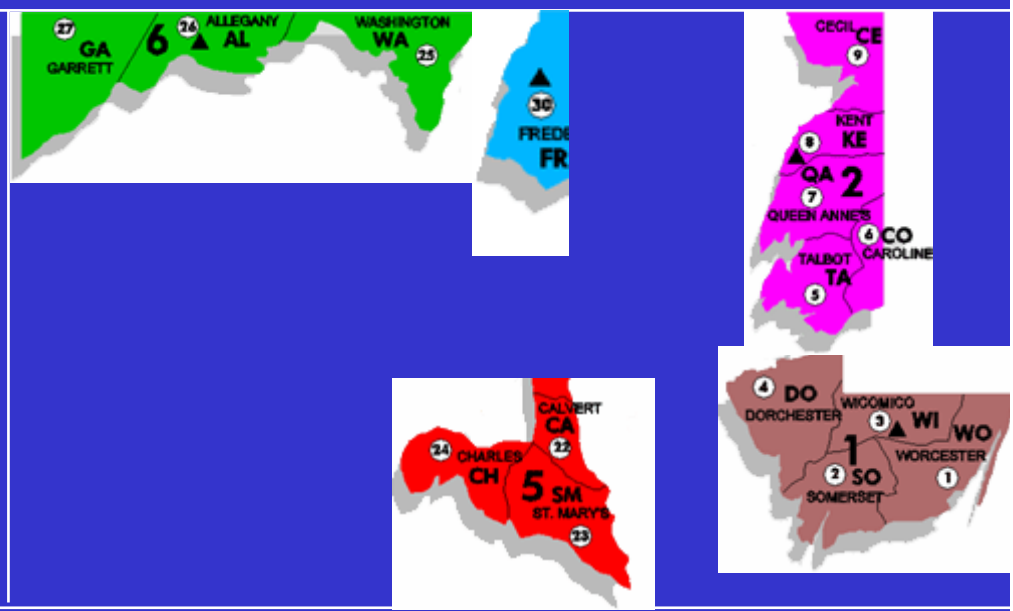
CHART PLANNING, DESIGN, INTEGRATION, AND PROJECT DEVELOPMENT SERVICES



Rural M&O/ITS Strategic Deployment Plan
Technical Memorandum No. 3

Prepared by

Edwards and Kelcey

for

Maryland State Highway Administration
CHART Program

MARCH 2007

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Maryland Department of Transportation

CHART PLANNING, DESIGN, INTEGRATION, AND PROJECT DEVELOPMENT SERVICES

Rural Management and Operations (M&O)/Intelligent Transportation Systems (ITS)

Strategic Deployment Plan

FINAL

Technical Memorandum No. 3

March 23, 2007

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EXECUTIVE SUMMARY

Development of the *Rural Management and Operation Systems (M&O)/Intelligent Transportation Systems (ITS) Strategic Deployment Plan* is an effort initiated by the State Highway Administration (SHA) and Office of Coordinated Highways Action Response Team (CHART) and ITS Development. M&O along with ITS have been recognized in many large cities throughout Maryland. Because such an accomplishment had been successful around the Capital and Baltimore Beltways, the major interstates, and the Annapolis and Frederick areas, SHA and the Office of CHART and ITS Development have begun an expansion of their system to include rural areas of Maryland into this program. It is essential to incorporate the rural areas into the CHART program to facilitate rural-to-rural communication as well as communication with the state's urban areas, especially when it comes to roadway management. Primary focus of this *Plan* is to define the M&O/ITS planning and deployment needs of rural Maryland that would lead toward reduced seasonal highway congestion, better information to motorists of evacuation and emergency procedures, and improved communications with other parts of the State and neighboring areas, as to events that are taking place in Maryland or its adjoining States. Because of the variant environments throughout Maryland, three rural areas have been grouped in order to serve the needs of various locations. The three areas are as follows: Eastern Shore, Western Maryland, and Southern Maryland. In order to accomplish this vast task, a series of stakeholder meetings was organized where representatives from different organizations gathered together, not only to support their respective organizational missions, but to also help Maryland improve the ITS planning process. Existing local ITS inventory and needs for additional M&O/ITS strategies and deployments assembled from the stakeholder meetings have been considered for an assessment. Additionally, existing, in construction, and planned CHART ITS deployments were considered as well.

The M&O/ITS inventory and needs assessment focuses on identifying M&O/ITS deployments and strategies to support weather, evacuation, seasonal and everyday traffic, special events, and safety issues in the rural parts of Maryland; locating the areas that are candidates for deployment of ITS devices; prioritizing needs based on the perceived benefits and level of importance; and recognizing gaps in on-going evacuation planning efforts. Stakeholders from the three rural areas identified fifty two needs that would help them to improve M&O/ITS. The most common among them are request for access to the CHART data, better roadway monitoring, and establishment of working/coordination groups to support the use and maintenance of the *Strategic Plan*. The biggest concerns for the Eastern shore stakeholders were access to the CHART data and traffic monitoring to support emergency and incident management as well as everyday traffic. Western Maryland stakeholders expressed their worries towards weather detection and roadway monitoring to support emergency and incident management and provide better information to travelers during inclement weather. Communications issues and roadway monitoring to support emergency and incident management during everyday traffic and major evacuations were the highest priority concerns for the Southern Maryland stakeholders.

The needs assessment served as a base to identify gaps between the stakeholders' needs and the Maryland ITS Architecture. The gap analysis considered ITS Architecture Components and Scope into discussion and summarizes recommended changes in the following areas: List of

Stakeholders, List of Projects, and Elements. However, possible changes will be required in the section on Operational Concepts.

The M&O/ITS strategies plan that addresses the stakeholders' needs was established. The plan provides a schedule for deployments and cost estimates. Based on the prioritization established among needs, three phases were developed. Each phase is associated with the specific priority code. Phase 1 is associated with the highest priority code and is number one priority for the rural Maryland. Seven (7) of the twenty (20) needs identified by the Eastern shore stakeholders qualified for Phase 1, two (2) of the nineteen (19) from the Western Maryland and six (6) of the twelve (12) from the Southern Maryland. The following is the summary of the proposed solutions and needs for Phase 1:

- Install CHART workstations to provide access to the CHART data.
- Install Dynamic Message Signs (DMS) to support evacuation plans and diversion routes as well as provide motorists with advance incident warning massages.
- Install Roadway Weather Information Systems (RWIS) to support detour routes.
- Purchase 800MHz radios and provide adequate training to provide better communication among traffic and incident management users.
- Expand Freeway Incident Traffic Management (FITM) plans to support detour routes.
- Install guide signs to support emergency evacuations.

The following table summarizes ITS deployment costs by phase and rural part of Maryland. Total ITS deployment costs for the three Maryland rural areas are $14.6 million. Phases 2 and 3 account for 74% and 5% of the total costs, respectively. Highlighted in the table below is Phase 1, with total costs of $3.1 million, or 21% of the total deployment costs for all three rural areas. Operations and Maintenance (O&M) annual estimated costs for Phase 1 are $187,500. Phase 1 deployments have been identified as highest priority in this effort, and require immediate action.

Rural M&O/ITS Implementation Cost Estimates – Summary by Phase

RURAL AREA	PHASE 1	PHASE 2	PHASE 3	SUBTOTAL
Eastern Shore	$593,497	$2,062,318	$598,994	$3,254,810
Western Maryland	$716,471	$7,270,409	$124,545	$8,111,426
Southern Maryland	$1,798,482	$1,454,374	-	$3,252,856
Total	**$3,108,450**	**$10,787,101**	**$723,539**	**$14,619,091**

Additionally, revenue sources such as federal funding sources and available public/private partnerships are presented in this report. As a highlight of the funding section, the SHA Consolidated Transportation Program (CTP) for next five-year period (2006 – 2011) has been already planned and does not include the proposed M&O/ITS needs presented here. SHA

together with CHART and rural area stakeholders have to work together towards finding sources to support the proposed deployment plan. Section five discusses available funding sources that could be possibly used for the rural M&O/ITS needs.

The following sections of this document provide insight on how SHA and the Office of CHART and ITS Development plan to accomplish the goals of delivering M&O/ITS technology to rural Maryland, and the cooperation and collaboration it has achieved throughout the process.

1.0 INTRODUCTION

The Maryland State Highway Administration (SHA) and Office of CHART and ITS Development initiated a process of developing a *Rural Management and Operations (M&O)/Intelligent Transportation Systems (ITS) Strategic Plan* to define the M&O/ITS planning and deployment needs of rural Maryland. Their goal to have an effective transportation maintenance and operation program working consistently, the CHART *M&O/ITS Strategic Plan* addresses some major issues that are not associated just with Metropolitan areas, but also with the suburban areas of the State. Issues such as congestion, safety, incident-related delays, traveler information dissemination, effective transportation resources for emergencies and disasters, and effective transportation operations centers for agency coordination apply to rural areas as well, but in a different way. The M&O strategies formulated in this plan will be geared towards unique challenges that are typically encountered in rural parts of Maryland, particularly relating to snowfall and fog in the mountainous areas, hurricanes on the Eastern Shore and limited communications capabilities in these regions. The *Plan* focuses on the continuous expansion of the very successful CHART program functions into the rural areas, which include all the areas outside of the Baltimore and Washington D.C. Metropolitan regions. The CHART program embraces the continuous deployment of ITS technologies and the expansion of the CHART incident management program.

1.1 ITS IN METRO AREA

Baltimore-Washington D.C. Metropolitan region essentially consists of the Washington D.C., Northern Virginia and urbanized Maryland areas and is rounded with the suburban areas in Maryland and Virginia. The Maryland Statewide ITS Architecture identifies interconnects and architecture flows between freeway, arterial, toll administration and transit management centers, information service providers, public safety centers, Commercial Vehicle Operations (CVO) systems, and archived data, emission and parking management systems between state, county and local agencies in Maryland. The Virginia Department of Transportation (VDOT) Northern Virginia (NOVA) District ITS Architecture is a VDOT-centric architecture, and as such, identifies interconnects and architecture flows between VDOT and county agencies, local jurisdictions, and other regional agencies that operate roadway and transit systems in the NOVA District. The Metropolitan Washington Area ITS Architecture is closely coordinated with on-going Maryland Statewide and VDOT NOVA District ITS architecture initiatives.

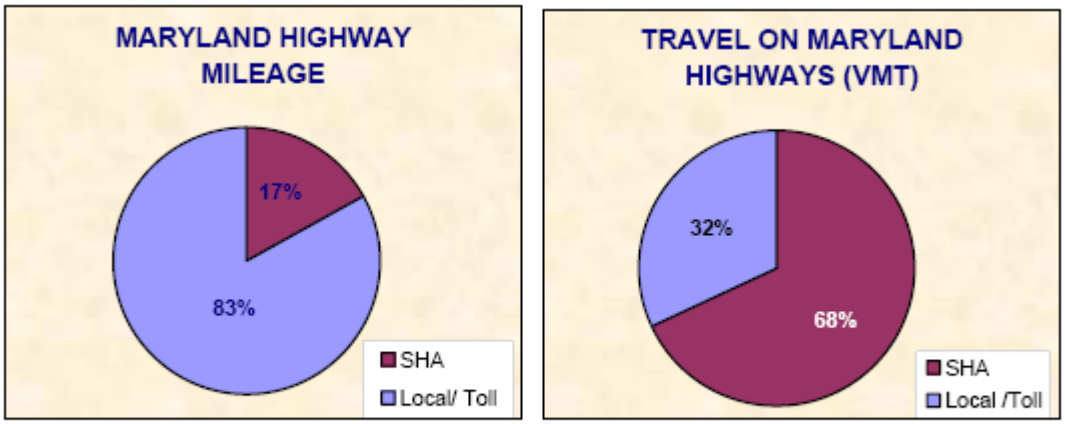
1.1.1 Maryland Department of Transportation (MDOT)

Maryland attracts various businesses and high educated people to its core and the major reason is the popularity of the Baltimore-Washington D.C. Metropolitan area. With a population of 5,296,486 and medium household income of $56,763, Maryland has a high potential for growth in all aspects. Maryland is home to the Maryland State Highway Administration (SHA), which is a part of much bigger institution - the Maryland Department of Transportation (MDOT). Maryland SHA maintains more than 16,000 lane miles of interstate, primary and secondary roads

and more than 2,500 bridges (SHA Annual Report, FY 2005). Maryland SHA is responsible for designing, building, and maintaining the state's roads and bridges. Exhibit 1.1 shows SHA's contributions in the Maryland Highway Mileage and Total Vehicle Miles (VMT) in Maryland. The SHA's road system by lane-miles accounts 16% of Interstate roads, 17% of Maryland Roads, and 67% of US Routes (Exhibit 1.2).

Exhibit 1.1

Maryland Highway Mileage and VMT in Maryland(1)

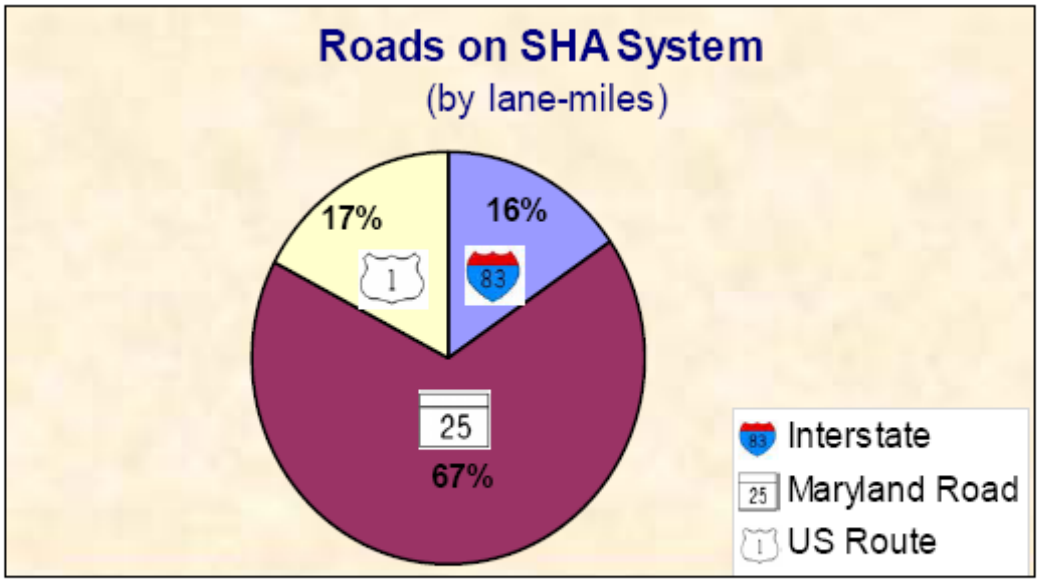


Although SHA accounts for 17% of Maryland Highway Mileage, it caters to 68% of the total vehicle miles of travel (VMT) in Maryland.

(1) Source: SHA Annual Report, FY 2005

Exhibit 1.2

Roads on SHA System: Interstates, Maryland Roads and US Routes[(1)]



Maryland Roads, US Highways and Interstate Highway lane miles account for 67%, 17%, and 16% of the SHA System road network respectively.

(1) Source: SHA Annual Report, FY 2005

Maryland SHA employs over 3,200 people at various locations throughout the state and at its headquarters in Baltimore. The Statewide Operations Center (SOC) is located in the SHA's Hanover complex and operates 24/7. This complex is home to the CHART and Maryland's Emergency Operations Center and is responsible for addressing traffic and roadway incidents and emergencies such as snowstorms, hurricanes and homeland security threats. CHART operations rely heavily on the State's extensive communications network and on the ITS devices that are currently deployed throughout the State. These devices include closed circuit television (CCTV) cameras, dynamic message signs (DMS), portable dynamic message signs (PDMS), highway advisory radios (HAR), Shazams (static signs mounted with flashing amber beacons), automatic traffic recorders (ATR), side-firing (SF) remote traffic microwave sensors (RTMS) and roadway weather information systems (RWIS) or weather stations. Maryland SHA has seven (7) district offices and 28 maintenance shops that handle most of the daily traffic operations (Exhibit 1.3).

Exhibit 1.3

Maryland SHA' District Offices and Maintenance Shops[(1)]

(1) Source: SHA's Web Page (www.marylandroads.com)

1.1.2 Virginia Department of Transportation (VDOT)

The NOVA District of the VDOT is comprised of VDOT owned and operated facilities located within the jurisdictions of Arlington, Fairfax, Loudoun and Prince William Counties; the Cities of Alexandria, Fairfax, Falls Church, Manassas, Manassas Park; and the Towns of Herndon, Clifton, Dumfries, Middleburg and Leesburg. The NOVA Smart Traffic Center operates the Interstate roadways in Northern Virginia. The NOVA Safety Service Patrol provides field incident management and motorist assistance on the Interstate roadways. The NOVA Smart Traffic Signal System operates traffic signals throughout Fairfax, Loudoun and Prince Williams Counties. Many jurisdictions located within the boundaries of the VDOT Northern Virginia (NOVA) District are responsible for operating and maintaining the secondary roadways and for providing emergency services within their borders. VDOT NOVA is also responsible for clearing state-maintained roads (snow removal), all cities, as well as Arlington County clear their own streets.

Controllers in the Northern Virginia Smart Traffic Center oversee more than 100 miles of roads. Computer monitors and cameras are situated so that controllers can tell what is happening on these roadways at any given time. In addition to the usual congestion mitigation, incident management and traffic planning efforts, the Northern Virginia Smart Traffic Center is also an integral component in the in the management of the region's HOV lanes. Gates and gate groups are used to reverse HOV lanes to accommodate the traffic flow heading north and east in the

morning and south and west in the afternoon. Traffic is also controlled via ramp meters that limit traffic flow onto the mainlines through the use of traffic signals at the bottom of entrance ramps.

Loop detectors and pavement sensors that are embedded in the roadways prompt an automatic incident detection system that alert Traffic Center controllers when and where there is likely to be an accident. This equipment also gathers speed volume and occupancy data. The Traffic Center also uses a meteorological weather satellite to monitor rain, snow and ice conditions.

To alert the public of traffic conditions, the Smart Traffic Center uses variable message signs and Highway Advisory Radio sites. Commuters and travelers can tune to the designated radio frequency within a five- to seven-mile radius of the radio sites.

Another ITS provider in the region is the National Park Service. The Regional Transit Electronic Clearinghouse**,** a service of the National Park Services provides regional electronic fare system for WMATA, Fairfax County Connector, City of Fairfax CUE, Montgomery County Ride On, Arlington County ART, MARC, DASH, VRE PRTC, and MD MTA. The service integrates fares collection across these commuter providers.

1.1.3 District Department of Transportation (DDOT)

DDOT manages and maintains the majority of the roads, streets, bridges, traffic signals, and related transportation infrastructure within the District of Columbia. DDOT is responsible for the management and response to regional emergencies regarding streets and roadways in the District of Columbia. DDOT operates the DC Integrated Transportation Management System (ITMS).

The Washington Metropolitan region is in the process of integrating existing transportation information and management systems in Virginia, Maryland, and the District of Columbia into a Regional Integrated Transportation Information System (RITIS).

RITIS collects data of regional interest and fuses these data into regional information that can be used to enhance regional traveler information and transportation management functions performed by member agencies. Member agencies include: FHWA, Metropolitan Washington Council of Governments (COG); Virginia DOT; Maryland State Highway Administration; DC Department of Public Works; Washington Metropolitan Area Transit Agency; Montgomery County Department of Public Works

The Capital Wireless Integrated Network (CapWIN) is a state-of-art wireless integrated mobile data communications network being implemented to support federal, state, and local law enforcement, fire and emergency medical services (EMS), transportation, and other public safety agencies primarily in the Washington, DC Metropolitan area.

CapWIN, is being developed as a result of the need for improved coordination and information sharing among public safety and transportation agencies and organizations in Maryland,

Virginia, and Washington, DC. Currently, agencies in the DC region do not have the means to communicate directly with each other in a mobile environment.

Whenever incidents occur, responders rely on their own communication centers as intermediaries in passing messages to other responders. With CapWIN, agencies will be able to communicate directly with each other and can access information for use in planning and implementing traffic control during major incidents. Law enforcement and emergency medical services will also use CapWIN to share critical information across counties and regions and improve response to emergencies.

The transportation-related benefits of CapWIN include: reduced traffic delays; increased customer satisfaction, shared historical information among agencies, improved resource allocation through real-time information, increased worker safety in construction zones, improved response to natural and man-made disasters, increased transportation and public safety assistance through increased information and reduced duplication of expenditures on technology.

1.2 RURAL ITS IN MARYLAND

CHART opened its 24-hour-a-day Statewide Operations Center (SOC) in 1995 and ever since has been focused on expansion of the ITS devices across the State increasingly taking on the character of a true statewide incident management program. Whereas initially the focus had been the deployment of ITS devices around the Capital and Baltimore Beltways, the major interstates and the Annapolis and Frederick areas, the program had begun expanding to rural areas of the State. As such, CHART Business Plans developed in 1995 and 2000 have reflected the program goals of filling the "gaps" in the existing coverage areas and expanding to include coverage (detection, monitoring and response) of incidents in the rural parts of the Maryland. These goals still exist and this current effort of developing a *Rural M&O/ITS Strategic Deployment Plan* is a direct result of CHART's desire to see this goal realized. CHART has a large number of ITS counterparts across the nation and, through Federal Highway Administration (FHWA) initiatives or direct peer-to-peer interactions, has always sought and shared information on Maryland's ITS initiatives. Table 1.1 summarizes some of the Rural ITS Applications that have been deployed by various States experiencing transportation challenges similar to Maryland. ITS deployment projects identified in Table 1.1 were selected because the core problems they addressed were similar to those raised during the stakeholder meetings held in Maryland's rural areas. It is anticipated that these deployment solutions will provide CHART with examples of potential approaches for inclusion in the Strategic Deployment Plan.

Table 1.1
Rural ITS Applications in Peer States

MD RURAL AREA	COMPARIBLE ISSUES & SOLUTIONS IN OTHER STATES		
	State	Project	Project Summary
Eastern Shore	Oregon	Seaside Flood Warning System	▪ Focus on traveler information ▪ High water conditions requiring monitoring and traffic control ▪ ITS used to enhance existing maintenance procedures ▪ System goal was to automate water level monitoring, provide high water advisory to motorists and provide prior event notification to dispatch and maintenance personnel
Western Maryland	Ohio	Ohio DOT RWIS	▪ Focus on traveler information ▪ Expansion of RWIS to aid in planning road treatment strategies ▪ Real-time information available on Website ▪ System goal was to enhance safety of motorists by providing comprehensive information and help improve maintenance scheduling
	California Oregon	Siskiyou Pass Traveler Information and Incident Management System	▪ Focus on rural surveillance ▪ Mountainous region with weather and roadway geometry challenges; need for regular maintenance ▪ Project included development of Incident Management and Winter Response Plans ▪ Objectives included improving local incident management, traveler information services, and enhancing traveler mobility
	California	Caltrans Motorist Warning System	▪ Focus on traveler information ▪ San Joaquin County freeways subject to low visibility conditions (fog and wind-blown dust); frequent chain-reaction collisions ▪ Project involved the deployment of environmental sensor stations (ESS), incandescent DMS and the highway patrol's vehicle guidance system ▪ Objective was to improve roadway safety by warning motorists of driving hazards
Southern Maryland	Iowa	Evaluation of Surveillance Using Helikite	▪ Focus on rural surveillance and work zone safety and information ▪ Project led by Iowa State University for Transportation Research (CTRE) ▪ Explored using tethered balloons (Helikites) as platforms for transportation data collection; project involved remote sensing applications and wireless control and image transmission ▪ System benefits: quick deployment; easily relocated; less height restrictions; wider coverage area ▪ Goals included Helikite evaluation for pan, tilt and zoom cameras; work zone surveillance; and monitoring of incidents and special events

Tables 1.2, 1.3, and 1.4 provide summaries of the CHART existing, under construction and planned ITS devices for the three rural areas identified in this subtask. In addition, existing CHART communications beneficial to this task were identified. The information was obtained from the ITS device database currently maintained by CHART and through conversations with CHART planners and field support personnel. The coordination meetings with the stakeholders also resulted in the identification of additional local ITS devices and communications infrastructure to supplement the information contained in the CHART ITS database. The information is shown in tables below. More detailed information on the location and construction status of CHART ITS devices (tabular format) and communications is contained in **Appendix A-1**.

The fiber optic network that runs throughout Maryland is significantly important for the devices such as CCTV cameras or DMSs (see detailed map for the fiber optic coverage in **Appendix A-1**). This information is helpful in the process of finding locations for such devices. All of the Maryland's Eastern Shore is interconnected with a microwave backbone network, but has no fiber optic backbone. Southern Maryland has limited microwave backbone network only reaching south to Prince Frederick. Fiber Optic backbone is limited to serving only US-301 down to the Nice Bridge. Western Maryland has microwave and fiber optic extending to Keysers Ridge in Garrett County. Locating the existing radio towers for future CCTV deployment consideration is also vital information in this process (see detailed map in **Appendix A-1**).

Eastern Shore ITS Resources

Table 1.2a
CHART Eastern Shore (1) ITS Device Summary

DEVICE TYPE (2)	NUMBER OF DEVICES			TOTAL
	Existing	Under Construction	Planned (3)	
CCTV	2	16 (4)	--	18
DMS	--	--	--	--
PEDESTAL DMS	--	--	6	6
PDMS	7	--	--	7
HAR	9	--	3	12
SHAZAM	14	--	9	23
ATR	5	--	--	5
RADAR (SF)	--	--	--	--
WEATHER STATION	7	--	2	9
TOTAL	**44**	**16**	**20**	**80**

(1) Eastern shore is defined in this task as SHA Districts 1 and 2.
(2) See the Appendix for details on device locations by roadway and by SHA District.
(3) The scheduled completion year for planned devices range from FY 2006 to FY 2008.
(4) This total includes eight (8) radio tower CCTV camera installations.

Table 1.2b

Additional Eastern Shore Local ITS Devices and Communications Infrastructure (1)

AGENCY/ORG.	ITS DEVICE	COMMUNICATION INFRASTRUCTURE	COMMENTS
Dorchester County Emergency Management	2 PDMS		These units do not have remote access
Worcester County Dept. of Emergency Services		Operations Center – expanded communications	Recent improvements to operations center could support CHART systems
Queen Anne County Dept. of Emergency Services		Wireless Network; Virtual Private Network	These networks provide a lot of capacity to accommodate future CHART resources.
Talbot County Emergency Management	1 CCTV		This resource is owned by Easton Utilities

(1) Additional infrastructure information obtained from the stakeholder meeting.

Western Maryland ITS Resources

Table 1.3a

CHART Western Maryland (1) ITS Device Summary

DEVICE TYPE (2)	NUMBER OF DEVICES			TOTAL
	Existing	Under Construction	Planned (3)	
CCTV	1	6 (4)	2	9
DMS	4	--	1	5
PEDESTAL DMS	--	--	--	--
PDMS	4	--	--	4
HAR	6	--	--	6
SHAZAM	11	--	--	11
ATR	--	--	--	--
RADAR (SF)	1	--	--	1
WEATHER STATION	15	--	3	18
TOTAL	**41**	**6**	**6**	**53**

(1) Western Maryland is defined in this task as SHA District 6 and the western portion of Frederick County, bounded to the east by US-15 and US-340.
(2) See the Appendix for details on device locations by roadway and by SHA District.
(3) The scheduled completion year for planned devices range from FY 2006 to FY 2008.
(4) Radio tower CCTV camera installations.

Table 1.3b

Additional Western Maryland Local ITS Devices and Communications Infrastructure (1)

AGENCY/ORG.	ITS DEVICE	COMMUNICATION INFRASTRUCTURE	COMMENTS
Allegany County Emergency Service		AllCoNet	County-wide wireless network; currently 8 towers operational; private usage being planned.
		450 MHz Radios	Currently being used by State EMS.
		High Band VHS	
		800 MHz System	
		800 MHz, 400 MHz and High Band VHS	Currently, this resource is in one location only; it's being investigated by the State but not considered a viable communications option.
Garrett County Emergency Services		High Band VHS	
Washington County Division of Public Works		Broadband Wireless System	This system may be available to backhaul traffic data to the Internet.

(1) Additional infrastructure information obtained from the stakeholder meeting.

Southern Maryland ITS Resources

Table 1.4a

CHART Southern Maryland (1) ITS Device Summary

DEVICE TYPE (2)	NUMBER OF DEVICES			TOTAL
	Existing	Under Construction	Planned (3)	
CCTV	--	1 (4)	3	4
DMS	--	--	--	--
PEDESTAL DMS	--	--	--	--
PDMS	--	--	--	--
HAR	--	--	2	2
SHAZAM	--	--	--	--
ATR	--	--	--	--
RADAR (SF)	--	--	--	--
WEATHER STATION	3	--	2	5
TOTAL	**3**	**1**	**7**	**11**

(1) Southern Maryland is defined in this task as Calvert, Charles and St. Mary's Counties and the southern portions of Anne Arundel and Prince George's Counties, with northern boundaries delineated by MD-210, MD-373, US-301, MD-4 and MD-258.
(2) See the Appendix for details on device locations by roadway and by SHA District.
(3) The scheduled completion year for planned devices range from FY 2006 to FY 2008.
(4) This total includes three (3) radio tower CCTV camera installations.

Table 1.4b

Additional Southern Maryland Local ITS Devices and Communications Infrastructure (1)

AGENCY/ORG.	ITS DEVICE	COMMUNICATION INFRASTRUCTURE	COMMENTS
Calvert County Government		Wireless Network	The wireless network is currently under construction.
Maryland State Police – BK "H"		Low-Band and 800 MHz Radio System	Currently being used just by police.

(1) Additional infrastructure information obtained from the stakeholder meeting.

In addition, it is essential to state that in the development of the Rural M&O/ITS Strategic Plan, efforts were made by CHART to coordinate with its counterparts in neighboring states and document the M&O activities that they perform on a regular basis. This was necessary in order to avoid or minimize conflicting information provided to motorists traversing state lines during incidents and emergencies. Unfortunately during the course of this project, just two agencies (Delaware Department of Transportation and Virginia Department of Transportation) from two neighboring states (Delaware and Virginia) responded to the CHART's request to give inputs on the M&O/ITS current developments in their states. However, Internet research was conducted for the purpose of getting more information about ITS developments in neighboring states who did not provide any inputs. The following summarizes regional ITS Architectures for the neighboring jurisdictions of Virginia, Pennsylvania, West Virginia and Delaware.

A review of the regional ITS Architecture for Virginia revealed that the most comprehensive ITS Architecture development work to-date is associated with the NOVA region. The NOVA region does not coincide with the rural areas in Maryland defined for the Rural M&O/ITS Strategic Deployment Plan. However, the NOVA ITS Architecture does include *CHART, Maryland Public Safety and Emergency Management,* and *the University of Maryland (Research and Data Collection Centers)* as inventory elements.

In Pennsylvania, the Southern Allegheny Regional ITS Architecture corresponds to the rural area defined for Western Maryland in this document. The Southern Allegheny region is comprised of six (6) counties, three (3) of which are considered rural counties and these, coupled with another county in the region form a Rural Planning organization (RPO). A cursory examination of the ITS architecture for this region revealed that it contains some representation for agencies in the State of Maryland, thereby making it possible and potentially easier to coordinate M&O activities between the two states. Inventory elements within the Southern Alleghenies Regional ITS Architecture include *Maryland SHA, Maryland Emergency Management Agency (MEMA)* and *Maryland State Police (MSP).*

West Virginia has a Statewide ITS Architecture that includes connections to the five (5) states with which it shares borders. The region defined as the Western Maryland Rural Area shares a border with West Virginia and, similar to the ITS architecture for Pennsylvania, is included in the West Virginia Statewide ITS Architecture. The Maryland Stakeholders identified in the Architecture are Maryland SHA and MARC. The inventory elements identified in the

Architecture that are relevant to the development of the CHART M&O/ITS Strategic Plan are the *MSHA CHART Statewide TMC (SOC)* and the *MSHA Regional TOCs*.

Delaware's ITS Program (DelTrac) was designed to integrate most of DelDOT's ITS applications that currently operate as stand-alone systems. DelTrac is still in the early developmental stages and is currently focusing on traffic signal control systems as a first step in providing a comprehensive integration of all the State's ITS assets. The initial implementation of DelTrac throughout northern New Castle County does not include interface components with CHART. However, there is ongoing coordination between DelDOT and CHART personnel, which implies future coordination between both states for the development of the CHART M&O/ITS Strategic Plan.

In addition, identifying Transportation Management Centers (TMC) in neighboring states is also important for rural parts of Maryland (see map in **Appendix A-2**). Maryland's statewide operations center (SOC) is located in the Hanover SHA complex. The SOC is supported by local TOCs located throughout the State. Delaware has its TMC that covers the entire state and is located in Smyrna. Virginia has three (3) major TMCs called Smart Traffic Centers (STC). The most important one for rural Maryland is located in Arlington. West Virginia has its TOC located in City of Charleston and TOC in Huntington. Pennsylvania operates with two major TOCs and the one of significant importance to rural Maryland is Pittsburgh Metropolitan Area TOC located in Pittsburgh.

2.0 BACKGROUND

1.1 PURPOSE AND SCOPE

The SHA's Office of CHART and ITS Development tasked Edwards and Kelcey (EK) to develop a *Rural M&O/ITS Strategic Plan* to define the ITS planning and deployment needs of rural Maryland. Consistent with the goals of an effective transportation maintenance and operation strategy, the CHART *M&O Strategic Plan* addresses some major issues such as minimizing congestion, improving safety, reducing incident-related delays, providing timely and accurate information to travelers, providing effective transportation resources for emergencies and disasters, and establishing effective transportation operations centers for agency coordination. The M&O strategies formulated in this plan will be geared towards unique [weather] challenges that are typically encountered in rural parts of Maryland, particularly relating to snowfall and fog in the mountainous areas, hurricanes on the Eastern Shore and limited communication capabilities in these regions. The *Plan* focuses on the continuous expansion of the very successful CHART program functions into the rural areas, which include all the areas outside of the Baltimore and Washington D.C. Metropolitan regions. The CHART program embraces the continuous deployment of ITS technologies and the expansion of the CHART incident management program.

This entire process was a joint effort involving stakeholders from the rural agencies, with input as required, from neighboring jurisdictions. For the purpose of better understanding different parts of rural Maryland and their needs, the project area is grouped as follows:

- The Eastern Shore (SHA Districts 1 and 2)
- Western Maryland (SHA District 6 and the western portion of Frederick County, bounded to the east by US-15 and US-340)
- Southern Maryland (Calvert, Charles and St. Mary's Counties and the southern portions of Anne Arundel and Prince George's Counties, with northern boundaries delineated by MD-210, MD-373, US-301, MD-4 and MD-258)

The Eastern Shore area spreads over the SHA's Districts 1 and 2. The rural area in Western Maryland includes entire SHA District 6 and portion of the SHA's District 7. US-15 and US-340 are among major roads that run through west part of Maryland carrying traffic from/to West Virginia and Pennsylvania. US-301 is one of the main roads that run through Southern Maryland and needs a lot of attention when considering hurricane evacuations or other emergency evacuations. Therefore, the boundaries for the two rural areas, Western Maryland and Southern Maryland have been set to include these routes.

The needs assessment analysis was developed under the Technical Memorandum No. 1 and summarized here to include the following information:

- Key stakeholders contact list for rural Maryland (see **Appendix A-3**).
- Information gathered from stakeholders regarding the M&O needs, and existing local ITS and communications inventory.

- A comprehensive review of relevant plans and studies (existing ITS, hurricane evacuation, Freeway Incident Traffic Management (FITM), and Incident Management Plans)
- Gaps in the existing devices, communications infrastructure, and activities.
- Infrastructure in neighboring states (Virginia, Delaware, Pennsylvania, and West Virginia).
- Regional inventory and needs assessment.
- Maps and tables.

Next step of the project was to focus on the Maryland Statewide M&O/ITS Architecture where the information gathered in the needs assessment was used to identify gaps in the Maryland Statewide ITS Architecture. Detailed steps of this subtask were analyzed in the Technical Memorandum No. 2 and summary of the results is included in this document.

During the course of the project, EK worked with SHA and the stakeholders to establish rural ITS strategies that addresses the needs identified in the Technical Memorandum #1. EK worked with SHA to map the rural ITS strategies to existing SHA goals and objectives identified in the SHA Business Plan. The developed rural ITS strategies and mapped SHA goals and objectives provide the framework for the development of the *Rural M&O/ITS Strategic Plan*, which is presented in this document. The plan includes schedules for deployment and cost estimates. Additionally, the *Plan* addresses the following:

- Implementation of planned technologies.
- Presents a phased approach.
- Available and alternative communications options (i.e. fiber, microwave, T-1. etc.) that will enable established rural ITS strategies.
- Alternative revenue sources including federal funding sources and public/private partnerships that were available.
- Cost options based on the implementations of elements described in the concept plan.

1.2 TECHNICAL APPROACH

The overall approach for this project was comprised of the following components:

- Interviews with stakeholders, who included SHA personnel in the rural Districts, incident and emergency responders, and SHA counterparts in neighboring States.
- Reviews of studies and plans relating to M&O/ITS within the target rural areas.
- Analyses of the Maryland Statewide ITS Architecture and the National ITS Architecture.
- Analysis of the SHA existing Business Plan.
- Reviews of the available funding sources.

In order to compile comprehensive lists of stakeholders for the different rural areas, the project team worked very closely with CHART planning and field operations personnel to ascertain the nature(s) of their past M&O, the different agencies that were impacted by the response strategy employed at the time and the lessons learned. This information enabled stakeholder lists (see **Appendix A-4** for a complete stakeholders' list) to be compiled that, for the most part, included a wide range of agencies, not the least of which were emergency management and law enforcement personnel. There was also a deliberate and successful effort to include senior SHA personnel in the stakeholder meetings in order to emphasize the importance of the rural M&O strategic planning process to the SHA leadership. It also served to reassure stakeholders that the results of the M&O strategic planning process would not be shelved, but that there would be ongoing coordination between SHA leadership and stakeholders to facilitate potential future implementation of rural M&O strategies emerging from the strategic planning process.

The following subsections detail the steps undertaken by the project team in accomplishing these components.

1.2.1 Stakeholder Interviews

To accomplish this subtask, the project team organized meetings with stakeholders in the rural areas previously defined. These meetings focused on achieving the following objectives:

1. Identifying the existing ITS and communications infrastructure and coordination among transportation and emergency response agencies.
2. Identifying the "gaps" in the coverage areas where there might be the potential for additional ITS device deployments, communications infrastructure.
3. Identifying the "gaps" in coordination between various agencies.
4. Developing strategies for expanding the ITS infrastructure.
5. Fostering coordination among the various participating agencies and neighboring jurisdictions.

The stakeholder meetings were very informal and took on the form of open discussions. Personnel from each of the invited agencies outlined the resources they had that supported effective acquisition and dissemination of incident information as well as communication coordination with other agencies. They also indicated if there were any recent or planned communications infrastructure improvements for their facilities and if any of the ITS or communications resources they had bore the potential for integration with the CHART system. In most instances, the stakeholders expressed a desire to have access to CHART, which gives limited access to images and information from the Statewide Operation Center (SOC).

The stakeholder meetings resulted in the compilation of a series of notes that highlighted the main discussion topics from each meeting as well as the concerns of stakeholders, vis-à-vis their existing capabilities to access and share up-to-date incident information. The project team also compiled information on the perceived maintenance and operations needs of the stakeholders

along with their suggestions for potential ways to address those needs and thereby help them better plan for and manage incidents in the regions. Additionally, CHART provided information on the ITS Infrastructure from their database, which contains existing, under construction, and planned devices in the rural areas. Finally, tables were developed to facilitate the compilation of additional infrastructure information to supplement the data gleaned from the CHART ITS database. This information included an inventory of local ITS devices as well as any existing or planned local communications infrastructure. This component of the subtask relies heavily on follow-up with stakeholders and this was done in tandem with the development of this document.

Following the stakeholder meetings, maps and tables depicting the ITS device coverage area for the rural districts – initially compiled to facilitate discussions with stakeholders – were revised to reflect more accurate locations of devices as well as to show devices that were not previously included in the CHART ITS device database. This information was shared with the stakeholders for their review and verification. The culmination of all the stakeholder meetings and coordination work was a set of notes that outlined stakeholder concerns, identified deficiencies in the information contained in the CHART ITS device database and provided suggestions of solutions to satisfy the M&O/ITS needs in the various rural areas.

1.2.2 Review of Relevant Documents

For the second component of the approach to this subtask, a comprehensive review of available relevant studies (see **Appendix A-4** for a complete list of relevant documents) was conducted in order to gain a better understanding of the existing M&O/ITS infrastructure in rural Maryland. The following documents were collected and reviewed as they were deemed relevant to this study:

- SHA's Hurricane Evacuation Traffic Control Plan, Ocean City, Maryland, 2004
- Eastern Shore Hurricane Evacuation Traffic Management, Draft Summary of Meetings with all Jurisdictions in August-September 2005
- Maryland Statewide Incident Management Coordination, A Field Guide, 2005
- Freeway Incident Management (FITM) Plans along Interstate Route 70 in Washington County
- Freeway Incident Management (FITM) Plans along Interstate Route 81 in Washington County
- Freeway Incident Management (FITM) Plans along US Route 301 in Charles County
- Maryland Eastern Shore Hurricane Evacuation Traffic Management Plan – Interim Report , July 2006
- CHART Non-Constrained Deployment Plan (NCDP), April 2005

The Evacuation Plan for Southern Maryland is currently in progress and its final version will be released by the end of 2006. It will cover Calvert, Charles and St. Mary's Counties. The

CHART NCDP was reviewed to ensure that it supports the Rural ITS Strategic Plan in expanding ITS deployments into the rural areas of Maryland.

These studies were great supplement to the entire project endeavor in giving a broad picture of what was done in rural parts of Maryland to support CHART M&O/ITS efforts to expand this program into suburban areas. Most of the information presented here will be used to develop Rural ITS Strategic Plan.

1.2.3 Analysis of the Maryland ITS Architecture

Statewide ITS architecture is not static. It must change as plans change, ITS projects are implemented, and the ITS needs and services evolve in the region. The Statewide ITS architecture must be maintained so that it continues to reflect the current and planned ITS systems, interconnections, and other aspects of architecture. The following list includes several of the events that may cause change to the Statewide ITS architecture:

- **Changes in Regional Needs**. The ITS architecture supports transportation planning in addressing regional needs. Over time these needs change and the corresponding aspects of the Statewide ITS architecture that addresses these needs may need to be updated.
- **New stakeholders.** As the needs of new stakeholders are identified, the Statewide ITS architecture must be updated to reflect these needs in the regional view of the ITS elements, interfaces, and information flows.
- **Changes in stakeholder or element names.** An agency's name or the name used to describe their element(s) can undergo change in time. Transportation agencies occasionally merge, split, or just rename themselves. In addition element names may evolve as projects are defined. The Statewide ITS architecture should be updated to use the currently correct names for both stakeholders and elements.
- **Changes due to Project Implementation.** When actually implemented, a project may add, subtract or modify elements, interfaces, or information flows from the Statewide ITS architecture. Because the Statewide ITS architecture is meant to describe the current (as well as future) regional implementation of ITS, it must be updated to correctly reflect how the developed projects integrate into the region.

