public/private opportunity exists where a vendor provides funding in exchange with access/use of the CATV facilities.					
INSTITUTIONAL CONSIDERATIONS: Lead agency is required to supervise the design and implementation of this program.					
COMMENTS: This project increases route diversion, reducing traffic demand and recovery times at congested locations.					

CATEGORY: Traveler Information Systems

PROJECT: L4.5 Kiosks/Videotex System - Phase III

DECODIDETON	Declar and line 1		01		
DESCRIPTION:	locations and upgrade system to provide interactive capabilities,				
APPLICABLE	Traveler Services Information Incident Management Pre-Trip				
USER SERVICE:	Information		P		
COSTS					
Study/Design:	\$76,000	Additional Annual Agency Personnel:	\$32,000		
Implementation:	\$506,000	Annual Operations & Maintenance:	\$126,000		
Communications:					
- Capital	None	Service Life (Years):	20		
- Annual Lease	\$50,000				
STAFFING REQUIR	REMENTS				
- Engineering Supervi	sor .1	- Field Supervisor .0.	5		
- Staff Engineer	.3	- Field Technician .2			
BENEFITS					
Annual User Benefits:	\$65,000	Benefit/Cost Ratio: 0.2			
Other:					
FUNDING SOURCES	: STP, CMAQ				
PUBLIC/PRIVATE PA	ARTNERSHIP:	Strong possibility.			
INSTITUTIONAL CO	DNSIDERATIONS:	Identification of location, content of sequencing, etc. are key factors for s program.	the database, success of this		
COMMENTS:	COMMENTS: This project increases route diversion, reducing traffic demand and recovery times at congested locations.				

I

ł

CATEGORY: Traveler Information Systems

PROJECT: L4.6 In-Vehicle Traveler Information System Operational Test

DESCRIPTION:	Design and implement operational test of in-vehicle traveler information to evaluate system effectiveness.			
APPLICABLE USER SERVICE:	En-Route Driver Info Information, Incident	ormation, Route Guidance, Traveler Serv Management	vices	
COSTS				
Study/Design:	\$138,000	Additional Annual Agency Personnel:	\$62,000	
Implementation:	\$1,265,000	Duration;	4 years	
Communications:		Annual Operations & Maintenance:	\$140,000	
- Capital	None			
- Annual Lease	\$10,000	Service Life (Years):	5	
STAFFING REQUIRE	EMENTS			
- Engineering Supervis	sor .2	- Field Supervisor .1		
- Staff Engineer	.5	- Field Technician .5		
BENEFITS				
Annual User Benefits:	\$32,000	Benefit/Cost Ratio: 0.06		
Other:				
FUNDING SOURCES	: STP, CMAQ			
PUBLIC/PRIVATE PA	ARTNERSHIP:	Strong possibility to work with auton manufacturers and related industries.	nobile	
INSTITUTIONAL CONSIDERATIONS: Lead agency is required to manage this task.				
COMMENTS: This project increases route diversion, reducing traffic demand and recovery times at congested locations.				

I

I

CATEGORY: Incident Management

PROJECT: L5.1 Freeway Service Patrol (FSP) - Phase III

DESCRIPTION:	Continue operation approximately 40 r	n of FSP during weekday peak periods ov niles of the freeways in the priority corri-	er dors.
APPLICABLE USER SERVICE:	Incident Manageme	ent	
COSTS			
Study/Design:	None	Additional Annual Agency Personnel:	\$157,000
Implementation:	\$400,000	Annual Operations & Maintenance:	\$200,000
Communications:	Included in O&M		
		Service Life (Years):	10
STAFFING REQUIRI	EMENTS		
- Drivers	8	- Field Supervisor	l
- Staff Engineer	.4	- Drivers	3
BENEFITS			
Annual User Benefits:	\$2,000,000	Benefit/Cost Ratio: 4.9	
Other:	Very well receiv	red by the public.	
FUNDING SOURCES	: HES		
PUBLIC/PRIVATE PA	ARTNERSHIP:	Strong possibility to involve private companies.	e tow
INSTITUTIONAL CO	NSIDERATIONS:	Lead agency is required for coordinaddition, public education is necess project.	nation. In ary for this
COMMENTS:	Several of the exist This project improv	ing FSP programs use private tow truck over the public relations and reduces duration	companies. of incidents.

