



I-83 Southbound Near Ruxton Road

1. CHART TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS (TSM&O)

Transportation System Management and Operations (TSM&O) is a program to optimize the performance of the existing transportation system through real-time management. This program maximizes performance to preserve capacity and improve mobility. In Maryland, the efforts are led by the Coordinated Highways Action Response Team (CHART). CHART is a multi-agency effort to improve mobility for Maryland's highway system through its Advanced Traffic Management System (ATMS), service patrols, communication, system integration, and incident response and management. CHART's mission is to improve mobility and safety using intelligent transportation systems (ITS) devices and interagency teamwork to address non-recurring congestion. Non-recurring congestion includes crashes, vehicle breakdowns, work zones, special events, and weather events. Non-recurring congestion is estimated to account for more than 50 percent of all delays on roadways. The Statewide Operations Center (SOC) in Hanover near BWI Airport, supported by three other regional centers, is the main coordination hub. The SOC and the strategically located Traffic Operations Centers (TOCs) use the previously mentioned ATMS to support CHART's critical functions, including traffic monitoring and incident management. Traffic is monitored using a series of ITS devices. The information is used in conjunction with reports provided by radio communications, local government communications, and traffic signal systems

to both detect and respond to incidents. In addition, CHART is one of 26 agencies from Florida to Maine that are part of the I-95 Corridor Coalition working cooperatively to improve inter-regional travel in the northeast through consensus, cooperation, coordination, and communication. CHART is involved in:

- **Emergency Preparedness** - Redundant Power and Communication, Decentralized Communications and Emergency Operations Center (EOC) Activation and coordination with the Maryland Emergency Management Agency (MEMA).
- **Emergency Weather Operations** - Automatic Vehicle Location Fleet Management System and Resource Tracking System.
- **Incident Management** - Emergency Traffic Patrols, CHART Operations Centers, and Emergency Response Units.
- **Traffic Management** - Special Event and Work Zone Management.
- **Traffic and Roadway Monitoring** - Cell phone #77.
- **CCTV, and Public/Private Partnerships.**
- **Traveler Information** - Maryland 511 Traveler Information System - High-quality, Timely, and Comprehensive Travel Information to Motorists, CCTV Camera Video Sharing with First Responders, and Internet (www.traffic.maryland.gov).



US 40/Rossville Boulevard

In 2016, the CHART program responded to and cleared more than 30,000 incidents and assisted over 42,000 stranded motorists.