The technical approach to this effort is predicated on clearly mapping the needs identified in Technical Memorandum No. 1 to the elements of the Maryland Statewide ITS Architecture to determine what parts of the Maryland Statewide ITS Architecture must be updated to reflect the types of changes that were noted above.

The approach is based on considering how each of the identified stakeholders' needs can be accommodated by the existing architecture. Or, if they cannot be accommodated, which parts of the architecture will have to be revised.

1.2.4 Analysis of the SHA Existing Business Plan

The SHA Business Plan for the Office of CHART FY2004-2007 dated February, 2005 was used to map the existing goals presented in the business plan with the rural needs identified in the

Technical Memorandum No.1. Mostly all of the proposed stakeholders' needs were mapped fairly easily with the business plan, except five (5) out of fifty one (51) that did not have a match. These needs that do not match with the existing Business Plan are primarily focused on shifting around some of the devices to get better coverage or installing new devices to better support evacuation plans. More on this will be discussed in the later sections of the document.

1.2.5 Reviews of the Available Funding Sources

EK conducted a research towards the ITS deployment funding using Internet and Federal Highway Administration (FHWA) contacts. As a result, through SAFETEA-LU (Safe, Accountable, Flexible, Efficient Transportation Equity Act: Legacy for Users) Implementation, Congress made a clear choice to not to create any set-aside for ITS deployments and decided to fund it through the Federal-aid funds provided to the States. Eligible Federal-aid funds are provided through National Highway System (NHS), Surface Transportation Program (STP), and Congestion Mitigation Air Quality (CMAQ). States then have to work individually to come up with the case to get these funds to support rural ITS deployments.

3.0 SUMMARY OF THE RURAL ITS NEEDS ASSESSMENT

This section summarizes the stakeholders' M&O/ITS needs assessment analysis conducted to identify specific needs for the rural parts of Maryland (refer to Technical Memorandum #1 for more detailed information). The entire process of information gathering from stakeholders from the following rural areas of Maryland: The Eastern Shore (SHA Districts 1 and 2); Western Maryland (SHA District 6 and the western portion of Frederick County, bounded to the east by US-15 and US-340), and Southern Maryland (Calvert, Charles and St. Mary's Counties and the southern portions of Anne Arundel and Prince George's Counties, with northern boundaries delineated by MD-210, MD-373, US-301, MD-4 and MD-258), was very successful. The stakeholders had a chance to discuss the ITS needs in their jurisdictions considering CHART's existing, under construction, and planned M&O/ITS strategies and deployments. Representatives from different agencies and organizations gathered together to support CHART's program. Needs for additional M&O/ITS strategies and deployments assembled from the stakeholders' meetings and contacts were summarized for future consideration. The following goals, established at the beginning of this process have been accomplished:

- Identified M&O/ITS deployments and strategies to support weather, evacuation, seasonal and everyday traffic, special events, and safety issues in the rural parts of Maryland.
- Identified other M&O/ITS strategies.
- Located areas that are candidates for deployment of ITS devices.
- Prioritized needs based on the perceived benefits and level of importance.
- Recognized gaps in on-going evacuation planning efforts.

These actions will help CHART in their statewide efforts to support continuous deployment of ITS technologies and expansion of the incident management program.

A major product of this process was the identification of the needs of the rural stakeholders. These requirements were presented in three tables (see **Appendix A-1**), one covering each of the three rural regions of the state. This effort involved twenty two (22) unique Stakeholders who identified fifty one (51) specific M&O/ITS needs. The additional ITS devices being proposed by the different agencies in this region are highlighted. Each need is assigned a priority code (PC) defined as follows:

PC01: *There is an immediate need for this resource. The resource is crucial for day-to-day M&O activities and for providing effective responses to incidents and emergencies.*

PC02: *The resource can help to alleviate existing challenges in M&O activities; however, such operations are not adversely impacted by its absence. The resource can be acquired within 2-3 years.*

PC03: *This resource would give additional capabilities to M&O personnel. Execution of current M&O strategies is not dependent on the acquisition of this resource. The resource could be implemented in the long-term (i.e. 3-5 years).*

In addition to the accomplishments achieved during this process to expand CHART's effort to improve the M&O/ITS statewide, the following recommendations/solutions for the rural areas of Maryland were developed to assist with the next steps in implementing an integrated statewide ITS network.

Rural areas are often forgotten when ITS expansion is considered, but these areas are very crucial for M&O during large-scale evacuations. However, seasonal and everyday traffic, special events, inclement weather and safety issues have to be considered as well. Taking into consideration all these concerns, a plan to expand the ITS *device coverage* and *communications infrastructure* and to identify *coordination gaps* to address these concerns was developed. This plan includes areas and in some cases specific intersections and routes where a specific devices or communications needs have to be considered for implementation/installation/further investigation. Summary tables and maps included in **Appendix A-1** summarize the proposed needs and solutions identified by different organizations in the three recognized rural areas of Maryland. Further study is required to identify the exact locations based on affirmed proposals. Generally, the following recommendations were proposed for consideration as necessary to support the ITS statewide system expansion:

Device Coverage

- Install Dynamic Message Signs (DMS) at various locations.
- Install CCTV cameras at various locations.
- Install detection cameras at various locations.
- Install Road Weather Information System (RWIS) devices at various locations.
- Install Highway Advisory Radio (HAR) devices in various locations.
- Install SHAZAM devices at various locations.
- Install speed detectors.

Communications Infrastructure

- Install CHART workstations at Emergency Operations Centers and/or Counties.
- Provide access to CCTV images to different organizations.
- Establish cellular communication for DMSs.
- Establish training courses for personnel on proper use of communications devices/equipment.
- Exchange information with neighbors to improve everyday traffic.

Other

- Install mile-markers every 1/10th of a mile.
- Install arrow boards on emergency response vehicles.
- Identify detour routes to support every day traffic and evacuation plans.

- Install evacuation guide signs directing motorists to specific routes.
- Provide situational awareness among public.
- Expand FITM and evacuation plans.

Table A-1.1 (**Appendix A-1**) addresses the issues important to the rural stakeholders from the Eastern Shore area of the state. As might be expected, many of the needs expressed by these stakeholders are directly related to emergency evacuation. Of the twenty (20) specific needs identified in Table A-1.1 (**Appendix A-1**), five (5) were specifically related to weather-related (hurricane) emergency evacuation. Another common theme mentioned by this group was the need to have better access to CHART data. Six (6) users specifically mentioned this need. As noted in Table A-1.1 (**Appendix A-1**), there are twenty one (21) proposed needs that involve an extension of the existing CHART elements (Workstations, CCTV cameras, DMS, and RWIS). These solutions included both installing new elements and relocating existing elements to have a better impact. One stakeholder identified a unique need that was independent of CHART elements. Queen Anne County Department of Emergency Services identified a need for Training specifically related to the proper use of communications equipment.

Table A-1.2 (**Appendix A-1**) addresses the issues noted by stakeholders located in western Maryland. These stakeholders represented five different organizations and generated nineteen (19) specific needs. Their most concern was about winter weather issues, traveler information, and traffic management in general. Washington County Division of Public Works expressed their concerns about emergency evacuations from the Washington D.C. area and tried to propose needs that would also apply to day-to-day operations. The table identifies proposed solutions to all sixteen (16) needs by an extension of the existing Chart elements (Workstations, CCTV cameras, DMS, and RWIS). There was one need expresses by District 6 that would be resolved through better control and support between law enforcement and State and County personnel during periods of severe congestion. This implies a need for more communications capabilities among these agencies.

The needs of representatives from five stakeholder organizations in southern Maryland are expressed in Table A-1.3 (**Appendix A-1**). Like the stakeholders from the Eastern Shore, these stakeholders also voiced concern about emergency evacuation; both from the perspective of being the evacuating agency, and the perspective of being the receiving agency. These stakeholders identified twelve (12) unique needs. Like the other areas, most of these needs can be met by extensions of the existing CHART elements (Workstations, CCTV cameras, DMS, and RWIS). There were several solutions, however, that were not related to CHART hardware. The SHA in Calvert County identified the need for improved interagency communications. This same stakeholder identified the need for more 800 MHz radios. The MSP (Barrack H) identified needs for an expanded FITM plan and issues related to simulcasting.

In summary, stakeholders from the three rural areas expressed M&O/ITS related concerns and proposed needs that would serve them better improving congestion, evacuation, and everyday traffic. The following outlines needs that are the most often discussed at the stakeholders meetings:

- Provide access to CHART data.

- Improve traffic monitoring.
- Establish working/coordination groups similar to ROCC and B-ROCC to support the use and maintenance of the Strategic Plan.

4.0 SUMMARY OF THE MARYLAND STATEWIDE ITS ARCHITECTURE

Maryland Statewide ITS Architecture was discussed in the Technical Memorandum No.2 as a part of a greater purpose to serve the Maryland State Highway Administration (SHA) and Office of CHART (Coordinated Highways Action Response Team) and ITS Development in their efforts to expand Management and Operation Systems (M&O) along with Intelligent Transportation Systems (ITS) into the rural areas of Maryland. Technical Memorandum No.1 has grouped rural Maryland in the following three areas (Eastern Shore, Western Maryland and Southern Maryland) in order to make appropriate accomplishments. Memorandum No.2 has been developed with an emphasis on the Maryland ITS Architecture and its gaps where stakeholders' needs and solutions, developed and explained under the Technical Memorandum No.1, for rural Maryland were considered. The gap analysis considered ITS Architecture Components and Scope into discussion. Finally, the document summarizes recommended changes in the following areas: List of Stakeholders, List of Projects, and Elements. However, possible changes will be required in the section Operational Concepts. The following subsections summarize the Technical Memorandum No.2 findings.

4.1 INTRODUCTION AND BACKGROUND

The entire process of identifying gaps in the Maryland ITS Architecture is based on the rural M&O/ITS needs developed earlier in this project. It was obvious at the beginning that some of the components of the Maryland ITS Architecture will have to be updated. Each of the components in the Statewide ITS architecture is important and must reflect the current status if the architecture is to fulfill its promise. The architecture components include the geographic scope, functional scope and architecture timeframe, and helps frame each of the parts of the Statewide ITS architecture. Geographic scope defines the ITS elements that are in the region, although additional ITS elements outside the region may be necessary to describe if they communicate ITS information to elements inside the region. Functional scope defines which services are included in the Statewide ITS architecture. Architecture timeframe is the distance (in years) into the future that the Statewide ITS architecture will consider. The following are components considered in the analysis:

- List of Stakeholders
- Operational Concept
- List of ITS Elements
- List of Agreements
- Interfaces between Elements (interconnects and information flows)
- System Functional Requirements
- Applicable ITS Standards

Technical Memorandum No.2 focuses on identifying gaps in the existing Maryland Statewide ITS Architecture using already identified needs from the Technical Memorandum No.1 and it considered the following portions of the ITS Architecture:

- Architecture Scope
    - Description of the Region

  - Stakeholder List
  - List of Agreements
  - List of Projects
- Architecture Components
  - Description of Elements
  - Operational Concept
  - Functional Requirements
  - Interface Requirements
  - ITS Standards

4.2 TECHNICAL APPROACH

Statewide ITS architecture must be maintained to continue to reflect the current and planned ITS systems, interconnections, and other aspects of architecture. Therefore, Statewide ITS architecture must change as plans change, ITS projects are implemented, and the ITS needs and services evolve in the region. The following is the list of the events that may cause change to the Statewide ITS architecture:

- Changes in Regional Needs
- New stakeholders
- Changes in stakeholder or element names
- Changes due to Project Implementation

The technical approach to this task was to map the needs identified in the Technical Memorandum No. 1 to the elements of the Maryland Statewide ITS Architecture to determine what parts of the Maryland Statewide ITS Architecture must be updated. The approach is based on considering how each of the 51 needs can be accommodated by the existing architecture. Or, if they cannot be accommodated, which parts of the architecture will have to be revised.

The next phase of this task was to determine the impact of the 51 specific needs, identified in the Technical Memorandum No.1 and summarized in **Appendix A-1,** on the Maryland Statewide ITS Architecture beginning with the "Stakeholders" and the affected "User Services."

Before moving further to the section about the Maryland's ITS Architecture, it is important to give a definition of the National ITS Architecture. The National ITS Architecture gives a solid structure to "planning, defining, and integrating intelligent transportation systems." The National Architecture, Version 5.1 states that there are three major components of the architecture:

- The functions (e.g., gather traffic information or request a route) that are required for ITS
- The physical entities or subsystems where these functions reside (e.g., the field or the vehicle).
- The information flows and data flows that connect these functions and physical subsystems together into an integrated system.

4.3 MARYLAND STATEWIDE ITS ARCHITECTURE

The Maryland Statewide ITS Architecture provides a regional framework for ensuring institutional agreement and technical integration for the implementation of ITS projects or groups of projects. Beyond this formal definition, the architecture is essentially a complex database that depicts all of the linkages of the various agencies. It describes the participants (Stakeholders); it defines the deployed technologies (Elements); and it describes how each user uses the Elements (services) to meet its needs (ITS Architectural Diagrams). Market packages play an important role in the ITS Architecture. They have been successfully used separately or in combination to address real transportation problems and needs. One or more equipment packages combined together represent a market package.

The Maryland Statewide ITS Architecture identifies existing and planned ITS projects across the State as well as the ITS Architecture "elements" and "services" that are associated with those projects. It defines the relationships among the elements and describes the flow of information between elements. The document also presents an ITS "operational concept" and identifies key ITS stakeholders and agreements. As the architecture is designed to be an evolving document, as the state begins to emphasize ITS deployments in rural areas, certain parts of the architecture will have to be modified.

The Baseline ITS Architecture was completed in 2001 (2001 Baseline). The current version of the Maryland Statewide ITS Architecture was organized, generated, and assembled during 2004 and published in 2005. The baseline architecture developed with an urban flair concentrating on the heavily trafficked corridors in the Baltimore and Washington metropolitan areas. As the architecture matures, additional emphasis is being addressed to the more rural areas of the region. A key feature of the 2005 Update is use of a "hybrid" approach to define architectural elements. Under this approach, architecture elements – which are the entities, such as Transit Management Centers, depicted in the Architecture – are characterized as either Generic or Specific, depending on the detail of information readily available during the update.

One of the primary potential areas needing updating, are elements that are currently defined as Generic, but because of their impact on the rural architectural requirements may be reclassified as Specific.

4.4 RURAL STAKEHOLDERS

A Stakeholder is defined as a public agency, private organization, or the traveling public with a vested interest, or a "stake" in one or more transportation Elements within the Statewide ITS Architecture. Following this characterization, Stakeholders for the Maryland Architecture generally own, operate, maintain, administer and/or plan for the one or more of the transportation elements. These agencies/organizations identified to date are listed in the Technical Memorandum No.2. The following are the stakeholders who participated directly in this project and are pulled out from the Statewide ITS Architecture:

- Allegany County Emergency Services and Communications
- Calvert County Public Safety Department
- Caroline County Department of Emergency Services

- Cecil County Department of Emergency Services
- Charles County Department of Emergency Services
- Dorchester County Department of Public Safety
- Maryland State Highway Administration – CHART
- Maryland State Police
- Queen Anne's County Department of Emergency Services
- Saint Mary's County Department of Public Safety
- Somerset County Department of Land Use & Environment
- Talbot County Department of Public Safety
- Virginia Department of Transportation
- West Virginia Department of Transportation
- Wicomico County Department of Emergency Services

Representatives from a total of 21 different rural agencies were represented and expressed needs in the initial meetings. Many of the representatives were identified as existing Stakeholders. Only three, Worcester Department of Emergency Services, the Garrett County Fire and Rescue Department, and the City of Cumberland were not directly or indirectly represented in the current list of Stakeholders.

4.5 USER SERVICES

The initial effort was to correlate each defined need with the appropriate User Service. The User Services document what the system should do from the user's perspective. User Services form the basis of the ITS Architecture and will enable the effort to focus on the architectural flows that are related to the needs of the rural users.

There are 33 user services which form the basis of the ITS Architecture. A number of functions are required to accomplish each user service. To reflect this, each of the user services is broken down into successively more detailed functional statements, called user service requirements, which form the fundamental requirements for the National ITS Architecture. The rural User Services are used to identify which architectural data flows must be revised to reflect the current needs. Of the 33 user services defined in the architecture, the following were identified as potentially having an impact on the identified rural user needs.

- En-route Driver Information
- Route Guidance
- Traffic Control
- Incident Management
- Emergency Vehicle Management
- Emergency Notification and Personal Security
- Disaster Response and Evacuation
- Maintenance and Construction Operations

The correlation between the identified stakeholder needs and these user services is shown in a tabular format included in **Appendix A-5**.

There were a total of 28 mentions of needs that were related to En-route Driver Information. Other user needs included Traffic Control (16), Maintenance and Construction Operations (13); Emergency Vehicle Management (12); Incident Management (11); Disaster Response and Evacuation (5); Route Guidance (2); and Emergency Notification and Personal Security (1). This correlation between the needs and user services provides a good indication of which areas of the Maryland Statewide ITS Architecture require updating based on the identified rural needs.

4.6 RECOMMENDED ITS ARCHITECTURE UPDATES

This subsection provides a brief overview of each major section of the Maryland's ITS Architecture. This is followed by a discussion of what changes may be required as a result of the rural architecture activities.

4.6.1 Introduction

There is a little need to update this section of the architecture. However, when updates are made as recommended in this effort, two sections will require minor editing to include the rural updates: "1.3 – Architecture History" and "1.4 – Update Approach."

4.6.2 Architecture Scope

This section also requires little if any changes. The section describes the geography of the state including the boundaries of the seven State Highway Administration districts. Also included in this section are county population figures and other demographic information, descriptions of the principal highway network as well as other similar data. Minor changes are recommended in this section to include references to the rural portions of the State.

Stakeholder List

The Stakeholder list needs to be updated. There were three participants at the regional meetings that represented agencies that are not specifically included in the list of Stakeholders: Worcester Department of Emergency Services, the Garrett County Fire and Rescue Department, and the City of Cumberland.

Other Stakeholders who attended the meetings signed as representing agencies with names slightly different than that in the ITS Architecture. For example users identified themselves as Cecil County Department of Emergency Services while the architecture identifies the Cecil County Emergency Management Center as a Stakeholder. Charles County experienced a similar discrepancy.

If these differences may be the simple result of a person not knowing the official Stakeholder title, or the differences may reflect an error in the Maryland ITS Architecture caused by a change in the management structure of the participating agency. Since the initial list of Stakeholders was constructed in 1999 and 2000, it is time for the entire list to be updated. This update should be conducted in parallel with the updating of the Elements as noted below.

4.6.3 List of Agreements

The following are two new agreements proposed in the Technical Memorandum No.1:

1. Mutual aid agreement between the Ocean City/SHA Districts and Delaware Department of Transportation (DelDOT) to establish CCTV cameras, detection capabilities and communications for use in developing detour route transitions across state lines. Some stakeholders in the process are Delaware, Maryland, Cecil County and MdTA. There is also concern regarding the incursion of one state's forces into the other's territory to provide assistance. Such actions might require a change in the language of any existing mutual aide agreement. In addition, the State Governor would have to sanction such a move, which would have to be coordinated thru DEMA and MEMA.
2. Assistance agreement between the Washington County 911 Center and the State. The existing 911 Center is being relocated and the new location will have fiberoptic and microwave communications. They need CHART to assist in setting up the new center. Technical Memorandum No.1 indicated that assistance in setting up the center might be a NIMS issue. CHART would address the video compression and decompression (cameras require bandwidth of about 384 Kb/s). However, Technical Memorandum No.1 indicated that if the 911 Center microwave system "touches" the State's microwave backbone, it might be possible to work out an assistance agreement.

As a result, above are the recommended changes to this portion of the architecture.

4.6.4 List of Projects

Several new projects were identified during the rural ITS meetings. For the most part, however, the identified projects involved the extension of existing systems. For example, there were many instances of needing additional CCTV surveillance to be able to monitor traffic flows, and RWIS stations to be able to monitor weather. Also frequently mentioned was the need for DMS and HAR to better communicate with drivers. There was one pervasive need that was mentioned by several users, this is the need to be able to view CCTV images available in the CHART system. This need can be met by the installation of a CHART Workstation running "CHART Lite" software.

An important result of these meetings was that there is no need for a new User Service. That is, the subsystems that CHART currently supports appear to be able to meet all of the needs discussed at the meetings. The List of Projects, however, must be updated to reflect the current situation.

4.6.5 Maryland ITS Architecture Elements

Elements are defined as the basic building blocks of the Maryland ITS Architecture. They are used to describe a system or piece of a system. Specifically, Elements are represented in architecture diagrams by the boxes that are exchanging information (through Interconnects and Information Flows).

In the case of the Maryland Architecture, Elements represent collections of hardware, software, data, processes, and people that work together to achieve a common goal within the overall Maryland transportation system.

The existing elements below might have required updating as a result of the rural ITS emphasis. However, there were no changes identified that would require a new element to be defined or even a generic element to be redefined as a specific element.

Arterial TMCs

Arterial Traffic Management Centers (TMC) is a Generic Element that represents locations that manage a broad range of transportation facilities including rural and suburban highway systems, as well as urban and suburban traffic control systems. These offices/operations centers monitor and control traffic and road networks. This Element includes both the systems and personnel involved in the operations within the office/operations centers.

The Facilities are:

- Allegany County Public Works Division Office
- Calvert County DPW Office
- Caroline County DPW Traffic Office
- Cecil County DPW Office
- Charles County DPW Office
- City of Rockville TMC
- DDOT ITMS/TMC
- Dorchester County DPW Office
- FEDEX Field Operations Center
- Garrett County Roads Department Office
- Hyattsville DPW Office
- Kent County DPW Office
- M&T Bank Stadium Operations Center
- Queen Anne's County DPW Office
- Saint Mary's County DPW Office
- SHA Signals
- Somerset County DPW Office
- Talbot County DPW Office
- Washington County DPW Office
- Wicomico County DPW Office
- Worcester County DPW Office

The elements that are highlighted in the above list represent counties wherein Stakeholders have suggested that their identified needs might be met by various ITS devices. If a project is planned to meet the need described by the county, then these Elements may be candidates for changing from Generic to Specific depending on the complexity of the project and the interactions among Stakeholders.

CHART SOC

The Coordinated Highways Action Response Team (CHART) Statewide Operation Center (SOC) is a Specific Element that represents the systems and personnel responsible for improving the real-time operations of Maryland's highway system through teamwork and technology. The CHART SOC is located in Hanover, MD. This center houses the backbone database for multiple transportation operations in Maryland, and provides a connection between the regional CHART Traffic Operations Centers (TOCs) located throughout the State, as well as various other transportation stakeholder agencies. CHART is responsible for operating ITS systems, traffic control, snow removal, coordinating with other agencies during incidents, and performing other traffic engineering to improve highway operations. All of the proposed M&O solutions involve CHART to one degree or another.

Emergency Vehicles

Emergency Vehicles is a Generic Element that represents vehicles owned and operated by public safety and other transportation agencies that respond to traffic incidents. These include, police, fire, EMS, and traffic patrol vehicles.

Freeway TMC Field Equipment

Freeway Traffic Management Center (TMC) Field Equipment is a Generic Element that represents both the existing and planned equipment distributed on and along the freeways that monitor and control traffic, as well as monitors and manages the roadway itself. Equipment may include traffic detectors, environmental sensors, traffic signals, highway advisory radios, dynamic message signs, CCTV cameras, video image processing systems, grade crossing warning systems, HOV lane management systems, reverse lane management systems, and barrier systems that control access to transportation infrastructure such as roadways, bridges, and tunnels. These devices are owned and operated by agencies associated with the Freeway TMCs Element. This section in the Maryland ITS Architecture does not define the SHAZAM sign and therefore description should be added.

Freeway TMCs

Freeway Traffic Management Centers (TMCs) is a Generic Element that represents agency facilities that manage a broad range of transportation infrastructure within and adjacent to Maryland, including rural and suburban freeway systems. These offices/operations centers generally monitor and control traffic, as well as coordinate maintenance, construction, and incident management operations along freeways. This Element includes both the systems and personnel involved in operations within the office/center.

Maintenance and Construction Management Centers

Maintenance and Construction Management Centers is a Generic Element that represents those centers/offices/shops that monitor and manage roadway infrastructure construction and maintenance activities along arterials and freeways. This Element includes the systems and personnel responsible for operations within centers.

Maintenance and Construction Vehicles
Maintenance and Construction Vehicles is a Generic Elements that represents maintenance, construction, or other specialized service vehicles or equipment that provide the sensory, processing, storage, and communications functions necessary to support highway maintenance and construction. This Element includes the existing and future in-vehicle systems that communicate with maintenance and construction centers/offices/shops for routine and emergency activities.

Public Safety Centers
Public Safety Centers is a Generic Element that represents public safety (including police, fire, and EMS), emergency management, and other allied state and federal agency systems that support incident management, disaster response and evacuation, security monitoring, and other security and public safety-oriented transportation applications. This Element includes the systems and personnel operating within these offices/operations centers/agencies.

This Element defines some 90 different facilities which include virtually all of the agencies represented by the Stakeholders who attended the rural ITS needs meetings.

4.6.6 Operational Concept

An Operational Concept for the Statewide ITS Architecture captures each stakeholder's current and future roles and responsibilities – at a high level – in the implementation and operation of the region's transportation systems. The Operational Concept is represented with the tabular form in the architecture. The table shows roles and responsibilities in operational coordination and information sharing between stakeholders. Other defined roles and responsibilities include existing/future participation in particular regional projects, as well as regional systems integration responsibilities.

Changes will be required in this section to reflect how the various agencies will interface to meet the rural ITS needs. For example, CHART would need to increase its presence in rural areas and share information valuable to both parties. Also, in Southern Maryland the agencies that are responsible for evacuation planning will likely have a larger role in the future. Table 5 summarizes possible stakeholders' roles and responsibilities based on the information received at the Rural ITS stakeholders' meetings. In addition to the Stakeholder's "name" and "roles and responsibilities". far right column defines a status of a particular role and responsibility compared with the Maryland ITS Architecture Operational Concept Table A-5.2 (see **Appendix A-5**) Roles and Responsibilities. Working with neighboring states to improve coordination and data sharing is very important, however, CHART would like to be involved in helping Maryland's rural areas working towards this direction. Though, CHART does not have a control in what has been planned and what will be planned in the neighboring states, which are the reasons for not having roles and responsibilities in operational coordination and information sharing between the rural parts and neighboring states identified.

4.6.7 Functional Requirements

Functional Requirements define the activities that are performed by various systems in the region. This is done by associating each system with its share of the work to provide a particular ITS service. Functional Requirements are intended to be high-level descriptions of what the system will do rather than detailed design requirements. In the Maryland Architecture, Functional Requirements are defined by associating Maryland Architecture Elements with one or more "Functional Areas".

No changes are required in this section of the architecture based on the rural ITS needs.

4.6.8 Interface Requirements

Interface requirements define how the Elements within the region will exchange information. This is commonly referred to as System Interconnects. The Interface Requirements build on the general integration strategy that has been defined by the regional stakeholders to create a "framework for integration". Included in this framework, is not only a definition of which systems exchange information, but also a description of the information that is being exchanged (Information Flows) and whether those information exchanges are existing or planned.

Within the MD Architecture, Interconnects and Information Flows between the defined Elements are provided in the diagrams the Statewide ITS Architecture. Each Element has a specific Interconnect Diagram associated with that shows the subject Element in the center, linked with existing or planned Interconnect lines to other Elements. Behind each Interconnect Diagram are the respective Information Flow Diagrams, which further define the information exchanges that constitute every link in the subject Element's Interconnect Diagram.

No changes are required in this section of the architecture based on the rural ITS needs. However, if any Elements are revised, changes from Generic to Specific for example, then new diagrams and changes to the existing diagrams would be required.

4.6.9 ITS Standards

ITS standards are industry-consensus system standards that define how components operate within a consistent framework. By specifying how systems and components interconnect, ITS standards promote interoperability. The operation of the Maryland transportation system benefits by promotion of ITS systems and equipment that are designed to meet the latest ITS standards. .

No changes are required in this section of the architecture based on the rural ITS needs.

4.6.10 Appendices

No changes are required in this section of the architecture based on the rural ITS needs.

4.7 SUMMARY OF THE RECOMMENDED ITS ARCHITECTURE UPDATES

General, very few changes to the Statewide ITS architecture would be necessary. The use of Generic and Specific Elements in the Maryland ITS Architecture is a very powerful and flexible concept that allow the existing architecture to encompass the rural needs that have been identified. As with any documentation product, revisions are required to keep up with changes in the "real world."

There are four specific areas that will require attention:

1. List of Stakeholders

It is recommended that each rural county be engaged and the agencies in that county who will be active participants in the rural architecture effort be uniquely identified.

2. List of Projects

It is recommended that the List of Projects be updated to reflect the current status.

3. Elements

Although no new Elements, or Element changes from Generic to Specific have been identified as needed, the possibility exists that this need may result from additional efforts. Especially in the areas of Emergency Evacuation and Disaster Response, it may be important to create a Specific Element to better describe the Interconnects and Information Flows.

4. Operational Concept

Also related to the increased efforts in the areas of Emergency Evacuation and Disaster Response, the Operational Concept will have to be developed to describe these events.

5.0 RURAL M&O/ITS STRATEGIES ASSESSMENT

Section 3.0 summarizes the stakeholders' needs assessment analysis, while this Section focuses on the M&O/ITS strategies assessment conducted in order to help CHART in their efforts to expand M&O/ITS deployments in the rural areas of Maryland. Stakeholders at each of the three rural area meetings summarized their local M&O activities and the ITS and communications infrastructure. However, the stakeholders also shared some of their M&O/ITS device and communications needs and the potential measures that could satisfy those needs. The needs identified were not limited to infrastructure, but ranged from personnel support to having access to CHART and other resources within the State. A summary of the M&O/ITS device and communications needs identified by stakeholders in each of the identified rural areas can be found in **Appendix A-1**. To better understand the tabular presentation of needs and solutions, each need is assigned a priority code (PC). *PC01* represents an immediate need for this resource and the resource is crucial for day-to-day M&O activities and for mounting effective responses to incidents and emergencies; *PC02* represents a resource that can help to alleviate existing challenges in M&O activities and the resource can be acquired within 2-3 years; and *PC03* represents a resource that would give additional capabilities to M&O personnel and this resource could be implemented in the long-term (i.e. 3-5 years).

5.1 RURAL M&O/ITS STRATEGIES

The needs assessment analysis plays a major role in conducting the rural M&O/ITS strategies assessment. The following subsection discusses how the stated stakeholders' needs and prioritized solutions could be implemented over a period of 6 years. The proposed infrastructure needs/solutions and prioritizations form the basis for SHA's determination of project scope and implementation schedule for each of the identified rural areas. Using the summary table of the M&O/ITS device and communication needs identified by stakeholders, three phases were developed based on the prioritization process. The following outlines the three phase process:

Phase 1

Needs recognized as *PC01* are crucial for day-to-day M&O/ITS activities and mounting effective responses to incidents and emergencies. These needs are categorized in Phase 1 and could be completed within a period of eighteen months.

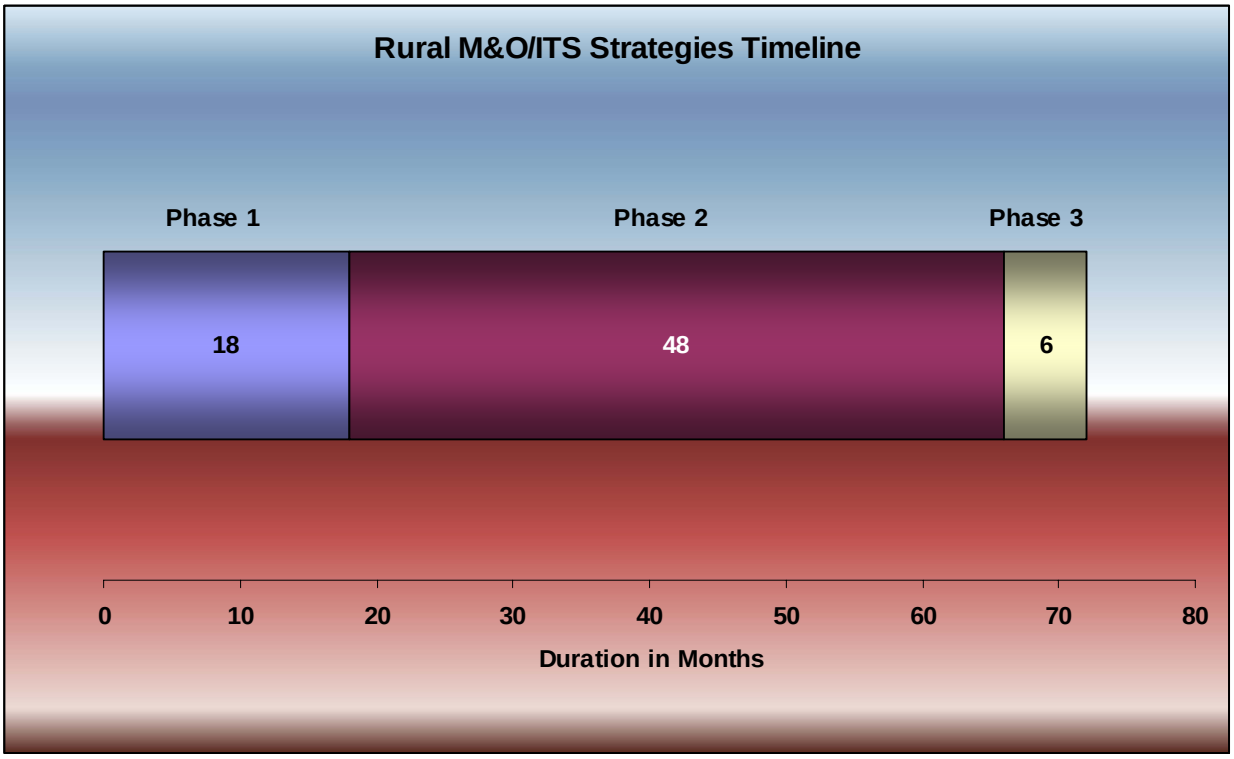
Phase 2

The resources that can be acquired within 2-3 years are classified as *PC02* and categorized as Phase 2. This phase should be completed within a 4-year period.

Phase 3

Some of the stakeholders' needs identified in the summary table as *PCO3* do not have significant impact on the execution of the current M&O/ITS strategies and could be implemented in the long-term. These resources are categorized in Phase 3 and they could be completed within a period of six months. Exhibit 5.1 shows graphical timeline presentation of all three phases.

Exhibit 5.1
Rural M&O/ITS Strategies – Timeline



Tables 5.1 through 5.*3* outline three phases of the M&O ITS device and communications requirements identified by stakeholders at the rural area meetings. The Charles County Emergency Services need for the DMS at US-301 approaching Smallwood Drive was one-time request and would be removed from future considerations. This need is highlighted with gray color to distinguish from other needs. The ITS devices identified are highlighted in the tables and have been incorporated into the CHART ITS device database, mapped on the Maryland Statewide ITS device map (together with the existing, under construction, proposed and planned ITS devices), and are presented in graphical format in **Appendix A-1**. There are two (2) new needs presented in Table 5.1, where fifty one (51) needs were identified after the initial stakeholders meetings and added to the *Strategic Deployment Plan*. Subsequent to meeting with stakeholders from Southern Maryland, information on additional ITS device needs was obtained from MSP in St. Mary's County. These needs are included in the strategies assessment process. They are not reflected in the M&O/ITS Needs and Solutions table for Southern Maryland, however, they were included in Technical Memorandum #1 for consideration in the overall Rural M&O/ITS strategic planning process. The proposed DMS locations are in the area of Leonardtown in St. Mary's County. Daily traffic in this area is often busy, and these roadways

are considered essential for the evacuation plans. Given this significance, the proposed ITS devices could be implemented in three (3) to four (4) years, and are therefore classified as Phase 2 priorities. Another request came from SHA's Office of CHART to add a need for Eastern shore. Additional CHART workstations are necessary for counties and city offices in order to provide access to CHART data. This particular need had been already identified in the technical Memorandum No.1 and here is expanded by adding more sites that are in need for CHART workstations. This request is considered for the Rural ITS/M&O Strategies Assessment.

In addition to establishing the phasing process for the needs proposed by the various agencies, existing Freeway Incident Management (FITM) plans for the rural areas were analyzed. *Table 5.4* summarizes the existing FITM sections and their status. Some of these sections, such as I-68, I-81, US50, I-70, and US301 are related to Maryland's rural areas. I-68, I-81, and I-70 are major roadways in Western Maryland. A FITM plan for I-70 was completed in 2003, and I-68 and I-81 plans are currently under revision. US 301, a major route on the Eastern Shore, has the oldest FITM plan that should be considered for revision. This route is of high importance not just for M&O in this rural area, but also for the Metropolitan area in the case of emergency evacuations. *Table 5.5* outlines the proposed new and revised rural FITM sections. During this process, available relevant documents were analyzed in order to define key routes for the rural areas and their importance in the M&O course. These routes were considered for developing new FITM plans that would support evacuation plans in particular rural areas. However, MSP Barrack "H" from Southern Maryland requested expansion of the FITM plans for US301 to support detour routes. This would also bring significant benefits to the evacuation plans for that area. US301 is not only important for Southern Maryland emergency evacuations, it is also considered essential for the emergency evacuations of the Washington-Baltimore Metropolitan Area.

While the majority of FITM plans were not considered for a phasing process, they serve a significant role to the CHART M&O/ITS program expansion in rural areas, and the proposed FITM plan sections could be implemented in three (3) to four (4) years.

In order to ensure successful implementation and maintenance of the proposed ITS solutions, it was recognized that establishing working/coordination groups is necessary. However, coordination between Counties and different agencies is important as well in succeeding in these efforts. Additionally, working closely with neighbors to improve coordination during special events, such as evacuations and emergency incidents, was recognized by most of the areas that are close to border with another state (refer to Technical Memorandum No.1 for more detailed information). In addition, neighboring states were contacted to provide their inputs regarding the inter-state coordination needs and of the four (4) States identified as neighboring the rural Maryland regions, two (2) provided feedback on the kinds of initiatives that they had in place, or were planning to undertake in the near future. Currently, there is some coordination occurring, particularly with Delaware through DelDOT) as it shares several high volume corridors with Maryland, i.e. US-40, US-301, US-13 and US-113. Delaware and Maryland also share a popular beachfront area along the eastern shore that makes coordination between the two States during hurricane and emergency evacuations virtually inevitable. The information obtained from Virginia pertained to the Western Maryland region. In this region, Virginia does not share a

border with Maryland (only West Virginia does); however, traffic and roadway information along the I-81 corridor that traverses both States could provide useful information for both jurisdictions.

Table 5.6 summarizes proposed inter-jurisdictional and inter-state M&O coordination efforts that were identified from the rural Maryland stakeholder meetings and discussed in more details in the Technical Memorandum No.1.