CATEGORY: Incid	CATEGORY: Incident Management				
PROJECT: L5.2 Incident Management Team Support - Phase III					
DESCRIPTION:	DESCRIPTION: Continue activities of the incident management team established in Phase I.				
APPLICABLE USER SERVICE:	Incident Managemen	ıt			
COSTS					
Study/Design: Implementation:	\$180,000	Additional Annual Agency Personnel: Annual Operations & Maintenance:	None None		
Communications: - Capital	None	Service Life (Years):	10		
- Annual Lease	None	والمرافق والمراقع والمراقع والمراقع والمراقع والمحافظ والمحافظ والمحافظ والمحافظ والمحافظ والمحافظ والمحافظ وال			
STAFFING REQUIREMENTS - Engineering Supervisor - Staff Engineer - Field Technician					
BENEFITS					
Annual User Benefits:		Benefit/Cost Ratio:			
Other:	Improves effective	eness of incident management.			
FUNDING SOURCES:	HES				
PUBLIC/PRIVATE PARTNERSHIP: Coordination with private service providers and possible partnership is applicable in this project such as hospitals.					
INSTITUTIONAL CONSIDERATIONS: Team approach and clear roles and responsibilities for various events is necessary for success of this program.					
COMMENTS: Establishment of this program is already underway. Essential for effective and coordinated incident management.					

CATEGORY: Travel Demand Management

PROJECT: M.I HOV Design and Implementation

DESCRIPTION:	Design and imp freeways in the	Design and implement HOV facilities on approximately 10 miles of freeways in the priority corridors.			
APPLICABLE USER SERVICE:	Demand Manag	Demand Management and Operations			
COSTS					
Study/Design:	\$2,760,000				
Implementation:	\$39,220,000	Added operations & maintenance is assumed at 1% over and above the ongoing maintenance provided by NDOR	\$420,000		
Communications:					
- Capital	None	Service Life (Years):	20		
- Annual Lease	None				
BENEFITS Annual User Benefits: \$100,000 Benefit/Cost Ratio: 0.02 Other: 0.02 0.02 0.02					
FUNDING SOUR	CES: STP, NHS,	CMAQ			
PUBLIC/PRIVATI	E PARTNERSHIP:	Not common for this project.			
INSTITUTIONAL CONSIDERATIONS: This project requires a lead agency and coordination between agencies along all priority corridors.					
COMMENTS:	<u>, , , , , , , , , , , , , , , , , , , </u>	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	- <u></u>		

CATEGORY: Trave	el Demand Manage	ment	
PROJECT: L6.2	Demand Manageme	nt Support - Phase II	
DESCRIPTION:	Continue on-going travel demand management activities including maintenance of rideshare database and studies to identify feasible travel demand programs.		
APPLICABLE USER SERVICE:	Demand Managemen Matching and Reserv	nt and Operations, Pre-Trip Information, vation	Ride
COSTS			
Study/Design:	\$100,000	Additional Annual Agency Personnel:	None
Implementation:	None	Annual Operations & Maintenance:	None
Communications:			
- Capital .	None	Service Life (Years):	10
- Annual Lease	None		
STAFFING REQUIRE	MENTS		
 Engineering Supervis 	- Engineering Supervisor - Field Supervisor		
- Staff Engineer	- Field Technician		
BENEFITS			
Annual User Benefits:		Benefit/Cost Ratio:	
Other:	Reduces vehicular	traffic demand at congested locations.	
FUNDING SOURCES:	CMAQ		
PUBLIC/PRIVATE PARTNERSHIP: Strong possibility, especially with large employers.			
INSTITUTIONAL CO	NSIDERATIONS:	Lead agency required.	
COMMENTS:	Essential to effective services.	deployment of ITS travel demand manaş	gement user