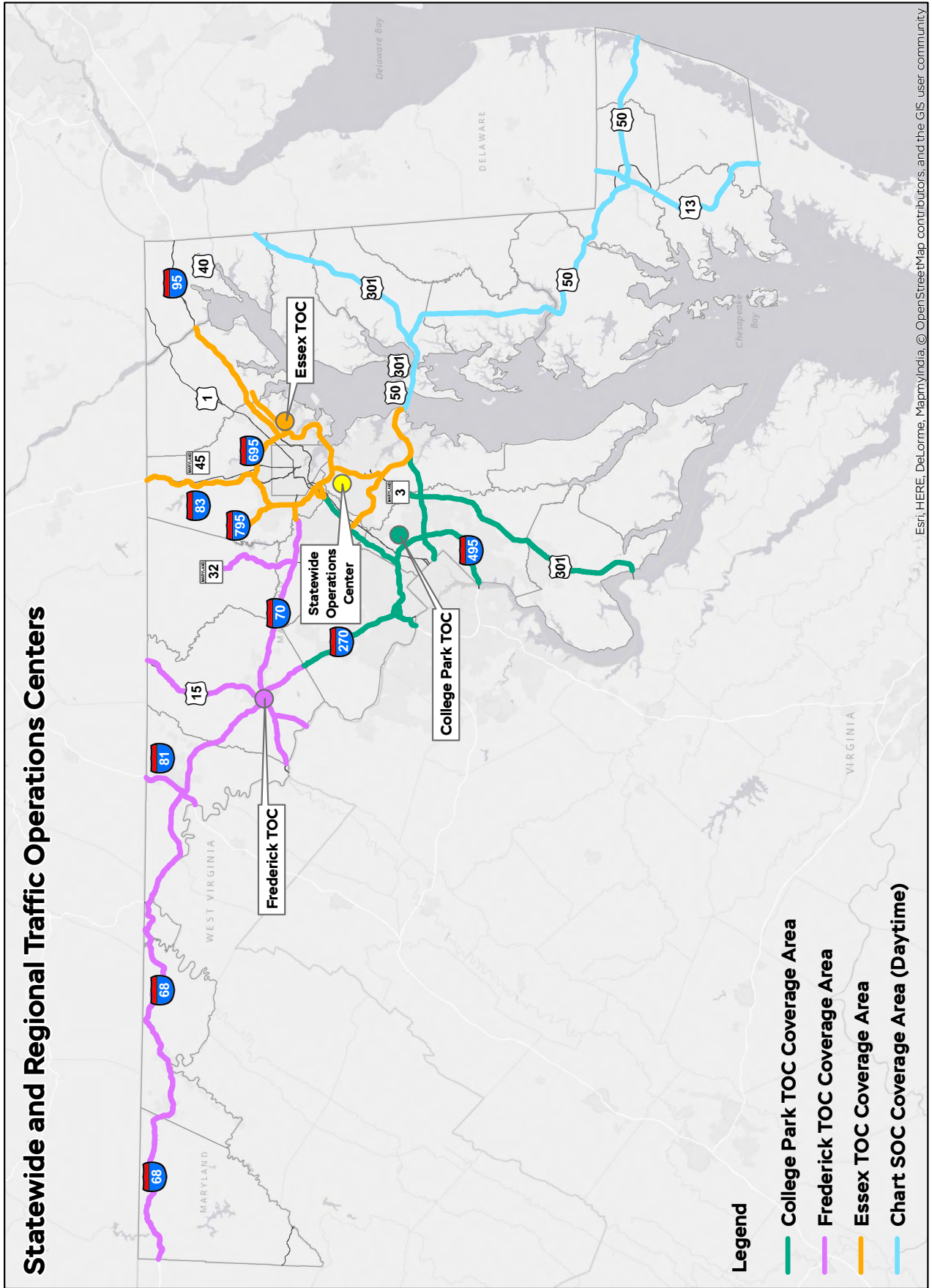
a. CHART Incident Management

CHART has many functions to keep traffic moving along Maryland roadways. One of the key areas is incident management. Traffic incidents require a multi-disciplinary effort to detect, respond, and clear collisions or other traffic impacting incidents so traffic operations can be restored as quickly and safely as possible. Emergency traffic patrols (ETPs) monitor major roadways to assist drivers when their vehicles become disabled or when involved in a crash. These ETP's are assigned to high-volume/high-incident routes and locations to boost the efficiency of the emergency response program. There are currently 46 full-time ETPs in the Baltimore, Washington, Frederick and Annapolis regions that offer various types of motorist assistance on the freeways. These ETPs operate 24 hours a day/seven days a week in the metro areas. In addition, from May through September, extra patrols are assigned to respond to the increased traffic volume traveling to and from Atlantic Ocean beaches and locations on the Eastern Shore. Traffic is monitored using closed-circuit television (CCTV) cameras, speed sensors, and weather stations at the SOC and at regional Traffic Operations Centers (TOCs) located in College Park, Essex and Frederick. The location of the SOC and TOCs along with their coverage areas are shown in Figure II-3. At the time an incident is detected, the necessary information is communicated to emergency service personnel. From the SOC, motorists are then alerted to the incident through the use of dynamic message signs which identify the location of the incident or the travel time along that section of roadway. This allows motorists to make better real-time decisions. The use of incident management and traveler information system initiatives result in roadway users saving billions of dollars in delay savings, wasted fuel, and emissions.

The number of CHART service patrol responses has greatly increased in the past three years due to increase in full-time ETPs. Between 2013 and 2016, the number of responses has grown by more than 50%.

The total number of CHART responses on a yearly basis is illustrated in the Figure II-4.