Table 5.1
Rural M&O/ITS Strategies – Phase 1

RURAL AREA	AGENCY/ORGANIZATION	PROPOSED M&O NEED	PROPOSED M&O SOLUTION	IMPLEMENTATION REQUIREMENTS
Eastern Shore	**Dorchester County Emergency Management**	Access to CHART data	Install CHART workstation [CHART LITE] at Dorchester County EOC	Computer desktop and accessories
	Maryland State Police	Resources to better support the evacuation plans	*DMS*: - MD-13 in the vicinity of MD-133	Purchase, installation, and testing
	Wicomico County Emergency Management	Access to CHART data to support emergency and incident management	Install CHART workstation at Wicomico Co. EOC (by Spring 2006)	Computer desktop and accessories
	SHA District 2	Access to CHART data to support emergency and incident management	Install CHART workstation	Computer desktop and accessories
	Talbot County Emergency Management	Access to CHART data to support emergency and incident management	Install CHART workstation	Computer desktop and accessories
	Queen Anne County Dept. of Emergency Services	Training	Additional personnel training on proper use of communications equipment/devices	Instruction and facility
	SHA's Office of CHART	Access to CHART data to support emergency and incident management	Install CHART workstations in counties and city offices	Computer desktop and accessories
Western Maryland	**Allegany County Emergency Services**	Detection devices on I-68 detour routes	*RWIS*: - Along MD-51	Purchase, installation, and testing
	Garrett County Fire and Rescue Department	Provide motorist with advance incident warning messages	*DMS (high visibility):* - I-68 (EB) prior to mm 24 - Between mm 29 and 31	Purchase, installation, and testing
Southern Maryland	**SHA – Calvert County**	800 MHz radios	Discuss issue with Calvert County EOC; St. Mary's County EOC has already been supplied with eight (8) radios.	Installation and testing
		Improvement in vital decision points for diversion routes	*DMS*: - US-301 @ MD-4 - MD-5 @ MD-231	Purchase, installation, and testing

RURAL AREA	AGENCY/ORGANIZATION	PROPOSED M&O NEED	PROPOSED M&O SOLUTION	IMPLEMENTATION REQUIREMENTS
			- MD-231 @ MD4	
	Charles County Emergency Services	Traveler information for emergency evacuations and recurring congestion	*DMS*: - US-301 prior to MD-5 (PG County) - US-301 (SB) prior to MD-228 - MD-210 (SB) in the Accokeek area	Purchase, installation, and testing
	MSP Barrack "H"	Support for police actions and responsibilities on US-301 detour routes	Expanded FITM Plan	Per roadway corridor
		Positive evacuation guidance for Washington DC evacuees	Install evacuation guide signs directing motorists to specific routes, e.g. Nice Bridge, MD-210, Calvert County	Twenty miles and sign per 1/4 mile
		Rectify simulcast issues	Join CapWIN or use CapWIN's solution to resolve the issue.	Equipment and labor for one setup

Table 5.2
Rural M&O/ITS Strategies – Phase 2

RURAL AREA	AGENCY/ORGANIZATION	PROPOSED M&O NEED	PROPOSED M&O SOLUTION	IMPLEMENTATION REQUIREMENTS
Eastern Shore	**Dorchester County Emergency Management**	Roadway-monitoring capabilities	*CCTV Cameras*: - Along MD-335 and MD-336. - US-50 @ MD-331 - MD-16 @ WalMart Store	Purchase, installation, and testing
	Cecil County Department of Emergency Services	Resources to supplement emergency evacuation operations	Provide access to CHART CCTV camera images	Labor for setup
	Maryland State Police	Enhanced roadway monitoring	Provide access to CHART CCTV camera images	Labor for setup
	Wicomico County Emergency Management	Better integration with CHART ITS devices	Need cellular communication option for the DMS	Labor for setup
		Better roadway monitoring	*CCTV Cameras*: - MD-13 @ US-50	Purchase, installation, and testing
	Caroline County Emergency Management	Better roadway monitoring at the MD-DE border	*CCTV Cameras/Detection Devices*: - MD-331 (entering MD from DE) - MD-318 (entering MD from DE)	Purchase, installation, and testing
			Communications: - Connectivity with 911 centers	Estimate
	SHA District 1	Facilitate turning from MD-9 to MD-589	Shift existing DMS on MD-9 (WB) farther west	Labor for setup
	SHA District 2	Better information coverage on US-301	*Shazam*: - Shift existing Shazam from MD-290 @ US-301 to MD-213 @ US-301	Labor for setup
	Somerset County	Improve information dissemination	*DMS*: - MD-413, MD-363, and MD-13 (north of Pocomoke)	Purchase, installation, and testing
	Queen Anne County Dept. of Emergency Services	Traffic monitoring/traveler information in the vicinity of the MD-DE border	*CCTV:* - Establish two (2) sites to view traffic to/from DE	Purchase, installation, and testing

RURAL AREA	AGENCY/ORGANIZATION	PROPOSED M&O NEED	PROPOSED M&O SOLUTION	IMPLEMENTATION REQUIREMENTS
			DMS - Deploy signs based on location of CCTVs	Purchase, installation, and testing
Western Maryland	**Allegany County Emergency Services**	Traffic diversion resources for flooding and whitewater recoveries	*DMS*: - (no location specified)	Purchase, installation, and testing
			HAR: - (no location specified)	Purchase, installation, and testing
		Aid stranded motorists in identifying their location on the roadway	Install mile-markers every 1/10th of a mile in addition to on bridges and other road crossings	Purchase and installation
		Minimize risk to motorists by emergency responders	Install arrow boards on emergency response vehicles	Purchase, installation, and testing
		Access to CHART data	CHART Workstation at 911/EOC facility in Cumberland	Computer desktop and accessories
	SHA District 6	ITS resources	*DMS*: - US-340 @ Harpers Ferry	Purchase, installation, and testing
			HAR: - US-340 @ Harpers Ferry	Purchase, installation, and testing
		Congestion relief on major routes	- Use I-68 through various towns - Law enforcement support - County/State support (CTP proj. funds)	Estimate
		Access to CHART data to support incident management	Install CHART workstations in the counties	Computer desktop and accessories
		Traveler information	*DMS:* - In the vicinity of the Old Town	Purchase, installation, and testing
		Winter weather warning for truckers	*HAR:* - Friendsville area Welcome Center	Purchase, installation, and testing
			Shazam: - EB approach to Welcome Center	Purchase, installation, and testing
			- WB approach to Welcome Center	

RURAL AREA	AGENCY/ORGANIZATION	PROPOSED M&O NEED	PROPOSED M&O SOLUTION	IMPLEMENTATION REQUIREMENTS
		Weather detection capabilities and roadway condition data	*RWIS:* - On Haystack Mountain	Purchase, installation, and testing
	SHA District 7	Provide snow event/road closure warnings; Routine roadway maintenance	*DMS:* - I-70 (EB) approaching I-81 - I-70 (WB) approaching I-81 - I-81 (NB) approaching I-70 - I-81 (SB) approaching I-70	Purchase, installation, and testing
		Traveler information (DMS and HAR in various locations)	*DMS and HAR:* - East of MD-65 bet. MD-65 & US-40) - I-68 and Cumberland - I-68 @ I-7 Truck Stop - Halfway and Wisel Blvd. - MD-51 @ Rail Underpass - US-40 corridor in Hagerstown - US-220 corridor in Cresuptown - I-70 WB ramp @ 65 (ramp too short)	Purchase, installation, and testing
	City of Cumberland	Weather detection capabilities and roadway condition data	*RWIS:* - I-68 @ Haystack Mtn. (near Exit 41; possibly at City sewer pump station) - I-68 @ MD-639 (Willowbrook Road) - MD-51 (Industrial Blvd.) near City of Cumberland corporate limits - I-68 @ MD-36 (or at SHA saltdome on MD-36)	Purchase, installation, and testing
		Traffic-monitoring capabilities	*CCTV Cameras:* - I-68 @ MD-639 (Willowbrook Road) - I-68 @ Exit 42 (possibly at City water pump station) - I-68 @ MD-36 (or at SHA saltdome on MD-36)	Purchase, installation, and testing

RURAL AREA	AGENCY/ORGANIZATION	PROPOSED M&O NEED	PROPOSED M&O SOLUTION	IMPLEMENTATION REQUIREMENTS
	Washington County Division of Public Works	Improved roadway monitoring	*CCTV Cameras (Internet accessible):* - MD-67 @ MD-340 (on County-owned communications tower) - I-70 @ US-40 - I-81 @ Maugans Ave. - I-81 @ Halfway Blvd. - I-81 @ US-40 - I-81 @ Showalter Rd. (near Hagerstown Regional Airport) - US-11 @ Showalter Rd. (near Hagerstown Regional Airport) - Planned Lamb's Knoll tower (coverage to include MD-340 over the Potomac river to US-340 @ MD-67)	Purchase, installation, and testing
		Improvement in the support provided to alleviate daily traffic congestion	*DMS:* - I-81 SB, just south of the PA line - I-81 NB, just north of the WVA line - I-70 EB, just east of the Allegany Co. line - I-70 WB, just west of the Frederick Co. line (prior to MD-66)	Purchase, installation, and testing
Southern Maryland	**SHA – Calvert County**	Communications and Control Center	(Uncertain of additional avenues to achieve this. The effort has been investigated for may years with no success)	
		Weather-monitoring capability	*RWIS*: Anne Arundel and Calvert County Line	Purchase, installation, and testing
	Calvert County Sheriff Office	Incident detection capability	*CCTV Cameras*: - Various locations along MD-4	Purchase, installation, and testing
	Charles County Emergency Services	Construction zone warning	*DMS*: - US-301 approaching Smallwood Drive	N/A
	St. Mary County Emergency Management	Detection and monitoring capabilities along MD-235	*Speed Detectors and CCTV Cameras* - Various locations along MD-235	Purchase, installation, and testing

RURAL AREA	AGENCY/ORGANIZATION	PROPOSED M&O NEED	PROPOSED M&O SOLUTION	IMPLEMENTATION REQUIREMENTS
		Support for contra-flow operations during emergencies	Address the issue in the County's evacuation plan.	Labor
		Support evacuation plans	*DMS:* MD-4 @ Solomons Bridge MD-235 @ MD-4 MD-4 @ MD-5 MD-5 @ MD-245	Purchase, installation, and testing

Table 5.3
Rural M&O/ITS Strategies – Phase 3

RURAL AREA	AGENCY/ORGANIZATION	PROPOSED M&O NEED	PROPOSED M&O SOLUTION	IMPLEMENTATION REQUIREMENTS
Eastern Shore	**Dorchester County Emergency Management**	Enhanced traveler information	*DMS*: - Install DMS on MD-16 in the vicinity of the WalMart store	Purchase, installation, and testing
	SHA District 1	Improve support for the evacuation plans	*DMS*: - MD-12 location base on investigations)	Purchase, installation, and testing
	SHA District 2	Modification to CHART ITS device plans	*RWIS:* - Relocate RWIS planned for MD-291 @ US-301	Labor for setup
Western Maryland	**Allegany County Emergency Services**	Contingency Devices	*Multiple Devices:* - CCTV (omni-directional) – I-68 @ Orleans Rd. (Exit 68) - DMS – I-68 (WB) @ Orleans Rd (Exit 68; SHA Orleans Rd. Saltdome) - HAR – MD-51, east of Oldtown (SHA Oldtown Saltdome) - Shazam – MD-51, east of Oldtown (SHA Oldtown Saltdome)	Purchase, installation, and testing

Table 5.4
Existing FITM Sections

ROADWAY	STATUS
I-68	New – under revision
I-81	New – under revision
I-83	Completed in 2004
I-95	Completed in 1996 – under revision
I-95/495	Completed in 1996 – under revision
I-695	Completed in 2006
I-495	Completed in 1996 – under revision
I-270	Completed in 1996 – under revision
MD100	Completed in 2005
US50	Completed in 2003
MD295	Completed in 2003
I-97	Completed in 2003
US301 (Eastern Shore)	Completed in 1980s
US301 (Southern Maryland)	Completed in 2002
I-70	Completed in 2003

Table 5.5
Proposed New and Revised Rural FITM Sections

ROADWAY	SECTION
Eastern Shore	
US50	From Bay Bridge to Ocean City
US301	From Bay Bridge to Delaware border
Western Maryland	
I-68	Uncovered Sections from existing plan
US340	From Frederick to West Virginia border
US15	From Frederick to Pennsylvania border
Southern Maryland	
MD2/4	From Annapolis to Southern end of Calvert County
MD5/235	From west Charles County border to Hermanville of St. Mary's County

Table 5.6
Proposed M&O/ITS Coordination Efforts

MARYLAND RURAL AREA	PROPOSED COORDINATION NEEDS
EASTERN SHORE	▪ Coordinate emergency evacuation operations with United States Army Corps of Engineers (USACE) ▪ Organize a stakeholder forum to address the need for increased CHART presence in the districts, e.g. more workstations (raise issue at CHART Board Meetings) ▪ Establish working/coordination groups similar to ROCC and B-ROCC to support the use and maintenance of the Strategic Plan ▪ Continue work with the DelMarVa Task Force to coordinate traffic movement between Maryland, Delaware and Virginia **DE** ▪ Work with MD (CHART) to determine traffic crossing the State Line ▪ Work closely with Ocean City and SHA districts during evacuations (through Mutual Aid Agreements)
WESTERN MARYLAND	▪ Coordination with PennDOT on road closures during snow events ▪ FITM implementation notification and coordination between the District 7 and Washington County ▪ Complete plans for downstate evacuation and that of the Pittsburg area. Plan development underway by Allegany County. ▪ SHA Districts need to discuss resource-sharing during major incidents with WV, PA, and Washington and Garrett Counties. Also involve PA and WV in the incident management planning process ▪ Set clear guidelines for response agencies re lane/roadway closures, activation of ITS assets and when incidents should be turned over to SHA (Statewide Protocol needed) ▪ Establishment of traffic management teams similar to ROCC and B-ROCC ▪ Regular incident management conferences ▪ Develop strategy for making local legislatures more aware of the key elements of CHART planning process.
SOUTHERN MARYLAND	▪ Regional coordination in advance of emergency evacuations to develop workable strategies for detours and sheltering ▪ Update current St. Mary's County Evacuation Plan to reflect ultimate destination/routing evacuees. ▪ Investigate the establishment of a working/coordination group (Southern ROCC) to support the use and maintenance of the Strategic Plan ▪ Coordination between SHA shop and Emergency Operations Centers (EOC) personnel to maximize use of the available resources. ▪ Develop MOU for other Southern MD counties, similar to that used in St. Mary's County. ▪ VDOT coordination to garner information on detour strategies affecting US-301

5.2 COMMUNICATIONS REQUIREMENTS FOR PROPOSED M&O/ITS DEVICES

Communications media is essential to implementing various ITS Devices. This section focuses on the communications requirements for devices identified and proposed for deployments.

CCTV Cameras

Video from cameras may be transported via a few different methods, but in general will require larger bandwidth than most other applications. Additionally, quality-of-service (QoS) features may be necessary to maintain the quality and integrity of the video stream for the length of the circuit. Video can either be transported directly as an analog signal or it can be encoded into a digital signal.

Analog video can be transported over a few different types of media, however fiber or coaxial cable are the most common. Over fiber optic cable, analog video can be transported for several miles without requiring amplification. Over coaxial cable, analog video requires relatively frequent amplification, and should only be used for short runs of no longer than a few miles. Analog video transport is reliable for shorter distances and simpler to implement than digital transport, but is not recommended for longer distances and will not maintain the quality and integrity of the baseband video signal as well as digital transport will.

Digitized video can be transported over distances of almost any length using any one of several different methods. Such media may include fiber or microwave, and may utilize time-division multiplexing (TDM) formats such as SONET, or packed based formats such as Video-over-IP. Digital video is more complex mainly due to the added function of encoding the video, but will allow video to be transported over hundreds of miles with little to no loss of video quality.

The amount of bandwidth necessary to transport a digital video stream will be dependent on a few properties of the video, primarily format, compression and frame rate. Certain video formats, such as MPEG-2 or MPEG-4 video, can be compressed to conserve bandwidth. However, as the level of video compression is increased, the quality of the video is decreased. Frame rate can also be decreased to conserve bandwidth; however as frame rates become slower, the video becomes choppier. This becomes increasingly noticeable to the viewer as the frame rate is decreased from 25-30 frames per second. The desired amount of compression and frame rate is generally dependent upon the application, and the minimum quality of video that is necessary for the application to be effective.

Recommended minimum specifications for full motion CCTV video transport:

- Platform**:** digital MPEG-4 video
- Physical medium**:** fiber optics or microwave
- Bandwidth: 500 kbps to 1.5 Mbps for MPEG-4 video; however bandwidth will vary greatly depending on format, frame rate and compression
- Network topology: TDM is the most reliable, particularly if a SONET system is available. IP-based transport, such as Ethernet can be used, but QoS measures must be

implemented to ensure an acceptable degree of reliability. Leased circuits may be used if no State-owned facilities are available, but are not recommended otherwise.

Access to the State's CHART CCTV cameras has been requested by other State and local agencies. It is recommended that video-over-IP be utilized on a view-only basis (CHART has priority over PTZ functions, otherwise allow no ability for agencies other than CHART to use the PTZ functions). All agencies with access to CHART's video would have an IP-based connection to CHART's traffic operations center, and be granted access to view any cameras as CHART may allow. Communications requirements would generally include any IP-based circuit. This circuit should be carried over fiber or microwave if available. Otherwise, a leased circuit from the local exchange carrier is an alternative solution where in-house facilities are not available. It is highly recommended that QoS measures be utilized for these links.

DMS

DMS signs generally use a low amount of bandwidth, which is typically not real-time sensitive. A low-speed digital data circuit should be sufficient to handle typical communication requirements for a DMS. If State network facilities, such as SONET or IP over fiber or microwave currently exist at or near the DMS, it is recommended that a fractional T1 or IP-based circuit be utilized over these facilities. If the State has existing wireless facilities such as Wi-Fi or 4.9-GHz available near any DMS units, such a link may also be used to connect to DMS units. Encryption is highly recommended for wireless connections.

At DMS units where no State network exists, a dial-up phone circuit leased from the local exchange carrier or a cellular-based low-speed data service would likely be the most cost-effective solution.

Recommended minimum specifications for communications with DMS units:

- Platform: standard digital data
- Physical medium: fiber optics or microwave where State facilities exist at the DMS unit, otherwise dial-up over a leased phone circuit or cellular-based low-speed data service
- Bandwidth: a DS0 (64-kbps) circuit or less should be sufficient
- Network topology: TDM and/or IP-based transport where State facilities exist, otherwise dial-up over a leased phone circuit or cellular-based low-speed data service

Detection Devices

Vehicle detection devices generally use a low amount of bandwidth; however these devices may be real-time sensitive. A low-speed digital data circuit should be sufficient to handle typical communication requirements for a vehicle detector. If State network facilities, such as SONET or IP over fiber or microwave currently exist at or near the detection device, it is recommended that a fractional T1 or IP-based circuit be utilized over these facilities. If the State has existing wireless facilities such as Wi-Fi or 4.9-GHz available near any detection units, such a link may also be used to connect devices. Encryption is highly recommended for wireless connections.

At vehicle detection units where no State network exists, a dedicated fractional T1 circuit leased from the local exchange carrier or a cellular-based data service would likely be necessary, but is

only recommended if no State-owned communications facilities are available. If the download of data from a detection device is done periodically, and is thus not real-time sensitive, a dial-up phone circuit leased from the local exchange carrier or a cellular-based low-speed data service would likely be the most cost-effective solution.

Recommended minimum specifications for communications with vehicle detection devices:

- Platform: standard digital data
- Physical medium: fiber optics or microwave where State facilities exist at the detection unit, otherwise a leased phone circuit or cellular-based data service
- Bandwidth: a DS0 (64-kbps) circuit or less should be sufficient
- Network topology: TDM and/or IP-based transport where State facilities exist, otherwise a leased phone circuit or cellular-based data service

Road Weather Information System (RWIS)

RWIS (weather) devices generally use a low amount of bandwidth, which may be somewhat real-time sensitive. A low-speed digital data circuit should be sufficient to handle typical communication requirements for an RWIS device. If State network facilities, such as SONET or IP over fiber or microwave currently exist at or near the RWIS, it is recommended that a fractional T1 or IP-based circuit be utilized over these facilities. If the State has existing wireless facilities such as Wi-Fi or 4.9-GHz available near any RWIS units, such a link may also be used to connect devices. Encryption is highly recommended for wireless connections.

At RWIS units where no State network exists, a dial-up phone circuit leased from the local exchange carrier or a cellular-based low-speed data service would likely be the most cost-effective solution.

Recommended minimum specifications for communications with RWIS devices:

- Platform: standard digital data
- Physical medium: fiber optics or microwave where State facilities exist at the detection unit, otherwise a leased phone circuit or cellular-based data service
- Bandwidth: a DS0 (64-kbps) circuit or less should be sufficient
- Network topology: TDM and/or IP-based transport where State facilities exist, otherwise dial-up over a leased phone circuit or cellular-based low-speed data service

Highway Advisory Radio (HAR)

HAR generally uses a moderate to low amount of bandwidth that is typically not real-time sensitive, as a pre-recorded messages are typically utilized. A low-speed digital data circuit should be sufficient to handle download of the looped recording to a HAR transmitter. If State network facilities, such as SONET or IP over fiber or microwave currently exist at or near the HAR unit, it is recommended that a fractional T1 or IP-based circuit be utilized over these facilities. If the State has existing wireless facilities such as Wi-Fi or 4.9-GHz available near any HAR units, such a link may also be used to connect devices. Encryption is highly recommended for wireless connections.

At HAR units where no State network exists, a dial-up phone circuit leased from the local exchange carrier or a cellular-based data service would likely be the most cost-effective solution.

Recommended minimum specifications for communications with vehicle detection devices:

- Platform: recorded digital audio
- Physical medium: fiber optics or microwave where State facilities exist at the detection unit, otherwise a leased phone circuit or cellular-based data service
- Bandwidth: a DS0 (64-kbps) circuit or less should be sufficient
- Network topology: TDM and/or IP-based transport where State facilities exist, otherwise dial-up over a leased phone circuit or cellular-based low-speed data service

Shazam

Shazam devices would need only a control signal to turn the flashing lights on or off. The SHA currently performs this operation through DTMF tones, which can be handled with a simple analog phone circuit.

Recommended minimum specifications for communications with Shazam units:

- Platform: control signaling using DTMF tones
- Physical medium: dial-up analog phone circuit
- Bandwidth: very low
- Network topology: dial-up analog phone circuit

CHART Workstations

CHART workstations should each be connected to the State's network via an Ethernet connection of no less than 100-Mbps to ensure that any graphically intensive applications including video, maps, or otherwise, can adequately function at each CHART workstation.

WAN connections to each location where CHART traffic video and data feeds are accessed will vary in bandwidth based on whether or not State-owned facilities are available. It is recommended that State-owned fiber or microwave be used wherever it currently exists, as this will be more cost effective and provide some flexibility to increase bandwidth if needed. Otherwise, leased circuits from the local exchange carrier will be necessary.

The number of circuits and bandwidth will vary based on the amount of users at each site, and how much time each user needs to access video feeds from the field simultaneously. The total amount of bandwidth necessary will increase as more workstations at a site need to access video simultaneously. The effect of data downloads from any of the other ITS field devices may be considered to be negligible on the overall bandwidth to a user workstation location.

This summary gives a basic understanding of what needs to be considered before implementation takes place. Further analyses for all proposed ITS locations are necessary.

5.3 COST ESTIMATES FOR THE PROPOSED RURAL M&O/ITS STRATEGIES

The cost of implementing ITS devices for Maryland's rural areas has been estimated based on the 2004 CHART estimates and SCRITS (SCReening for ITS), an analysis tool package developed through the Federal Highway Administration. CHART estimates are based on the conducted CHART projects involving ITS deployments. SCRITS is a spreadsheet analysis tool for estimating the user cost and benefits of Intelligent Transportation Systems (ITS). It is intended as a sketch-level or screening-level analysis tool for allowing practitioners to obtain an initial indication of the possible cost-benefits of various ITS applications. It is not intended for detailed analysis. SCRITS was developed in response to the need for simplified estimates in the early stages of ITS-related planning, in the context of either a focused ITS analysis, a corridor/subarea transportation study, or regional planning analysis. One SCRITS module includes cost estimates for installation and maintenance of a variety of ITS devices. The cost estimates for Phases 1 through 3 were based on this module. The cost figures listed in the table are installation and test costs only (maintenance costs not included).

Developing the proposed rural FITM sections is considered a separate item, and is not shown along with other rural ITS needs. The following Table summarizes costs to produce needed FITM plans for the proposed sections. Using the prioritization made in a previous section, associated costs for the proposed FITM plans are added to Phase 2 costs.

Table 5.7
Rural M&O/ITS Proposed FITM Plans - Cost Estimates

ROADWAY	SECTION	COSTS
Eastern Shore		
US50	From Bay Bridge to Ocean City	$22,400
US301	From Bay Bridge to Delaware border	$11,800
Western Maryland		
US340	From Frederick to West Virginia border	$8,200
US15	From Frederick to Pennsylvania border	$8,200
Southern Maryland		
MD2/4	From Annapolis to Southern end of Calvert County	$17,200
MD5/235	From west Charles County border to Hermanville of St. Mary's County	$12,800
TOTAL		**$80,600**

In summary, the overall cost to implement Phases 1 through 3 amounts to $14,619,091. *Phase 1* would require $3,108,450, or 21% of total cost; *Phase 2* would require $10,787,101, or 74% of total, and *Phase 3* would require $723,539, or 5% of total. Besides equipment and installation costs, annual Operations and Maintenance (O&M) costs are presented. US Department of Transportation (DOT) ITS cost database was used to estimate these costs. Detailed breakdowns for both costs are presented in Tables 5.8 through 5.10. Table 5.11 summarizes deployment cost

estimates by Phase and rural area. Annual O&M costs are presented in Table 5.12. Rural areas are shown in different colors for better presentation. In addition, **Appendix A-6** presents in detail each need/solution as a separate project. For better understanding, needs were separated by phase and type.

SHA Consolidated Transportation Program (CTP) for next five-year (2006 – 2011) period has been already planned and does not include the proposed M&O/ITS needs presented here. SHA together with CHART and rural area stakeholders have to work together towards finding sources to support the proposed deployment plan. Section five discusses available funding sources that could be possibly used for the rural M&O/ITS needs.

Table 5.8
Rural M&O/ITS Implementation Cost Estimates – Phase 1

RURAL AREA	AGENCY/ORGANIZATION	PROPOSED M&O NEED	PROPOSED M&O SOLUTION	COSTS ($)	REMARKS	ANNUAL O&M COSTS ($)
Eastern Shore	**Dorchester County Emergency Management**	Access to CHART data	Install CHART workstation [CHART LITE] at Dorchester County EOC	18,000	Computer desktop and accessories	1,800
	Maryland State Police	Resources to better support the evacuation plans	*DMS*: - MD-13 in the vicinity of MD-133	286,997	Purchase, installation and testing included	15,000
	Wicomico County Emergency Management	Access to CHART data to support emergency and incident management	Install CHART workstation at Wicomico Co. EOC (by Spring 2006)	18,000	Computer desktop and accessories	1,800
	SHA District 2	Access to CHART data to support emergency and incident management	Install CHART workstation	18,000	Computer desktop and accessories	1,800
	Talbot County Emergency Management	Access to CHART data to support emergency and incident management	Install CHART workstation	18,000	Computer desktop and accessories	1,800
	Queen Anne County Dept. of Emergency Services	Training	Additional personnel training on proper use of communications equipment/devices	500	Instruction and facility	50
	SHA 's of CHART	Access to CHART data	Install CHART workstations in counties and city offices	234,000	Computer desktop and accessories	23,400
Western Maryland	**Allegany County Emergency Services**	Detection devices on I-68 detour routes	*RWIS*: - Along MD-51	142,477	Purchase, installation and testing included	14,200
	Garrett County Fire and Rescue Department	Provide motorist with advance incident warning messages	*DMS (high visibility):* - I-68 (EB) prior to mm 24 - Between mm 29 and 31	573,994	Purchase, installation and testing included	30,000
Southern Maryland	**SHA – Calvert County**	800 MHz radios	Discuss issue with Calvert County EOC; St. Mary's County EOC has already been supplied with eight (8) radios.	16,000	Installation and testing included	1,600
		Improvement in vital decision points for diversion routes	*DMS*: - US-301 @ MD-4 - MD-5 @ MD-231 - MD-231 @ MD4	860,991	Purchase, installation and testing included	45,000
	Charles County Emergency Services	Traveler information for emergency evacuations and recurring congestion	*DMS*: - US-301 prior to MD-5 (PG County) - US-301 (SB) prior to MD-228 - MD-210 (SB) in the Accokeek area	860,991	Purchase, installation and testing included	45,000
	MSP Barrack "H"	Support for police actions and responsibilities on US-301 detour routes	Expanded FITM Plan	50,000	Per roadway corridor	5,000
		Positive evacuation guidance for Washington DC evacuees	Install evacuation guide signs directing motorists to specific routes, e.g. Nice Bridge, MD-210, Calvert County	8,000	Twenty miles and sign per 1/4 mile	800
		Rectify simulcast issues	Join CapWIN or use CapWIN's solution to resolve the issue.	2,500	Equipment and labor for one setup	250

Table 5.9
Rural M&O/ITS Implementation Cost Estimates – Phase 2

RURAL AREA	AGENCY/ORGANIZATION	PROPOSED M&O NEED	PROPOSED M&O SOLUTION	COSTS ($)	REMARKS	ANNUAL O&M COSTS ($)
Eastern Shore	**Dorchester County Emergency Management**	Roadway-monitoring capabilities	*CCTV Cameras*: - Along MD-335 and MD-336. - US-50 @ MD-331 - MD-16 @ WalMart Store	185,863	Purchase, installation and testing included	18,600
	Cecil County Department of Emergency Services	Resources to supplement emergency evacuation operations	Provide access to CHART CCTV camera images	18,000	Labor for setup	1,800
	Maryland State Police	Enhanced roadway monitoring	Provide access to CHART CCTV camera images	18,000	Labor for setup	1,800
	Wicomico County Emergency Management	Better integration with CHART ITS devices	Need cellular communication option for the DMS	10,000	Labor for setup	1,000
		Better roadway monitoring	*CCTV Cameras*: - MD-13 @ US-50	61,954	Purchase, installation and testing included	6,200
	Caroline County Emergency Management	Better roadway monitoring at the MD-DE border	*CCTV Cameras/Detection Devices*: - MD-331 (entering MD from DE) - MD-318 (entering MD from DE)	123,908	Purchase, installation and testing included	12,400
			Communications: - Connectivity with 911 centers	50,000	Estimate	5,000
	SHA District 1	Facilitate turning from MD-9 to MD-589	Shift existing DMS on MD-9 (WB) farther west	500	Labor for setup	-
	SHA District 2	Better information coverage on US-301	*Shazam*: - Shift existing Shazam from MD-290 @ US-301 to MD-213 @ US-301	1,000	Labor for setup	-
	Somerset County	Improve information dissemination	*DMS*: - MD-413, MD-363, and MD-13 (north of Pocomoke)	860,991	Purchase, installation and testing included	45,000
	Queen Anne County Dept. of Emergency Services	Traffic monitoring/traveler information in the vicinity of the MD-DE border	*CCTV:* - Establish two (2) sites to view traffic to/from DE	123,908	Purchase, installation and testing included	12,400
			DMS - Deploy signs based on location of CCTVs	573,994	Purchase, installation and testing included	30,000
Western Maryland	**Allegany County Emergency Services**	Traffic diversion resources for flooding and whitewater recoveries	*DMS*: - (no location specified)	286,997	Purchase, installation and testing included	15,000
			HAR: - (no location specified)	16,000	Installation and testing included	900
		Aid stranded motorists in identifying their location on the roadway	Install mile-markers every 1/10th of a mile in addition to on bridges and other road crossings	1,000	Installation included	100
		Minimize risk to motorists by emergency responders	Install arrow boards on emergency response vehicles	3,000	Installation and testing included	300
		Access to CHART data	CHART Workstation at 911/EOC facility in Cumberland	18,000	Computer desktop and accessories	1,800
	SHA District 6	ITS resources	*DMS*:	286,997	Purchase, installation and testing included	15,000

RURAL AREA	AGENCY/ORGANIZATION	PROPOSED M&O NEED	PROPOSED M&O SOLUTION	COSTS ($)	REMARKS	ANNUAL O&M COSTS ($)
			- US-340 @ Harpers Ferry			
			HAR: - US-340 @ Harpers Ferry	16,000	Installation and testing included	900
		Congestion relief on major routes	- Use I-68 through various towns - Law enforcement support - County/State support (CTP proj. funds)	48,000		4,800
		Access to CHART data to support incident management	Install CHART workstations in the counties	72,000	Computer desktop and accessories	7,200
		Traveler information	*DMS (or PDMS):* - In the vicinity of the Old Town	286,997	Installation and testing included	15,000
		Winter weather warning for truckers	*HAR:* - Friendsville area Welcome Center	16,000	Installation and testing included	900
			Shazam: - EB approach to Welcome Center - WB approach to Welcome Center	49,182	Purchase, installation and testing included	4,900
		Weather detection capabilities and roadway condition data	*RWIS:* - On Haystack Mountain	142,477	Purchase, installation and testing included	14,200
	SHA District 7	Provide snow event/road closure warnings; Routine roadway maintenance	*DMS (or PDMS):* - I-70 (EB) approaching I-81 - I-70 (WB) approaching I-81 - I-81 (NB) approaching I-70 - I-81 (SB) approaching I-70	1,147,989	Purchase, installation and testing included	60,000
		Traveler information (DMS and HAR in various locations)	*DMS and HAR:* - East of MD-65 bet. MD-65 & US-40) - I-68 and Cumberland - I-68 @ I-7 Truck Stop - Halfway and Wisel Blvd. - MD-51 @ Rail Underpass - US-40 corridor in Hagerstown - US-220 corridor in Cresuptown - I-70 WB ramp @ 65 (ramp too short)	2,423,977	Purchase, installation and testing included	127,200
	City of Cumberland	Weather detection capabilities and roadway condition data	*RWIS:* - I-68 @ Haystack Mtn. (near Exit 41; possibly at City sewer pump station) - I-68 @ MD-639 (Willowbrook Road) - MD-51 (Industrial Blvd.) near City of Cumberland corporate limits - I-68 @ MD-36 (or at SHA saltdome on MD-36)	569,909	Purchase, installation and testing included	56,800
		Traffic-monitoring capabilities	*CCTV Cameras:* - I-68 @ MD-639 (Willowbrook Road) - I-68 @ Exit 42 (possibly at City water pump station)	185,862	Purchase, installation and testing included	18,600

RURAL AREA	AGENCY/ORGANIZATION	PROPOSED M&O NEED	PROPOSED M&O SOLUTION	COSTS ($)	REMARKS	ANNUAL O&M COSTS ($)
			- I-68 @ MD-36 (or at SHA saltdome on MD-36)			
	Washington County Division of Public Works	Improved roadway monitoring	*CCTV Cameras (Internet accessible):* - MD-67 @ MD-340 (on County-owned communications tower) - I-70 @ US-40 - I-81 @ Maugans Ave. - I-81 @ Halfway Blvd. - I-81 @ US-40 - I-81 @ Showalter Rd. (near Hagerstown Regional Airport) - US-11 @ Showalter Rd. (near Hagerstown Regional Airport) - Planned Lamb's Knoll tower (coverage to include MD-340 over the Potomac river to US-340 @ MD-67)	495,634	Purchase, installation and testing included	52,000
		Improvement in the support provided to alleviate daily traffic congestion	*DMS:* - I-81 SB, just south of the PA line - I-81 NB, just north of the WVA line - I-70 EB, just east of the Allegany Co. line - I-70 WB, just west of the Frederick Co. line (prior to MD-66)	1,187,989	Purchase, installation and testing included	60,000
Southern Maryland	**SHA – Calvert County**	Communications and Control Center	(Uncertain of additional avenues to achieve this. The effort has been investigated for may years with no success)			-
		Weather-monitoring capability	*RWIS*: Anne Arundel and Calvert County Line	142,477	Purchase, installation and testing included	14,200
	Calvert County Sheriff Office	Incident detection capability	*CCTV Cameras*: - Various locations along MD-4	61,954	Purchase, installation and testing included	6,200
	St. Mary County Emergency Management	Detection and monitoring capabilities along MD-235	*Speed Detectors and CCTV Cameras* - Various locations along MD-235	66,954	Purchase, installation and testing included	6,695
		Support for contra-flow operations during emergencies	Address the issue in the County's evacuation plan.	5,000	Labor	500
		Support evacuation plans	*DMS:* - MD-4 @ Solomons Bridge - MD-235 @ MD-4 - MD-4 @ MD-5 - MD-5 @ MD-245	1,147,988	Purchase, installation and testing included	60,000

Table 5.10
Rural M&O/ITS Implementation Cost Estimates – Phase 3

RURAL AREA	AGENCY/ORGANIZATION	PROPOSED M&O NEED	PROPOSED M&O SOLUTION	COSTS ($)	REMARKS	ANNUAL O&M COSTS ($)
Eastern Shore	**Dorchester County Emergency Management**	Enhanced traveler information	*DMS*: - Install DMS on MD-16 in the vicinity of the WalMart store	286,997	Purchase, installation and testing included	15,000
	SHA District 1	Improve support for the evacuation plans	*DMS*: - MD-12 location base on investigations)	286,997	Purchase, installation and testing included	15,000
	SHA District 2	Modification to CHART ITS device plans	*RWIS:* - Relocate RWIS planned for MD-291 @ US-301	25,000	Labor for setup	-
Western Maryland	**Allegany County Emergency Services**	Contingency Devices	*Multiple Devices:* - CCTV (omni-directional) – I-68 @ Orleans Rd. (Exit 68) - DMS – I-68 (WB) @ Orleans Rd (Exit 68; SHA Orleans Rd. Saltdome) - HAR – MD-51, east of Oldtown (SHA Oldtown Saltdome) - Shazam – MD-51, east of Oldtown (SHA Oldtown Saltdome)	124,545	Purchase, installation and testing included	24,550

Table 5.11
Rural M&O/ITS Implementation Cost Estimates – Summary by Phase and Rural Area

RURAL AREA	PHASE 1	PHASE 2	PHASE 3	SUBTOTAL
Eastern Shore	$593,497	$2,062,318	$598,994	$3,254,810
Western Maryland	$716,471	$7,270,409	$124,545	$8,111,426
Southern Maryland	$1,798,482	$1,454,374	-	$3,252,856
Total	**$3,108,450**	**$10,787,101**	**$723,539**	**$14,619,091**

Table 5.12
Rural M&O/ITS Annual M&O Cost Estimates – Summary by Phase and Rural Area

RURAL AREA	PHASE 1	PHASE 2	PHASE 3	SUBTOTAL
Eastern Shore	$45,650	$134,200	$30,000	$209,850
Western Maryland	$44,200	$455,600	$24,550	$524,350
Southern Maryland	$97,650	$87,595	-	$185,245
Total	**$187,500**	**$677,395**	**$54,550**	**$919,445**

5.4 SHA GOALS AND OBJECTIVES ALIGNED WITH THE CHART BUSINESS PLAN

The latest Business Plan for the Office of CHART and ITS Development FY 2004-2007 was updated in February 2005. The following mission statement best describes this document: "Efficiently provide mobility for our customers through a safe, well-maintained and attractive highway system that enhances Maryland's communities, economy and environment." The Plan identifies six (6) performance areas:

- *Performance Area:* ***Highway Safety***

GOAL 1: IMPROVE HIGHWAY SAFETY IN MARYLAND

- *Performance Area:* ***Mobility/Congestion Relief***

GOAL 2: IMPROVE MOBILITY FOR OUR CUSTOMERS.

- *Performance Area:* ***System Preservation and Maintenance***

GOAL 3: MAINTAIN A QUALITY HIGHWAY SYSTEM

- *Performance Area:* ***Efficiency in Government***

GOAL 4: IMPROVE EFFICIENCIES IN OUR BUSINESS PROCESSES IN A FISCALLY RESPONSIBLE MANNER.

- *Performance Area:* ***Environmental Stewardship***

GOAL 5: DEVELOP AND MAINTAIN MARYLAND STATE HIGHWAYS IN AN ENVIRONMENTALLY RESPONSIBLE MANNER.

- *Performance Area:* ***Customer Service and Satisfaction***

GOAL 6: PROVIDE SERVICES AND PRODUCTS TO OUR CUSTOMERS THAT MEET OR EXCEED THEIR EXPECTATIONS.

Each goal has assigned objectives that were explained in detail in the Business Plan.

The rural M&O/ITS strategies presented here were used to map SHA goals and objectives developed under the Business Plan. **Appendix A-7** gives a tabular format of this effort. There are fifty one (51) stakeholder needs identified in Technical Memorandum No.1 (see **Appendix A-1**) and forty five (45) found their match in the Business Plan. This represents 90 percent of the proposed needs, and makes a strong alignment to CHART's mission. The following Table presents five (5) needs that did not have a match in the Business Plan. However, three (3) of the presented needs encourage improvements in everyday traffic by shifting some devices. CHART may consider these during the development of the most current Business Plan. Two (2) other needs that are not currently associated with the CHART Business Plan strategies promote improvements in supporting evacuation plans by installing new ITS devices.

Table 5.13
Proposed M&O/ITS Requirements [Eastern Shore]
Not Currently Associated with CHART Business Plan Strategies

AGENCY/ORGANIZATION	PROPOSED M&O NEED	PRIORITY CODE	PROPOSED M&O SOLUTION	PERCEIVED BENEFIT
MARYLAND STATE POLICE	Resources to better support the evacuation plans	PC01	*DMS*: ▪ MD-13 in the vicinity of MD-133	Provide traveler information on closure of MD-133 @ MD-13 per evacuation plans.
SHA DISTRICT 1	Facilitate turning from MD-9 to MD-589	PC02	Shift existing DMS on MD-9 (WB) farther west	Support everyday traffic.
	Improve support for the evacuation plans	PC03	*DMS*: ▪ MD-12 location base on investigations	MD-12 is a major traffic diversion route. DMS installation would improve information dissemination
SHA DISTRICT 2	Modification to CHART ITS device plans	PC03	*RWIS:* ▪ Relocate RWIS planned for MD-291 @ US-301	Better everyday traffic support.
	Better information coverage on US-301	PC02	*Shazam*: ▪ Shift existing Shazam from MD-290 @ US-301 to MD-213 @ US-301	Better everyday traffic support.

CHART is currently working on updating the existing Business Plan and may also consider improvements in the areas presented here that were not covered with the existing Plan. A new Business Plan will have one goal and seven (7) objectives, but it is still under development and needs more work until its completion. The following summarizes a proposed goal and its objectives:

GOAL: Ensure mobility and safety for the users of Maryland's Roadway network through the application of management and operations and interagency teamwork.

- **OBJECTIVE 1: ROADWAY MONITORING**

Increase availability of key incident data in the Baltimore/Washington Metropolitan Area from X% of all incidents to Y% of all incidents by June 30, 2010.

Measurement: Percent increase of captured incident data

- **OBJECTIVE 2: INCIDENT MANAGEMENT**

Provide effective incident management that reduces non-recurring delay by at least XXM vehicle hours to achieve related cost savings of $XM for the traveling public, including $XM for commercial traffic, by June 30, 2010.

Measurement: Delay by vehicle hours / cost savings during non-recurring congestion

- **OBJECTIVE 3: TRAFFIC MANAGEMENT**

Provide effective traffic management that reduces recurring delay by at least XXM vehicle hours to achieve related cost savings of $XM for the traveling public, including $XM for commercial traffic, by June 30, 2010.

Measurement: Delay by vehicle hours / cost savings during recurring congestion

- **OBJECTIVE 4: TRAVELER INFORMATION**

Achieve X% or greater positive customer feedback regarding traveler information by June 30, 2010.

Measurement: Feedback from website / media coordination meetings / postcards

- **OBJECTIVE 5: EMERGENCY OPERATIONS**

Complete X% of programmed Emergency Operations related enhancements, developments, and plans, annually.

Measurement: Percent of completed initiatives

- **OBJECTIVE 6: EMPLOYEE SATISFACTION**

Increase employee satisfaction by achieving 80% positive feedback on employee surveys by June 30, 2010.

Measurement: Percentage of overall employee satisfaction

- **OBJECTIVE 7: BUSINESS PROCESSES**

Establish documented procedures to improve CHART's internal controls for procurement, inventory, and asset management by June 30, 2010.

Measurement: Creation of documented procedures for procurement, inventory, and asset management

6.0 RURAL M&O/ITS FUNDING SOURCES

SHA's Office of CHART and ITS Development would seek funding sources to support the Rural M&O/ITS initiatives proposed in this document. This section summarizes research performed to achieve the proposed goals for the rural areas in Maryland. This endeavor is part of CHART's program to expand M&O/ITS device deployments and improve communications in three rural areas.

In SAFETEA-LU (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users) Congress made the clear choice not to create any set-aside for ITS deployment, as was proposed by ITSA and AASHTO, and chose instead to make clear that ITS deployment was to be funded through use of the Federal-aid funds (National Highway System (NHS); Surface Transportation Program (STP); and Congestion Mitigation and Air Quality (CMAQ)) provided to the States. The question for the States to consider is how they can work individually and collectively to make the case for the use of these funds to support rural ITS deployment. However, federal funding is not the only resource available for improving M&O/ITS programs in individual states. Public/private partnerships get more involved in helping surface transportation towards safer, less congested, and innovative technologies. While federal and public/private partnerships are two major investments sources for the ITS deployments, homeland security funding could be considered in some special cases.

6.1 OVERVIEW OF THE SAFETEA-LU PROGRAM AND FEDERAL FUNDING SOURCES

SAFETEA-LU is the largest funding source for surface transportation investments in highways, highway safety, and public transportation. The goal is to improve safety, reduce traffic congestion, improve efficiency in freight movement, increase intermodal connectivity, and protect the environment – as well as laying the groundwork for addressing future challenges. SAFETEA-LU promotes more efficient and effective Federal surface transportation programs by focusing on transportation issues of national significance, while giving State and local transportation decision makers more flexibility for solving transportation problems in their communities. Focus of the SAFETEA-LU program is to support the following:

- System Management and Operations
- Congestion Management
- Real-Time Information
- ITS
- Freight

For a purpose of the *Rural M&O/ITS Strategic Plan*, the focus of this document is on available funding for ITS. Every state gets the budget every year to support their ground transportation needs based on requested projects. SAFETEA-LU considers high priority projects first. Implications of SAFETEA-LU on ITS and Operations is as follows:

- More funding for ITS and Operations.

- Maintains strong ITS R&D program.
- Increases focus on congestion relief.
- Puts strong focus on managed lanes and pricing.
- Establishes nationwide requirement for real-time information systems.
- Advances system management and operations.