~ •

CATEGORY: Travel Demand Management					
PROJECT: L6.3	PROJECT: L6.3 Park-and-Ride Implementation - Phase II				
I)ESCRIPTION:	Design and implen and-ride facilities a corridors.	nent expansion of park-and-ride program t at approximately five more locations in the	o add park- priority		
AWPLICABLE USER SERVICE:	Demand Manageme	ent and Operations			
(COSTS					
Study/Design:	\$50,000	Additional Annual Agency Personnel:	\$16,000		
Implementation:	\$450,000	Duration:	2 years		
<i>(Communications:</i>		Annual Operations & Maintenance:	\$50,000		
- Capital	None				
- Annual Lease	None	Service Life (Years):	20		
STAFFING REQUIRI	EMENTS				
- Engineering Supervi	sor .05	- Field Supervisor			
- Staff Engineer	.1	- Field Technician .2			
BENEFITS					
Annual User Benefits:	\$360,000	Benefit/Cost Ratio: 3.3			
Other:					
FUNDING SOURCES: CMAQ					
PUBLIC/PRIVATE P	ARTNERSHIP:	(P: Arrangements are possible with private entities so that existing/proposed lots could be used for multipurposes.			
INSTITUTIONAL CO	DNSIDERATIONS:	Maintenance of park-and-ride lots w for consideration.	ill be an issue		
COMMENTS:	When right-of-way demand manageme congested locations	y is available, this could be a cost-effective ent. This project reduces vehicular traffic de s.	e measure for emand at		

CATEGORY: Travel Demand Management				
PROJECT: L6.4	Smart Transit Serv	ice Implementation		
DESCRIPTION:	Design and implement service to additional test (Project M6.4).	Design and implement expansion of smart transit service to provide service to additional areas where feasible based on results of operational test (Project M6.4).		
APPLICABLE USER SERVICE:	Demand Managemen Personalized Public '	t and Operations, Public Transportation Transit	Management,	
COSTS				
Study/Design:	\$60,000	Additional Annual Agency Personnel:	\$29,000	
Implementation:	\$540,000	Duration:	2 years	
Communications:		Annual Operations & Maintenance:	\$60,000	
- Capital	None			
- Annual Lease	None	Service Life (Years):	10	
STAFFING REQUIRE	MENTS			
- Engineering Supervis	sor .1	- Field Supervisor .1		
- Staff Engineer	.2	- Field Technician .2		
BENEFITS				
Annual User Benefits:		Benefit/Cost Ratio:		
Other:	Increases transit ri	dership in lower density areas.		
FUNDING SOURCES	S: MATC (with 50	1% local match)		
PUBLIC/PRIVATE PA	RTNERSHIP:	Possible with transit service and sys providers.	tems	
INSTITUTIONAL CON	SIDERATIONS:			
COMMENTS:	Good source of fundi	ng already earmarked.		

PROJECT: L7.1 Traffic Management Forum - Phase III

DESCRIPTION:	Continue activities of the Traffic Management Forum established in		
	corridors, ramp metering, and on-going discussions of critical issues identified in earlier phases.		
APPLICABLE USER SERVICE:	Traffic Control		
COSTS	No cost has been assum	ned.	
STAFFING REQUIRE	MENTS No addition	al staffing has been assumed.	
BENEFITS			
Annual User Benefits:		Benefit/Cost Ratio:	
Other:	Facilitates the deploy operations.	yment of ITS technologies and effective ATMIC	
FUNDING SOURCES:	Not needed.		
PUBLIC/PRIVATE PARTNERSHIP: Not applicable.			
INSTITUTIONAL CO	NSIDERATIONS:	Consensus building will be a key issue at this Forum. A lead agency should be identified which could possibly rotate, per members' wishes.	
COMMENTS:	This forum is considered and signal coordination	ed an important arena to discuss traffic management issues.	

PROJECT: L7.2 Public/Private Partnerships - Phase III

DESCRIPTION:	Continue public/private partnership activities initiated in earlier phases.
APPLICABLE USER SERVICE:	Incident Management, Demand Management and Operations, Pre-Trip Information, Ride Matching and Reservation
COSTS:	No cost has been assumed.
STAFFING REQUIRI	EMENTS: No additional staffing has been assumed.
BENEFITS:	
Annual User Benefits:	Benefit/Cost Ratio:
Other:	Facilitates the deployment of ITS technologies.
FUNDING SOURCES	: Not needed.
PUBLIC/PRIVATE PA	ARTNERSHIP:
INSTITUTIONAL CO	NSIDERATIONS: A lead agency is required to start this program.
COMMENTS:	This program is important as it should identify a market for the strategic deployment business plan and facilitate various partnerships.

.