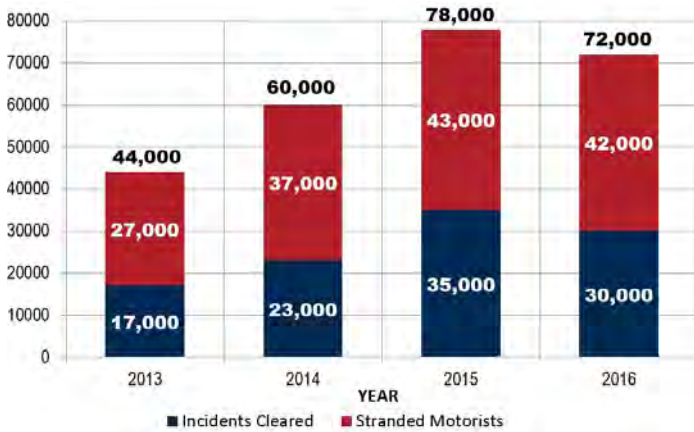
Figure II-3



Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community

Figure II-4

CHART SERVICE PATROL RESPONSES



The type of incident and its time of occurrence can have a wide range on its impact to the travelling public. A broken-down vehicle on the shoulder late at night may not impact traffic operations while a dual-lane closure due to a crash in the peak period would cause major congestion. The more severe the incident, the more important it is for the cooperation of numerous agencies involved with CHART working together to achieve the goal of improving mobility and safety. In order to improve mobility, incidents need to be cleared quickly so that lanes can be reopened as soon as possible. The faster an incident is cleared from the roadway the greater the benefits (reducing delay to the travelling public and minimizing the chance for secondary incidents). Safety is of the utmost importance in protecting those involved in the incident, the emergency personnel responding, and other motorists on the roadway. This is accomplished using detailed incident management plans and procedures to address different situations. Reviews take place regularly to learn from past incidents and put in place new or revised procedures to improve for next time.

CHART has many different resources dedicated to traffic management that include:

- Emergency Traffic Patrols (ETP's), which are used to provide emergency motorist assistance and to clear disabled vehicles from the travel lanes.
- Emergency Response Units (ERU's), which establish overall traffic control at crash locations.
- Freeway Incident Traffic Management (FITM) plans and response trailers, which are pre-stocked with traffic control

The average response time to an incident in 2016 was 11.8 minutes and the average incident took 24.1 minutes to clear.

tools including detour signs, cones, and trailblazer signs that are used to quickly set up pre-planned detour routes when incidents require full roadway closure.

- A "Clear the Road" policy, which provides direction for the rapid removal of vehicles from the travel lanes rather than waiting for law enforcement or private towing services to remove disabled vehicles which are blocking travel lanes.
- An Information Exchange Network (IEN) Clearinghouse, provided through the I-95 Corridor Coalition workstation at the SOC, which shares regional incident and traveler information to member agencies.

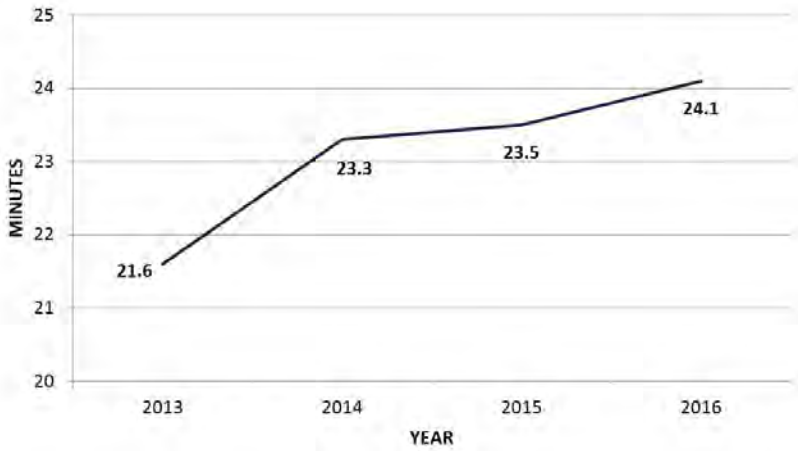
Various factors are evaluated in reviewing the performance of CHART over the past year. This includes the amount of time it takes to respond to an incident, the length to clear that incident, the reduction in delay, and ultimately the annual user cost savings provided by CHART. Figure II-5 depicts the trends of average incident duration and reduction in delay over the last four years.