Federal funding information for fiscal years 2005 to 2009 is available through SAFETEA-LU. Based on the five-year apportionment analysis (FY 2005 through FY 2009) developed by the Federal Highway Administration's Office of Legislation and Strategic Planning, the following funding amounts were planned for Maryland:

- Year 2005 – $110,213,291
- Year 2006 – $100,048,982
- Year 2007 – $101,114,168
- Year 2008 – $102,564,170
- Year 2009 – $104,215,749

SAFETA-LU Operations, ITS, and Freight Provisions presented by the National Associations Working Group (NAWG) on September 22, 2005 makes significant focus on congestion mitigation, including congestion management, real-time information, and ITS. ITS provisions plan to invest $550 million in research and development program (5301 – 5310) over five (5) years and to focus on the following:

- Road Weather - $20 million (5308)
- I-95 Corridor - $35 million (5211)
- Rural and Interstate Corridor Communications Study - $3 million (5507)

6.2 OTHER FUNDING SOURCES

Another possible M&O/ITS funding source could be through homeland security finance. A primary goal of the Homeland Security Funding Task Force is to keep the country safe. The Funding Task Force operates under the Homeland Security Advisory Council (HSAC), which consists of a group of leaders from state and local governments, the emergency response community, academia, and the private sector. Members of the Task Force on State and Local Homeland Security Funding ensure that the nation's emergency managers, first responders, and law enforcement officials get the federal funds they need as soon as possible to protect their communities. Some of the M&O/ITS inventory may fall into this category, for example, proposed DMS at MD-4 @ Solomons Bridge in St. Mary's County. ITS deployments at bridges, overpasses, and other similar areas could be very sensitive and may qualify for this funding. HR 5441 legislation, making appropriations for the Department of Homeland Security (DHS) for the fiscal year ending September 30, 2007 and includes the following two transportation related bills:

- Surface transportation security and
- Transportation security support

Surface transportation security expenses related to providing surface transportation security activities accounts for $37,200,000 and will remain available until September 30, 2008. Transportation security support expenses related to providing transportation security support accounts for $523,283,000 and will remain available until September 30, 2008.

6.2 SUMMARY OF THE RURAL M&O/ITS FUNDING SOURCES

Generally, there is no specific funding available for the rural areas of the State. SHA and the Office of CHART and ITS Development must develop budgets on a year-to-year basis. Basically, the Maryland State Highway Administration, like other state agencies, presents a list of the planned projects for each year and FHWA reserves the rights to approve or disapprove the funding. Recent developments in the country push the FHWA to support projects of high importance, such as projects improving security. CHART and rural stakeholders may face difficulties in meeting the proposed schedule. The proposed M&O/ITS deployments may need to be adjusted throughout the years to fit into a tight budget.

7.0 SUMMARY OF THE MANAGEMET AND OPERATIONS (M&O)/INTELLIGENT TRANSPORTATION SYSTEMS (ITS) STRATEGIC PLAN

The entire process, beginning with information gathering from stakeholders through different analyses and research until the end, was very prosperous. CHART has successfully completed the large task of assembling various agencies from rural areas of Maryland for one mission: to expand and continue CHART efforts in implementing M&O/ITS deployments throughout the State. The following rural areas were considered: The Eastern Shore (SHA Districts 1 and 2); Western Maryland (SHA District 6 and the western portion of Frederick County, bounded to the east by US-15 and US-340), and Southern Maryland (Calvert, Charles and St. Mary's Counties and the southern portions of Anne Arundel and Prince George's Counties, with northern boundaries delineated by MD-210, MD-373, US-301, MD-4 and MD-258). The stakeholders from these three rural areas expressed their concerns and needs, which were summarized and analyzed. Based on the needs of various agencies, solutions were developed and the process of prioritization was applied. If there is an immediate need for a specific resource, a priority code PC01 is assigned. Priority code 2 is assigned to all needs that can help to alleviate existing problems, but operations are not directly impacted by their absence. Finally, strategies that can provide additional capabilities to M&O personnel, but execution of current M&O strategies is not dependent on the acquisition of this resource, priority code 03 is assigned. This methodology is used to develop M&O/ITS strategic plan by phasing the stakeholders needs based on the priority coding. The *Plan* considers three (3) phases that are planned for implementation over a period of six (6) years.

Developing the *Rural M&O/ITS Strategic Plan* is a challenge for every agency. Communications media is one of very essential components in this course. Very generic analysis is made considering communications needs for every identified strategy. Further investigations in this direction are required before any of the presented needs is considered for deployment. This *Plan* gives basic information on/about what is needed, from the communications perspective, to install various devices.

After the rural M&O/ITS strategies were identified, the Maryland Statewide ITS Architecture was analyzed for possible gaps. Several recommendations are made in order to update the Statewide ITS Architecture. There are four specific areas that will require attention:

- List of Stakeholders
- List of Projects
- Elements
- Operational Concept

The next step in this process was to map identified rural M&O/ITS strategies with the existing CHART Business Plan. The existing Business Plan has six (6) goals for six (6) performance areas. Each goal has its own objectives. The mapping procedure shows that about 90 percent of the strategies maps with the goals and objectives from the Business Plan. This means that CHART is on the right track following their mission to "Efficiently provide mobility for our

customers through a safe, well-maintained and attractive highway system that enhances Maryland's communities, economy and environment."

Finally, the most important part of the entire effort is the financial part of this process. CHART, as a state agency, has budget limitations that are out of its direct control. Funding is an issue that must be seriously considered. Different funding sources are available, but the most important one comes from the U.S. government. Other options, such as public/private partnerships or various procurement alternatives, could be considered.

The following goals, established at the beginning of this process, have been accomplished:

- Identify M&O/ITS deployments and strategies to support weather, evacuation, seasonal and everyday traffic, special events, and safety issues in the rural parts of Maryland.
- Identify other M&O/ITS strategies.
- Locate areas that are candidates for deployment of ITS devices.
- Prioritize needs based on the perceived benefits and level of importance.
- Recognize gaps in on-going evacuation planning efforts.
- Identify gaps in the Maryland Statewide ITS Architecture by considering identified rural M&O/ITS strategies.
- Evaluate communications requirements for various ITS devices.
- Map rural M&O/ITS strategies with CHART goals and objectives stated in the existing Business Plan.
- Analyze potential funding sources to support these efforts.

Rural areas are often forgotten when ITS expansion is considered, but these areas are very crucial for M&O during large-scale evacuations. However, seasonal and everyday traffic, special events, inclement weather and safety issues must be considered as well. Taking each of these elements into consideration, this *Plan* will help CHART in expanding and accomplishing their efforts.

8.0 CONCLUSION

Overall, the effort to define CHART's ITS planning and deployment needs through the development of a *Rural Management and Operations (M&O)/Intelligent Transportation Systems (ITS) Strategic Plan* has achieved a significant level of success. Meetings held with stakeholders from the various regions generated feedback on ITS device needs, communication infrastructure requirements, and coordination gaps in current M&O practices. The information garnered for Technical Memorandum No.1 was not an abstract compilation, but involved the participation of stakeholders throughout the process in reviewing meeting notes and developing lists of device and resource needs. Technical Memorandum No.2 addressed the gaps between Maryland's ITS Architecture and proposed stakeholder needs.

After the information was collected from stakeholders, proposed M&O/ITS deployments were prioritized and a three (3)-phased schedule was developed. The phasing process included proposed M&O needs gathered from stakeholders and the proposed expansion of FITM plans for three rural areas. Finally, funding, the most important part of this Plan was discussed and presented. It is clear that rural areas are not treated separately and there is no funding reserved for this purpose. CHART and local agencies must work together to find best solutions possible to achieve the goals set in this document. The end product of all the efforts to-date is presented in Section 5.0. These show in tabular form how the needs of the various stakeholders have been scheduled for future funding along with the ultimate deployment of CHART ITS assets throughout the State of Maryland.

REFERENCES

1. Maryland Department of Transportation (MDOT), Maryland State Highway Administration (SHA), Coordinated Highways Action Response Team (CHART), Maryland Statewide ITS Architecture, Version: April 2005.

2. U.S. Department of Transportation (DOT), National ITS Architecture, Version: 5.1 (2005).

3. Edwards and Kelcey and Williams Associates Engineers, Rural M&O/ITS Strategic Deployment Plan, Technical Memorandum No.1., 2006.

4. Edwards and Kelcey and Williams Associates Engineers, Rural M&O/ITS Strategic Deployment Plan, Technical Memorandum No.2., 2006.
5. Census 2000, US Census Bureau.
6. Business Plan for the Office of CHART and ITS Development FY 2004-2007, FY 2005 Update February 28, 2005.

APPENDIX

A-1 PROPOSED RURAL M&O/ITS NEEDS AND SOLUTIONS

During the course of the project, rural M&O/ITS needs and solutions were identified in the Technical Memorandum No.1 and summarized here in tabular (Tables A-1.1 through A-1.3) and graphic forms (Exhibits A-1.1 through A-1.3). The ITS devices being proposed by the different agencies in this region are highlighted. However, there are other important data collected from CHART and used in the development of the *Rural M&O/ITS Strategic Plan*. Data used in this document are as follows:

- Existing ITS Infrastructure.
- ITS Infrastructure Under Construction.
- Planned ITS Infrastructure.

CHART maintains its own database, which contains information about the ITS infrastructure owned and operated by CHART. Tables that summarize the ITS infrastructure for rural Maryland is included in this Appendix. Additionally, maps showing the fiber optic coverage and radio tower locations in Maryland are attached. Table A-1.4 summarizes radio tower locations plotted on the map.

In addition, one of the needs identified by Charles County Emergency Services to have DMS installed to warn motorists of the construction zone is not relevant at this time. The need was kept in the summary of the stakeholders' needs, but was removed from the cost estimates in the final strategic plan. Depending on when the proposed deployments will take place, it may need to be reviewed to see if the particular need still exists.

Table A–1.1
Proposed M&O/ITS Needs and Solutions [Eastern Shore]

AGENCY/ORGANIZATION	PROPOSED M&O NEED	PRIORITY CODE	PROPOSED M&O SOLUTION	PERCEIVED BENEFIT
DORCHESTER COUNTY EMERGENCY MANAGEMENT	Access to CHART data	PC01	Install CHART workstation [CHART LITE] at Dorchester County EOC	Support emergency and incident management
	Roadway-monitoring capabilities	PC02	*CCTV Cameras*: ▪ Along MD-335 and MD-336. ▪ US-50 @ MD-331 ▪ MD-16 @ WalMart Store	Monitor evacuations from southern portions of State (MD-335 and MD-336 are the only viable evacuations routes) and along US-50 and MD-331.
	Enhanced traveler information	PC03	*DMS*: ▪ Install DMS on MD-16 in the vicinity of the WalMart store	Provide additional information outlet to motorists
CECIL COUNTY DEPARTMENT OF EMERGENCY SERVICES	Resources to supplement emergency evacuation operations	PC02	Provide access to CHART CCTV camera images	Enable more efficient emergency evacuation coordination and response if actual field conditions are known and/or seen.
WORCESTER COUNTY DEPT. OF EMERGENCY SERVICES	Access to CHART CCTV camera images.	N/A	The Department is satisfied with current CHART plans for their region	Support emergency and incident management.
MARYLAND STATE POLICE	Resources to better support the evacuation plans	PC01	*DMS*: ▪ MD-13 in the vicinity of MD-133	Provide traveler information on closure of MD-133 @ MD-13 per evacuation plans.
	Enhanced roadway monitoring	PC02	Provide access to CHART CCTV camera images	Provide a more stable environment to view CHART images. Current practice uses the CHART website; often there are connection or image-viewing problems.
WICOMICO COUNTY EMERGENCY MANAGEMENT	Better integration with CHART ITS devices	PC02	Need cellular communication option for the DMS	Increased efficiency and accuracy in information sharing.
	Better roadway monitoring	PC02	*CCTV Cameras*: ▪ MD-13 @ US-50	Support everyday traffic, as well as emergency and incident management.
	Access to CHART data to support emergency and incident management	PC01	Install CHART workstation at Wicomico Co. EOC (by Spring 2006)	Support emergency and incident management.
CAROLINE COUNTY EMERGENCY MANAGEMENT	Better roadway monitoring at the MD-DE border	PC02	*CCTV Cameras/Detection Devices*: ▪ MD-331 (entering MD from DE) ▪ MD-318 (entering MD from DE) *Communications:* ▪ Connectivity with 911 centers	Support everyday traffic, as well as emergency and incident management.
SHA DISTRICT 1	Facilitate turning from MD-9 to MD-589	PC02	Shift existing DMS on MD-9 (WB) farther west	Support everyday traffic.
	Improve support for the evacuation plans	PC03	*DMS*: ▪ MD-12 location base on investigations	MD-12 is a major traffic diversion route. DMS installation would improve information dissemination.

AGENCY/ORGANIZATION	PROPOSED M&O NEED	PRIORITY CODE	PROPOSED M&O SOLUTION	PERCEIVED BENEFIT
SHA DISTRICT 2	Modification to CHART ITS device plans	PC03	*RWIS:* ▪ Relocate RWIS planned for MD-291 @ US-301	Better everyday traffic support.
	Better information coverage on US-301	PC02	*Shazam*: ▪ Shift existing Shazam from MD-290 @ US-301 to MD-213 @ US-301	Better everyday traffic support.
	Access to CHART data to support emergency and incident management	PC01	Install CHART workstation	Support emergency and incident management.
SOMERSET COUNTY	Improve information dissemination	PC02	*DMS*: ▪ MD-413, MD-363, and MD-13 (north of Pocomoke)	Better everyday traffic support as well as better emergency and incident management.
TALBOT COUNTY EMERGENCY MANAGEMENT	Access to CHART data to support emergency and incident management	PC01	Install CHART workstation	Support emergency and incident management.
QUEEN ANNE COUNTY DEPT. OF EMERGENCY SERVICES	Training	PC01	Additional personnel training on proper use of communications equipment/devices	More effective communication; increased life of the equipment/device.
	Traffic monitoring/traveler information in the vicinity of the MD-DE border	PC02	*CCTV:* ▪ Establish two (2) sites to view traffic to/from DE *DMS* ▪ Deploy signs based on location of CCTVs	Avoid conflicting messages to travelers and streamlines emergency management operations once more accurate information is known of traffic conditions.

Table A–1.2
Proposed M&O/ITS Needs and Solutions [Western MD]

AGENCY/ORGANIZATION	PROPOSED M&O NEED	PRIORITY CODE	PROPOSED M&O SOLUTION	PERCEIVED BENEFIT
ALLEGANY COUNTY EMERGENCY SERVICES	Detection devices on I-68 detour routes	PC01	*RWIS*: ▪ Along MD-51	Allow the dissemination of inclement weather information to motorists, especially truckers (this is a high truck volume route).
	Traffic diversion resources for flooding and whitewater recoveries	PC02	*DMS*: ▪ (no location specified) *HAR*: ▪ (no location specified)	Provide adequate advance traveler information before motorists get stuck in these emergency situations.
	Aid stranded motorists in identifying their location on the roadway	PC02	Install mile-markers every 1/10th of a mile in addition to on bridges and other road crossings	Facilitate efficient response by emergency personnel once they know the approximate location of distressed motorists; crucial during blizzards
	Minimize risk to motorists by emergency responders	PC02	Install arrow boards on emergency response vehicles	Increase visibility and minimize the chance of secondary incidents.
	Contingency Devices	PC03	*Multiple Devices:* ▪ CCTV (omni-directional) – I-68 @ Orleans Rd. (Exit 68) ▪ DMS – I-68 (WB) @ Orleans Rd (Exit 68; SHA Orleans Rd. Saltdome) ▪ HAR – MD-51, east of Oldtown (SHA Oldtown Saltdome) ▪ Shazam – MD-51, east of Oldtown (SHA Oldtown Saltdome)	Support emergency and incident management, as well as everyday traffic.
	Access to CHART data	PC02	CHART Workstation at 911/EOC facility in Cumberland	Support emergency and incident management.
SHA DISTRICT 6	ITS resources	PC02	*DMS*: ▪ US-340 @ Harpers Ferry *HAR*: ▪ US-340 @ Harpers Ferry	Provide motorists with information on back-ups in the area. Existing queue detector does not provide adequate warning (limited coverage area).
	Congestion relief on major routes	PC02	▪ Use I-68 through various towns ▪ Law enforcement support ▪ County/State support (CTP proj. funds)	Better control and support during severe congestion from both law enforcement and State personnel.
	Access to CHART data to support incident management	PC02	Install CHART workstations in the counties	Support emergency and incident management.

AGENCY/ORGANIZATION	PROPOSED M&O NEED	PRIORITY CODE	PROPOSED M&O SOLUTION	PERCEIVED BENEFIT
	Traveler information	PC02	*DMS:* ▪ In the vicinity of the Old Town	Support everyday traffic.
	Winter weather warning for truckers	PC02	*HAR:* ▪ Friendsville area Welcome Center *Shazam:* ▪ EB approach to Welcome Center ▪ WB approach to Welcome Center	Provide advisory/warning messages to truckers during inclement weather.
	Weather detection capabilities and roadway condition data	PC02	*RWIS:* ▪ On Haystack Mountain	Provide weather detection capabilities to support the dissemination of roadway condition information during inclement weather. This will be useful in light of the increasing developments in the Haystack Mountain area.
SHA DISTRICT 7	Provide snow event/road closure warnings; Routine roadway maintenance	PC02	*DMS:* ▪ I-70 (EB) approaching I-81 ▪ I-70 (WB) approaching I-81 ▪ I-81 (NB) approaching I-70 ▪ I-81 (SB) approaching I-70	Provide advance warning to motorists of incidents, congestion, etc. on the respective approaches. Particularly useful for truckers for FITM plan routing.
	Traveler information (DMS and HAR in various locations)	PC02	*DMS and HAR:* ▪ East of MD-65 bet. MD-65 & US-40) ▪ I-68 and Cumberland ▪ I-68 @ I-7 Truck Stop ▪ Halfway and Wisel Blvd. ▪ MD-51 @ Rail Underpass ▪ US-40 corridor in Hagerstown ▪ US-220 corridor in Cresaptown ▪ I-70 WB ramp @ 65 (ramp too short)	Additional traveler information. Also useful for those traveling to/from Pennsylvania and West Virginia.
GARRETT COUNTY FIRE AND RESCUE DEPARTMENT	Provide motorist with advance incident warning messages	PC01	*DMS (high visibility):* ▪ I-68 (EB) prior to mm 24 ▪ Between mm 29 and 31	Advance warnings will alert motorists of roadway incidents in this heavy fog/low visibility area. This will lower the risks to emergency responders (current signs are not very visible in heavy fog).
CITY OF CUMBERLAND	Weather detection capabilities and roadway condition data	PC02	*RWIS:* ▪ I-68 @ Haystack Mtn. (near Exit 41; possibly at City sewer pump station) ▪ I-68 @ MD-639 (Willowbrook Road) ▪ MD-51 (Industrial Blvd.) near City of Cumberland corporate limits ▪ I-68 @ MD-36 (or at SHA saltdome on MD-36)	Provide additional weather monitoring capabilities that will support information dissemination to motorists.

AGENCY/ORGANIZATION	PROPOSED M&O NEED	PRIORITY CODE	PROPOSED M&O SOLUTION	PERCEIVED BENEFIT
	Traffic-monitoring capabilities	PC02	*CCTV Cameras:* ▪ I-68 @ MD-639 (Willowbrook Road) ▪ I-68 @ Exit 42 (possibly at City water pump station) ▪ I-68 @ MD-36 (or at SHA saltdome on MD-36)	Increased traffic monitoring.
WASHINGTON COUNTY DIVISION OF PUBLIC WORKS	Improved roadway monitoring	PC02	*CCTV Cameras (Internet accessible):* ▪ MD-67 @ MD-340 (on County-owned communications tower) ▪ I-70 @ US-40 ▪ I-81 @ Maugans Ave. ▪ I-81 @ Halfway Blvd. ▪ I-81 @ US-40 ▪ I-81 @ Showalter Rd. (near Hagerstown Regional Airport) ▪ US-11 @ Showalter Rd. (near Hagerstown Regional Airport) ▪ Planned Lamb's Knoll tower (coverage to include MD-340 over the Potomac river to US-340 @ MD-67)	The broadband wireless system in place in Washington County might be available to backhaul CCTV camera image/data to the Internet. The County would be willing to assist SHA in the implementation of this system [contact: Gary Rohrer].
	Improvement in the support provided to alleviate daily traffic congestion	PC02	*DMS:* ▪ I-81 SB, just south of the PA line ▪ I-81 NB, just north of the WVA line ▪ I-70 EB, just east of the Allegany Co. line ▪ I-70 WB, just west of the Frederick Co. line (prior to MD-66)	Support everyday traffic.

Table A–1.3
Proposed M&O/ITS Needs and Solutions [Southern MD]

AGENCY/ORGANIZATION	PROPOSED M&O NEED	PRIORITY CODE	PROPOSED M&O SOLUTION	PERCEIVED BENEFIT
SHA – CALVERT COUNTY	Communications and Control Center	PC02	(Uncertain of additional avenues to achieve this. The effort has been investigated for many years with no success)	Significant improvement in communications. Poor wireless service; only land lines operate reliably.
	Weather-monitoring capability	PC02	*RWIS*: Anne Arundel and Calvert County Line	Support everyday traffic.
	800 MHz radios	PC01	Discuss issue with Calvert County EOC; St. Mary's County EOC has already been supplied with eight (8) radios.	Improve interagency communication and coordination; facilitate efficient incident response.
	Improvement in vital decision points for diversion routes	PC01	*DMS*: ▪ US-301 @ MD-4 ▪ MD-5 @ MD-231 ▪ MD-231 @ MD4	Provide evacuation, incident and emergency information from several different avenues. Also increases the traveler information coverage area.
CALVERT COUNTY SHERIFF OFFICE	Incident detection capability	PC02	*CCTV Cameras*: ▪ Various locations along MD-4	Provide images of incidents along this major corridor in the county and helps organize and manage responses (particularly because side roads do not have the capacity to handle large-scale diversions).
CHARLES COUNTY EMERGENCY SERVICES	Construction zone warning	PC02	*DMS*: ▪ US-301 approaching Smallwood Drive	Gives advance warning of construction on US-301 and allows diversion to MD-277.
	Traveler information for emergency evacuations and recurring congestion	PC01	*DMS*: ▪ US-301 prior to MD-5 (PG County) ▪ US-301 (SB) prior to MD-228 ▪ MD-210 (SB) in the Accokeek area	Provide traveler information during emergency evacuations. They also can give motorists guidance on detour routes during incidents and recurring congestion.
MSP BARRACK "H"	Support for police actions and responsibilities on US-301 detour routes	PC01	Expanded FITM Plan	This would provide MSP with better guidance on what to do after a FITM Plan is implemented and prescribe the appropriate level of MSP resources required.
	Positive evacuation guidance for Washington DC evacuees	PC01	Install evacuation guide signs directing motorists to specific routes, e.g. Nice Bridge, MD-210, Calvert County	Reduces confusion for evacuees on the appropriate route to get to their final destinations.
	Rectify simulcast issues	PC01	Join CapWIN or use CapWIN's solution to resolve the issue.	Support emergency and incident management.
ST. MARY COUNTY EMERGENCY MANAGEMENT	Detection and monitoring capabilities along MD-235	PC02	*Speed Detectors and CCTV Cameras* ▪ Various locations along MD-235	Allows better monitoring of the corridor during incidents.
	Support for contra-flow operations during emergencies	PC02	Address the issue in the County's evacuation plan.	Support emergency and incident management.

Exhibit A-1.1 Eastern Shore ITS Devices and Communications Infrastructure

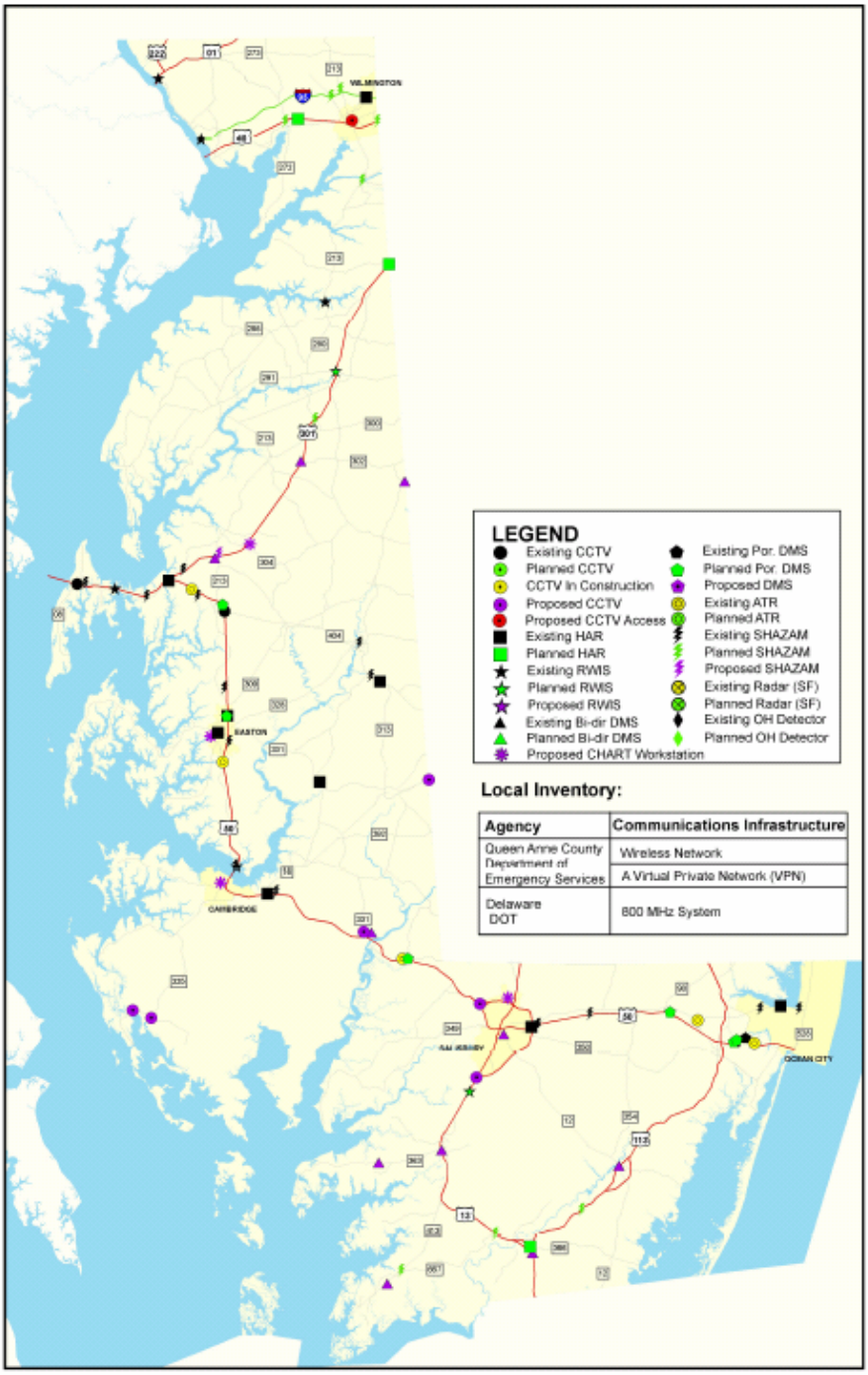
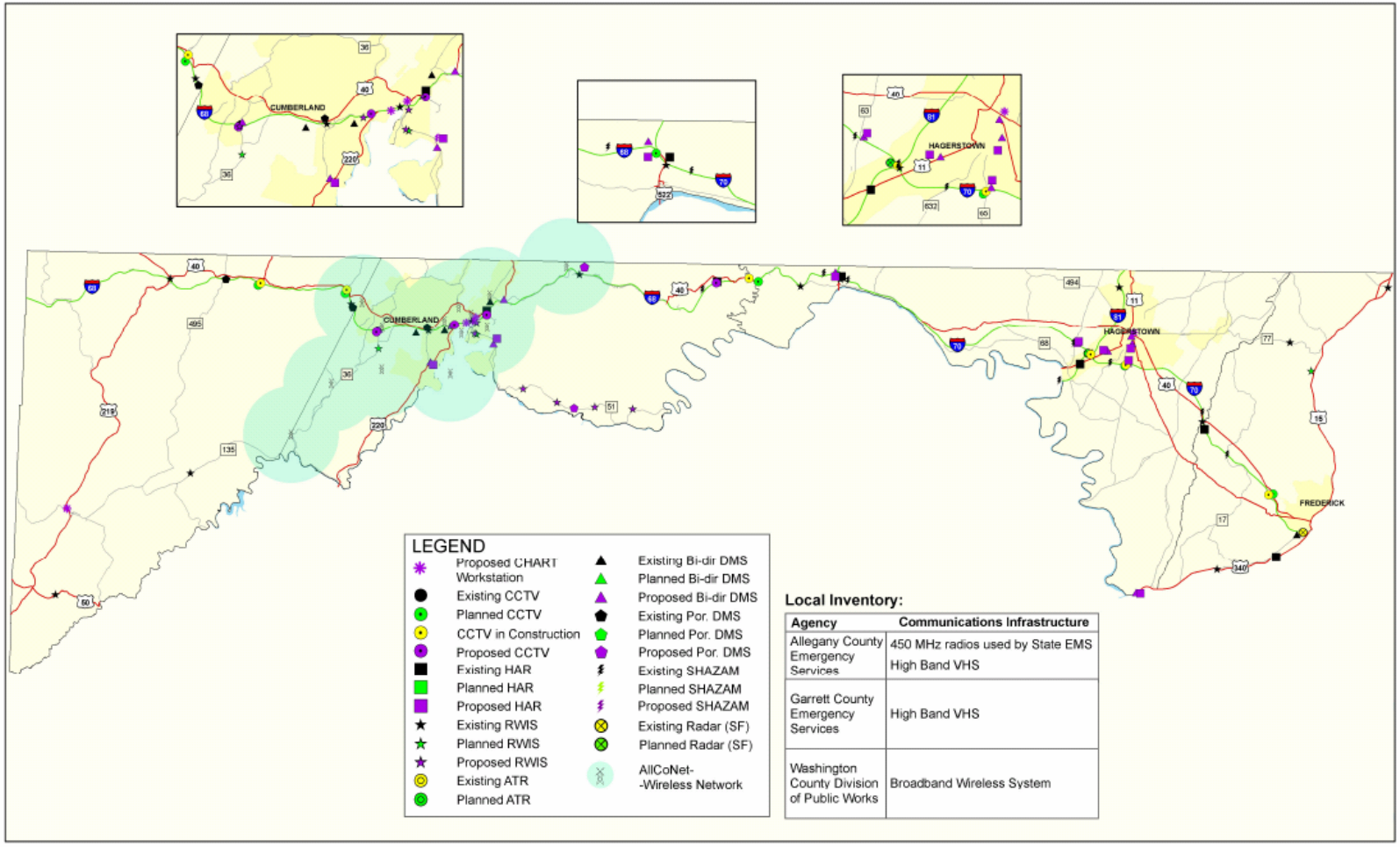


CHART ITS Devices on Eastern Shore

Exhibit A-1.2 Western Maryland ITS Devices and Communications Infrastructure



Local Inventory:

Agency	Communications Infrastructure
Allegany County Emergency Services	450 MHz radios used by State EMS High Band VHS
Garrett County Emergency Services	High Band VHS
Washington County Division of Public Works	Broadband Wireless System

CHART ITS Devices in Western Maryland

Exhibit A-1.3 Southern Maryland ITS Devices and Communications Infrastructure

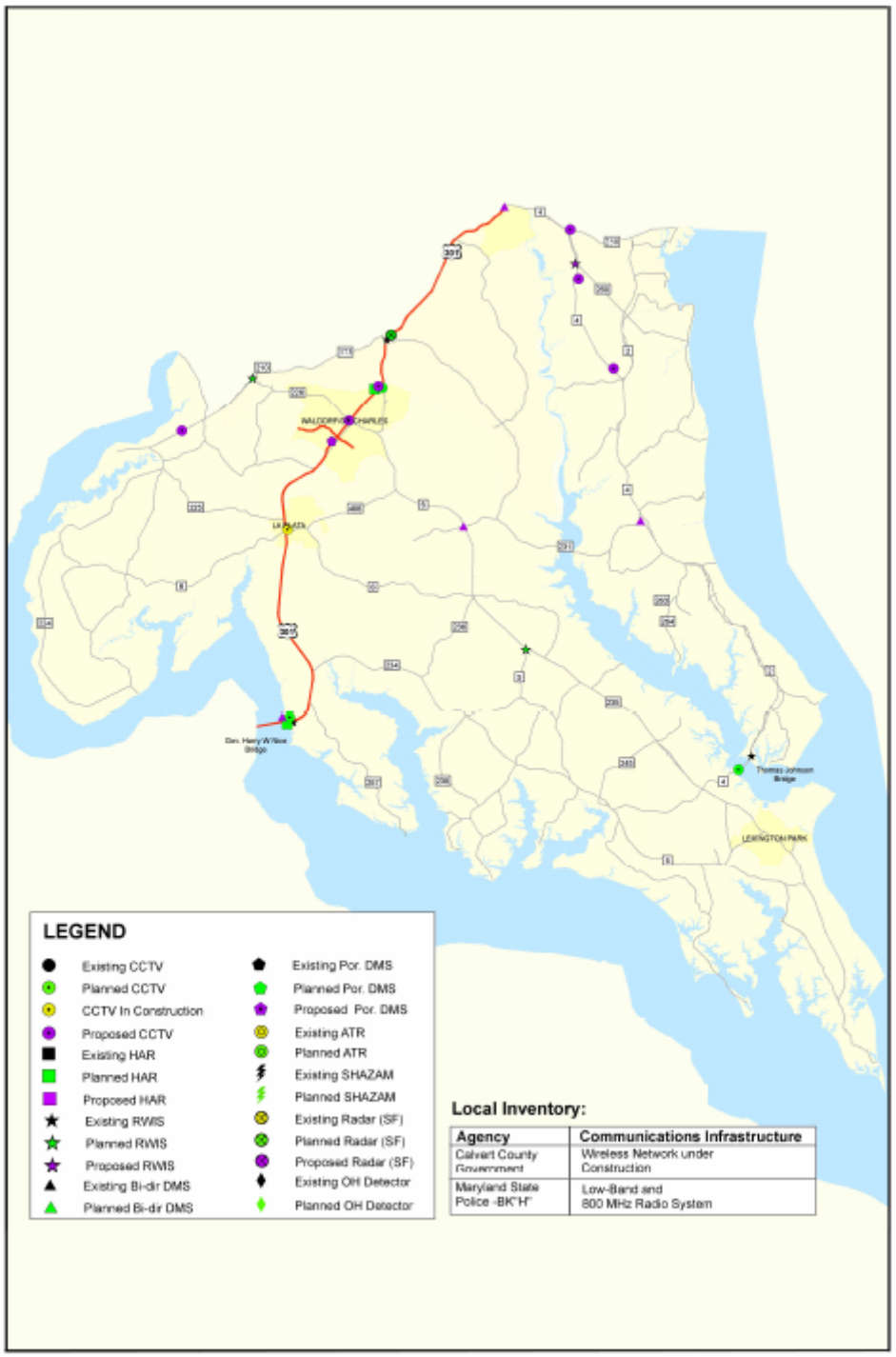


CHART ITS Devices in Southern Maryland

TABLE A-1.4 EASTERN SHORE DEVICES

EXISTING DEVICES

Device Type: CCTV - Close Circuit Television
Total No's: 2

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	US 50/US 301@ MD 8 (East of the Bay Bridge)	Queen Anne's	2
2	US 50 @ MD 404	Talbot	

Device Type: HAR - Highway Advisory Radio
Total No's: 9

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	US 50 @ MD 16, Rest Area (Cambridge)	Dorchester	1
2	US 50 @ US 13 (Salisbury)	Wicomico	
3	MD 90 @ St. Martin's Bridge	Worcester	
4	MD 331, 1/4 mile East of Preston (Dover Portable HAR)	Caroline	2
5	MD 404 East of MD 16 (Denton)		
6	I-95 @ MD 297 (Elkton)	Cecil	
7	US 50 @ US 301 (Queenstown)	Queen Anne's	
8	US 50 @ MD 322 (Easton)	Talbot	
9	SHA Easton Shop (Dover Portable HAR)		

Device Type: ATR - Automatic Traffic Recorder
Total No's: 5

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	US 50 @ Riverton Road	Wicomico	1
2	MD 90 @ MD 346	Worcester	
3	US 50 @ Holly Grove Road		
4	US 50 @ Carmichael Road	Queen Anne's	2
5	US 50 @ Schwaninger Road	Talbot	

Device Type: Portable DMS - Portable Dynamic Message Signs
Total No's: 7

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	US 50 E. of Md 313/54	Wicomico	1
2	US 50 @ Hall Rd (seasonal)	Worcester	
3	US 50 @ Md 589 (seasonal)		
4	US 50 @ Md 452 (Friendship Rd)		
5	MD 404 @ Md 313 (seasonal)	Caroline	2
6	US 50 bet Md 404 & 213	Queen Anne's	
7	US 50 E. of Hiners Ln.	Talbot	

Device Type: SHAZAM
Total No's: 14

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	US 50 (WB) @ MD 16 (east side)	Dorchester	1
2	US 50 (WB) West of MD 353	Wicomico	
3	US 50 (EB) @ MD 350		
4	MD 90 (EB) East of MD 589	Worcester	
5	MD 90 (WB) @ MD 528		
6	MD 404 (WB) @ MD 16 [Sennett Road?] (south side)	Caroline	2
7	MD 404 (EB) @ MD 313 (north side)		
8	US 50/US 301 (WB) East of Bay Bridge	Queen Anne's	
9	US 50/US 301 (EB) just east of Bay Bridge (prior to US 50/US 301 split)		
10	US 301 (SB) North of US 50/US 301 split		
11	US 50 (WB) East of US 50/US 301 split [1/2 mile prior to MD 456]		
12	US 50 (EB) @ Choptank River Bridge	Talbot	
13	US 50 (EB) @ Hiners Lane		
14	US 50 (WB) West of Dutchman's Lane		

Device Type: WEATHER STATION
Total No's: 7

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	US 50 @ MD 331 (Nanticoke River)	Dorchester	1
2	US 50 @ US 13	Wicomico	
3	US 1 @ Conowingo River Dam	Cecil	2
4	I-95 @ Tydings Bridge		
5	MD 213 @ Sassafras River	Kent	
6	US 50 @ Kent Narrows Bridge	Queen Anne's	
7	US 50 @ Choptank River	Talbot	

DEVICES UNDER CONSTRUCTION

Project: Radio Tower CCTV Camera Installation

Total No's: 8

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	US 50 @ MD 331 - Vienna, SHA	Dorchester	1
2	US 13 @ US 50 Salisbury Barrack	Wicomico	
3	MD 528 @ Worcester Street - Ocean City	Worcester	
4	MD 528 @ MD 90/65th Street - Ocean City		
5	MD 528 @ 136th Street - Ocean City		
6	US 301@ MD 304 - Safety Drive QA PSAP	Queen Anne's	2
7	MD 404 @ MD 313 - Denton, SHA	Caroline	
8	US 50 @ Choptank River Bridge - Trappe	Talbot	

Project: Area-wide CCTV Camera Deployment Phase 1

Total No's: 8

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	US 50 @ MD 90	Worcester	1
2	US 50 @ MD 611		
3	MD 90 @ MD 589		
4	US 50 @ US 113		
5	US 50 @ US 13 (Salisbury)	Wicomico	
6	US 50/US 301 @ Kent Narrows Bridge	Queen Anne's	2
7	US 50 @ US 50/US 301 split		
8	US 50 @ MD 331 (Easton)	Talbot	

PLANNED DEVICES

Device Type: HAR - Highway Advisory Radio
Total No's: 3

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	US 13 @ US 113	Worcester	1
2	US 40, 5 miles West of Elkton	Cecil	2
3	US 301 @ Delaware State Line		

Device Type: Pedestal DMS - Pedestal Dynamic Message Signs
Total No's: 6

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	US 50 @ MD 452	Worcester	1
2	US 50 @ Hall Road		
3	US 50 @ Friendship Road	Wicomico	
4	US 50 East of MD 54		
5	US 50 Between MD 404 and MD 213	Queen Anne's	2
6	US 50 @ MD 322	Talbot	

Device Type: WEATHER STATION
Total No's: 2

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	US 13 Bypass South (North of Old Eden Rd)	Wicomico	1
2	US 301 @ MD 291	Kent	2

Device Type: SHAZAM
Total No's: 9

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	US 13 (SB) @ MD 667	Somerset	1
2	US 113 (SB) @ Betheden Church Road	Worcester	
3	US 13 (NB) @ Tulls Corner Road		
4	MD 213 (NB) @ North of C&D Canal	Cecil	2
5	US 213 (SB) North of I-95		
6	US 40 (EB) @ Delaware State Line		
7	US 40 (WB) @ MD 272		
8	I-95 (NB) @ MD 545		
9	US 301 (NB) @ MD 290	Kent	

TABLE A-1.5 WESTERN MARYLAND DEVICES

EXISTING DEVICES

Device Type: DMS - Dynamic Message Signs
Total No's: 4

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	I-68 (EB) prior to US 220	Allegany	6
2	I-68 (WB) @ Hillcrest		
3	I-68 (EB) @ Lavale		
4	I-70 (EB) 1.5 miles prior to I-270 (West of MD 180)	Frederick	7

Device Type: HAR - Highway Advisory Radio
Total No's: 6

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	I-68 @ Orleans Road (Piney Grove)	Allegany	6
2	I-68 @ Willowbrook Road (Cumberland)		
3	US 522 @ I-70 (Hancock)	Washington	
4	I-81 @ US 11 (Williamsport)		
5	I-70 @ South Mountain Rest Area		
6	US 15 @ US 340 (Frederick)	Frederick	7

Device Type: Portable DMS - Portable Dynamic Message Signs
Total No's: 4

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	I-68 EB @ Mile Point 1.0	Garett	6
2	I-68 WB @ Exit 39	Allegany	
3	I-68 WB @ Exit 34	Allegany	
4	I-68 WB E. of Exit 19	Garrett	

Device Type: SHAZAM
Total No's: 11

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	I-68 (EB) prior to Orleans Road	Allegany	6
2	I-68 (WB) prior Orleans Road		
3	I-68 (WB) at exit 47		
4	I-70 (WB) prior to Hancock	Washington	
5	I-68 (EB) prior to US 522		
6	I-70 (WB) @ I-81		
7	I-70 (EB) @ MD 63		
8	I-70 (WB) @ MD 632		
9	I-81 (NB) @ MD 68		
10	I-70 (WB) @ South Mountain	Frederick	7
11	I-70 (EB) @ MD 17		

Device Type: WEATHER STATION
Total No's: 15

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	I-68 @ Mile Post 43	Allegany	6
2	I-68 @ MD 53 [Street Road?]		
3	I-68 @ MD 144		
4	I-68 @ Savage Mountain	Garrett	
5	I-68 @ US 219		
6	MD 135 @ Salt Dome		
7	US-50 @ Table Rock Road		
8	I-70 @ MD 522	Washington	
9	I-68 @ Sidling Mountain		
10	I-81 @ Showalter Road		
11	I-70 @ I-81		
12	I-70 @ Frederick County Line	Frederick	7
13	US 15 @ MD 140		
14	US 340 @ MD 180		
15	MD 77 @ Catoctin State Park		

Device Type: Detector (Side-Fire)
Total No's: 1

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	I-70 @ MD 180 (Jefferson Pike), 1 mile west of Exit 53	Frederick	7