CATEGORY: Deployment Support

PROJECT: L7.3 Education Program - Phase III

DESCRIPTION:	Continue development and implementation of education programs initiated in earlier phases as well as new programs pertinent to long-term ITS deployment activities.		
APPLICABLE USER SERVICE:	En-Route Driver Information, Route Guidance, Traveler Services Information, Traffic Control, Incident Management, Demand Management and Operations, Pre-Trip Information, Ride Matching and Reservation, Public Transportation Management, En-Route Transit Information, Personalized Public Transit, Electronic Payment Services, Freight Mobility		
COSTS:			
Study/Design and		Additional Annual Agency Personnel:	\$16,000
Implementation:	\$350,000	Annual Operations & Maintenance:	None
Communications:		-	
 Capital 	None	Service Life (Years):	10
- Annual Lease	None		
STAFFING REQUIRE	MENTS		
- Engineering Supervis	sor .1	- Field Supervisor	
- Staff Engineer	.2	- Field Technician	
BENEFITS			
Annual User Benefits:		Benefit/Cost Ratio:	
Other:	Increases technical deployment.	knowledge of responsible agencies and	promotes ITS
FUNDING SOURCES	: CMAQ		
PUBLIC/PRIVATE PARTNERSHIP: It is possible for certain private entities to sponsor materials, etc.			
INSTITUTIONAL CONSIDERATIONS: This program should be developed carefully with stakeholders' input and include a wide range of audience.			
COMMENTS: Very important as it is considered a key element relative to the success of ITS deployment and users' acceptance.			

CATEGORY:	Deployment Support		
PROJECT:	L7.4 Intermodal Coordin	nation Program - Phase III	
DESCRIPTION:	Continue activities of Phase I.	f intermodal coordination committee esta	ablished in
APPLICABLE USER SERVICE:	Travel Service Inforr Trip Information, Pul	nation, Demand Management and Operablic Transportation Management, Freigh	ations, Pre- 1t Mobility
COSTS			
Study/Design and Implementation: Communications:	\$230,000	Additional Annual Agency Personnel: Annual Operations & Maintenance:	\$11,000 None
- Capital	None	Service Life (Years):	10
- Annual Lease	None		
STAFFING REQU - Engineering Sup - Staff Engineer	UIREMENTS Dervisor .1 .1	- Field Supervisor - Field Technician	
BENEFITS			_
Annual User Benej	its:	Benefit/Cost Ratio:	
Other:	Facilitates ITS dep	oloyment.	
FUNDING SOUR	CES: CMAQ		
PUBLIC/PRIVA	TE PARTNERSHIP:	HIP: Private service providers and various user organizations should be involved in this program.	
INSTITUTIONAI	L CONSIDERATIONS:	Private entities should have a role	in this program
COMMENTS:			

PLEASE FAX THE FOLLOWING 3 PAGES TO ABBAS BY IO/17/95 Fax (213) 488-9440

SHORT-TERM	1st Priority	2nd Priority	3rd Priority
SIGNAL SYSTEMS			
S1.1 Signal Timing Plan Development - Phase I			
S1.2 Local Traffic Controller and Detection Improvements - Phase I			
S1.3 Traffic Control Systems			
2. SURVEILLANCE			
S2.1 CCTV Installation - Phase I			
AREA-WIDE TRAFFIC MANAGEMENT AND INFORMATION CENTER ATMIC)			
S3.1 Functional Requirements Study			
S3.2 Design			
I. TRAVELER INFORMATION SYSTEMS			
S4.1 Radio Data System (RDS) Development			
S4.2 Highway Advisory Radio (HAR) - Phase I			
S4.3 Changeable Message Signs (CMS) - Phase I			
S4.4 Cable TV System (CATV) - Phase I			
S4.5 Kiosks/Videotex System - Phase I			
S4.6 Internet/Computer Bulletin Board System (BBS) - Phase I			
S4.7 Highway Advisory Telephone (HAT) - Phase I			
5. INCIDENT MANAGEMENT	,		
S5.1 Freeway Service Patrol (FSP) - Phase I			
S5.2 Emergency Vehicle Access			
S5.3 Reference Markers			
S5.4 Incident Management Team Development			
5. TRAVEL DEMAND MANAGEMENT			
S6.1 Smart Transit Service Study			
S6.2 Ride-Sharing Database			
S6.3 Park-and-Ride Study			
1. DEPLOYMENT SUPPORT			
S7.1 Traffic Management Forum - Phase I			
S7.2 Public/Private Partnerships - Phase I			
S7.3 Education Program - Phase I		l	1
57.4 Intermodal Coordination Program - Phase I			
S7.5 Area-wide Signing and Striping Database - Phase I			