DEVICES UNDER CONSTRUCTION

Project: Radio Tower CCTV Camera Installation

Total No's: 6

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	I-68 @ MD 546 - Savage Mt. SHA	Garrett	6
2	I-68 @ US 219 - Grantsville		
3	I-70 @ I-81	Washington	
4	I-70 @ MD 65 - Hagerstown SHA		
5	I-68 @ Allegany/Washington County Line - Sideling Hill		
6	I-70 @ Gambrill Park Rd - Frederick/Gambrills	Frederick	7

PLANNED DEVICES

Device Type: DMS - Dynamic Message Signs
Total No's: 1

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	I-70 (WB) @ I-68	Washington	6

Device Type: WEATHER STATION
Total No's: 3

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	MD 36 @ Franklin Saltdome	Allegany	6
2	MD 51 @ Oldtown Saltdome		
3	US 15 @ Catotin Trail	Frederick	7

Project: Radio Tower CCTV Camera Installation
Total No's: 2

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	I-68 @ I-70	Washington	6
2	I-68 @ Maryland Avenue	Allegany	

TABLE A-1.6 SOUTHERN MARYLAND DEVICES

EXISTING DEVICES

Device Type: WEATHER STATION
Total No's: 3

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	MD 4 @ Patuxent River	Calvert	5
2	US 301 @ Nice Bridge (Potomac River)	Charles	
3	US 301 @ MD 5	Prince George's	3

DEVICES UNDER CONSTRUCTION

Project: Radio Tower CCTV Camera Installation

Total No's: 1

No.	LOCATION	COUNTY	SHA DISTRICT
1	US 301 @ MD 6 - LaPlata Tower	Charles	5

PLANNED DEVICES

Device Type: HAR - Highway Advisory Radio
Total No's: 2

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	US 301/MD 5 @ PG County Line	Charles	5
2	US 301 @ Nice Bridge (Potomac River)		

Project: Radio Tower CCTV Camera Installation

Total No's: 1

No.	LOCATION	COUNTY	SHA DISTRICT
1	MD 4 @ Thomas Johnson Bridge (West End)	St. Mary's	5
2	US 301 @ Nice Bridge		
3	US 301/MD 5 @ Prince George's Co. Line	Charles	

Device Type: WEATHER STATION
Total No's: 2

No.	LOCATION	COUNTY	S.H.A. DISTRICT
1	MD 5 @ MD 235	St. Mary's	5
2	MD 210 @ MD 228	Prince George's	3

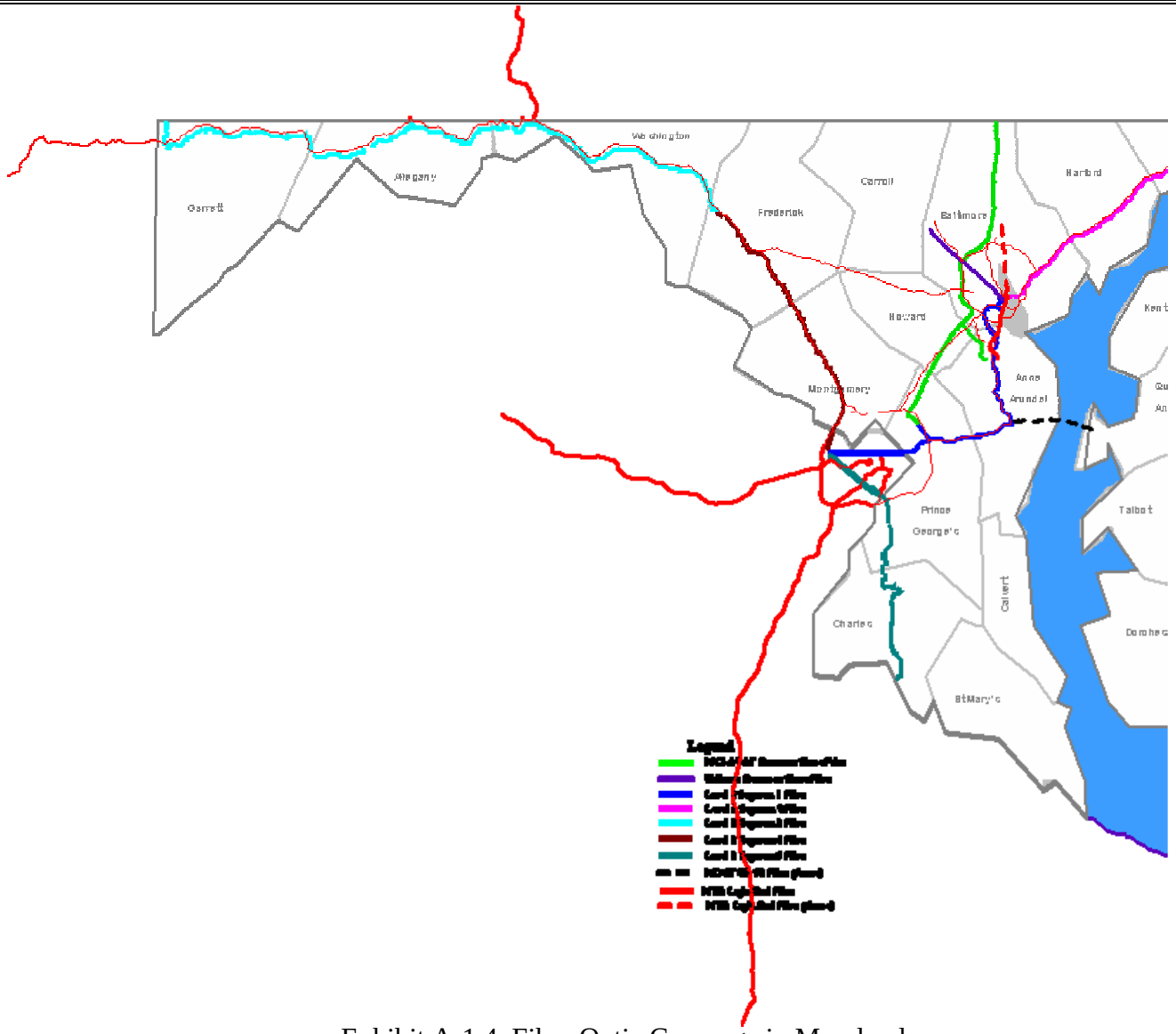
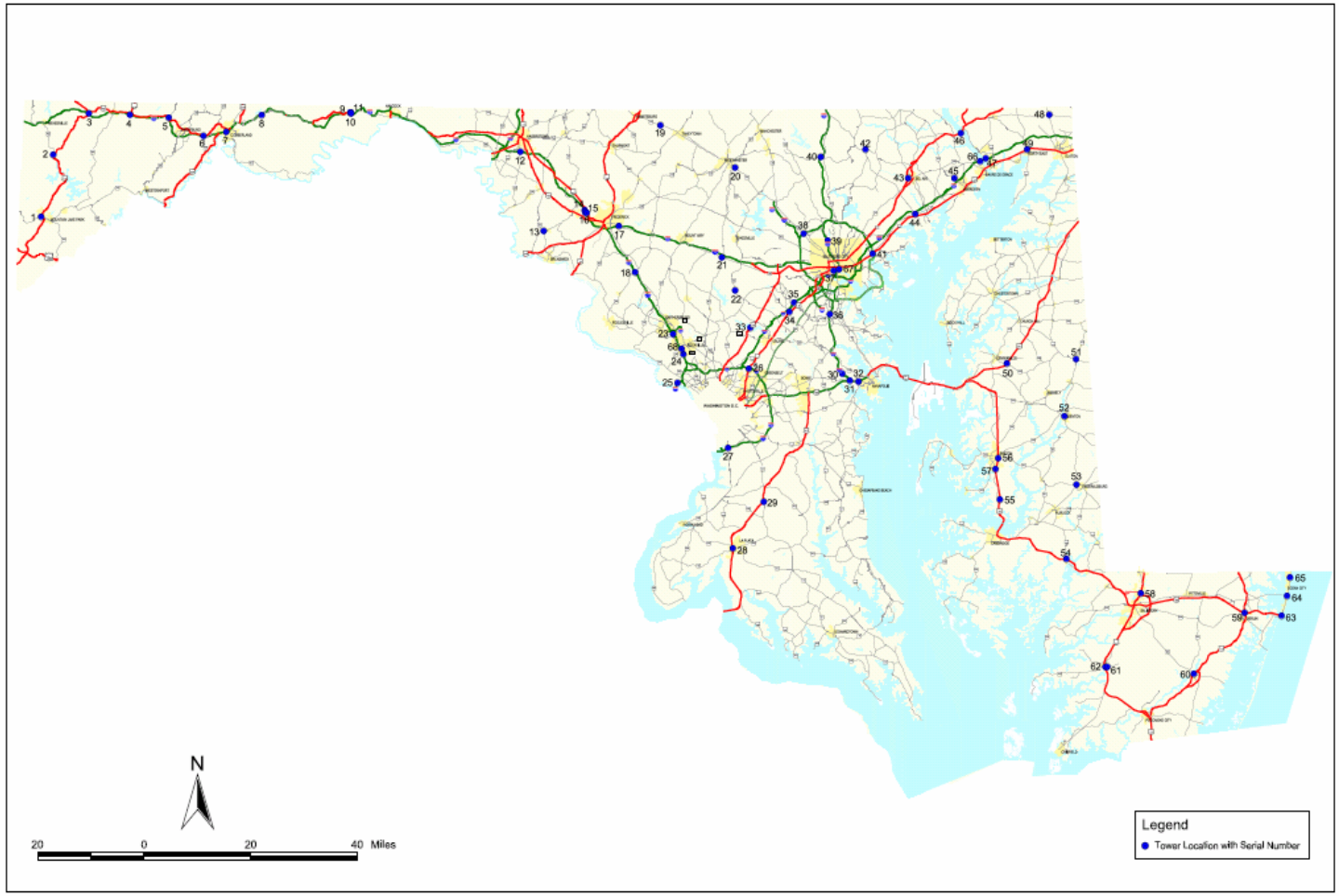


Exhibit A-1.4 Fiber Optic Coverage in Maryland



MARYLAND STATE HIGHWAY ADMINISTRATION
CHART PROGRAM

Radio Tower Locations for Future CCTV Deployment Consideration
Statewide

November 03, 2004

Exhibit A-1.5 Map of Radio Tower Locations in Maryland

Table A–1.4
List of Existing Radio Tower Locations Throughout Maryland

MAP KEY	TOWER No.	SITE NAME	OWNER	COUNTY	HEIGHT (Avg) ft	MAJOR ROAD	MINOR ROAD
59	9	BERLIN-MSP	MSP	WORCESTER	340	US 50	US 113
45	29	CHURCHVILLE SHA	SHA	HARFORD	75	MD 22	N OF I-95
26	30	COLLEGE PARK BARRACK	MSP	PRINCE GEORGES	340	I-495/I-95	US 1
46	33	CONOWINGO	MSP	HARFORD	330	US 1	CONOWINGO DAM
30	35	CROWNSVILLE MPT	MPT	ANNE ARUNDEL	1000	I-97	CROWNSVILLE HOSPITAL
52	47	DENTON SHA	SHA	CAROLINE	358	MD 404	MD 313
57	57	EASTON-MSP	MSP	TALBOT	330	US 50	MD 322
56	59	EASTON SHA	SHA	TALBOT	75	US 50	MD 331
14	77	FREDERICK/GAMBRILLS	SHA	FREDERICK	100 (on 1400 ft Mtn)	I-70	GAMBRILL PARK RD
15	82	GAMBRILL DNR	DNR	FREDERICK	On Mtn	I-70	GAMBRILL PARK RD
16	84	GAMBRILL SHA	SHA	FREDERICK	On Mtn	I-70	GAMBRILL PARK RD
36	88	GLEN BURNIE SHA	SHA	ANNE ARUNDEL	75	I-97	MD 176
41	90	GOLDEN RING SHA	SHA	BALTIMORE	75	US 40	I-695
12	97	HAGERSTOWN SHA	SHA	WASHINGTON	358	I-70	MD 65
40	98	HEREFORD SHA	SHA	BALTIMORE	340	I-83	MD 138
1	101	HOOP HOLE HILL	SHA	GARRETT	100 (on Hill)	US 219	ROUTE 7
3	112	KEYSERS RIDGE SHA	SHA	GARRETT	75	I-68	US 40
13	115	LAMBS KNOLL - MIEMSS	MIEMSS	WASHINGTON	On Mtn	MD 67	MD 17
28	117	LAPLATA TOWER	MIEMSS	CHARLES	100-200???	US 301	MD 6
42	124	MADONNA TOWER 2	MIEMSS	HARFORD	358	MD 153	MD 23
2	133	MCHENRY BARRACK	MSP	GARRETT	???	US 219	MD 42
49	143	NORTH EAST BARRACK	MSP	CECIL	340	US 40	MD 272
32	149	PAROLE	MSP	ANNE ARUNDEL	250-300	US 50/US 301	EXIT 23
38	153	PIKESVILLE	MSP-	BALTIMORE	300	I-695	MD 140

MAP KEY	TOWER No.	SITE NAME	OWNER	COUNTY	HEIGHT (Avg) ft	MAJOR ROAD	MINOR ROAD
			Private Owner				
61	162	PRINCESS ANNE SHA	SHA	SOMERSET	75	US 13	MD 388
24	167	ROCKVILLE BARRACK	MSP	MONTGOMERY	250	I-270	MONTROSE RD
	170	RT 40	MIEMSS	BALTIMORE	400	US 40	
50	173	SAFETY DRIVE QA PSAP	MIEMSS	QUEEN ANNES	300	US 301	MD 304
58	175	SALISBURY BARRACK	MSP	WICOMICO	200	US 13	US 50
5	179	SAVAGE MT SHA	SHA	GARRETT	100 (on Mtn)	I-68	MD 546
23	183	SHADY GROVE	WSSC	MONTGOMERY	???	I-270	SHADY GROVE RD
9	186	SIDELING HILL	MSP	WASHINGTON	On Mtn	I-68	AL/WA CO LINE
10	187	SIDELING HILL	MIEMSS	WASHINGTON	On Mtn	I-68	AL/WA CO LINE
11	188	SIDELING HILL TOWER	MIEMSS	WASHINGTON	On Mtn	I-68	AL/WA CO LINE
37	196	SOB	DGS	BALTIMORE CITY	On Building	EUTAW ST	PRESTON
33	215	US 29 & DUSTIN RD	MIEMSS	MONTGOMERY	250	US 29	DUSTIN RD
54	216	VIENNA-SHA	SHA	DORCHESTER	358	US 50	MD 331
29	219	WALDORF BARRACK	MSP	CHARLES	100	US 301	MD 5
34	225	WATERLOO BARRACK	MSP	HOWARD	100	US 1	MD 175
20	230	WESTMINSTER BARRACK	MSP	CARROLL	300	MD 140	MD 97
67	238	WORLD TRADE CENTER	MTA	BALTIMORE CITY	400	PRATT ST	GAY ST
22	246	DAYTON-SHA	SHA	HOWARD	340	MD 32	SHA BLDG
6	247	LAVALE-SHA	SHA	ALLEGHANY	75	I-68	TOLL GATE HOUSE
39	249	WBFF	SHA	BALTIMORE	700	I-83 (JFX)	Radio Tower
44	251	JOPPA	COUNTY	HARFORD	330	I-95/US 40	MD 152
43	253	TOLLGATE	COUNTY	HARFORD	330	US 1	MD 24
66	255	LAPIDUM	COUNTY	HARFORD	180	I-95 (EXIT 89)	LAPIDUM RD
21	256	COOKSVILLE	COUNTY	HOWARD	400	MD 97	MD 144
35	258	TIMBERS	COUNTY	HOWARD	340	I-95	MD 100
19	262	BRIDGEPORT-SHA	SHA	FREDERICK	358	MD 140	BRIDGEPORT RD
17	264	FREDERICK LEC-TOC7	COUNTY	FREDERICK	100	I-70 (EXIT	MD 144/AIRPORT DR

MAP KEY	TOWER No.	SITE NAME	OWNER	COUNTY	HEIGHT (Avg) ft	MAJOR ROAD	MINOR ROAD
						56)	
8	277	MARTIN MTN - SHA	SHA	ALLEGANY COUNTY	Scheduled FY06	I-68	ROCKY GAP ST PARK
7	278	CUMBERLAND - EOC	COUNTY	ALLEGANY COUNTY	100 (on Knoll)	I-68	ROUTE 28
4	279	GRANTVILLE	MIEMSS	GARRETT COUNTY	330	I-68	US 219
65	290	136TH ST	CITY	WORCESTER COUNTY	200	MD 528	136TH ST
63	291	WORCESTER ST	CITY	WORCESTER COUNTY	< 200	MD 528	WORCESTER ST
60	294	SNOW HILL	COUNTY	WORCESTER COUNTY	340	US 113	MD 12
64	295	OCEAN CITY-65TH	MIEMSS	WORCESTER COUNTY	340	MD 528	MD 90/65TH ST
62	299	PRINCESS ANNE-MSP	MSP	SOMERSET COUNTY	340	US 13	MD 388
55	301	TRAPPE	SHA	TALBOT COUNTY	340	US 50	MD 565
48	307	FAIRHILL	DNR	CECIL COUNTY	330	MD 273	MD 213
47	308	JFK HWY	MIEMSS	CECIL COUNTY	340	I-95	TYDINGS MEM BRIDGE
51	312	GOLDSBORO	COUNTY	CAROLINE COUNTY	340	MD 313	MD 311/MD 287
53	313	FEDERALSBURG	MIEMSS	CAROLINE COUNTY	340	MD 313	MD 318
27	314	OXEN HILL	SHA	PRINCE GEORGE'S COUNTY	250	I-495/I-95	MD 210
18	316	I-270 MPT	MPT	MONTGOMERY COUNTY	450	I-270	WEIGHT STA S OF EXIT 22
25	317	PERSIMMION	SHA	MONTGOMERY COUNTY	250	I-495	PERSIMMION TREE RD
68	319	MCCF	MIEMSS	MONTGOMERY COUNTY	250	I-270 (EXIT 5)	GREAT FALLS RD/WOOTTON PKWY
31	322	BROADCREEK	COUNTY	ANNE ARUNDEL COUNTY	600	US 50	I-97

A-2 TRAFFIC OPERATIONS CENTERS (TOC)

Transportation Management Centers (TMC) play an important role in the ITS arena focused to improve travel through the State. Maryland's Statewide Operations Center (SOC) is located in the SHA's headquarter in Hanover, near Baltimore-Washington International Thurgood Marshall Airport (BWI). The SOC is supported with its satellite TOCs located in Frederick, Baltimore, and College Park and Authority Operations Centers (AOC) operated by Maryland Transportation Authority (MdTA) located at Fort Mc Henry Tunnel, FSK Bridge, and Perryville. These TOCs and AOCs are able to read CHART database and at the same time give input into it. Three seasonal TOCs, which have same functions, are shown in Table A-2.1. Located in District Heights and known as Prince George's County TRIP Center also serves as the TOC, but has limited capabilities to just read the CHART database and not to give direct inputs. In addition, CHART workstations with the same function as TRIP Center, are installed in different agencies and shown in tabular format in Table A-2.2. TMCs in neighboring states are important for coordination and data exchange and for that reason, the following map shows TMCs that are essential for rural Maryland.

Table A-2.1

Seasonal CHART TOCs

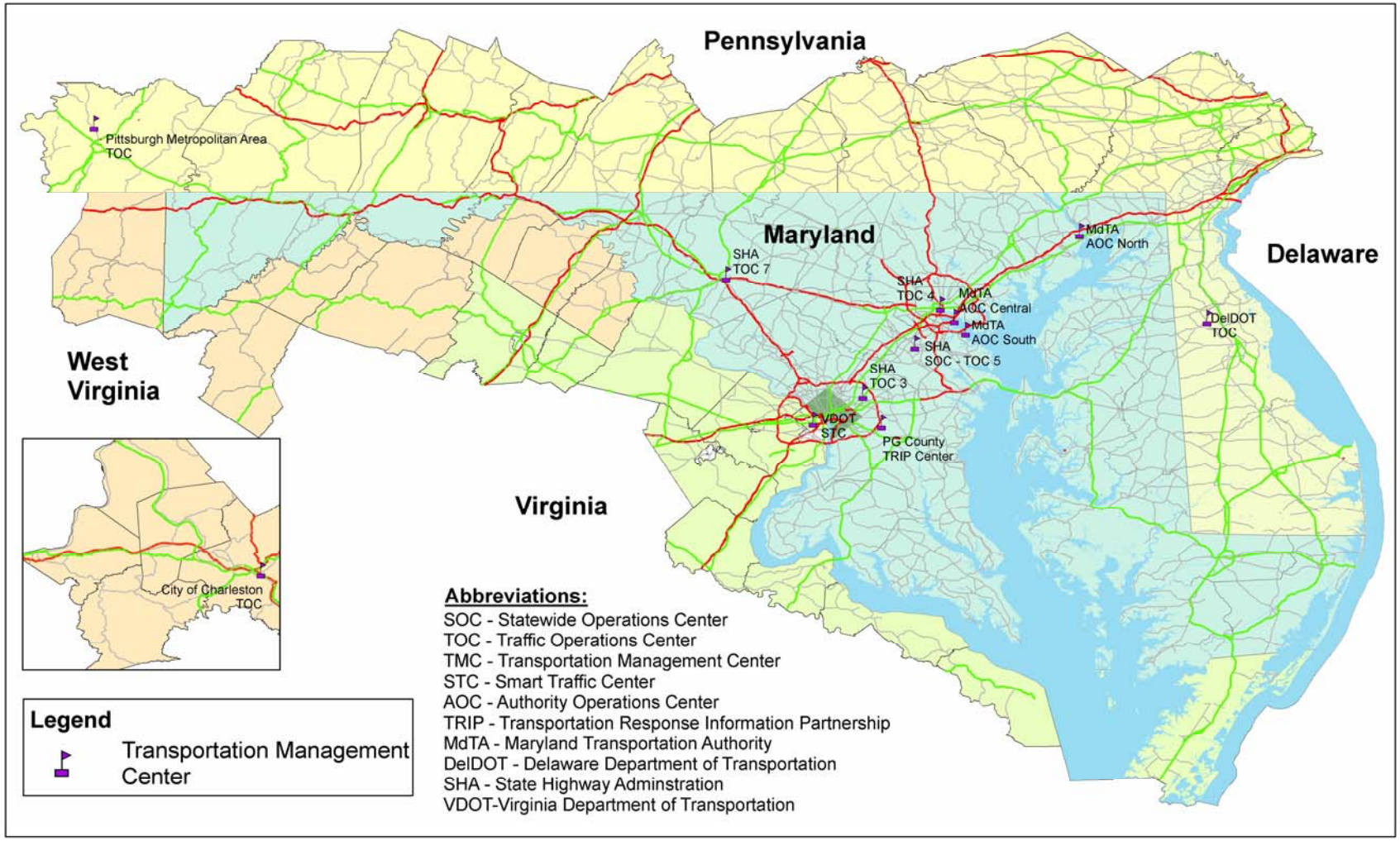
Location	CHART Lite Name	Site Type	Function
Ravens Stadium	RAVENSTOC	TOC	Transportation Management
Maryland Emergency Management	MEMA	TOC	Emergency Operations
Redskins Stadium	REDSKINSTOC	TOC	Transportation Management

Table A-2.2

CHART Workstations

Location	CHART Lite Name	Site Type	Function
TOC 6	DIST 6	TOC	Transportation Management
SHA District 3 Headquarters	DIST 3	District	Emergency Operations
SHA District 4 Headquarters	DIST 4	District	Emergency Operations
SHA District 5 Headquarters	DIST 5	District	Emergency Operations
SHA Radio Shop	SHA RADIO SHOP	Shop	Device Maintenance
SHA Fairland Shop	SHA FAIRLAND	Shop	Highway Maintenance
SHA Laurel Shop	SHA LAUREL	Shop	Highway Maintenance
SHA Upper Marlboro Shop	SHA UP MARLBORO	Shop	Highway Maintenance
SHA Gaithersburg Shop	SHA GAITHERSBURG	Shop	Highway Maintenance
SHA Owings Mills Shop	SHA OWINGS MILLS	Shop	Highway Maintenance
SHA Golden Ring Shop	SHA Golden Ring	Shop	Highway Maintenance
SHA Dayton Shop	SHA DAYTON	Shop	Highway Maintenance
SHA Annapolis Shop	SHA Annapolis	Shop	Highway Maintenance
SHA Hereford Shop	SHA HEREFORD	Shop	Highway Maintenance
SHA Churchville Shop	SHA CHURCHVILLE	Shop	Highway Maintenance

Location	CHART Lite Name	Site Type	Function
Traffic.com	Traffic.Com	Media	Transportation Management
MSP R - Golden Ring	MSP GOLDEN RING	MSP	Law Enforcement
MSP Q - College Park	MSP COLLEGE PARK	MSP	Law Enforcement
MSP L - Forestville	MSP FORESTVILLE	MSP	Law Enforcement
MSP A -Waterloo	MSP WATERLOO	MSP	Law Enforcement
MSP F - North East	MSP NORTHEAST	MSP	Law Enforcement
MSP J - Annapolis	MSP ANNAPOLIS	MSP	Law Enforcement
MSP N - Rockville	MSP ROCKVILLE	MSP	Law Enforcement
MSP P - Glen Burnie	MSP GLEN BURNIE	MSP	Law Enforcement
MdTA Police Building	MdTA LMB	Partner	Law Enforcement
MIEMSS	MIEMSS	Partner	Emergency Operations
Baltimore County Police	BALTO CO PD	Partner	Law Enforcement
Howard County Police	Howard City 911	Partner	Law Enforcement
VDOT NOVA	NOVA STC	Partner	Transportation Management
MC Traffic Management	MCTMC	Partner	Transportation Management
Park Police	US PARK POLICE	Partner	Law Enforcement
MAA - BWI Airport	MAA BWI	Partner	Transportation Management
DC DOT	DDOT	Partner	Transportation Management
MTA - 6 St. Paul Street, Baltimore	MTA	Partner	Transportation Management
Anne Arundel County EOC	AA CTY 911	Partner	Emergency Operations
Harford County EOC	HARFORD CTY 911	Partner	Emergency Operations
Anne Arundel County DPW&T	AA DPW	Partner	Transportation Management
MD State NOC Hanover	NOC	Dev/Test	Development and Testing
University of MD College Park	University of MD CATT_LAB	Dev/Test	Development and Testing
SHA Emergency Operations Center	SHA EOC	TOC	Emergency Operations
Law Mall	Frederick LEC	Partner	Law Enforcement
Baltimore County EOC	Baltimore Co EOC	Partner	Emergency Operations



Transportation Management Centers in Maryland & Neighboring States

A-3 STAKEHOLDER LISTS AND REGIONAL STAKEHOLDER MEETING NOTES

The following are the stakeholder lists that were compiled prior to the M&O/ITS Infrastructure meetings on the Eastern Shore, and in Western and Southern Maryland. The lists reflect the parties who stand to benefit from the expansion of CHART device and communications infrastructure into the various regions. Conversely, these are the same individuals and agencies that could experience severe operational constraints in responding to incidents if they do not have quick access to traffic data and communication resources to share information with other responding agencies. Additionally, the stakeholders' meeting notes summarizing four (4) meetings held with stakeholders in order to collect information about M&O/ITS needs for rural Maryland, are included as well. The stakeholders' meetings took place in this order:

1. Eastern Shore Stakeholder Meeting - February 2, 2006, SHA Centreville Maintenance Shop
2. Western Maryland Stakeholder Meeting- February 8, 2006, SHA District 6 Office, La Vale
3. Southern Maryland Stakeholder Meeting– February 10, 2006, SHA Maintenance Shop, La Plata
4. Western Maryland Follow-Up Meeting – May 9, 2006, SHA District 6 Office, La Vale

Eastern Shore Stakeholder List

No.	Name	Title	Agency	County	Phone	E-mail
1	Gene Donaldson	TMC Operations Manager	Delaware Department of Transportation		302-659-2401	genedonaldson@state.de.us
2	Terry O. Wright	ADE - Maintenance	Maryland State Highway Administration		410-810-3250	twright@sha.state.md.us
3	Ed Millikin	Director	Talbot County Emergency Management	Talbot	410-770-8160	mullikin@talbgov.org
4	Tommy Haddaway	Communication Technologist	Talbot County Emergency Management	Talbot	410-770-8160	thaddaway@talbgov.org
5	Gail Oldershaw	Emergency Planner	QAC Department of Emergency Services	Queen Anne's	410-758-4500 x 1105	goldershaw@qac.org
6	John Chew	Director	QAC Department of Emergency Services	Queen Anne's	410-758-4500 x 1103	jchew@qac.org
7	Richard Lindsay	District Engineer	Maryland State Highway Administration	Queen Anne's	410-810-3210	rlindsay@sha.state.md.us
8	James R. Wright Sr.	ADE - M1	Maryland State Highway Administration, District 1 Office	Wicomico	410-677-4010	jwright1@sha.state.md.us
9	Donnie Drewer	District Engineer	Maryland State Highway Administration, District 1 Office	Wicomico	410-677-4000	ddrewer@sha.state.md.us
10	Gene Cofiell	ADE - Traffic	Maryland State Highway Administration, District 1 Office	Wicomico	410-677-4040	gcofiell@sha.state.md.us
11	Cindy L. Towers	Coordinator	Caroline County Emergency Management	Caroline	410-479-2622	ctowers@emerg.caroline.md.us
12	Jeffrey R. Robinson	Emergency Management Technician	Wicomico County Emergency Management	Wicomico	410-548-4820	jrobinson@wicomicocounty.org
13	Doug Dods	BK CDT	Maryland State Police - Berlin	Worcester	410-641-3101	ddods@mdsp.org
14	David A. Fitzgerald	Emergency Management Planner	Worcester County Department of Emergency Services	Worcester	410-632-1311	dfitzgerald@co.worcester.md.us
15	Amy L. Temple	Hazard Mitigation Coordinator	Cecil County Department of Emergency Services	Cecil	410-392-2022	atemple@ccgov.org
16	F/Sgt Krah Plunkert	Assistant Cmdr. MSO Easton	Maryland State Police	Dorchester	410-822-3101	kplunkert@mdsp.org
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20	Bryan C. Ebling	Director	Caroline County Emergency Management	Caroline	410-479-2622	bcebling@emerg.caroline.md.us

Western Maryland Stakeholder List

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Southern Maryland Stakeholder List

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Eastern Shore Meeting Notes

DATE AND TIME:	February 2, 2006, 9:00 AM
LOCATION:	SHA Centreville Maintenance Shop
ORIGINATED BY:	Rural ITS and M&O Strategic Deployment Plan Steering Committee
RECORDED BY:	Neil Robinson (Williams Associates-Engineers – Subcontractor to Edwards & Kelcey, Project Consultant)
PARTICIPANTS:	(see attached list)
SUBJECT:	Rural ITS M&O Strategic Deployment Plan **[EASTERN SHORE]**

I. Welcome and Introductions (EK)

The meeting commenced with welcome and introductions by Doug Rose (SHA's Deputy Administrator and Chief Engineer for Operations). He provided an overview of the CHART Program as it relates to congestion mitigation and safety, and of the program's funding sources (CMAQ, CTP, etc.). He explained that CHART had it's origins in the Reach the Beach program but has since expanded to address incidents in other parts of the state. Doug indicated that the purpose of the meeting was to verify the ITS field devices in the jurisdiction, identify where other devices are needed and ultimately get buy-in from stakeholders in the region on the plans that CHART has for the area.

Mike Zezeski (Director: SHA's Office of CHART and ITS Development) also addressed the group and expressed that the goal of the meeting was to get the region's stakeholders more involved in CHART's strategic planning activities. In addition, he reiterated that CHART needed to focus continually on operations in the various regions, i.e. where can CHART best deploy/utilize its resources to meet the needs of response agencies in the area, particularly through the use of technological tools. He said that success in these aspirations could be achieved through practicing the "four C's" which he firmly believes in (i.e. cooperation, coordination, communication and consensus).

II. Project Background

Alvin Marquess (CHART Operations Manager) presented a brief overview of the ongoing CHART initiatives targeting the area. These included:

- 16 CCTVs being made operational on the Eastern Shore by this Summer
- A simulation by Dr. Gang- Len Chang of the University of Maryland, Department of Civil and Environmental Engineering for incident scenarios on the Eastern Shore

He also indicated that a lot of the ideas initiated on the Eastern Shore are currently being used in the Washington and Baltimore areas.

III. Project Overview and Scope/Schedule/Status

K.R. Marshall (Vice President of Edwards and Kelcey – Project Consultant Team) gave an overview of the scope of CHART's Rural M&O Strategic Plan, emphasizing that there needed to be an understanding of what resources the CHART program has, which then has to be coupled with the program goals so that reasonable planning can occur for a 5-20 year horizon. He indicated that the general scope of the meeting was to:

- Identify what is out there.
- Determine what is being planned for the area.
- Identify "gaps" in the coverage area.
- Develop strategies for expanding the system.
- Foster coordination among the various agencies involved.

K.R also encouraged the meeting participants to identify other stakeholders who should be in attendance so that there could be as much input as possible during the development of the strategic plan. The following are the highlights of his overview:

1. In the development of the Rural M&O Strategic Plan the State was divided into three (3) rural areas: Eastern, Southern and Western. The plan development is still in the information-gathering stage and ultimately, all the findings will be compiled in a system needs and inventory assessment document. Currently, existing, planned and under-construction ITS devices have been inventoried with most of the information having been obtained from the CHART GIS database. Relevant studies have also been gathered as a part of the investigation. A summary of the inventory for SHA Districts 1 and 2 was presented in the information package distributed at the meeting.
2. During the planning process, the ITS architectures for the state of Maryland as well as for the CHART Program will be investigated, summarized and included in the needs and inventory assessment document. This should be accomplished within the next 4-5 weeks.
3. Not many documents have been collected to-date; however, this effort is ongoing. Refer to the slide presentation for a list of the documents collected thus far.

IV. Open Discussion and Forum

The open discussion segment of the meeting involved each of the stakeholders present stating their current interaction with the CHART Program and briefly outlining the ITS resources (devices, workstations, etc.) they had access to and the telecommunication resources they had in place to accommodate the future installation of CHART resources and connectivity to the CHART system. Alvin presented maps with the most updated M&O/ITS inventory (existing, under construction, and planned devices). He advised all attendees to review planned ITS inventory and to share their opinions and requests. The following is a summary of those presentations and the associated discussions that ensued.

A question was raised regarding the effectiveness of HARs in getting broadcasts to motorists and if CHART had the capability of measuring this, i.e. the number of motorists who actually tune in to the stations. Alvin indicated that the HARs are a good tool to disseminate traveler information; however, there are frustrations due to the weak signals. Currently MdTA is

conducting demonstrations on a new system to synchronize HARs to broadcast uninterrupted signals. Hopefully, the advent of the new system will provide more reliable HAR broadcasts in the future. The only measure that he is aware of was a headlight study that was conducted to determine which motorist had responded to Shazam prompts. K.R. also indicated that the credibility of HARs (and DMS) had suffered in the past because of the posting of unreliable messages. This seemed to indicate that there were deficiencies both in the amount of information that was available to pass on to motorists as well as in operator interface with the system.

Dorchester County Emergency Management – Wayne Robinson indicated that they had purchased two (2) PDMS units but they did not have remote access to the equipment. They also need a CHART workstation/CHART-Lite to be able see images and access data from the various statewide ITS devices. Regarding evacuation, Route 50/Route 16 @ Wal-Mart is prone to accidents and this can impede evacuation efforts for vehicles from MD-343 (this passes through a residential area and portions of the road are prone to flooding). MD-336 to MD-335 is the only viable evacuation route for traffic from the southern parts of the county and DMS and CCTV cameras are needed on MD-331 (not on US-50) for residents going to shelter at the middle school. A CCTV camera is also needed at MD-16 and Wal-Mart. In response to the observation that there are no hurricane evacuation signs in the county, Alvin indicated that Tom Tran was finalizing evacuation plan that would include signs.

Cecil County Department of Emergency Services – Amy Temple indicated that her focus was in evacuation planning hence she could not speak extensively on the issue of ITS devices. However, she anticipated that there would be a need for access to CCTV images to supplement the department's evacuation operations.

Worcester County Department of Emergency Services – David Fitzgerald expressed concern that there should be DMS on routes other than US-50. He was pleased to see that the maps of planned devices showed future devices on roads to the north (DE) and south (VA) of US-50. He indicated that his department had recently improved their operations center so they were ready to accommodate CHART devices and communications infrastructure. Also, they are live from Snow Hill and are expanding to the north. He indicated that they had an option to accommodate cellular communications if necessary. K.R. requested that he provide any existing reports on what the department has been doing to expand/upgrade their capabilities and improve operations. David noted that it is critically important that states adjoining Maryland are given due consideration in any operations planning that occurs. Doug shared that Maryland meets with VDOT every six (6) months primarily to discuss issues pertaining to the DC beltway area. This effort will have to be expanded to include the shore areas. He admitted that SHA has not been duly diligent in this area and invited Donnie Drewer (District 1) to attend SHA's next coordination meeting with VDOT.

Maryland State Police – Doug Dods said that the evacuation plan calls for the closure of MD-133 @ MD-13 in Pocomoke City . He notes that DMS are good tools to have but it would be beneficial to have CCTV images as well. With respect to current monitoring practices, MSP obtains CHART information via internet access. Some of the problems encountered through this practice include failed internet connectivity and malfunctioning software (Real Player) to view CCTV images.

Wicomico County Emergency Management – Jeffery Robinson said that they had funding to get the cellular communication option for DMS. Alvin agreed and said that he understood this to already be in progress. Jeffery also indicated that there is a need for a CCTV at MD-13 and US-50. A big issue for them as well was the removal of high-profile vehicles from the road.

Caroline County Emergency Management – Cindy Towers emphasized that since this county borders DE, they have to be duly concerned with traffic coming from Delaware to Maryland and will depend greatly on coordination with the task force for advice. Brian Ebling noted that there are no detection devices or CCTV cameras on MD-331 and MD-318 coming from Delaware. These roadways should be instrumented and and they need connectivity to the 911 centers. There is fiber from the microwave tower to facilitate this. Alvin questioned the status of communications/protocols between counties and if there were any issues with decision-makers getting the correct information from the right people (this was a problem with Hurricane Katrina). Brian indicated that they have been pressing MEMA for help in devising and implementing a communication plan. For the most part, communication within the county has been effective; however, doing so across county lines has proven problematic.

SHA District 1 – Donnie Drewer indicated that the PDMS on Friendship Road was not functional. He likes the locations of the planned PDMS on the maps however questioned if they will be bi-directional. Alvin stated that there where PDMS shown, if they are not bi-directional then two (2) of the portables will be placed back-to-back. In addressing the earlier issue of the effectiveness of HAR and DMS messages, Donnie indicated that from past observations of motorist behavior, they do work. He also noted that the DMS on MD-9 (WB) might need to be placed further west to facilitate turning off on MD-589 or St. Martin's. Alvin concurred. MD-12 needed to be investigated for sign placement because in the event of an evacuation, this is a major route for diverting traffic. Doug questioned whether any segments along MD-12 were listed as flood-prone areas. Donnie indicated that only the area by the bridge coming out of Snow Hill had that designation.

Somerset County – In addressing some issues for this county, James Wright of SHA District 1 commented that a DMS might be needed at MD-413 and MD-363. MD-13 (SB) north of Pokamoke needed a DMS as well. He also noted that MD-12 is very important for major evacuations or emergencies and suggested adding a DMS and/or CCTV somewhere along that route.

SHA District 2 – Richard Lindsay emphasized the need to heighten public awareness (especially among locals in Stevensville and Grasonville on the plans the state has for the area. There is widespread sentiment that the focus is primarily on beach traffic and not enough consideration is given to the impacts on them. The public also needs to be made aware of the plans that DE has that will have some impact on them. In addressing the issue of HAR and DMS effectiveness, he indicated that public feedback could be obtained via customer surveys/questionnaires. Terry Wright indicated that a camera already exists at US-50 and Kent Narrows; and although an RWIS is planned for MD-291 and US-301, his preference is to locate it in Denton on MD-404. Also, the Shazam at MD-290 and US-301 could be moved south to the MD-213 intersection to provide better coverage on the north-south route. Other concerns expressed were the aging condition of the PDMS and the need to coordinate emergency evacuation operations with the USACE as all evacua0tion routes

take vehicles to high-level canal crossings. Alvin raised the issue of placing DMS on the trade list but that was already investigated and was not possible. Regarding CHART's presence in the districts' operations centers, Richard said that there was a more immediate need for workstations. Mike Zezeski suggested that his attendance at CHART board meetings might push that issue towards some resolution. He also said that a forum involving Eastern Shore stakeholders might be required to get everyone engaged in meaningful dialog on this topic.

Talbot County Emergency Management – Ed Millikin said that currently, there are no plans for devices. Tommy Haddaway indicated that Easton Utilities Company has a CCTV at MD-328 and US-50. This camera shows up on their website. He suggested that CHART involve Easton Utilities in future discussions about device placement. He also said that the emergency management office needs workstations that allow them to view more than one site at a time.

Queen Anne County Department of Emergency Services – John Chew indicated that the department has limited resources and is dependent on the evacuation plan to provide direction in emergencies. They are ready to accommodate any plans that CHART has for the region. He said that the entire county is on a wireless network and there is a lot of capacity. A virtual private network (VPN) also exists and this too has a lot of capacity. Alvin mentioned that the CCTV on a microwave tower in the area has operational issues and as soon as they were resolved, CHART would see about the installation of a workstation. A question was raised regarding PTZ control for the CCTV to which K.R. responded that arbitration issues would make such control difficult. John emphasized the need for CHART personnel to visit their operations center to see the set-up there. He was concerned that there were too many workstations there already and hence would not want additional ones. He was reassured that with the new CHART software, existing workstations could be configured to view pertinent CHART device information. John also emphasized that as important as it was to have technological tools to facilitate communications, it is also critical that users understand how the system functions and know how to properly use it. Gail Oldershaw expressed concern that in addition to the county hosting evacuating traffic from the DC Metro area, they might also need to accommodate traffic from the opposite direction, i.e. Delaware. Maryland should have the ability to know what's happening in Delaware before sending its motorists there. As such, two sites might be required on US-301 along with the appropriately-placed DMS.

DelDOT – Gene Donaldson expressed his familiarity with the CHART Program and indicated that the DelDOT's transportation management program has a statewide focus and does not separate the state into rural and metropolitan areas as Maryland does. He said that Delaware's program attempts to strike a balance across the entire state. He expressed a willingness to meet with any of the stakeholders to discuss the scope of DelDOT's transportation management program. The following are some of the highlights of DelDOT's activities as they pertain to the program:

- Through efforts by PB, DelDOT has recently begun updating its ITS architecture.

- They are currently engaged in all-hazards planning (not just hurricane planning) and this entails coordination with MD. The effort started in Sussex County (done) and has commenced in Kent County.
- Transportation management teams have been formed for US-13 and US-113 as well as for police, fire, emergency management and transportation professionals (note: DE has 62 volunteer fire departments).
- All major routes will have specific detour routing information so that information on the detour route is known right down to the intersection level, e.g. number of cones needed, etc. This information will be made available on the website.
- Real-time ITS resources are available on the DelDOT website.
- DelDOT is responsible for 96% of the roadways in the state, as well as for rail and transit systems. By summer 2006, all traffic signals on US-13 and US-113 will be on the system (US-1 is already on). The goal is that all signals will eventually be on the system (only about ½ of all signals currently on).
- The TMC is now up and running 24-hours/day, 7-days/week. The information number to call is 302-659-2400.
- Regarding communications, currently, DelDOT has an 800 MHz system that will be enhanced using Department of Homeland Security (DHS) funding. Also, to facilitate communication tie-ins, fiber and expensive bandwidth along the beach is being leased. A telecommunications plan is being developed to show how all the sub-systems are integrated to function as part of one system.
- A strategic implementation plan exists for the deployment of DMS throughout the state. Also, regarding evacuation from Ocean City, regardless of what the plans dictate, intuitively, residents in the northern part of Ocean City will head towards Delaware. As such, a DMS is needed in that area to provide information to evacuees.
- DelDOT has over 80 CCTV cameras, but the state still needs to increase its detection capabilities. In addition, they need to work with Maryland to determine the traffic crossing the state line and have the system automatically determine these volumes. It is inefficient to have someone constantly monitoring CCTV camera images for changes in traffic patterns when this process can be automated. On the evacuation side, DelDOT needs to work closely with Ocean City and the SHA districts – through mutual aid agreements – to establish CCTV cameras, detection capabilities and communications for use in developing detour route transitions across state lines. Some stakeholders in the process are Delaware, Maryland, Cecil County and MdTA). Of concern also, is the incursion of one state's forces into the other's territory to provide assistance. Such actions might require a change in the language of any existing mutual aide agreement. In addition, the State Governor would have to sanction such a move, which would have to be coordinated thru DEMA and MEMA. Gene indicated that some meetings are needed to streamline coordination of this type.
- Delaware was the first state to have own a primary license for broadcasting (1380 AM). The coverage area included Dover and downtown Philadelphia. This radio system is used for weather announcements at the discretion of the TMC manager and

other relevant parties. The information is also posted to the DelDOT website. In addressing an earlier issue re the effectiveness of HARs, Gene said that this was difficult to monitor the usefulness of HAR broadcasts. However, he knows that it is being used as a significant number of motorists do contact DelDOT to find out why some roadway-related messages were not broadcast.

- The system is being designed as a web-based system.

General

- Doug said that it was worthwhile exploring whether developers should help fund the deployment of devices. SHA has not broached this subject before. He also indicated that there is an ongoing effort to get Maryland senators to work together in recognizing and acting on SHA issues. SHA concerns framed in the context of service enhancements have been shown to be an effective way of getting additional funding. Forums such as today's help establish the basis for justifying additional funding requests to the Legislature.
- KR noted that the ROCC and B-ROCC concepts have been effective in facilitating coordination among jurisdictions and thus might be useful for similar issues in the counties.
- Mike and Alvin noted that XM radio purchased one CHART workstation and as such broadcasts traffic information obtained from the SOC. On the issue of formal announcements of special events, Mike explained that Maryland has a special events coordinator who responds to activities that are triggered by requests for specific traffic control assistance. Generally, the state is not informed of special events unless there are particular requests for lane closures or signs (in such cases, events are logged in the CHART system). He cautioned however, that State resources are limited so responses to special events need to be measured. Alvin indicated that the CHART system can page personnel by county and interested persons can be added to the list to get paged for special events. This is also true for weather events. It was suggested that a special "tag" could be added to the special event announcement to indicate the extent of the impacts on traffic. This, however, would be difficult to accomplish without input from event organizers.
- James Witherspoon noted that Washington DC is currently implementing a "one-stop-shop" system that provides a variety of real-time traveler information for the Maryland, Washington DC and Virginia areas. Such a system obviates the need to have different and potentially disparate stand-alone systems. The first routing for the data from this system is via CapWIN. The list below was presented prior to presentation of "Next Steps" as a summary of the M&O strategies proposed during the Eastern Shore Regional Stakeholder Meeting.

  - ITS Device Placement.
  - Increase Public Awareness.
  - Identification/Coordination of Locally Owned ITS Devices.

- Additional CHART Workstation and Communications Infrastructure Use/Protocol Training.
- Inventory and Maximize Communications Infrastructure Capacity and Use.
- Increase Inter/Intra-State M&O Coordination via CHART and CHART Lite.
- Establish Mutual Aid Agreements.
- Increase Information Sharing (i.e. Major Events) - Develop Statewide Traveler Information Clearinghouse.
- Consider Methods of Securing Funding for the Deployment of M&O Strategies from Developers.
- Establishment of an Eastern Shore TOC.
- Identify Benefits Associated with M&O Strategies and Develop a Method of Prioritizing M&O Strategies.
- Develop a Strategic Plan Brochure or Executive Summary for Elected Officials.
- Consider Regional Operations Collaboration and Coordination Meetings to Support the Use and Maintenance of the Strategic Plan.
- Consider HAR Benefits and Alternatives (i.e. AM or Satellite Radio).

V. Conclusion

Doug Rose concluded the session at approximately 11:35 am

Attendance List

No.	Name	Title	Agency	County	Phone	E-mail
1	Mike Zezeski	Director	Maryland State Highway Administration, Office of CHART	Anne Arundel	410-582-5605	mzezeski@sha.state.md.us
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4	Neil Robinson	Vice President	Williams Associates Engineers (WAE)	Anne Arundel	410-729-1004	nrobinson@waengineers.com
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8	Ed Millikin	Director	Talbot County Emergency Management	Talbot	410-770-8160	mullikin@talbgov.org
9	Tommy Haddaway	Communication Technologist	Talbot County Emergency Management	Talbot	410-770-8160	thaddaway@talbgov.org
10	Gail Oldershaw	Emergency Planner	QAC Department of Emergency Services	Queen Anne's	410-758-4500 x 1105	goldershaw@qac.org
11	John Chew	Director	QAC Department of Emergency Services	Queen Anne's	410-758-4500 x 1103	jchew@qac.org
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13	James R. Wright Sr.	ADE - M1	Maryland State Highway Administration, District 1 Office	Wicomico	410-677-4010	jwright1@sha.state.md.us
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15	Gene Cofiell	ADE - Traffic	Maryland State Highway Administration, District 1 Office	Wicomico	410-677-4040	gcofiell@sha.state.md.us
16	Cindy L. Towers	Coordinator	Caroline County Emergency Management	Caroline	410-479-2622	ctowers@emerg.caroline.md.us
17	Jeffrey R. Robinson	Emergency Management Technician	Wicomico County Emergency Management	Wicomico	410-548-4820	jrobinson@wicomicocounty.org
18	Doug Dods	BK CDT	Maryland State Police - Berlin	Worcester	410-641-3101	ddods@mdsp.org
19	David A. Fitzgerald	Emergency Management Planner	Worcester County Department of Emergency Services	Worcester	410-632-1311	dfitzgerald@co.worcester.md.us
20	Amy L. Temple	Hazard Mitigation Coordinator	Cecil County Department of Emergency Services	Cecil	410-392-2022	atemple@ccgov.org
21	F/Sgt Krah Plunkert	Assistant Cmdr. MSO Easton	Maryland State Police	Dorchester	410-822-3101	kplunkert@mdsp.org
22	Steve Garvin	Emergency Management Planner	Dorchester County Emergency Management	Dorchester	410-228-1818	sgarvin@docogonet.com
23	Wayne Robinson	Director	Dorchester County Emergency Management	Dorchester	410-228-1818	wrobinson@docogonet.com
24	Paul Hurley	Sheriff's	Dorchester County	Dorchester	410-228-4142	phurley@sheriff.docogonet.com
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27	Bryan C. Ebling	Director	Caroline County Emergency Management	Caroline	410-479-2622	bcebling@emerg.caroline.md.us
28	Doug Rose	Deputy Administrator	Maryland State Highway Administration	Baltimore	410-545-0360	drose@sha.state.md.us
29	K.R. Marshall	Vice President	Edwards and Kelcey	Baltimore	410-747-3420	kmarshall@ekmail.com

Western Maryland Meeting Notes

DATE AND TIME:	February 8, 2006, 9:00 AM
LOCATION:	SHA District 6 Office, La Vale
ORIGINATED BY:	Rural ITS and M&O Strategic Deployment Plan Steering Committee
RECORDED BY:	Neil Robinson (Williams & Associates – Subcontractor to Edwards & Kelcey, Project Consultant)
PARTICIPANTS:	(see attached list)
SUBJECT:	Rural ITS M&O Strategic Deployment Plan **[WESTERN MARYLAND]**

I. Welcome and Introductions

The meeting commenced with welcome and introductions by Doug Rose (SHA's Deputy Administrator and Chief Engineer for Operations). He gave an overview of the CHART Program and explained that the visit to the region was a part of a series of sessions reaching out to the rural parts of the state to determine their ITS needs. He noted also that there is a rapidly-diminishing rural area as there is congestion everywhere in the State.

CHART started as a reach the beach" program but due to congestion and safety issues, the program has expanded to encompass incident management and air quality and hence the federal government has provided CMAQ funds in this respect. Doug indicated that a lot has been done with CHART: emergency patrols and ITS devices to assist with traffic management and that quite a bit of money has been spent over last 10 years to assist in Maryland traffic and coordination with adjoining states. Now looking at how we can expand CHART to rural areas (Washington co, rapidly becoming a mini Frederick. He said that the State was working with Homeland Security, MEMA, etc. to deal with evacuation issues. There is no real guidance or strategic coordination for evacuation therefore stakeholder input is being sought (emergency planners, etc.) as well as traffic personnel to try to build a framework. Doug reminded that District 7 built a new TOC 7 due to the recognition of the need for such as facility. Similarly, in this planning process, there is a dollar limit to what can be done, hence the strategic planning efforts to prioritize resource deployment. The day's discussion, he said would focus on what is there today (ITS devices), strategies for future deployment (CHART) and getting ideas from the district

II. Project Background

In providing background information on the Project. Alvin Marquess (CHART Operations Manager) noted that about 2 years ago he helped to develop a policy to get things started. There was noted excitement at the time and need for technology in the area, such as a need for motorist warning systems for motorists in the mountainous region. He said that Marsh Smith and Chief Baker, persons with whom he has worked have pressed to get things going.

He was also surprised that MSP was absent from the meeting as last year CHART visited all the state barrack and got a wish lists of needs, e.g. workstations, more permanent DMS. Alvin reiterated the need to plan out strategies and also critique the agencies on what can be done differently. One issue was that of radio frequency and sharing the band to get emergency information out. Ron Frye indicated that he understood how MSP could be reluctant to share radio frequency with a volunteer FD. KC Keith expressed surprise that County emergency planners were absent as it would be useful for them to be at the meeting. There are a lot of issues re effectively evacuation people during emergencies. Ron expressed the possibility of getting people off at Orleans road as a staging area for emergency evacuations (off I-68) and then directing them from there to designated shelters, e.g. Allegany College and Frostburg State are potential shelters. Doug suggested that it might be wise to have a separate session with county planners to address some of the emergency evacuation communication issues. He was already aware of problems with incompatible systems that are purchased without inter-agency coordination

III. Project Overview and Scope/Schedule/Status

K.R. Marshall (Vice President of Edwards and Kelcey – Project Consultant Team) gave an overview of work done by the Steering Committee to-date. The focus of all the meetings held is to develop Rural ITS M&O Strategic Deployment Plan. The plan will accomplish the following:

- Determine what ITS resources/assets are currently deployed
- What ITS devices are under construction or are being planned
- Acquire input and ideas from the stakeholders
- Identify the gaps in the coverage area
- Develop a strategic plan that includes device funding and prioritization as first steps before the design and construction phases. The plan will also include procurement strategies.

The following are the highlights of K.R.'s overview:

1. He indicated that the Steering Committee is in the information gathering stage. Reports will be compiled and the ITS architecture will be reviewed and modified as needed to make the plan work. The final strategic plan will be ready in the April/May timeframe.
2. The plan will look at system architecture, i.e. the Maryland and CHART Architectures. All suggestions will be compared to the CHART architecture and changed if necessary.
3. Several documents have already been collected as a part of the effort. These include evacuation plans; FITM Plans, Statewide Incident Management Guide, etc. (the list of documents is available from the presentation slides)

4. Information has been collected and tabulated on the existing, planned and under construction ITS devices owned and controlled by CHART (see the presentation handouts)

IV. Open Discussion and Forum

The following is a synopsis of the open discussion segment of the meeting. Participants were encouraged to identify ITS needs in their areas as FHWA was looking to see how they can get funding started for rural ITS deployment projects:

SHA District 6 – KC indicated that county emergency planners are relatively new and hungry for information. They will not be telling the District what to do, but will know what information is there to help with their planning. Also, traffic volumes are growing everywhere. Motorist complaints have come in about back-ups around US-340. Whitewater recoveries cause problems also as there is no other crossing in the area. Regarding CHART workstations, Allegany and Garrett Counties should be getting theirs very soon. KC indicated that there is an interest to have access given to EMS personnel, police, etc, to see SHA's weather information. Additional resources might be needed in Garrett County to accommodate this. Alvin recommended that a request be made to Rick Dye for further investigation. Bob Fisher noted that he still makes the calls/decision for system closures due to inclement weather.

The following relates to existing or proposed devices/resources:

- KC indicated that there is a permanent device (HAR, DMS, RWIS) along I-68 WB at Exit 47 (Allegany county), prior to the HAR at Willowbrook Road (not on the list). Egua Igbinosun (CHART ITS Development Manager) emphasized the need to review the maps to see if there are missing items. CHART personnel were in the area over three years ago but things have changed since then.
- The Radio Tower CCTV located at the intersection of I-70 and MD-81 is listed as Washington Co., but should be Frederick Co.
- Need to verify if there is a DMS on I-70 EB just inside the Pennsylvania line
- Representation of I-68 should be shown as a double line so that the one-directional PDMS (WB) can be shown as being replaced with a double-faced sign in the median. Egua questioned if the alignment could accommodate this. Alvin said that there is a problem with the angularity of the double-faced PDMS.
- Regarding the HARs, KC suggested that the outside circle of the icon depict the coverage range for the HAR. He will provide additional critique later and also supply material to all three county planners (Jenny McGann)
- US-340 and Harpers Ferry might need a device (Doug suggested the installation of a queue detector; however one is installed already but it is not adequate)
- Alvin indicated that a Shazam was requested for I-68 EB

SHA District 7 – During snow events, PennDOT will close the roads without informing Maryland. This poses significant problems as there are no good truck diversion routes, even though there are several short run routes known to locals

The following relates to existing or proposed devices/resources:

- For the FITM for the I-81 area, PDMS needed on all legs of the interchange. Also, it might be useful to have a permanent DMS in the region to cut response time to incidents and the extent of the detours (DMS in the median). It would help also for routine maintenance as I-70 can get backed up during these events
- There is a concern on FITMS for notification to EB traffic approaching Frederick. The only option is to have SHA's Washington County put out PDMS west of US-40 to divert traffic out of the backup; Washington County might be waiting on the call before responding. Doug suggested that a PDMS would be a good solution to help deal with Frederick County. issues
- East of MD-65 place a bi-directional sign in median between MD-65 and US-40,

Allegany County Emergency Service – Ron noted that they are currently setting up plans for downstate evacuation and for the Pittsburg area. This helps with terrorism planning however things are moving away from that. Egua suggested that we also need to take into account the evacuation from other parts of the state that feed into this area. Weather radios and cameras help especially in Rocky Gap area. Additionally, sometimes when calls come in, responders have no idea where people are. This is a problem across the Cumberland Bridge (Haystack) in the westbound direction. Another problem is that the fire and EMS vehicles have to navigate the road with other vehicle there. Alvin suggested mounting arrow boards on vehicles for maximum visibility to other motorists. Another major issue/challenge is being able to divert traffic, e.g. when there is flooding up in Locust Grove. Regarding weather events, for weather information, the school board normally calls the EOC. Alvin suggested using the precipitation timing maps for information.

The following relates to existing or proposed devices/resources

- RWIS on MD-51 for when motorists are rerouted off I-68 (a lot of trucks are now using MD-51)
- AllCoNet (wireless network; Beth Thomas is the contact) could be a useful resource for linking to CHART. It's a county-wide system with about 8 towers running and will be made available to private citizens at an initial cost. High-speed internet service is currently provided through cable companies. Emergency Hazmat team is now an AllCoNet partner.
- 450 Mhz used by state EMS
- High band VHS
- State NMS is looking at 800Mhz

- (800 MHz, 400MHz and High band VHS in one spot was being investigated by the state; not viable right now)

General

- It's imperative to have a meeting with planners from counties (and possibly neighboring states) who did not show at today's meeting. The district depends on WV, PA, Washington County and Garrett County for resources during major incidents, i.e. fire, flooding, etc.
- Investigate the usefulness of quarterly ROCC-type meetings. CHART should meet with each county first before brining everyone together.
- PennDOT is becoming very active in incident management. As the SOC runs scenarios to help streamline response strategies, these planning sessions need to include PennDOT and WV in the planning process.
- The Parks service has consistently fought any expansion. Burkittsville does not want congestion in their small community and other options along MD-67 are not viable. In some of these areas, law enforcement is desperately needed (traffic enforcement). There is no support from the county on the CTP to get project funding there. No interest has been garnered from SHA planners in spite of the districts efforts to get them involved. The only option might to be rerouting motorists back to Frederick; is there a need to have Frederick county involved in future planning meeting. Alvin agreed that it would be useful since the districts share a border; however, he has gotten resistance when this was tried in other areas.
- EMS first priority is the safety of responders. Often the problem arises with private tow truck companies as sometimes the police do not have enough information to direct towers to the incident scene so the scene remains un-cleared for hours. Each city Fire, Police, etc works off a call list of tow truck companies (2 lists exist; for Cumberland and the rest of the county). The state does not respond to incidents to provide traffic control assistance unless there is a request from MSP.
- Approx 6-7 tower cams to come to the region. This will enable responders to review the scene before responding
- Proposed Device Locations (needs to be reviewed)
  - KC – I-68 and Cumberland
  - I-68 and I-70
  - I-70 Thursday, Friday and Sunday
  - I-70 Ex. 24 @ MD-63 – truck stop
  - Halfway and Wisel Blvd.
  - MD-51 @ rail Underpass

- US-40 corridor in Hagerstown
- US-220 corridor in Cresaptown (next ten years).
- WB ramp to, I-70 at MD-65 (ramp to short; geometric problem)
- MD-65 east presents a difficult merge

V. Conclusion

KC will coordinate the responses of the planners who could not attend the meeting. Their comments on the plan will be recorded in the presentation booklets and forwarded to Egua.

In ending the meeting, Doug asked Ron to continue looking into issues and provide feedback. He realizes that there are communication issues that need to be rectified and asked Ron to pass on the information to his counterparts so that they will be up to speed for future meetings.

Doug expressed thanks to those who attended and promised to be touch with feedback.

Attendance List

No.	Name	Title	Agency	County	Phone	E-mail
1	Neil Robinson	Vice President	Williams Associates Engineers (WAE)	Anne Arundel	410-729-1004	nrobinson@waengineers.com
2	Linda Z. Puffenbarger	Traffic Engineer	SHA District 6	Washington	301-491-2527	lzerbee@sha.state.md.us
3	Ivana Lucic	Transportation Engineer	Edwards and Kelcey	Baltimore	410-747-3420	ilucic@ekmail.com
4	Ray Johnson	ADE - Maintenance	SHA District 7	Frederck	301-624-8106	rjohnson@sha.state.md.us
5	Egua Igbinosun	ITS Development Manager	Maryland State Highway Administration, Office of CHART	Anne Arundel	410-787-5873	eigbinosun@sha.state.md.us
6	James Witherspoon	Staff Engineer	Maryland State Highway Administration, Office of CHART	Anne Arundel	410-787-7601	jwitherspoon@sha.state.md.us
7	Ron Frye	Deputy Director	Allegany County Emergency Service	Allegany	301-777-5908	rfrye@allconet.org
8	Pat Murawski	Assistant Operations Manager	Maryland State Highway Administration, Office of CHART	Anne Arundel	410-582-5615	pmurawski@sha.state.md.us
9	Bob Fisher	DE	SHA District 6	Garrett	301-729-8486	bfisher@sha.state.md.us
10	Alvin Marquess	Operations Manager	Maryland State Highway Administration, Office of CHART	Anne Arundel	410-582-5677	amarquess@sha.state.md.us
11	Doug Rose	Deputy Administrator	Maryland State Highway Administration	Baltimore	410-545-0360	drose@sha.state.md.us
12	K.C. Keith	District 6 Traffic Team Leader	SHA District 6	Garrett	301-729-8440	kkeith@sha.state.md.us
13	K.R. Marshall	Vice President	Edwards and Kelcey	Baltimore	410-747-3420	kmarshall@ekmail.com

Western Maryland Follow-up Meeting Notes

DATE AND TIME:	May 9, 2006, 9:00 AM
LOCATION:	SHA District 6 Office, La Vale
ORIGINATED BY:	Rural ITS and M&O Strategic Deployment Plan Steering Committee
RECORDED BY:	Neil Robinson (Williams & Associates – Subcontractor to Edwards & Kelcey, Project Consultant)
PARTICIPANTS:	(see attached list)
SUBJECT:	Rural ITS M&O Strategic Deployment Plan **[WESTERN MARYLAND FOLLOW-UP MTG]**

I. Welcome and Introductions

The meeting commenced at 9:00AM with welcome by Bob Fisher (District Engineer, SHA District 6). He emphasized the importance of the CHART Program and the need to have the incident and emergency management personnel in western Maryland communicating effectively with each other and sharing resources where possible.

II. Project Background

Alvin Marquess (CHART Operations Manager) commenced by having all the meeting participants introduce themselves. He indicated that the purpose of the meeting was to get feedback from local emergency and incident response officials regarding their resource needs. He gave an overview of the CHART Program noting that it started in 1989 and has since expanded to the Eastern Shore and western Maryland. Increasingly, CHART has deployed more and more devices (e.g. CCTV cameras, PDMS, etc.) across the State, supporting local districts, emergency managers and overall traffic management activities. He said that areas previously considered "rural" no longer fit that definition and so CHART is slowly building out its network of devices and telecommunication infrastructure to these areas. As such, March 2006 saw the opening of a new operations center in Frederick and the addition of more State highway patrols in the area. The region should provide CHART with feedback on the resources needed so that the information can be included in the next budget cycle. In addition to this, there has been more collaboration between CHART and District 6; in ongoing efforts to develop NIMS, Bob identified some vehicles that could be equipped with arrow boards. The arrow board request was approved the week ending May 6. The mounting of arrow boards will not be limited to SHA vehicles (work ongoing with the Halfway Fire Department). Alvin ended by informing the group of an upcoming emergency response training scheduled for June 21-22.

III. Project Overview and Scope/Schedule/Status

James Witherspoon (CHART on-site ITS consultant) began by informing the attendees that the meeting was a follow-up meeting from the one held on February 8 and by thanking

everyone for attending. He reiterated the need to get input from everyone and proceeded to give an overview of the Rural ITS M&O project. The following are highlights of his comments:

- ITS uses advanced technology to help manage and operate transportation systems.
- The Rural ITS M&O plan will give a broad picture of the ITS and emergency/incident management needs in the more rural parts of the State. ITS will provide a tool through which to develop and implement traffic management and incident response strategies.
- Regarding the project schedule and approach, the system inventory and needs assessment is currently underway. Following this, gaps in the system will be identified, ITS devices will be programmed to fill these gaps and the resulting proposed system build-out will be represented in the Maryland ITS Architecture. Ultimately, the *Rural ITS M&O Strategic Deployment Plan* will be developed.
- Most of the CHART devices have been compiled and so the push is now to get information on the existing local devices. CHART can manage the State roadways; however, managing the roadway system requires information on devices on local roads.
- The meeting package includes information on the status of CHART devices as well as information from the first western MD meeting.
- The list of devices compiled thus far is fairly accurate. However, stakeholders should point out any glaring errors. To this end, Anthony Crawford (ADE – Maintenance, SHA District (6) indicated that two (2) of the PDMS shown for westbound traffic had been relocated. It was also pointed out that there is more than one (1) HAR. James noted that there are discrepancies with some of the devices as there was a conflict regarding whether or not to include Frederick as one of the rural areas.

In ensuing discussions, Alvin mentioned that CHART had a lot of success with the installation of CCTV cameras on communications towers. This is a very inexpensive venture that works out well when there is limited funding. The sites already have power and some form of communications that minimizes the cost to get them operational. Tower CCTV cameras provide good quality streaming video (15 frames per second) and wide coverage, depending on the topography. The minor problems that have been encountered are currently being addressed. Alvin also indicated that pole-mounted CCTV cameras are being installed on I-81 and I-70 and CHART needs to know where others are needed. He noted that CHART has partnered with Prince George's and Montgomery Counties in the installation of CCTV cameras and on the coordination of incidents. It is a resource-sharing venture in which some jurisdictions have the funds to install devices but not to integrate them with the SOC. This is where CHART provides partnering support.

Responding to Bob's inquiry about plans to expand CCTV cameras into Washington and Allegany Counties, Alvin indicated that there were plans to do that and these would be discussed later in the meeting. Bob also inquired about the function of side-firing detectors. Alvin explained that the side-firing speed detector is a new technology being used by CHART. The detectors are spaced at 1/10-mile and form the backbone of CHART's speed

detection system. They have been successful in providing speed information on the Eastern Shore and have also had application in simulation modeling. They are used by the University of Maryland in real-time simulations to get travel times, speed and other data. Data from side-firing detectors enable CHART to determine information on route delays and implement measures to maximize vehicle throughput on these routes. Often, the strategies employed are based on the results from previous simulation models. Based on Alvin's explanation, Bob expressed a desire to have side-firing detectors in District 6.

IV. Open Discussion and Forum

The following is a synopsis of the open discussion segment of the meeting. Participants were encouraged to identify ITS needs in their areas. There were some previous discussions that touched on concerns and needs of different agencies. Those discussions are also summarized below.

Garrett County Emergency Management – Brad Frantz (Director) indicated that clear guidelines are needed for when incidents are turned over to SHA. Alvin and Anthony said that a protocol currently exists. However, Joe Kroboth, III (Deputy Director Washington County Public Works) noted that he knows of cases where fire chiefs were arrested because of unclear procedures. He agreed that there are county-level protocols but said that they were not endorsed by the police. James said that similar concerns were expressed in the Eastern Shore and Southern Maryland meetings and that SHA has been asked to facilitate better coordination among responders. Brad concurred with George Small (ADE – Traffic, SHA District 6) that no incident management conference has been held in Washington County for a long time. He said that such conferences need to occur all over the State on a regular basis so that enough people are regularly informed on procedures. Alvin commented that conferences happen all the time; however he cautioned that a delicate balance needs to be attained when implementing explicit rules or procedures. Statewide, there might be departments with similar functions but they oftentimes have different perspectives on emergency/incident management and response. He stressed that relationships have to be built among responding agencies (to avoid overkill in responding to minor incidents).

With respect to Garrett County's resources, Brad indicated that they primarily operate on VHF high-band; however, some low-band exists. Recently added assets include a mobile telecommunications center with paging, State and local police communications. Alvin inquired if the system had AC-1000 capability, but this function is not operational and is currently being worked on. Brad noted that the county emergency management does not envision a need for 700 MHz and 800 MHz radios.

Marja Smith (Officer, Eastern Garrett Fire and Rescue Department) added that a high-visibility DMS was needed on westbound I-68 prior to MD-36 and eastbound I-68 prior to mile marker 24. Due to frequent, dense fog in the area, the current signs are not very effective and place fire fighters' safety in jeopardy. Some measure is needed to rapidly delay traffic and make it safe for responders to operate. Another dense fog and high accident location is I-68 in Big Savage (from mile marker 29 to 31). Traffic can back up for 24 hours. Brad noted that the Garrett County Hazard Mitigation Plan also validated the Big Savage roadway segment as a high accident segment. John DeVault (City of Cumberland) raised the

idea of the construction of PDMS permanent pad along the old national highway to provide detour routing information (similar to Pennsylvania's *Blue Routes*). Brad agreed to the idea stating that if mainline I-68 traffic can be delayed or rerouted during an accident, the accident might be cleared between ½ and 1-hour.

Washington County Public Works – Joe Kroboth, III (Deputy Director) said that he would compile a memo with all the initiatives they have in place and forward to James with a copy to SHA. Beyond the ITS and communications infrastructure, he wants to revisit the system and observe congestion corridors (within the next week) before making an assessment of the needs. Alvin indicated that the needs do not have to be high-tech and could include mile-marker placement and training. On the question of civil air patrols, Joe mentioned that they were used when the Savage River Dam was broken; images were sent back to MEMA. Alvin noted that there is also coordination with the MSP aerial division. In addition, an *interoperability team* exists that coordinates incident responses. The result of the team's meetings was *Teststack* that utilizes AC-1000. Five (5) Teststack systems are currently being implemented: the first ones will be at the 911 Center and MD-63 @ I-70, providing coverage for I-81 at Clearspring to MD-66 @ I-70. Ideally, the goal is to upgrade to a 700 MHz radio system. A grant is being worked on to fund the deployment of Teststack in three (3) western Maryland counties. Also, there is a DHS grant program for a quad-state initiative that ties digital microwave of National Incident Management System (NIMS) to that of other jurisdictions, e.g. Pennsylvania.

The following is a summary of from earlier discussions:

- Joe inquired about the possibility of the EOCs gaining access to CHART CCTV camera images. Alvin indicated that it was possible to do that as it had been done for other locations. The system is also browser friendly.
- The existing 911 Center is being relocated and the new location will have fiberoptic and microwave communications. They need CHART to assist in setting up the new center. Alvin indicated that assistance in setting up the center might be a NIMS issue. CHART would address the video compression and decompression (cameras require bandwidth of about 384 Kb/s). However, Alvin indicated that if the 911 Center microwave system "touches" the State's microwave backbone, it might be possible to work out an assistance agreement.
- The planned Lambs Knoll tower could be a good location for a tower CCTV camera. Craig Fetzer had one planned (coverage could include MD-340 over Potomac River to US-340 @ MD-67).
- Information is needed on factors considered by CHART in determining device locations, i.e. are proposed locations based on existing infrastructure or on areas where incidents might occur. James indicated that such decisions are based on factors such as existing infrastructure and communications availability. Alvin added that recent CCTV camera installations were based on the need to spend funds within a certain time. The Rural ITS M&O planning effort seeks to streamline the device deployment planning process.

- There is a consistent operational and coordination problem between local police and fire departments, particularly when it comes to lane closures versus roadway closures. There is a need for a Statewide protocol on how to activate ITS assets. Joe's understanding was that the responsibility rested with the MSP but that is not necessarily true.
- There was a question of who to contact to get an ITS device at a dangerous location. Joe indicated that he was informed that a radio system was in place at that location.

City of Cumberland – John De Vault (Engineering Specialist) indicated that the Street Department would benefit from having additional RWIS as this would get more information to them during inclement weather. In addition, there is an upcoming closure of Maryland Avenue of I-68 and he is coordinating with K.C. Keith (Traffic Team Leader, SHA District 6) to post that information – and information on other local closures – on the CHART website. He also emphasized the need for SHA to promote public awareness and use of the website to which KC suggested the possibility of CHART doing public service announcements. James noted that it was under consideration. Alvin indicated that a permitting system currently in place and even though it was developed for SHA's use, it could be expanded to local jurisdictions. John noted that there might be more towers in the area (for CCTV camera installation) due to the existence of the ALCONET wireless system. He is also looking to upgrade the traffic signal on Maryland Avenue with detection cameras and suggested that CHART investigate their usefulness to its program. KC also added that an RWIS is needed on Haystack Mountain on the east side of Cumberland (development is expanding in that area) and a CCTV camera is planned for Maryland Avenue at I-68. He indicated that John could provide CCTV camera placement options that provide coverage for the cross-town bridge and Willowbrook Road. John mentioned that the City of Cumberland might be able to secure funding through local grants therefore he would need specifications (device type and cost) for RWIS devices. Alvin said that CHART welcomes any funding assistance and would be responsible for the integration aspect of the device deployment. Bob requested RWIS specifications from James.

Allegany County Emergency Services – Dave Powell (Emergency Services Planner) raised the issue of the evacuation of a metropolitan area with an exodus of persons moving westward. He indicated that I-70 and I-68 are obvious routes however; MD-51 might be a viable alternative route. KC suggested the deployment of PDMS in the vicinity of the Old Town salt dome. Brad also raised a similar issue relating to MD-50 and for routes in neighboring states that do not run in Maryland. KC reminded the group that the purpose of the meeting was to address these kinds of issues. Neighboring states had also been asked for their input.

On the issue of host sheltering and resource needs, Dave outlined some of the activities and concerns of his department:

- MEMA informed counties in March 2004 to prepare to host thousands in the event of major incidents (WMD, terrorist attack, etc.). The Red Cross indicated that they could not handle sheltering of that magnitude so the onus would need to be on the local government to provide shelters.

- Frostburg University and the Board of Education, recruited and trained personnel; 15 shelters have been identified for 5,000 people in Allegany County.
- Dave has attended MEMA workshops in which evacuations were discussed but nothing on sheltering was addressed. Allegany County pressed issue with MEMA indicating that resources are needed to equip shelters. State help was also needed.
- On May 8, MEMA indicated that FEMA was convinced of county needs and committed two (2) containers with 1,000 cots for shelters.
- There have been numerous traffic operations planning sessions with between the County and SHA District 6 (George and KC). These have resulted in suggestions such as blocking the Orleans Road exit to prevent contaminants from entering the City. Dave needs to know what ITS device could be used to monitor traffic in that area.
- Bob noted that it would be useful to have a CCTV camera at the location where evacuating vehicles are queued. Dave indicated that he would check with DNR to see what resources they have in place (e.g. vacant area for staging vehicles; vehicle impound area; power supply; etc.). He is aware that resources such as sanitary facilities, tow vehicles and portable power supplies are currently being planned for.
- Alvin noted that there might be strategic locations for DMS placement for emergency evacuation as well as for people sitting in backups. HARS and Shazams should be in place to inform these motorists of evacuation services. KC mentioned that the area is remote but there will be a need for the ITS resources there in the event of evacuations. Alvin suggested that the projects be placed on the books so that it's there when funding is available. Dave was asked to record specific locations where devices are needed and then he along with Bob and KC would conduct a site inventory, develop a sketch and forward the information to James.
- KC again encouraged everyone to raise their issues because the session was geared at developing a wish list of needs. Things need to be asked for now even though they might be programmed for future years. US-40 scenic will be a secondary route.

SHA District 6 – The following are highlights of the comments and issues for District 6:

- George Small identified a tower in Allegany County that could be possible for the installation of a tower CCTV camera. Alvin indicated that it should be viable once that tower's system "touches" the State's microwave backbone.
- KC highlighted the recurring problem of relocating the PDMS pads that were placed close to the West Virginia line. Before the proliferation of wireless technology, and due to the difficulty of installing communications utilities, the pads were placed to warn truckers during the winter time. HARs are needed at the Friendsville area welcome center.
- There is re-occurring congestion and backups along US-340 between MD-67 and the Virginia state line. Autoscope currently monitors the bridge over the Potomac River.
- Allegany and Garret Counties have worked out a system for addressing incidents. Initial incident verification is needed and MSP was relied on for this because there

was direct communications with MSP. Now, for Allegany and Garret Counties, when Fire and Rescue arrives, verification based on initial an assessment of the incident is sufficient. MSP and the Sherriff sometimes take long to arrive. Alvin indicated that the SOC just needs to know what's happening and what's involved in order to activate the required ITS resource. Things can also go the other way, i.e. if the SOC has visual verification of incidents then they can inform local responders of the situation at the incident scene.

- David Ramsey (Regional Administrator, Maryland Institute of Emergency Medical Services Systems (MIEMSS)) indicated that communication problems often come between emergency/incident responders when there is a change in command, hence that's why there needs to be a Statewide protocol. John Latimer (Director, Washington County Division of Fire and Emergency Services) concurred and noted that there is a disconnect regarding who is responsible (fire chief or police) and on what roadways.
- It is important for the Fire Department to understand how the incidents all tie in to ITS as they need to know what resources are available so that they can make the appropriate calls.
- Bob noted that the Western Maryland Traffic Incident Management Conference, held in Finzel in October 2005, presented a good incident response model that might be applicable for Washington County as they appear to have several issues. It could then be applied to Allegany County. CHART is funded based on the legislature, and in particular, local legislative support (that's how the Frederick TOC7 was established). If funding can be garnered, similar training efforts can be realized.
- The strategy for getting local legislatures involved started with an awareness that there were devices that were not being used and so this was discussed with SHA and brought back to the legislature. Funding soon followed. James indicated that a similar approach might be applicable in other counties.
- Bob noted that western Maryland tends to be overlooked because the area is not in the limelight. The region has the same issues as metropolitan areas, just at a different scale. Since State statutes require reporting on incidents, working efficiently reflects well on the region and the State, and leads to possibility of funding.
- Bob's experience is that the main source of on-scene problems is the lack of communications among incident responders. More coordination is needed with the incident manager.
- Anthony recommended that counties revisit the information in the meeting handouts, develop their wish lists and forward the information (along with justifications for devices) to James. He will be tabulate the information and return to the counties for their reviews.

V. Conclusion

In ending the meeting, James asked that everyone send additional information by 5/16 and by 5/22 compiled meeting notes will be distributed to everyone. The next step is placing the entire device and communications infrastructure requests into the Maryland ITS Architecture, then incorporate some strategies into business plan so it remains visible to decision makers.

Western MD Attendance List

NO.	NAME	TITLE	AGENCY	COUNTY	PHONE	E-MAIL
1	Alvin Marquess	Operations Manager	Maryland State Highway Administration, Office of CHART	Anne Arundel	410-582-5677	amarquess@sha.state.md.us
2	David Ramsey	MIEMSS - Regional Adm.	MIEMSS	Allegany/Garrett	301-895-5934	dramsey@miemss.org
3	Virginia McGann Smith	Planner	Garrett County Emergency Management	Garrett	301-707-1173	ginny_mcgann@atlanticbb.net
4	Brad Frantz	Director	Garrett County Emergency Management	Garrett	301-334-7619	gcem@garrettcounty.org
5	Dave Powell	Emergency Services Planner	Allegany County Emergency Services	Allegany	301-777-5908	davepowell@allconet.org
6	Anthony Crawford	Assistant District Engineer - Maintenance	SHA District 6	Garrett	301-729-8400	acrawford@sha.state.md.us
7	John Di Fonzo	City Engineer	City of Cumberland	Allegany	301-759-6601	jdifonzo@allconet.org
8	John De Vault	Engineering Specialist	City of Cumberland	Allegany	301-759-6603	jdevault@allconet.org
9	George Small	Assistant District Engineer - Traffic	SHA District 6	Garrett/Allegany/Washington	301-729-8440	gsmall@sha.state.md.us
10	Joe Kroboth III	Deputy Director, Public Works	Washington County Public Works	Washington	240-313-2253	jkroboth@washco-md.net
11	John Latimer	Director, Division of Fire and Emergency Services	Washington County DFES	Washington	240-313-2903	jlatimer@washco-md.net
12	Pat Murawski	Assistant Operations Manager	Maryland State Highway Administration, Office of CHART	Anne Arundel	410-582-5615	pmurawski@sha.state.md.us
13	Neil Robinson	Vice President	Williams Associates Engineers (WAE)	Anne Arundel	410-729-1004	nrobinson@waengineers.com
14	Ivana Lucic	Transportation Engineer	Edwards and Kelcey	Baltimore	410-747-3420	ilucic@ekmail.com
15	K.C. Keith	District 6 Traffic Team Leader	SHA District 6	Garrett	301-729-8440	kkeith@sha.state.md.us
16	Bob Fisher	DE	SHA District 6	Garrett	301-729-8486	bfisher@sha.state.md.us
17	Marja G. Smith	Officer Eastern Garrett VFRD		Garrett	301-707-5295	masmith@ipcinternational.com
18	James Witherspoon	Staff Engineer	Maryland State Highway Administration, Office of CHART	Anne Arundel	410-787-7601	jwitherspoon@sha.state.md.us

Southern Maryland Meeting Notes

DATE AND TIME:	February 10, 2006, 9:00 AM
LOCATION:	SHA Maintenance Shop in La Plata, MD
ORIGINATED BY:	Rural ITS and M&O Strategic Deployment Plan Steering Committee
RECORDED BY:	Neil Robinson (Williams Associates-Engineers – Subcontractor to Edwards & Kelcey, Project Consultant)
PARTICIPANTS:	(see attached list)
SUBJECT:	Rural ITS M&O Strategic Deployment Plan **[SOUTHERN MARYLAND]**

I. Welcome and Introductions (EK)

The meeting commenced with the Welcome being given by Greg Welker, District Engineer for SHA District 5. He noted that it was important for the State to continually investigate what can be done to handle emergency management, traffic management and other related issues better. He also reminded the group that the US-301 FITM plan that was developed a number of years ago was a part of an emergency management planning effort. Personnel introductions followed.

Mike Zezeski (Director: SHA's Office of CHART and ITS Development) provided an overview of what was to be accomplished for the day and a synopsis of the CHART Program. He indicated that CHART started in the mid 1980s as a "reach the beach program" and its success has since caused it to expand to a Statewide program. He said that the program initially took on a strong emphasis in metropolitan areas of Baltimore, Washington, D.C. and Annapolis with a focus on the deployment of DMS and CCTV. CHART, he said, is primarily about incident management and weather events and hence encapsulates three aspects that are characteristic of a strong emergency management program:

a. Institutional Relationships (application of the 4-Cs: cooperation, coordination, communication and consensus) that help stakeholders to understand and define roles and responsibilities.

b. Actual Operations: pre-emergency plans for diversion.

c. Tools; technology to be implemented.

The day's focus, he said, would be on where best to employ resources given the limited funding. It is understood that there is a lot for SHA/CHART to do in southern Maryland to improve the way the State responds to emergencies. Mike introduced K.R. Marshall (Vice President of Edwards and Kelcey – Project Consultant Team) as the one to lead the day's discussions, noting that CHART has a strategic plan for ITS device deployment so the meeting would help determine how southern Maryland's needs can be met by and/or incorporated in the strategic plan. He also introduced Alvin Marquess (CHART Operations Manager) to provide background on the project.

II. Project Background

Alvin indicated that the timing of the meeting was good because he had met recently with Calvert County regarding their evacuation plans and he was getting ready to meet with St. Mary's County on the same issue. Charles County has already had some work done. He said that there is a need for the deployment of ITS devices that will support evacuation routing through certain areas, e.g. Nice Bridge (which is also a part of WW Bridge diversion routing plan). The challenge is how to accomplish all this (incident management goals) with device placement. He emphasized the importance of receiving feedback from the stakeholders as they know what the needs are. There are ongoing discussion with FHWA to secure funding for ITS in the rural areas; CMAQ funding may not apply to rural deployment but the needs will be documented to forward to FHWA anyway.

Alvin noted that CHART is trying to create an inventory of the resources that the southern personnel have. If resources exist, CHART would be willing to share resources to keep down the deployment cost. Currently, Rick Dye (CHART Integration) is completing software to make workstations require less bandwidth. The field guide is still in draft form.