MEDIUM-TERM	1st Priority	2nd Priority	3rd Priority
1. SIGNAL SYSTEMS	j		
 Ml. 1 Signal Timing Plan Development - Phase II Ml.2 Local Traffic Controller and Detection Improvements - Phase II Ml.3 Traffic Control Systems M1.4 Adaptive Traffic Control Operational Test M1.5 Advanced Traffic Controller Operational Test 2. SURVEILLANCE M2.1 CCTV Installation - Phase II 			
3. AREA-WIDE TRAFFIC MANAGEMENT AND INFORMATION CENTER (ATMIC) M3.1 ATMIC Implementation M3.2 Expert Systems Operational Test M3.3 Smart Corridor Operational Test M3.4 Ramp Metering - Phase I			
 4. TRAVELER INFORMATION SYSTEMS M4.1 Radio Data System (RDS) Operational Test M4.2 Highway Advisory Radio (HAR) - Phase II M4.3 Changeable Message Signs (CMS) - Phase II M4.4 Cable TV System (CATV) - Phase II M4.5 Kiosks/Videotex System - Phase II M4.6 Internet/Computer Bulletin Board System (BBS) - Phase II M4.7 Highway Advisory Telephone (HAT) - Phase II M4.8 Transit Vehicle Status Monitoring Operational Test 			
 5. INCIDENT MANAGEMENT M5.1 Freeway Service Patrol (FSP) - Phase II M5.2 Accident Investigation Sites M5.3 Equipment Storage Sites M5.4 Incident Management Team Support - Phase II 			
 6. TRAVEL DEMAND MANAGEMENT M6.1 HOV Needs Study M6.2 Demand Management Support - Phase I M6.3 Park-and-Bide Implementation - Phase I M6.4 Smart Transit Service Operational Test M6.5 Smart Card 			
 7. DEPLOYMENT SUPPORT M7.1 Traffic Management Forum - Phase II M7.2 Public/Private Partnerships - Phase II M7.3 Education Program - Phase II M7.4 Intermodal Coordination Program - Phase II M7.5 Area-wide Signing and Striping Database - Phase II 			

LONG-TERM	1st Priority	2nd Priority	3rd Priority
1. SIGNAL SYSTEMS			
L1. 1 Adaptive Traffic Control Implementation			1
L1.2 Advanced Traffic Controller Implementation			
2. SURVEILLANCE			
L2.1 Advanced Surveillance/Monitoring System			
3. AREA-WIDE TRAFFIC MANAGEMENT AND INFORMATION CENTER (ATMIC)			
L3.1 Expert Systems Implementation			
L3.2 Smart Corridor Implementation			· · · · · · · · · · · · · · · · · · ·
L3.3 Ramp Metering - Phase II			
4. TRAVELER INFORMATION SYSTEMS			
L4. 1 Radio Data System (RDS) Implementation			
L4.2 Highway Advisory Radio (HAR) - Phase III			
L4.3 Changeable Message Signs (CMS) - Phase III			
L4.4 Cable TV System (CATV) - Phase III			
L4.5 Kiosks/Videotex System - Phase III			
L4.6 In-Vehicle Travel Information System			
5. INCIDENT MANAGEMENT			
L5.1 Freeway Service Patrol (FSP) - Phase III			
L5.2 Incident Management Team Support - Phase III			
6. TRAVEL DEMAND MANAGEMENT			
L6.1 HOV Design and Implementation			
L6.2 Demand Management Support - Phase II			
L6.3 Park-and-Ride Implementation - Phase II			
L6.4 Smart Transit Service Implementation			
7. DEPLOYMENT SUPPORT			
L7.1 Traffic Management Forum - Phase III			
L7.2 Public/Private Partnerships - Phase II			
L7.3 Education Program - Phase III			L
L7.4 Intermodal Coordination Program - Phase III			

APPENDIX G

Support Technologies Descriptions

APPENDIX H

Cost Estimate Assumptions