III. Project Overview and Scope/Schedule/Status

K.R. gave an overview of work done by the Steering Committee to-date. He said that Anne Arundel County is included in the meeting, but is not considered a part of southern Maryland. The focus of all the meetings held is to develop Rural ITS M&O Strategic Deployment Plan. The plan will accomplish the following:

- Determine what ITS resources/assets are currently deployed.
- What ITS devices are under construction or are being planned.
- Acquire input and ideas from the stakeholders.
- Identify the gaps in the coverage area.
- Develop a strategic plan that includes device funding and prioritization as first steps before the design and construction phases.

The following are the highlights of K.R.'s overview:

5. He indicated that the Steering Committee had just started its analysis before Christmas and that notes taken were being recorded to capture all stakeholder comments; however, there will be other opportunities for comments before the plan is finalized.
6. The plan will look at system architecture, i.e. the Maryland and CHART Architectures. All suggestions will be compared to the CHART architecture and changed if necessary.
7. Several documents have already been collected as a part of the effort. These include evacuation plans; FITM Plans, Statewide Incident Management Guide, etc. (the list of documents is available from the presentation slides).

8. Information has been collected and tabulated on the existing, planned and under construction ITS devices owed and controlled by CHART (see the presentation handouts).
9. ITS is the application of technology to assist in traffic management.
10. There are a lot of devices in the north, but not much in the south. The meeting is to facilitate stakeholder input so that there can be the requisite justification for increased ITS device deployment in the rural areas of the State.

IV. Open Discussion and Forum

The following is a summary of the open discussion that ensued.

Calvert County – Tommy Swann noted that in the discussion of incidents we are talking about two different things: major evacuation and day-to-day operations. Daily issues are critical. He sees the need for an RWIS in north end of county (at the Anne Arundel County line) as well as for a communications and control Center. He has been trying to get for years to accomplish this. Wireless phones don't work well in the area so land lines are the only viable option. It was suggested that he coordinate with the Calvert County Emergency Management Director Bobby Fenwick to get 800 MHz radios. The whole county is on the 800 MHz radios so there is a lot of information to be shared. The issue would be communications to Tommy's desk as he is still on a low ban frequency. Tommy needs to discuss this with Robert Brady of the Calvert County EOC (the EOC has the ability to provide portable radios) and with Timothy Bennett who was supplied with eight (8) 800 MHz radios.

Bobby Jones noted that MD-4 is a main route and handling incidents along it can be tricky as there are no side roads to divert traffic onto. One priority is to get information to public quickly. Also, on the Thomas Johnson Bridge there is the need to get information to motorists early enough. The deployment of CCTVs would be a good strategy to see incidents Recommended placing a CCTV camera on the Glasva Tower on US-301 in Charles County. Bobby deferred to Lt. Homer Rich for more information as well as for diversions, noting that back roads not able to accommodate traffic. For incidents requiring evacuation, coordination between the regions was suggested so that workable strategies can be developed before decisions are made regarding where to send evacuees. Lt. Rich also noted that for serious incident with the power plant, MD- 4 is considered a ZONE 1 and he was concerned that what happened with Katrina could happen with Calvert County.

Calvert County is in the process of having a wireless network as a joint effort between the County government and the School District. This network should be on-line within the next two (2) months. They are also investigating CapWIN, but there are not a lot of users. It would be great if Charles and St. Marys Counties are using it.

St. Mary's County – With respect to the base, it was noted that regardless of the incident, Calvert would dump evacuees into St. Mary over the bridge. The current evacuation plans do not shown hot to address this situation. Some other areas of concern are MD-4 @ MD-

235 and MD-235 in Mechanicsville. ITS devices are needed to monitor these areas. Also, going north on MD-235, consideration should be given to having reversible lanes for evacuation. This configuration would be applicable for hurricane evacuations as well.

Charles County – Randy Stephens of MSP said that all his issues had been addressed; however, he expressed concern for evacuations from the Washington, DC area. He noted that once out of DC, evacuees did not have adequate guidance to particular routes or destinations, e.g. to the Nice Bridge, MD-210, Calvert County, etc. On the issue radio communications, he said that all police have a low band and 800 MHz portables that work well. The only issues exist with simulcasting. Regarding FITM plans, in practice, there has been a big diversion from FITM in that troopers have not been sent to side roads to help with traffic control. He emphasized that FITM plans work well to get motorists off US-301 but it needs to be expanded to detail the roles and responsibilities beyond that. Greg Welker noted that past FITM drills have worked well to spread resources during FITM plan implementation, however, Randy responded that drills are good theoretical exercises when enough personnel exists. The whole plan can fall apart if there are limited personnel on the scene to assist. He said that they have 17 mobile data computers and would soon be getting CapWIN. About 4-5 persons currently have it; it's a a good, simple system that works well for their needs.

Charles County Emergency Services – Jennifer Adams noted that US-301 is the major route through the county; however, they have no resources to provide advanced warning to motorists before they enter a construction area. They do not have access to portable signs so that will be on their wish list of items for the strategic plan. She suggested a PDMS before Smallwood Drive to divert persons to MD-227. Alvin also informed her that CHART WEB information is being integrated with the EOC. Chris Becker also noted that there was a need for message signs for people leaving Washington, DC and entering Prince George's County (close to the bridge and then up in Waldorf).

General

- Mike Zezeski had hoped to have Rick Dye (CHART integration) attend but he could not make it. He said that there are a lot of TOCs and 911 Centers but not very many in southern Maryland. He implored the group to think carefully about their needs as he hoped to have workstations set up soon.
- On the question of how the strategic plan ties in with ROCC, Alvin indicated that the tie-in is going well as he has been working with the local government. The process will be modeled after what happened on the Eastern Shore where each county was met with initially and then their concerns documented in a plan. Chris Becker wants them to be tied together so that information is not missed as a result of several different groups meeting. K.R. noted that some of the region's needs are already being addressed hence a southern ROCC might be formed from these meetings.
- The EOC gets most of the information and they need to issue information on the incident; the EOC personnel need to be able to disseminate information to responders. The SHA shop has to provide resources at the scene. SHA shop and PEOC personnel need to discuss protocols and procedures to get the most out of resources that are available. Additionally, Alvin indicated that the CHART workstation would be made available to

the EOC. Mike explained that for the workstation, software will allow the CHART-LITE program to be loaded on to an existing workstation. It will also enable the 911 center, EOC, SOC to be tied together to share information in the future. The only facility that SHA owns is the SOC; collocation occurs in the statewide jurisdictions. The concept is to have CHART workstation in an already existing facility. The push would be to have CHART personnel local to build relationships and provide better support, e.g. with roving patrols. Resources can be dedicated to do this to ease burden on MSP. It has been very effective where practiced. Greg W said that worked well in St. Mary's County.

- Alvin indicated that RITIS is a new system that does not require the integration of separate system. Each system provides RITIS with the information that is needed and users in turn access what they need from RITIS. RITIS can take information from different sources compile and send out customized information. Currently, there is a regional system for sharing voice communication that is trying to integrate WEBEOC and RITIS.
- Greg Welker indicated that a lot of the traffic signals can be remotely controlled. Vital decision points for diversion routes, and good candidates for permanent DMS are: US-301 @ MD-4; MD-5@ MD-231; MD-231@ MD-4. At the Patuxent Naval Air Station, several gates exist and there is a constant change in gate usage that affects traffic patterns; a CCTV with DMS can help to reach motorists in this area especially during construction. The Naval station was looking into installing DMS to help with gate assignments but project died due to lack of funding.
- Greg said that cooperation among the southern Maryland counties is uniquely good as opposed to Eastern Shore. There are a number of places suited for evacuation planning that need ITS devices (permanent installation) to reduce response time evacuation planning: LPG Terminal, Calvert Cliffs, PAX Base. The existing MOU in St Mary's County is a good basis for the other counties. In the long-term, coordination is needed with VDOT as Maryland needs to know backups on the Virginia side and what's happening in terms of their operations.
- With respect to Hurricane Katrina lessons, evacuation, etc, there is a new effort on the Western Shore; Joe Gab of the USACE will release mapping soon that will fit into the evacuation planning; meeting coming up soon; will get information to those interested.
- Mohamed Ali expressed concern for snow operations. Alvin indicated that EORS handles that, but that there may be a need for an operations center down here with all the agencies, MSP, EOC, SHA, etc to address incidents. A similar effort was done in Frederick County.
- There already are EOCs in each district so we have to be careful not to create duplicates of what exists. Alvin explained that CHART is not an EOC but they support requests and deploy resources needed.
- Greg W. stated that the Tri-County Council discusses growth issues, traffic modeling but not incident management. The Tri-County Council may be a good forum to host a ROC working group.

In concluding, James Witherspoon summarized the day's proceedings as follows:

- Possibility exists for a TOC in the area.
- Need to identify Places where CHART LITE can be installed.
- There might be a need for a Southern Maryland ROCC (similar suggestion obtained for East and western MD).
- Need to identify the locations of requested ITS devices.
- Integration of 911 centers, MSP and CHART data, possibly thorough RITIS.
- Identify potential reversible route on MD-235.
- EOCs operate independently, but there is coordination between the managers monthly (as a Homeland Security group); suggestion to have a day dedicated for all these meetings.
- Information from the meeting is to be compiled into Technical Memorandum #1 and forwarded to stakeholders; Gaps will then be identified and then the plan will be finalized.

V. Conclusion

Mike Zezeski adjourned the meeting with K.R. suggesting that persons send email for clarification of any issues.

Attendance List

No.	Name	Title	Agency	County	Phone	E-mail
1	Pat Murawski	Assistant Operations Manager	Maryland State Highway Administration, Office of CHART	Anne Arundel	410-582-5615	pmurawski@sha.state.md.us
2	Alvin Marquess	Operations Manager	Maryland State Highway Administration, Office of CHART	Anne Arundel	410-582-5677	amarquess@sha.state.md.us
3	Bobby Jones	Lieutenant/Patrol Commander	Calvert County Sheriffs Office	Calvert	410-535-1600 x 2458	jonesbr@co.cal.md.us
4	Tommy Swann	Program Manager II (RME)	SHA/Calvert County	Calvert	410-535-1748	rswann@sha.state.md.us
5	K.R. Marshall	Vice President	Edwards and Kelcey	Baltimore	410-747-3420	kmarshall@ekmail.com
6	Greg Welker	District 5 Engineer	Maryland State Highway Administration, District 5		410-841-1001	gwelker@sha.state.md.us
7	Mike Zezeski	Director	Maryland State Highway Administration, Office of CHART	Anne Arundel	410-582-5605	mzezeski@sha.state.md.us
8	Jennifer Adams	Emergency Services Specialist	Charles County Emergency Services	Charles	301-609-3401	adamsjen@charlescounty.org
9	Homer R. Rich	Lieutenant/BK. Commander	Maryland State Police - BK "U"	Calvert	410-535-1400	hrich@mdsp.org
10	Randy Stephens	BK Commander	Maryland State Police - BK "H"	Charles	301-392-1234	rstephens@mdsp.org
11	Bobby Fenwick	Emergency Management Director	Calvert County Government	Calvert	410-535-1600 x 2301	fenwickjr@co.cal.md.us
12	Chris Becker	Charles County Sheriffs Office	Comm. Homeland Security Intel.	Charles	301-609-3914	beckerc@ccso.us
13	Timothy Bennett	Division Manager	St. Mary's County Emergency Management	St. Mary's	301-475-4200 x 2114	timothy.bennett@co.saint-marys.md.us
14	Greg Phillips	SHA District 5 Southern Team Manager	Maryland State Highway Administration, District 5	Anne Arundel	410-841-1027	gphillips@sha.state.md.us
15	Mohamed Ali	Transportation Engineer	Maryland State Highway Administration, District 5 (EK staff)	Anne Arundel	410-841-1026	mali@sha.state.md.us
16	Ivana Lucic	Transportation Engineer	Edwards and Kelcey	Baltimore	410-747-3420	ilucic@ekmail.com
17	Neil Robinson	Vice President	Williams Associates Engineers (WAE)	Anne Arundel	410-729-1004	nrobinson@waengineers.com
18	James Witherspoon	Staff Engineer	Maryland State Highway Administration, Office of CHART	Anne Arundel	410-787-7601	jwitherspoon@sha.state.md.us
19	Ian Preuss	Emergency Planner	Calvert County Emergency Management	Calvert	410-535-1600 x 2537	preussim@co.cal.md.us
20	Egua Igbinosun	ITS Development Manager	Maryland State Highway Administration, Office of CHART	Anne Arundel	410-787-5873	eigbinosun@sha.state.md.us

A-4 LIST OF RELEVANT DOCUMENTS

- SHA's Hurricane Evacuation Traffic Control Plan, Ocean City, Maryland, 2004
- Eastern Shore Hurricane Evacuation Traffic Management, Draft Summary of Meetings with All Jurisdictions in August-September 2005
- Maryland Statewide Incident Management Coordination, A Field Guide, 2005
- Freeway Incident Management (FITM) Plans along Interstate Route 70 in Washington County
- Freeway Incident Management (FITM) Plans along Interstate Route 81 in Washington County
- Freeway Incident Management (FITM) Plans along US Route 301 in Charles County
- SHA Annual Report, FY 2005, Business Plan Performance Results and Other Top Accomplishments
- Maryland Eastern Shore Hurricane Evacuation Traffic Management Plan – Interim Report, July 12, 2006
- Southern MD Emergency Evacuation Traffic Management Plan, Draft Phase
- CHART Non-Constrained Deployment Plan (NCDP), April 2005

A-5 MARYLAND ITS ARCHITECTURE RELEVANT TABLES

User services for the basis of the ITS Architecture and number of functions are required to accomplish each user service. Table A-5.1 summarizes the rural User Services used to identify which architectural data flows must be revised to reflect the current stakeholders' needs. In addition, an Operational Concept for the Statewide ITS Architecture captures each stakeholder's current and future roles and responsibilities, which is presented in Table A-5.2.

Table A-5.1 Stakeholders Needs and User Services

No.	Stakeholder	Need	User Service	Proposed Solution
1	Dorchester County Emergency Mgmt	Access to CHART Data	4-Incident Management 5-Emergency Veh Management 8-Maintenance and Construct Ops	CHART Workstation
2	Dorchester County Emergency Mgmt	Roadway-monitoring during evacuations	7-Disaster Response and Evac	CCTV Cameras
3	Dorchester County Emergency Mgmt	Enhanced traveler information	1-En-route Driver Information	DMS
4	Cecil County Dept of Emergency Services	Resources to supplement emergency evacuation	7-Disaster Response and Evac	CHART Workstation
5	Worcester Co Dept of Emergency Services	Access to CHART video images	8-Maintenance and Construct Ops 3-Traffic Control	CHART Workstation
6	Maryland State Police	Resources to better support evacuation plans	7-Disaster Response and Evac	DMS
7	Maryland State Police	Enhanced roadway monitoring	8-Maintenance and Construct Ops 3-Traffic Control	CHART Workstation
8	Wicomico Co Emergency Management	Better integration with CHART ITS devices	5-Emergency Vehicle Mgmt	Cellular communications with DMS
9	Wicomico Co Emergency Management	Roadway-monitoring capabilities	8-Maintenance and Construct Ops 3-Traffic Control	CCTV Cameras
10	Wicomico Co Emergency Management	Support emergency and incident management	4-Incident Management 5-Emergency Veh Management 8-Maintenance and Construct Ops	CHART Workstation
11	Caroline Co Emergency Management	Roadway Monitoring at MD-DE border	8-Maintenance and Construct Ops 3-Traffic Control	CCTV Cameras
12	SHA District 1	Turning problem at MD-9 and MD-589	8-Maintenance and Construct Ops	Relocate DMS
13	SHA District 1	Improve support for evacuation plans	8-Maintenance and Construct Ops 7-Disaster Response and Evac	DMS
14	SHA District 2	Weather information	1-En-route Driver Information 3-Traffic Control	Relocate planned RWIS for MD-291 @ US 301
15	SHA District 2	Communicate with drivers on US 301	1-En-route Driver Information	Relocate existing *Shazam* on US 301 near MD-290
16	SHA District 2	Support emergency and incident management	4-Incident Management 5-Emergency Veh Management 8-Maintenance and Construct Ops	CHART Workstation
17	Somerset County	Communicate with drivers on MD-413, MD-363, and MD-13	1-En-route Driver Information	DMS
18	Talbot County Emergency Management	Support emergency and incident management	4-Incident Management 5-Emergency Veh Management 8-Maintenance and Construct Ops	CHART Workstation
19	Queen Anne County Dept of Emergency Services	Training of proper use of communications equipment	5-Emergency Veh Management	Training
20	Queen Anne County Dept of Emergency Services	Monitor traffic at DE-MD border	1-En-route Driver Information 3-Traffic Control	CCTV and DMS
21	Allegany Co Emergency Services	Monitor traffic on I-68 detour routes	1-En-route Driver Information 3-Traffic Control	CCTV and RWIS
22	Allegany Co Emergency Services	Traffic diversion resources for flood conditions	1-En-route Driver Information 8-Maintenance and Construct Ops	DMS and HAR

No.	Stakeholder	Need	User Service	Proposed Solution
23	Allegany Co Emergency Services	Help stranded motorists identify their location	1-En-route Driver Information 6-Emergency Notification and Personal Security	Mile markers every 1/10 mile
24	Allegany Co Emergency Services	Minimize risks to motorists	8-Maintenance and Construct Ops	Arrow boards on emergency response vehicles
25	Allegany Co Emergency Services	Contingency devices	8-Maintenance and Construct Ops 3-Traffic Control	CCTV, DMS, HAR, *Shazam*
26	Allegany Co Emergency Services	Access to CHART data	4-Incident Management 5-Emergency Veh Management 8-Maintenance and Construct Ops	CHART Workstation
27	SHA District 6	Provide information to motorists near Harpers Ferry	1-En-route Driver Information	DMS and HAR
28	SHA District 6	Congestion relief on major routes	4-Incident Management 5-Emergency Veh Management 3-Traffic Control	Better control and support between law and State/County personnel
29	SHA District 6	Support emergency and incident management	4-Incident Management 5-Emergency Veh Management 8-Maintenance and Construct Ops	CHART Workstation
30	SHA District 6	Traveler information	1-En-route Driver Information	DMS near Old Town
31	SHA District 6	Be able to warn truckers of severe winter weather	1-En-route Driver Information 8-Maintenance and Construct Ops	HAR and *Shazam*
32	SHA District 6	Identify adverse weather conditions on Haystack Mt	1-En-route Driver Information	RWIS
33	SHA District 7	Snow event/road closure warnings on I-81 and I-70	1-En-route Driver Information 2-Route Guidance 5-Emergency Veh Management 8-Maintenance and Construct Ops	DMS
34	SHA District 7	Traveler information	1-En-route Driver Information	DMS and HAR at 8 locations on I-68, I-70, US-40, US-220 and several MD routes
35	Garrett Co Fire and Rescue Department	Provide incident warning messages	1-En-route Driver Information	DMS on I-68
36	City of Cumberland	Obtain better weather information	1-En-route Driver Information 3-Traffic Control	RWIS at I-68 and Haystack Mt and I-68 MD-639 and two other locations
37	City of Cumberland	Monitor traffic on I-68 detour routes	1-En-route Driver Information 3-Traffic Control	CCTV and CHART Workstation
38	Washington County Division of Public Works	Better roadway monitoring	1-En-route Driver Information 3-Traffic Control	CCTV
39	Washington County Division of Public Works	Improve support to everyday traffic	1-En-route Driver Information 3-Traffic Control	DMS and RWIS
40	SHA – Calvert County	Interagency and intragency communications	5-Emergency Veh Management	[CHART is uncertain of additional avenues to achieve this. This effort has been investigated for many years with no success.]
41	SHA – Calvert County	Obtain better weather information	1-En-route Driver Information 8-Maintenance and Construct Ops	RWIS at Anne Arundel and Calvert Co line
42	SHA – Calvert County	Interagency communications	4-Incident Management 5-Emergency Veh Management	Expand existing 800 MHz radio system

No.	Stakeholder	Need	User Service	Proposed Solution
43	SHA – Calvert County	Decision point motorist information	4-Incident Management 7-Disaster Response and Evac	DMS
44	Calvert County Sheriff's Office	Incident detection capability	1-En-route Driver Information 4-Incident Management 3-Traffic Control	CCTV at various locations on MD-4
45	Charles County Emergency Services	Warning signs in construction areas	1-En-route Driver Information	DMS at US-301 near Smallwood Drive
46	Charles County Emergency Services	Traveler information for emergency evacuations	1-En-route Driver Information 4-Incident Management 7-Disaster Response and Evac	DMS at US-301 near MD-5, US-301 near MD-228 and MD-210 near Accokeek
47	MSP Barrack "H"	Support police action on US-301 detour routes	1-En-route Driver Information 2-Route Guidance	Expand FITM plan
48	MSP Barrack "H"	Provide guidance for Washington, DC evacuation	1-En-route Driver Information 7-Disaster Response and Evac	Install guide signs for specific routes.
49	MSP Barrack "H"	Simulcast issues	1-En-route Driver Information	Join CapWIN or use CapWIN's solution to resolve the issue.
50	St. Mary County Emergency Management	Monitor MD-235 corridor	1-En-route Driver Information 3-Traffic Control	CCTV and speed detectors
51	St. Mary County Emergency Management	Support contra-flow operations	1-En-route Driver Information 3-Traffic Control	Address the issue in the County's evacuation plan.

Table A-5.2 Stakeholders Roles and Responsibilities

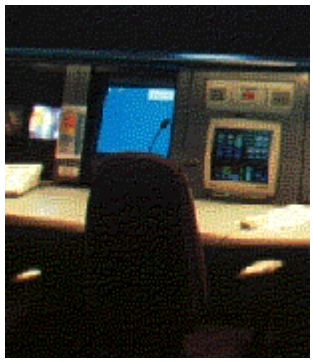
Stakeholder	Roles and Responsibilities	Status
Calvert County Emergency Management	**Emergency Management**	
	Calvert County Emergency Management to provide Charles County Emergency Management with information during emergency evacuations.	NOT PLANNED
	Calvert County Emergency Management to provide St. Mary's County Emergency Management with information during emergency evacuations.	NOT PLANNED
	Calvert County Emergency Management to provide Anne Arundel County Emergency Management with information during emergency evacuations.	NOT PLANNED
Charles County Department of Emergency Services	**Emergency Management**	
	Charles County Department of Emergency Services to provide St. Mary's County Emergency Management with information during emergency evacuations.	NOT PLANNED
	Charles County Department of Emergency Services to provide Calvert County Emergency Management with information during emergency evacuations.	NOT PLANNED
	Charles County Department of Emergency Services to provide Prince George's County Emergency Management with information during emergency evacuations.	NOT PLANNED
Maryland State Highway Administration	**Emergency Management**	
	Office of CHART to provide Dorchester County Emergency Management with incident information and coordination through a CHART workstation.	NOT PLANNED
	Office of CHART to provide Cecil County Department of Emergency Services with CCTV images.	NOT PLANNED
	Office of CHART to provide Worcester County Department of Emergency Services with CCTV images.	NOT PLANNED
	Office of CHART to provide Worcester Maryland State police Department with CCTV images.	NOT PLANNED
	Office of CHART to provide Wicomico County Emergency Management with incident information and coordination through a CHART workstation.	NOT PLANNED
	Office of CHART to provide SHA – District 2 Office with incident information and coordination through a CHART workstation.	NOT PLANNED
	Office of CHART to provide Talbot County Emergency Management with incident information and coordination through a CHART workstation.	NOT PLANNED

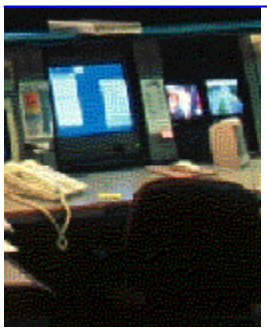
Stakeholder	Roles and Responsibilities	Status
	Office of CHART to provide Allegany County Emergency Management with incident information and coordination through a CHART workstation.	NOT PLANNED
	Office of CHART to provide Washington County Emergency Management with incident information and coordination through a CHART workstation.	NOT PLANNED
	Office of CHART to provide Garrett County Emergency Management with incident information and coordination through a CHART workstation.	NOT PLANNED
	SHA – District 7 to provide Washington County Emergency Management with incident information and FITM implementation.	NOT PLANNED
Saint Mary's County Emergency Management	**Emergency Management**	
	St. Mary's County Emergency Management to provide Charles County Department of Emergency Services with information during emergency evacuations.	NOT PLANNED
	St. Mary's County Emergency Management to provide Calvert County Emergency Management with information during emergency evacuations.	NOT PLANNED
Washington County Emergency Management	**Emergency Management**	
	Washington County Emergency Management to provide SHA – District 7 with incident information and FITM implementation.	NOT PLANNED

A-6 PROJECTS BY PHASE AND TYPE

The following tables present needs and solutions as separate projects in details. Projects are sorted by Phase and Type of needs. The most important details include location, costs, and benefits.

PHASE 1





M&O Need
Access to CHART Data

Phase 1

Rural Area: Eastern Shore
M&O Solution Subject: **CHART workstation**
Agency/Organization: Dorchester County Emergency Management

M&O Solution Description	Install CHART workstation [CHART LITE] at Dorchester County Emergency Operations Center
Perceived Benefit	Support emergency and incident management.
Technologies	Technologies will include computer desktop and its accessories.
Cost	**$18,000**
Cost Assumptions	Cost for one location is **$18,000.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Eastern Shore
M&O Solution Subject: **CHART workstation**
Agency/Organization: Wicomico County Emergency Management

M&O Solution Description	Install CHART workstation [CHART LITE] at Dorchester County Emergency Operations Center
Perceived Benefit	Support emergency and incident management.
Technologies	Technologies will include computer desktop and its accessories.
Cost	**$18,000**
Cost Assumptions	Cost for one location is **$18,000.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Eastern Shore
M&O Solution Subject: **CHART workstation**
Agency/Organization: SHA District 2

M&O Solution Description	Install CHART workstation [CHART LITE] at SHA District 2
Perceived Benefit	Support emergency and incident management.
Technologies	Technologies will include computer desktop and its accessories.
Cost	**$18,000**
Cost Assumptions	Cost for one location is **$18,000.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Eastern Shore
M&O Solution Subject: **CHART workstation**
Agency/Organization: Talbot County Emergency Management

M&O Solution Description	Install CHART workstation [CHART LITE] at Talbot County Emergency Operations Center
Perceived Benefit	Support emergency and incident management.
Technologies	Technologies will include computer desktop and its accessories.
Cost	**$18,000**
Cost Assumptions	Cost for one location is **$18,000.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Eastern Shore
M&O Solution Subject: **CHART workstation**
Agency/Organization: SHA's Office of CHART

M&O Solution Description	Install CHART workstations [CHART LITE] in counties and city offices (Somerset County (Princess Anne), Worcester County (Snow Hill and Ocean City), Caroline County (Denton), Queen Anne's County (Centreville), Kent County (Chestertown), and Cecil County (Elkton))
Perceived Benefit	Support emergency and incident management.
Technologies	Technologies will include computer desktop and its accessories.
Cost	**$234,000**
Cost Assumptions	Cost for thirteen (13) locations is **$234,000.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

M&O Need

Support Evacuation Plans

Advance Incident Warning Messages

Support Diversion Routes

Phase 1

Rural Area: Eastern Shore
M&O Solution Subject: **DMS**
Agency/Organization: Maryland State Police (MSP)

M&O Solution Description	Install DMS at MD13 in the vicinity of MD133
Perceived Benefit	Provide traveler information on closure of MD-133 @ MD-13 per evacuation plans.
Technologies	Technologies will include a DMS sign with integrated controller.
Cost	**$286,997**
Cost Assumptions	Cost for one DMS is **$286,997** and it includes the sign, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **DMS**
Agency/Organization: Garrett County Fire and Rescue Department

M&O Solution Description	Install two DMS signs at the following locations: • I-68 (EB) prior to mile marker 24 • Between mile markers 29 and 31
Perceived Benefit	Advance warnings will alert motorists of roadway incidents in this heavy fog/low visibility area. This will lower the risks to emergency responders (current signs are not very visible in heavy fog).
Technologies	Technologies will include a DMS sign with integrated controller.
Cost	**$573,994**
Cost Assumptions	Cost for two DMSs is **$573,994** and it includes two signs, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Southern Maryland
M&O Solution Subject: **DMS**
Agency/Organization: SHA – Calvert County

M&O Solution Description	Install three DMS signs at the following locations: • US301 at MD4 • MD5 at MD231 • MD231 at MD4
Perceived Benefit	Provide evacuation, incident and emergency information from several different avenues. Also increases the traveler information coverage area.
Technologies	Technologies will include a DMS sign with integrated controller.
Cost	**$860,991**
Cost Assumptions	Cost for three DMSs is **$860,991** and it includes three signs, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Southern Maryland
M&O Solution Subject: **DMS**
Agency/Organization: Charles County Emergency Services

M&O Solution Description	Install three DMS signs at the following locations: • US301 prior to MD5 (Prince George's County) • US301 (SB) prior to MD228 • MD210 (SB) in the Accokeek area
Perceived Benefit	Provide traveler information during emergency evacuations. They also can give motorists guidance on detour routes during incidents and recurring congestion.
Technologies	Technologies will include a DMS sign with integrated controller.
Cost	**$860,991**
Cost Assumptions	Cost for three DMSs is **$860,991** and it includes three signs, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

M&O Need

Detection Device on Diversion Routes

Phase 1

Rural Area: Western Maryland
M&O Solution Subject: **RWIS**
Agency/Organization: Allegany County Emergency Services

M&O Solution Description	Install RWIS along MD51
Perceived Benefit	Allow the dissemination of inclement weather information to motorists, especially truckers (this is a high truck volume route).
Technologies	Technologies will include RWIS.
Cost	**$142,477**
Cost Assumptions	Cost for RWIS is **$142,477** and it includes equipment, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

M&O Need
Training
Radios
Rectify Simulcast Issues

Phase 1

Rural Area: Eastern Shore
M&O Solution Subject: **Training**
Agency/Organization: Queen Anne County Department of Emergency Services

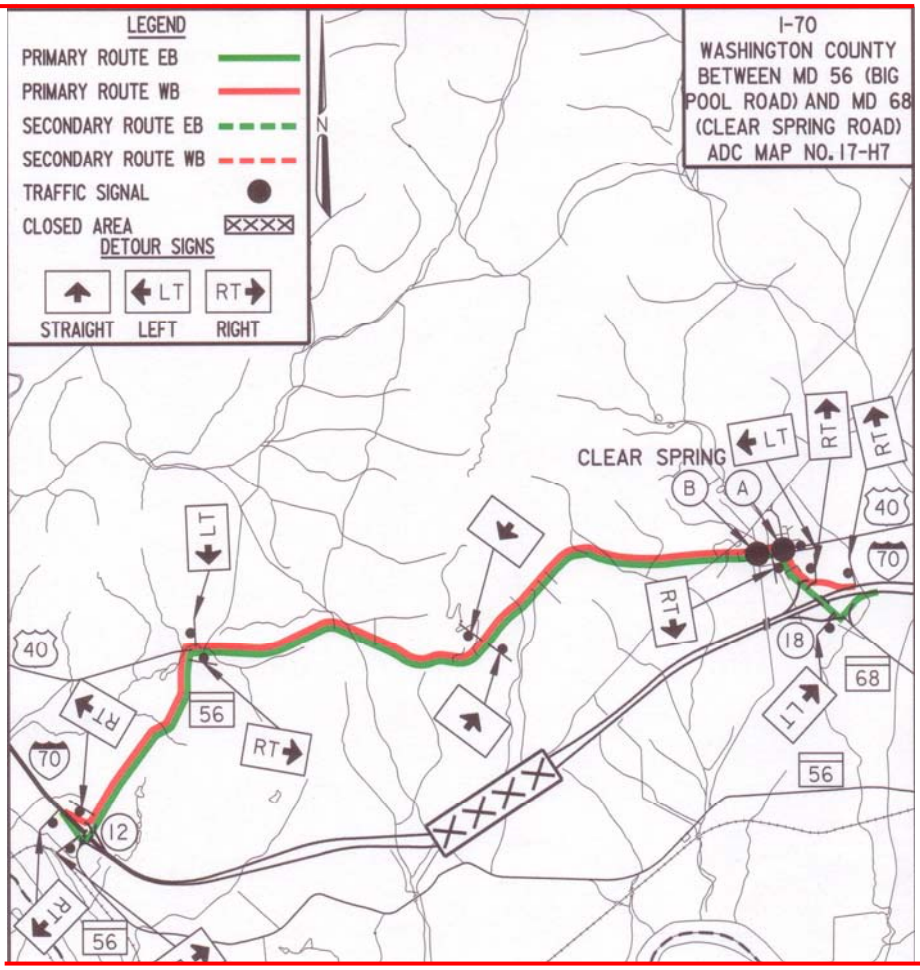
M&O Solution Description	Additional personnel training on proper use of communications equipment/devices
Perceived Benefit	More effective communication; increased life of the equipment/device.
Technologies	Technologies will include various communications equipment.
Cost	**$500**
Cost Assumptions	Cost for the communications training is **$500** and it includes instructor and facility**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

Rural Area: Southern Maryland
M&O Solution Subject: **800MHz Radios**
Agency/Organization: SHA – Calvert County

M&O Solution Description	Additional 800MHz radios
Perceived Benefit	Improve interagency communication and coordination; facilitate efficient incident response.
Technologies	Technologies will include 800MHz radio.
Cost	**$16,000**
Cost Assumptions	Cost for one 800MHz Radio is **$16,000** and it includes a radio and appropriate equipment**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

Rural Area: Southern Maryland
M&O Solution Subject: **Communications Equipment**
Agency/Organization: Maryland State Police (MSP) Barrack "H"

M&O Solution Description	Equipment to join CapWIN
Perceived Benefit	Support emergency and incident management.
Technologies	Technologies will include computer and other necessary equipment.
Cost	**$2,500**
Cost Assumptions	Cost for one setup is **$2,500** and it includes a computer along with the necessary equipment and installation**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed



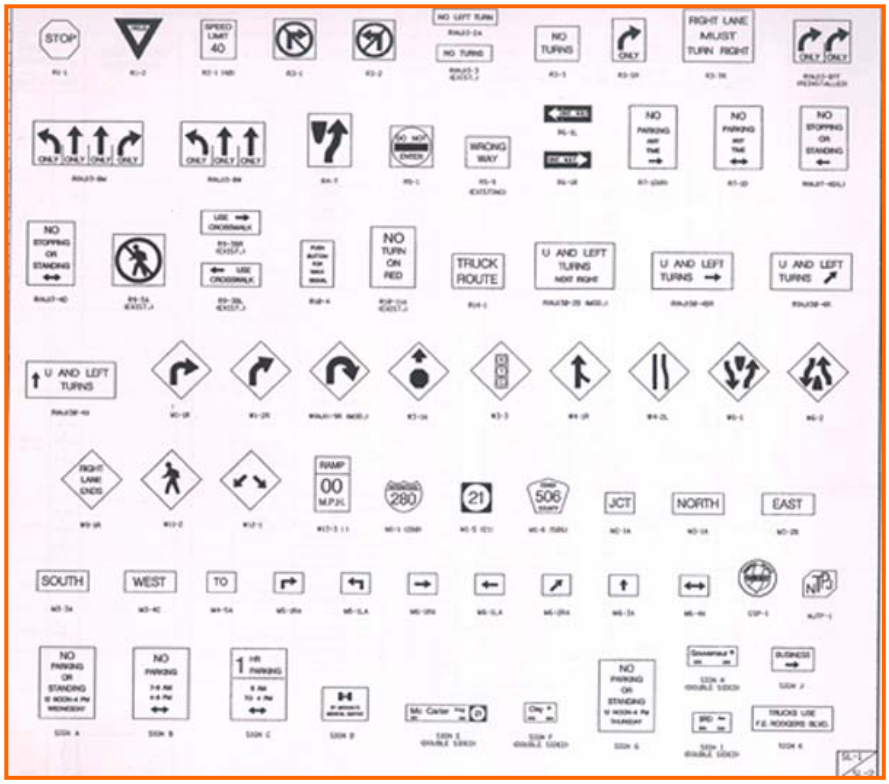
M&O Need

Support Detour Routes

Phase 1

Rural Area: Southern Maryland
M&O Solution Subject: **FITM Plan**
Agency/Organization: Maryland State Police (MSP) Barrack "H"

M&O Solution Description	Expanded FITM Plan
Perceived Benefit	This would provide MSP with better guidance on what to do after a FITM Plan is implemented and prescribe the appropriate level of MSP resources required.
Technologies	N/A
Cost	**$50,000**
Cost Assumptions	Cost to expand FITM Plan is **$50,000** and it is calculated per roadway corridor**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed



M&O Need

Evacuation Guidance

Phase 1

Rural Area: Southern Maryland
M&O Solution Subject: **Guide Signs**
Agency/Organization: Maryland State Police (MSP) Barrack "H"

M&O Solution Description	Evacuation Guide Signs
Perceived Benefit	Reduces confusion for evacuees on the appropriate route to get to their final destinations.
Technologies	N/A
Cost	**$8,000**
Cost Assumptions	Cost to install evacuation guide signs is **$8,000** and it includes costs of signs and installation along a twenty mile section (sign per ¼ mile)**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

PHASE 2

M&O Need

Enhance Roadway Monitoring

Support Emergency Evacuations

Phase 2

Rural Area: Eastern Shore
M&O Solution Subject: **CCTV**
Agency/Organization: Dorchester County Emergency Management

M&O Solution Description	Install CCTV cameras at the following locations: • Along MD335 and MD336 • US50 at MD331 • MD16 at WalMart store
Perceived Benefit	Monitor evacuations from southern portions of State (MD-335 and MD-336 are the only viable evacuations routes) and along US-50 and MD-331.
Technologies	Technologies will include CCTV camera.
Cost	**$185,863**
Cost Assumptions	Cost for three CCTV cameras is **$185,863** and it includes the CCTV cameras, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Eastern Shore
M&O Solution Subject: **CCTV**
Agency/Organization: Wicomico County Emergency Management

M&O Solution Description	Install CCTV camera at MD13 and US50
Perceived Benefit	Support everyday traffic, as well as emergency and incident management.
Technologies	Technologies will include CCTV camera.
Cost	**$61,954**
Cost Assumptions	Cost for one CCTV camera is **$61,954** and it includes the CCTV camera, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Eastern Shore
M&O Solution Subject: **CCTV**
Agency/Organization: Caroline County Emergency Management

M&O Solution Description	Install CCTV cameras at the following locations: • MD331 (entering Maryland from Delaware) • MD318 (entering Maryland from Delaware)
Perceived Benefit	Support everyday traffic, as well as emergency and incident management.
Technologies	Technologies will include CCTV camera.
Cost	**$123,908**
Cost Assumptions	Cost for two CCTV cameras is **$123,908** and it includes the CCTV camera, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Eastern Shore
M&O Solution Subject: **CCTV and DMS**
Agency/Organization: Queen Anne County Department of Emergency Services

M&O Solution Description	Install CCTV cameras at two sites to view traffic to/from Delaware and install DMS to support camera locations
Perceived Benefit	Avoid conflicting messages to travelers and streamlines emergency management operations once more accurate information is known of traffic conditions.
Technologies	Technologies will include CCTV camera, DMS with integrated controller.
Cost	**$697,902**
Cost Assumptions	Cost for two CCTV cameras and two DMS signs is **$697,902** and it includes the CCTV camera, DMS with integrated controller, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **CCTV**
Agency/Organization: City of Cumberland

M&O Solution Description	Install CCTV cameras at the following locations: • I-68 at MD639 (Willowbrook Road) • I-68 at Exit 42 (possibly at City water pump station) • I-68 at MD36 (or at SHA saltdome on MD36)
Perceived Benefit	Increased traffic monitoring.
Technologies	Technologies will include CCTV camera.
Cost	**$185,862**
Cost Assumptions	Cost for three CCTV cameras is **$185,862** and it includes the CCTV cameras, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Eastern Shore
M&O Solution Subject: **Communications equipment**
Agency/Organization: Caroline County Emergency Management

M&O Solution Description	Purchase various communications equipment
Perceived Benefit	Support everyday traffic, as well as emergency and incident management.
Technologies	Various communications equipment
Cost	**$50,000**
Cost Assumptions	Cost for the communications equipment is **$50,000** and it includes equipment, installation, and testing**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **CCTV**
Agency/Organization: Washington County Division of Public Works

M&O Solution Description	Install CCTV cameras (Internet accessible) at the following locations: ▪ MD-67 @ MD-340 (on County-owned communications tower) ▪ I-70 @ US-40 ▪ I-81 @ Maugans Ave. ▪ I-81 @ Halfway Blvd. ▪ I-81 @ US-40 ▪ I-81 @ Showalter Rd. (near Hagerstown Regional Airport) ▪ US-11 @ Showalter Rd. (near Hagerstown Regional Airport) ▪ Planned Lamb's Knoll tower (coverage to include MD-340 over the Potomac river to US-340 @ MD-67)
Perceived Benefit	The broadband wireless system in place in Washington County might be available to backhaul CCTV camera image/data to the Internet. The County would be willing to assist SHA in the implementation of this system [contact: Gary Rohrer].
Technologies	Technologies will include CCTV camera.
Cost	**$495,634**
Cost Assumptions	Cost for eight CCTV cameras is **$495,634** and it includes the CCTV cameras, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Southern Maryland
M&O Solution Subject: **CCTV**
Agency/Organization: Calvert County Sheriff Office

M&O Solution Description	Install CCTV camera at various locations along MD4
Perceived Benefit	Provide images of incidents along this major corridor in the county and helps organize and manage responses (particularly because side roads do not have the capacity to handle large-scale diversions).
Technologies	Technologies will include CCTV camera.
Cost	**$61,954**
Cost Assumptions	Cost for one CCTV cameras is **$61,954** and it includes the CCTV cameras, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Southern Maryland
M&O Solution Subject: **CCTV and Speed Detector**
Agency/Organization: St. Mary's County Emergency Management

M&O Solution Description	Install CCTV cameras and Speed Detectors at various locations along MD235
Perceived Benefit	Allows better monitoring of the corridor during incidents.
Technologies	Technologies will include CCTV camera and Speed Detector.
Cost	**$66,954**
Cost Assumptions	Cost for one CCTV camera and one Speed Detector is **$66,954** and it includes the CCTV cameras, speed detector with associate equipment, installation, and testing**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration and 2004 CHART estimates.
Status	Proposed

Rural Area: Eastern Shore
M&O Solution Subject: **CHART workstation**
Agency/Organization: Cecil County Department of Emergency Services

M&O Solution Description	Install CHART workstation [CHART LITE] at Cecil County Emergency Operations Center
Perceived Benefit	Enable more efficient emergency evacuation coordination and response if actual field conditions are known and/or seen.
Technologies	Technologies will include computer desktop and its accessories.
Cost	**$18,000**
Cost Assumptions	Cost for one location is **$18,000.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Eastern Shore
M&O Solution Subject: **CHART workstation**
Agency/Organization: Maryland State Police

M&O Solution Description	Install CHART workstation [CHART LITE] at the Maryland State Police (MSP) Office
Perceived Benefit	Provide a more stable environment to view CHART images. Current practice uses the CHART website; often there are connection or image-viewing problems.
Technologies	Technologies will include computer desktop and its accessories.
Cost	**$18,000**
Cost Assumptions	Cost for one location is **$18,000.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Southern Maryland
M&O Solution Subject: **County's Evacuation Plan Update**
Agency/Organization: St. Mary's County Emergency Management

M&O Solution Description	Update County's Evacuation Plan
Perceived Benefit	Support emergency and incident management.
Technologies	N/A
Cost	**$5,000**
Cost Assumptions	Cost for the Evacuation Plan update is **$5,000** and it includes labor**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

M&O Need

Modification to CHART ITS Devices
Improve Information Dissemination

Phase 2

Rural Area: Eastern Shore
M&O Solution Subject: **DMS Relocation**
Agency/Organization: SHA District 1

M&O Solution Description	Relocate existing DMS on MD9 WB further west
Perceived Benefit	Support everyday traffic.
Technologies	N/A
Cost	**$500**
Cost Assumptions	Cost for DMS relocation is **$500** and it includes DMS re-installation and testing**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

Rural Area: Eastern Shore
M&O Solution Subject: **Shazam Relocation**
Agency/Organization: SHA District 2

M&O Solution Description	Relocate existing Shazam from MD290 at US301 to MD213 at US301
Perceived Benefit	Better everyday traffic support.
Technologies	N/A
Cost	**$1,000**
Cost Assumptions	Cost for Shazam relocation is **$1,000** and it includes Shazam re-installation and testing**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

Rural Area: Eastern Shore
M&O Solution Subject: **DMS**
Agency/Organization: Somerset County

M&O Solution Description	Install DMS at the following locations: • MD413 • MD363 • MD13 north of Pocomoke
Perceived Benefit	Better everyday traffic support as well as better emergency and incident management.
Technologies	Technologies will include a DMS sign with integrated controller.
Cost	**$860,991**
Cost Assumptions	Cost for three DMS is **$860,991** and it includes the sign, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **DMS**
Agency/Organization: SHA District 6

M&O Solution Description	Install DMS at US340 at Harpers Ferry
Perceived Benefit	Provide motorists with information on back-ups in the area. Existing queue detector does not provide adequate warning (limited coverage area).
Technologies	Technologies will include a DMS sign with integrated controller.
Cost	**$286,997**
Cost Assumptions	Cost for one DMS is **$286,997** and it includes the sign, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **HAR**
Agency/Organization: SHA District 6

M&O Solution Description	Install HAR at US340 at Harpers Ferry
Perceived Benefit	Provide motorists with information on back-ups in the area. Existing queue detector does not provide adequate warning (limited coverage area).
Technologies	Technologies will include HAR and associated equipment.
Cost	**$16,000**
Cost Assumptions	Cost for one HAR is **$16,000** and it includes HAR with associated equipment, installation, and testing**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **DMS**
Agency/Organization: SHA District 6

M&O Solution Description	Install DMS in the vicinity of the Old Town
Perceived Benefit	Support everyday traffic.
Technologies	Technologies include DMS with integrated controller.
Cost	**$22,000**
Cost Assumptions	Cost for DMS sign is **$22,000** and it includes DMS, installation, and testing**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **HAR**
Agency/Organization: SHA District 6

M&O Solution Description	Install HAR at Friendsville area Welcome Center
Perceived Benefit	Provide advisory/warning messages to truckers during inclement weather.
Technologies	Technologies will include HAR and associated equipment.
Cost	**$16,000**
Cost Assumptions	Cost for one HAR is **$16,000** and it includes HAR with associated equipment, installation, and testing**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **Shazam**
Agency/Organization: SHA District 6

M&O Solution Description	Install Shazam at the following locations • EB approach to Welcome Center • WB approach to Welcome Center
Perceived Benefit	Provide advisory/warning messages to truckers during inclement weather.
Technologies	Technologies include Shazam and associated equipment
Cost	**$49,182**
Cost Assumptions	Cost for Shazam is **$49,182** and it includes Shazam with associated equipment, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **DMS**
Agency/Organization: SHA District 7

M&O Solution Description	Install DMS at the following locations: • I-70 EB approaching I-81 • I-70 WB approaching I-81 • I-81 NB approaching I-70 • I-81 SB approaching I-70
Perceived Benefit	Provide advance warning to motorists of incidents, congestion, etc. on the respective approaches. Particularly useful for truckers for FITM plan routing.
Technologies	Technologies will include a DMS sign with integrated controller.
Cost	**$1,147,989**
Cost Assumptions	Cost for four DMS is **$1,147,989** and it includes the sign, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **DMS and HAR**
Agency/Organization: SHA District 7

M&O Solution Description	Install DMS and HAR at the following locations: • East of MD65 bet. MD65 and US40 • I-68 in Cumberland • I-68 at I-70 truck stop • Halfway and Wisel Boulevard • MD51 at rail underpass • US40 corridor in Hagerstown • US220 corridor in Cresuptown • I-70 WB ramp at 65 (ramp too short)
Perceived Benefit	Additional traveler information. Also useful for those traveling to/from Pennsylvania and West Virginia.
Technologies	Technologies will include a DMS with integrated controller and HAR with associated equipment.
Cost	**$2,423,977**
Cost Assumptions	Cost for eight DMS and eight HAR is **$2,423,977** and it includes the sign, HAR with associated equipment, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **DMS**
Agency/Organization: Allegany County Emergency Services

M&O Solution Description	Install DMS at the location that will be specified later
Perceived Benefit	Provide adequate advance traveler information before motorists get stuck in these emergency situations.
Technologies	Technologies will include a DMS sign with integrated controller.
Cost	**$286,997**
Cost Assumptions	Cost for one DMS is **$286,997** and it includes the sign, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **HAR**
Agency/Organization: Allegany County Emergency Services

M&O Solution Description	Install HAR at the location that will be specified later
Perceived Benefit	Provide adequate advance traveler information before motorists get stuck in these emergency situations.
Technologies	Technologies will include HAR with associated equipment.
Cost	**$16,000**
Cost Assumptions	Cost for one HAR is **$16,000** and it includes HAR with associated equipment, installation, and testing**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

M&O Need

Traffic Diversion Resources

Congestion Relief

Phase 2

Rural Area: Western Maryland
M&O Solution Subject: **Traffic Support**
Agency/Organization: SHA District 6

M&O Solution Description	Traffic Support as follows: Use of I-68 through various towns Law enforcement support County/State support (CTP project funds)
Perceived Benefit	Better control and support during severe congestion from both law enforcement and State personnel.
Technologies	N/A
Cost	**$45,000**
Cost Assumptions	Cost for traffic support is **$45,000** and it includes labor**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **DMS**
Agency/Organization: Washington County Division of Public Works

M&O Solution Description	Install DMS at the following locations: ▪ I-81 SB, just south of the PA line ▪ I-81 NB, just north of the WVA line ▪ I-70 EB, just east of the Allegany Co. line ▪ I-70 WB, just west of the Frederick Co. line (prior to MD-66)
Perceived Benefit	Support everyday traffic.
Technologies	Technologies will include a DMS sign with integrated controller.
Cost	**$1,187,989**
Cost Assumptions	Cost for four DMS is **$1,187,989** and it includes the sign, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

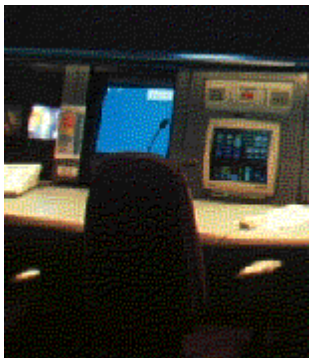
M&O Need

Improve Integration with CHART

Phase 2

Rural Area: Eastern Shore
M&O Solution Subject: **Cellular Communications for DMS**
Agency/Organization: Wicomico County Emergency Management

M&O Solution Description	Provide cellular communications option for the existing DMS
Perceived Benefit	Increased efficiency and accuracy in information sharing.
Technologies	N/A
Cost	**$10,000**
Cost Assumptions	Cost for a wireless data link to the sign, such as a Wi-Fi hop, may be necessary to link the sign with the nearest site where State fiber or microwave facilities can be accessed is **$10,000** and it includes equipment, installation, and testing**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed



M&O Need
Access to CHART Data

Phase 2

Rural Area: Western Maryland
M&O Solution Subject: **CHART workstation**
Agency/Organization: Allegany County Emergency Services

M&O Solution Description	Install CHART workstation [CHART LITE] at the Allegany County Emergency Operations Center in Cumberland
Perceived Benefit	Support emergency and incident management.
Technologies	Technologies will include computer desktop and its accessories.
Cost	**$18,000**
Cost Assumptions	Cost for one location is **$18,000.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **CHART workstation**
Agency/Organization: SHA District 6

M&O Solution Description	Install CHART workstation [CHART LITE] at Counties
Perceived Benefit	Support emergency and incident management.
Technologies	Technologies will include computer desktop and its accessories.
Cost	**$72,000**
Cost Assumptions	Cost for four locations is **$72,000.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

M&O Need
Weather Monitoring

Phase 2

Rural Area: Western Maryland
M&O Solution Subject: **RWIS**
Agency/Organization: SHA District 6

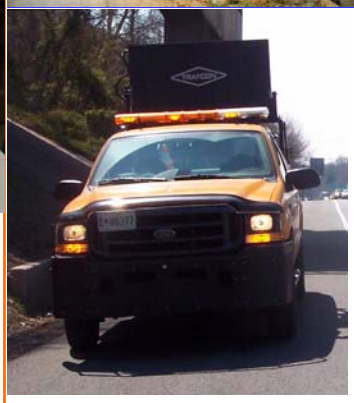
M&O Solution Description	Install RWIS on Haystack Mountain
Perceived Benefit	Provide weather detection capabilities to support the dissemination of roadway condition information during inclement weather. This will be useful in light of the increasing developments in the Haystack Mountain area.
Technologies	Technologies will include RWIS.
Cost	**$142,477**
Cost Assumptions	Cost for RWIS is **$142,477** and it includes equipment, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **RWIS**
Agency/Organization: City of Cumberland

M&O Solution Description	Install RWIS at the following locations: ▪ I-68 at Haystack Mountain (near Exit 41; possibly at City sewer pump station) ▪ I-68 at MD639 (Willowbrook Road) ▪ MD51 (Industrial Boulevard) near City of Cumberland corporate limits ▪ I-68 at MD36 (or at SHA saldome on MD36)
Perceived Benefit	Provide additional weather monitoring capabilities that will support information dissemination to motorists.
Technologies	Technologies will include RWIS.
Cost	**$569,909**
Cost Assumptions	Cost for four RWIS is **$569,909** and it includes equipment, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Southern Maryland
M&O Solution Subject: **RWIS**
Agency/Organization: SHA Calvert County

M&O Solution Description	Install RWIS at Anne Arundel and Calvert County line
Perceived Benefit	Support everyday traffic
Technologies	Technologies will include RWIS.
Cost	**$142,477**
Cost Assumptions	Cost for one RWIS is **$142,477** and it includes equipment, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed



M&O Need
Location Identification
Upgrade Emergency Vehicles
Construction Zone Warning

Phase 2

Rural Area: Western Maryland
M&O Solution Subject: **Mile Markers**
Agency/Organization: Allegany County Emergency Services

M&O Solution Description	Install mile markers every 1/10th of a mile in addition to on bridges and other road crossings
Perceived Benefit	Facilitate efficient response by emergency personnel once they know the approximate location of distressed motorists; crucial during blizzards.
Technologies	N/A
Cost	**$1,000**
Cost Assumptions	Cost for mile markers is **$1,000** and it includes signs and installation**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

Rural Area: Western Maryland
M&O Solution Subject: **Arrow Boards**
Agency/Organization: Allegany County Emergency Services

M&O Solution Description	Install arrow boards on emergency response vehicles
Perceived Benefit	Increase visibility and minimize the chance of secondary incidents.
Technologies	Technologies will include an LED arrow board.
Cost	**$3,000**
Cost Assumptions	Cost for one arrow board is **$3,000** and it includes a board and installation**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

PHASE 3

M&O Need

Enhance Traveler Information

Support Evacuation Plans

Phase 3

Rural Area: Eastern Shore
M&O Solution Subject: **DMS**
Agency/Organization: Dorchester County Emergency Management

M&O Solution Description	Install DMS on MD16 in the vicinity of the WalMart store
Perceived Benefit	Provide additional information outlet to motorists
Technologies	Technologies will include a DMS sign with integrated controller.
Cost	**$286,997**
Cost Assumptions	Cost for one DMS is **$286,997** and it includes the sign, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

Rural Area: Eastern Shore
M&O Solution Subject: **DMS**
Agency/Organization: SHA District 1

M&O Solution Description	Install DMS on MD12 (exact location based on additional investigation)
Perceived Benefit	MD-12 is a major traffic diversion route. DMS installation would improve information dissemination.
Technologies	Technologies will include a DMS sign with integrated controller.
Cost	**$286,997**
Cost Assumptions	Cost for one DMS is **$286,997** and it includes the sign, installation, and testing**.** The estimate is based on the 2004 CHART estimates.
Status	Proposed

M&O Need

Modification to CHART ITS Devices

Phase 3

Rural Area: Eastern Shore
M&O Solution Subject: **RWIS Relocation**
Agency/Organization: SHA District 2

M&O Solution Description	Relocate existing RWIS
Perceived Benefit	Better everyday traffic support.
Technologies	N/A
Cost	**$25,000**
Cost Assumptions	Cost for RWIS relocation is **$25,000** and it includes RWIS re-installation and testing**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration.
Status	Proposed

M&O Need
Contingency Devices

Phase 3

Rural Area: Western Maryland
M&O Solution Subject: **CCTV, DMS, HAR, and Shazam**
Agency/Organization: Allegany County Emergency Services

M&O Solution Description	Install CCTV camera at I-68 and Orleans Road (Exit 68) Install DMS at I-68 (WB) and Orleans Road (Exit 68; SHA Orleans Road Saldome) Install HAR at MD51, east of Oldtown (SHA Oldtown Saltdome) Install Shazam at MD51, east of Oldtown (SHA Oldtown Saltdome)
Perceived Benefit	Support emergency and incident management, as well as everyday traffic.
Technologies	Technologies include multiple ITS devices, such as CCTV camera (omni-directional), DMS, HAR, and Shazam
Cost	**$124,545**
Cost Assumptions	Cost for multiple ITS devices is **$124,545** and it includes devices (CCTV camera, DMS, HAR, and Shazam), installation, and testing**.** The estimate is based on the SCRITS (SCReening for ITS), an analysis tool package developed through Federal Highway Administration and the 2004 CHART estimates.
Status	Proposed

A-7 MAPPED RURAL M&O/ITS NEEDS WITH THE CHART GOALS AND OBJECTIVES

The following tables present how Rural M&O/ITS strategies map with the existing CHART goals and objectives. The current Business Plan covers six (6) performance areas and six (6) goals and every goal has its own objectives. The analysis resulted in forty five (45) needs that mapped with the existing CHART strategies, which is 90 percent of all identified needs.

HIGHWAY SAFETY

PERFORMANCE AREA: HIGHWAY SAFETY

GOAL 1: IMPROVE HIGHWAY SAFETY IN MARYLAND

OBJECTIVE 1.1: Reduce the annual number of traffic fatalities on all roads in Maryland from 662 in 2001 to fewer than 600 by December 31, 2006 and reduce the annual number of persons injured on all roads in Maryland from 60,000 in 2001 to fewer than 55,000 by December 31, 2006

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
1.1.7	Increase public support of traffic safety efforts through partnerships with the offices of the Governor, Secretary and elected officials by September 2006.	Support for police actions and responsibilities on US-301 detour routes	Expanded FITM Plan	MSP Barrack "H"	PC01
1.1.8	Continue collaboration, coordination, and integration activities with various responding agencies (including law enforcement, emergency responders, local and state transportation officials, and members of the media) to improve incident management annually.	Communication and control center	<none identified>	SHA – Calvert County	PC 02
1.1.10	Train SHA employees through the driver improvement program biennially. The following subjects will be covered: pedestrian safety, truck safety, work zone safety, seatbelt usage, impaired driver awareness, aggressive driver awareness and high-risk driver awareness.	Minimize risk to motorists by emergency responders	Install arrow board on emergency response vehicles	Allegany County Emergency Services	PC02
1.1.20	Continue to respond and clear incidents to provide a reduction of at least 100 secondary incidents annually.				

PERFORMANCE MEASURES:

1) Number of operations centers [CHART Input]
2) Number of vehicle assists [CHART Input]
3) Number of incident responses [CHART Input]
4) Total reduction in secondary incidents [CHART Output]

*

PERFORMANCE AREA: HIGHWAY SAFETY

GOAL 1: IMPROVE HIGHWAY SAFETY IN MARYLAND

OBJECTIVE 1.4: Increase statewide seat belt use from 86 percent in 2001 to at least 90 percent by December 31, 2006.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
1.4.3	Train CHART employees through the driver improvement program biennially.				
1.4.20	Work with public affairs to develop a driver and traffic safety brochure for distribution by CHART personnel by July 2006.				
1.4.21	Support the "Seatbelts Save Lives" campaign by posting messages on Dynamic Message Signs (DMS) when requested.				

PERFORMANCE MEASURES:

1) Number of people reached (OOTS, OC, CHART) [CHART Input]

*

PERFORMANCE AREA: HIGHWAY SAFETY

GOAL 1: IMPROVE HIGHWAY SAFETY IN MARYLAND

OBJECTIVE 1.5: Reduce the annual number of impaired driving related fatalities on all roads in Maryland from 254 in 2001 to fewer than 230 by December 31, 2006

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
1.5.20	Assist law enforcement agencies at impaired driver checkpoints by providing traffic control resources when requested.				
1.5.21	Support the "Don't Drink and Drive" campaign by posting messages on DMS when requested.				

PERFORMANCE MEASURES:

1)
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PERFORMANCE AREA: HIGHWAY SAFETY

GOAL 1: IMPROVE HIGHWAY SAFETY IN MARYLAND

OBJECTIVE 1.6: Reduce the number of work zone related traffic fatalities on all roads in Maryland from 19 in 2002 to fewer than 15 by December 31, 2006

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
1.6.2	Identify and implement at least two ITS technologies/concepts in work zones to improve traffic safety by December 2006.	Construction Zone warning	DMS on US-301 approaching Smallwood Drive	Charles County Emergency Services	PC02
1.6.20	Display provided work zone information on the CHART Website for 100% of highway work zones that involve a lane closure within 30 minutes of the onset of work.				
1.6.21	Notify SHA construction project engineers immediately when CHART personnel observe unsafe work zone conditions.				
1.6.22	Provide work zone alerts to the traveling public via DMS and Highway Advisory Radio (HAR) within 30 minutes of the onset work.	Traveler Information [1]	DMS on MD-16 in vicinity of WalMart	Dorchester Co. Emergency Mgmt	PC03
			DMS @ MD-413, MD-363 and MD-13 (north of Pokamoke)	Somerset County	PC02
			Two (2) DMS sites to view traffic to and from DE	Queen Anne Co. Department of Emergency Svcs.	PC02
			DMS & HAR on US-340 at Harpers Ferry	SHA District 6	PC02
			DMS in the vicinity of Old Town		PC02

OBJECTIVE 1.6: Reduce the number of work zone related traffic fatalities on all roads in Maryland from 19 in 2002 to fewer than 15 by December 31, 2006

CHART BUSINESS PLAN	RURAL ITS M&O STRATEGIC PLAN			
Strategies	***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
		DMS and HAR at various locations [2]	SHA District 7	PC02
		DMS @ I-68 EB prior to MM 24 and bet. MM 29 & 31	Garrett Co. Fire and Rescue Dept.	PC01
		DMS at US-301@ prior to MD-5; US-301 SB prior to MD-228; MD-210 SB in the Accokeek area	Charles County Emergency Services	PC01

PERFORMANCE MEASURES:

1) Number of ITS technologies deployed [CHART Input]

1 This proposed M&O need was not specifically associated with Work Zone operations when identified by the various Rural Area Agencies/Organizations.
2 See *Rural M&O Strategic Plan, Table 6.2* for the eight (8) DMS and HAR locations.

PERFORMANCE AREA: HIGHWAY SAFETY

GOAL 1: IMPROVE HIGHWAY SAFETY IN MARYLAND

OBJECTIVE 1.7: Reduce the annual number of fatalities resulting from aggressive driver-involved crashes from 61 in 2001 to fewer than 55 by December 31, 2006; and reduce the annual number of persons injured in aggressive driver-involved crashes on all roads in Maryland from 2420 in 2001 to fewer than 2250 by December 31, 2006.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
1.7.20	Notify law enforcement agencies immediately when aggressive drivers are observed by CHART service patrols.				
1.7.21	Support the law enforcement agencies' campaign against aggressive driving by posting messages on DMS when requested.				

PERFORMANCE MEASURES:

1)
*

PERFORMANCE AREA: HIGHWAY SAFETY

GOAL 1: IMPROVE HIGHWAY SAFETY IN MARYLAND

OBJECTIVE 1.8: Reduce the annual number of fatalities resulting from high-risk driver[1]-involved crashes from "XX" in 2002 to fewer than "XX" by December 31, 2006; and reduce the number of persons injured in high-risk driver-involved crashes on all roads in Maryland from "XX" to fewer than "XX" by December 31, 2006

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
1.8.20	Notify law enforcement agencies immediately when high-risk drivers are observed by CHART service patrols.				
1.8.21	Support the law enforcement agencies' campaign against high-risk drivers by posting messages on DMS when requested.				

PERFORMANCE MEASURES:

1)

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MOBILITY AND CONGESTION RELIEF

PERFORMANCE AREA: MOBILITY/CONGESTION RELIEF

GOAL 2: IMPROVE MOBILITY FOR OUR CUSTOMERS

OBJECTIVE 2.1: Provide effective incident management that reduces annual incident congestion delay by at least 30 million vehicle-hours to achieve related cost savings of $570M for the traveling public, including $150M for commercial traffic, by June 30, 2008.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
2.1.1	Continue collaboration and coordination with various responding agencies (including law enforcement, emergency responders, local and state transportation officials, and member of the media) annually.	Communication and control center	<none identified>	SHA – Calvert County	PC 02
2.1.2	Integrate CHART systems with various responding agencies (including law enforcement, emergency responders, local and state transportation officials, and members of the media) annually.	Access to CHART data	Install CHART-LITE at Dorchester Co. EOC	Dorchester Co. Emergency Management	PC01
		Resources to supplement Emergency Evac. Ops.	Provide access to CHART CCTV camera images	Cecil Co. Dept of Emergency Services	PC02
		Access to CHART CCTV camera images	Dept satisfied with CHART area plans	Worchester Co. Dept of Emergency Svcs.	N/A
		Better integration with CHART ITS devices	Need DMS cellular comm. option	Wicomico Co. Emergency Mgmt.	PC02
		Access to CHART data	Install CHART workstation at Wicomico Co. EOC		PC01
		Access to CHART data	Install CHART workstation	SHA District 2	PC01
			Install CHART Workstation	Talbot County Emergency Mgmt.	PC01

OBJECTIVE 2.1: Provide effective incident management that reduces annual incident congestion delay by at least 30 million vehicle-hours to achieve related cost savings of $570M for the traveling public, including $150M for commercial traffic, by June 30, 2008.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
			CHART workstation at 911/EOC facility in Cumberland	Allegany Co. Emergency Services	PC02
			Install CHART workstations in the counties	SHA District 6	PC02
2.1.3	Improve traffic and roadway monitoring capabilities by expanding existing deployments and improving technology annually.	Roadway monitoring capabilities	CCTV cameras along MD-335 and MD-336; US-50 @ MD-331; MD-16 @ WalMart store	Dorchester Co. Emergency Management	PC02
		Enhanced roadway monitoring	Provide access to CHART CCTV camera images	Maryland State Police	PC02
		Better roadway monitoring	CCTV camera at MD-13 @ US-50	Wicomico County Emergency Mgmt.	PC02
		Better roadway monitoring at MD-DE border	CCTV camera / detection devices at MD-331 and MD-318 (entering from DE); Connectivity with 911 centers	Caroline County Emergency Mgmt	PC02

OBJECTIVE 2.1: Provide effective incident management that reduces annual incident congestion delay by at least 30 million vehicle-hours to achieve related cost savings of $570M for the traveling public, including $150M for commercial traffic, by June 30, 2008.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
		Traffic monitoring	Two (2) CCTV sites to view traffic to and from DE	Queen Anne Co. Department of Emergency Svcs.	PC02
			CCTV cameras on I-68 @ MD-639 (Willowbrook Rd); I-68 @ Exit 42; I-68 @ MD-36	City of Cumberland	PC02
		Improved roadway monitoring	CCTV cameras at various locations [1]	Washington Co. Division of Public Works	PC02
		Detection and monitoring capabilities along MD-235	Speed detectors and CCTV cameras along MD-235	St. Mary County Emergency Management	PC02
2.1.4	Develop and implement training programs for regional incident responders/operators annually.	Training	Additional personnel training on proper use of comm. equip and devices	Queen Anne Co. Dept of Emergency Services	PC01
2.1.5	Perform evaluation of incident management program annually.				
2.1.6	Allocate resources (patrols, ITS devices, etc.) to assist traffic bound for Eastern Shore annually.				
2.1.7	Expand number of service patrols throughout the state by December 2006.				

OBJECTIVE 2.1: Provide effective incident management that reduces annual incident congestion delay by at least 30 million vehicle-hours to achieve related cost savings of $570M for the traveling public, including $150M for commercial traffic, by June 30, 2008.

CHART BUSINESS PLAN	RURAL ITS M&O STRATEGIC PLAN			
Strategies	***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code

PERFORMANCE MEASURES:

1) Number of incidents (calendar year) (CHART, OOTS) [CHART Input]
2) Number of service patrols (CHART) [CHART Input]
3) Number of incident responses and complete reports (calendar year) (CHART) [CHART Output]
4) Total Reduction in incident congestion delay (million vehicle-hours) (calendar year) (CHART) [CHART Outcome]
5) Commercial traffic cost savings ($ million) due to incident management (calendar year) (CHART, OOTS) [CHART Outcome]
6) Total user cost savings ($ million) for the traveling public including commercial traffic due to incident management (calendar year) [CHART Outcome]

1 See *Rural M&O Strategic Plan, Table 6.2* for the eight (8) CCTV camera locations.

PERFORMANCE AREA: MOBILITY/CONGESTION RELIEF

GOAL 2: IMPROVE MOBILITY FOR OUR CUSTOMERS

OBJECTIVE 2.3: Reduce delay caused by congestion in construction work zones on projects by "XX" percent each year.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
2.3.1	Develop list of construction projects where innovative techniques could be employed annually.				
2.3.2	Collect data on typical construction cost and delays associated with standard construction annually.				
2.3.3	Evaluate innovative construction techniques annually.				
2.3.20	Display provided work zone information on the CHART website for 100% of highway work zones that involve a lane closure within 30 minutes of the onset work.				
2.3.21	Provide work zone alerts to the traveling public via DMS and Highway Advisory Radio (HAR) within 30 minutes of the onset of work.	Traveler Information [1]	DMS on MD-16 in vicinity of WalMart	Dorchester Co. Emergency Mgmt	PC03
			DMS @ MD-413, MD-363 and MD-13 (north of Pokamoke)	Somerset County	PC02
			Two (2) DMS sites to view traffic to and from DE	Queen Anne Co. Department of Emergency Svcs.	PC02
			DMS & HAR on US-340 at Harpers Ferry	SHA District 6	PC02
			DMS in the vicinity of Old Town		PC02

OBJECTIVE 2.3: Reduce delay caused by congestion in construction work zones on projects by "XX" percent each year.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
			DMS and HAR at various locations [2]	SHA District 7	PC02
			DMS @ I-68 EB prior to MM 24 and bet. MM 29 & 31	Garrett Co. Fire and Rescue Dept.	PC01
			DMS at US-301@ prior to MD-5; US-301 SB prior to MD-228; MD-210 SB in the Accokeek area	Charles County Emergency Services	PC01

PERFORMANCE MEASURES:

1) Number lane closures (CHART, OOC, OOTS) [CHART Output]
2) Percentage of reduction in delay caused by congestion in construction work zones (CHART, OOC) [CHART Outcome]

1 This proposed M&O need was not specifically associated with Work Zone operations when identified by the various Rural Area Agencies/Organizations.
2 See *Rural M&O Strategic Plan, Table 6.2* for the eight (8) DMS and HAR locations.

PERFORMANCE AREA: MOBILITY/CONGESTION RELIEF

GOAL 2: IMPROVE MOBILITY FOR OUR CUSTOMERS

OBJECTIVE 2.6: Complete the development of Maryland Statewide transportation major emergency preparedness plans by December 31, 2006.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
2.6.1	Develop a comprehensive Transportation Emergency Management (Evacuation) Plan for the Washington Metropolitan Region by December 2005.				
2.6.2	Develop a comprehensive Transportation Emergency Management (Evacuation) Plan for the Baltimore Metropolitan Region by December 2005.				
2.6.3	Develop a comprehensive Transportation Emergency Management (Evacuation) Plan for the Eastern Shore by December 2005.				
2.6.4	Develop a comprehensive Transportation Emergency Management (Evacuation) Plan statewide by December 2005.				
2.6.5	Apply ITS and other technologies to monitor and protect the statewide infrastructure annually.				
2.6.6	Develop terrorism awareness and response training for SHA response personnel annually.				
2.6.7	Develop a Unified Emergency Preparedness and Management Plan or Emergency Operation Plan for all weather related emergencies by December 2005.				
2.6.8	Update SHA Continuity of Operations Plans (COOP) annually.				
2.6.9	Develop outcome performance measure to support this objective by July 2005.				
2.6.20	Provide capability for CHART Operations and Office Communications (OC) personnel to immediately post transportation emergency information prominently on the CHART Website.				

OBJECTIVE 2.6: Complete the development of Maryland Statewide transportation major emergency preparedness plans by December 31, 2006.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
2.6.2 1	Post Freeway Incident Traffic Management (FITM) on CHART map annually as the plans are updated by operations.	Support for police actions and responsibilities on US-301 detour routes	Expanded FITM Plan	MSP Barrack "H"	PC01

PERFORMANCE MEASURES:

1) Amount of equipment to support deployment of major emergency plans and systems (CHART, OOM, OOTS, Districts) [CHART Input]
2) Amount of staffing to support deployment of major emergency plans and systems (CHART, OOM, OOTS, Districts) [CHART Input]
3) Number of major emergency plans, strategies, and systems that are developed. (All Offices/Districts) [CHART Output]

SYSTEM PRESERVATION AND MAINTENANCE

PERFORMANCE AREA: SYSTEM PRESERVATION AND MAINTENANCE

GOAL 3: MAINTAIN A QUALITY HIGHWAY SYSTEM

OBJECTIVE 3.11: Regain bare pavement [2] on mainline Interstate and Primary SHA roadways [3] within 8 hours after a winter storm event [4] of 8-inuches or less of accumulated snowfall [5].

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
3.11.4	Maintain adequate staffing levels at the SOC to track snow storms and alert snow plow crews of roadway conditions during winter storm events.				
3.11.20	Provide and maintain the scanweb system for operations personnel to obtain detailed forecasts during winter storm events.				
3.11.21	Provide and maintain the scanweb system for operations personnel to access SHA weather stations to track the progress of the storm during winter storm events.				
3.11.22	Provide and maintain the Emergency Operations Reporting System (EORS) for operations personnel to update detailed SHA District, as well as, statewide plans during winter storm events.	Winter weather warning for truckers	HAR at Friendsville area Welcome Center; Shazams on EB and WB approach to Welcome Center	SHA District 6	PC02
		Weather detection capabilities and roadway condition data	RWIS on Haystack Mountain		PC02
		Provide snow event / road closure warnings; routine roadway maintenance	DMS on I-70 EB & I-70 WB approaching I-81; On I-81 NB & I-81 SB approaching I-70	SHA District 7	PC02

OBJECTIVE 3.11: Regain bare pavement [2] on mainline Interstate and Primary SHA roadways [3] within 8 hours after a winter storm event [4] of 8-inuches or less of accumulated snowfall [5].

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
		Weather detection capabilities and roadway condition data	RWIS on I-68 @ Haystack Mtn., at MD-639 and at MD-36; RWIS on MD-51 near Cumberland corporate limits	City of Cumberland	PC02
		Weather-monitoring capability	RWIS at Anne Arundel and Calvert County line	SHA – Calvert County	PC02
3.11.23	Provide and maintain the EORS for operations personnel to report success in gaining bare pavement following winter storm events.				

PERFORMANCE MEASURES:

1)

2 "Bare pavement" is defined as a roadway which has no measurable accumulation of snow, ice or slush.
3 A comprehensive, statewide list of roadways that will be held to this objective will be developed by the KPA.
4 A "winter storm event" is defined as any weather condition that results in snow or ice on the roadway surface of 8 inches or less of accumulated snowfall without drifting.
5 This objective does not include roadways in Garrett County.

EFFICIENCY IN GOVERNMENT

PERFORMANCE AREA: EFFICIENCY IN GOVERNMENT

GOAL 4: IMPROVE EFFICIENCIES IN OUR BUSINESS PROCESSES

OBJECTIVE 4.4: Eliminate all repeat legislative audit findings by June 30, 2005, and each audit cycle thereafter.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
4.4.1	Correct deficiencies cited in the Legislative Audit Report within one month of notification.				
4.4.3	Use feedback from Internal Controls Assessment Audits, the next phase of the Risk Assessment process, to correct deficiencies, including those areas vulnerable to repeat Legislative Audit findings within one month of notification.				
4.4.4	Enroll managers in Internal Controls Training Program (conducted at the completion of the offices Internal Controls Assessment Audits) annually.				

PERFORMANCE MEASURES:

1)

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PERFORMANCE AREA: EFFICIENCY IN GOVERNMENT

GOAL 4: IMPROVE EFFICIENCIES IN OUR BUSINESS PROCESSES

OBJECTIVE 4.5: Pay 98 percent or better of all vendor invoices within 30 days of receipt.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
4.5.1	Monitor invoices based on the Office of Finance's monthly Accounts Payable Aging Report.				
4.5.2	Train employees on the proper manner for handling invoices annually.				
4.5.3	Review the status of all late invoices based on the Office of Finance's monthly Report by Index.				

PERFORMANCE MEASURES:

1)
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PERFORMANCE AREA: EFFICIENCY IN GOVERNMENT

GOAL 4: IMPROVE EFFICIENCIES IN OUR BUSINESS PROCESSES

OBJECTIVE 4.6: Manage operating budget targets at the annual amended appropriation and manage the capital program to within 10 percent of the final Consolidated Transportation Program (CTP) target for the budget year.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
4.6.1	Review operating program expenditure data based on the Budget section's monthly reports.				
4.6.2	Monitor Capital Program expenditures based on Office of Finance's monthly Forecast Letter.				
4.6.3	Interact with Office of Finance's Capital Programming and Budget Sections in order to provide accurate data for forecast expenditures quarterly.				

PERFORMANCE MEASURES:

1)

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PERFORMANCE AREA: EFFICIENCY IN GOVERNMENT

GOAL 4: IMPROVE EFFICIENCIES IN OUR BUSINESS PROCESSES

OBJECTIVE 4.7: Maintain compliance with all current and future Disadvantaged Business Enterprise (DBE)/Minority Business Enterprise (MBE) statutory, Code of Maryland Regulations (COMAR), and Federal regulations.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
4.7.20	Track MBE expenditure to verify compliance quarterly.				

PERFORMANCE MEASURES:

1) Number of contracts complying [CHART Outcome]

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PERFORMANCE AREA: EFFICIENCY IN GOVERNMENT

GOAL 4: IMPROVE EFFICIENCIES IN OUR BUSINESS PROCESSES

OBJECTIVE 4.8: Annually achieve an 80 percent or better level of employee reported improvement in job effectiveness due to SHA training.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
4.8.1	Ensure training programs are competency based and address business requirements annually.				
4.8.2	Monitor training programs to ensure effectiveness of content and instruction annually.				
4.8.3	Utilize participant feedback for improvement of employee and organizational performance annually.				
4.8.4	Reinforce acquired knowledge and skills on the job to ensure high performance through manager and supervisor coaching and mentoring annually.				

PERFORMANCE MEASURES:

1)
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PERFORMANCE AREA: EFFICIENCY IN GOVERNMENT

GOAL 4: IMPROVE EFFICIENCIES IN OUR BUSINESS PROCESSES

OBJECTIVE 4.9: Complete 85 percent of training and development activities as requested on Personal Development Plans (PDP) annually.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
4.9.1	Ensure that each employee completes a PDP annually.				
4.9.2	Review PDP's to ensure that training requests are appropriate and achievable annually.				
4.9.3	Ensure that adequate resources are available to fulfill PDP requests annually.				
4.9.4	Schedule development activities annually.				
4.9.5	Monitor PDP's using the Learning Management System (LMS) annually.				

PERFORMANCE MEASURES:

1)
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PERFORMANCE AREA: EFFICIENCY IN GOVERNMENT

GOAL 4: IMPROVE EFFICIENCIES IN OUR BUSINESS PROCESSES

OBJECTIVE 4.10: Annually maintain the severity of work place injuries at or below year2000 level.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
4.10.1	Continue to develop workplace injury prevention procedures with quarterly reporting to all Senior Management Team Members.				
4.10.2	Deliver "injury prevention" training programs to employees 3 times a year.				
4.10.3	Increase safety awareness by partnering with other SHA divisions, local affiliations, governments, law enforcement and other emergency response personnel annually to promote safety through newsletters, training programs, bulletins, posters and trade magazines.				

PERFORMANCE MEASURES:

1) Number of safety training sessions conducted (calendar year) (OCE, All Offices/Districts) Number of lost work days due to injury (calendar year) (OCE, All Offices/Districts) [CHART Output]

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PERFORMANCE AREA: EFFICIENCY IN GOVERNMENT

GOAL 4: IMPROVE EFFICIENCIES IN OUR BUSINESS PROCESSES

OBJECTIVE 4.11: Reduce total Administrative and General (A&G) expenditures, adjusted for any increases in salaries and benefits and Consumer Price Index (CPI), by 10 percent of the FY 2002 total by June 30th, 2006.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
4.11.1	Increase direct labor charges to 70 percent of total salaries by July 2006.				
4.11.2	Monitor expenses based on the Office of Finance's monthly A&G reports.				
4.11.3	Attend A&G training provided by the Office of Finance's Budget section annually.				

PERFORMANCE MEASURES:

1)

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PERFORMANCE AREA: EFFICIENCY IN GOVERNMENT

GOAL 4: IMPROVE EFFICIENCIES IN OUR BUSINESS PROCESSES

OBJECTIVE 4.14: Improve representation in the top five (5) categories where disparities exist to better enable SHA to mirror the Maryland available workforce (where gaps exist in the FY2003 Affirmative Action Plan).

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
4.14.1	Ensure all Selection Plans include at least one (1) diversity related question during interview processes.				
4.14.2	Ensure interview panels are diverse to include, not limited to, representation of categories noted: at least one (1) minority, one (1) non-minority, and one (1) female member during interview processes.				
4.14.4	Develop focused strategies in classifications with a larger number of under represented classes, or a significant number of anticipated hires by October 2006.				
4.14.7	Educate and communicate to the workforce SHA's commitment to diversity through programs and special initiatives annually.				

PERFORMANCE MEASURES:

1)

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ENVIRONMENTAL STEWARDSHIP

PERFORMANCE AREA: ENVIRONMENTAL STEWARDSHIP

GOAL 5: DEVELOP AND MAINTAIN OUR MARYLAND STATE HIGHWAYS IN AN ENVIRONMENTALLY RESPONSIBLE MANNER

OBJECTIVE 5.8: Implement an SHA Environmental Stewardship Program involving all offices and Districts by the end of 2004.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
5.8.3	Recruit environmental stewards in each SHA office to assist in the implementation by December 2006.				
5.8.4	Develop and include environmental stewardship initiatives in the local business plans annually.				
5.8.20	Continue CHART service patrols and incident management to reduce fuel consumption and emissions annually.				
5.8.21	Improve the process of cleaning fuel spills from incident scene annually.				
5.8.22	Receive calls on behalf of the Maryland Department of Environment (MDE) during weeknights (5 PM to 9 AM) and weekends to expedite their response to environmentally impacting incidents.				

PERFORMANCE MEASURES:

1) Number of current SHA environmental initiatives and processes (OED, All Offices/Districts) [CHART Input]
2) Number of implemented strategic environmental activities and initiatives (OED, All Offices/Districts) Number of offices implementing environmental stewardship activities (OED, All Offices/Districts) [CHART Output]
3) Reduction in Emissions Reduction in Fuel Consumption [CHART Input]
4) Percentage of SHA offices implementing environmental stewardship program elements. (OED, All Offices/Districts) [CHART Outcome]

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CUSTOMER SERVICE AND SATISFACTION

PERFORMANCE AREA: CUSTOMER SERVICE AND SATISFACTION

GOAL 6: PROVIDE SERVICES AND PRODUCTS TO OUR CUSTOMERS THAT MEET OR EXCEED THEIR EXPECTATIONS

OBJECTIVE 6.1: Attain at least 80 percent overall Maryland Drivers' satisfaction rating of "A" or "B" biennially**.**

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
6.1.2	Conduct survey of Maryland Drivers every two years, with the next survey to be conducted by June 2006.				
6.1.3	Develop an action plan for improvements in "emergency response" and implement by June 2006.				
6.1.21	Coordinate with OC to develop a field survey card for distribution by CHART field personnel by December 2006.				

PERFORMANCE MEASURES:

1)
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PERFORMANCE AREA: CUSTOMER SERVICE AND SATISFACTION

GOAL 6: PROVIDE SERVICES AND PRODUCTS TO OUR CUSTOMERS THAT MEET OR EXCEED THEIR EXPECTATIONS

OBJECTIVE 6.4: Attain at least 80 percent "A" or "B" satisfaction rating biennially from Maryland drivers who completed the survey and also have contacted SHA**.**

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
6.4.2	Prepare responses to letters assigned to SHA by MDOT within 3 days of receipt in that office.				
6.4.3	Answer every telephone by voice mail or in person within 3 rings at all times.				

PERFORMANCE MEASURES:

1)

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PERFORMANCE AREA: CUSTOMER SERVICE AND SATISFACTION

GOAL 6: PROVIDE SERVICES AND PRODUCTS TO OUR CUSTOMERS THAT MEET OR EXCEED THEIR EXPECTATIONS

OBJECTIVE 6.7: Biennially meet or exceed the year 2000 level of internal customer satisfaction from the overall for the SHA Internal Climate Assessment.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
6.7.1	Review the survey results by July 2006.				
6.7.3	Develop an action plan to address low rated areas of concern by September 2006.				
6.7.4	Issue a report on the results and actions by December 2006.				

PERFORMANCE MEASURES:

1)

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PERFORMANCE AREA: CUSTOMER SERVICE AND SATISFACTION

GOAL 6: PROVIDE SERVICES AND PRODUCTS TO OUR CUSTOMERS THAT MEET OR EXCEED THEIR EXPECTATIONS

OBJECTIVE 6.8: Attain biennially at least an 80 percent internal customer service rating of "A" or "B" from the SHA Internal Climate Assessment.

CHART BUSINESS PLAN		RURAL ITS M&O STRATEGIC PLAN			
Strategies		***Proposed M&O Need***	Proposed M&O Solution	Agency/ Organization	Priority Code
6.8.4	Develop an action plan to address low rated areas of concern by September 2006.				

PERFORMANCE MEASURES:

1)