Especially in the Baltimore-Washington region with already heavy congested conditions, the longer an incident takes to clear the greater the cost associated with the delay experienced by motorists. Every minute in time savings translates into savings in annual user costs. In 2016, the annual user cost savings amounted to \$1.5 billion which is 10% greater than 2015 levels as shown in Figure II-5. Annual user cost includes reduction in delay, savings in fuel, and emissions.

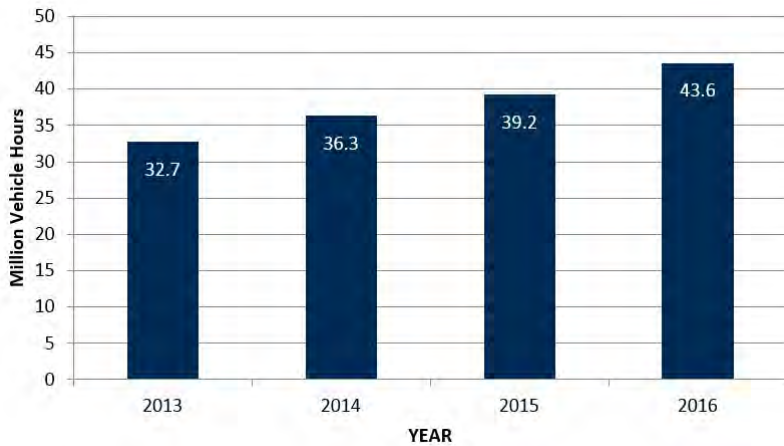
CHART achieved a \$1.5 Billion savings to motorists and reduced delay by approximately 43.6 million vehicle hours.

Figure II-5

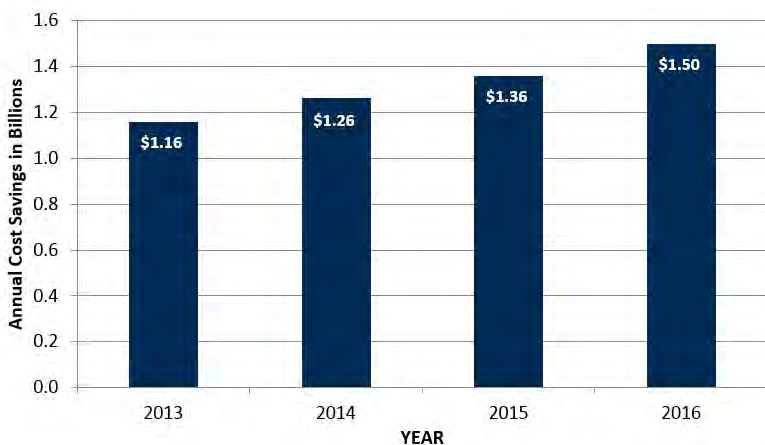
AVERAGE INCIDENT DURATION



REDUCTION IN DELAY



ANNUAL USER COST SAVINGS



Average incident duration in 2016 remained at similar levels as 2015, but the CHART program yielded a 14% reduction in overall delay (compared to 2015). This resulted in more than a 10% annual user savings compared to 2015 levels.



I-95 Cecil County

b. ITS/511

CHART and MDTA collect data from a wide variety of ITS devices that are strategically located throughout the State. This data is disseminated to motorists to allow them to make better decisions, there by reducing congestion and increase mobility. Travel time information is made available based on the analysis of INRIX probe speed data and displayed on more than 200 Dynamic Message Signs (DMS). The Maryland 511 Travel Information System continues to provide useful, high-quality, timely, and comprehensive travel information. These devices are evaluated each year and, based on funding availability, new features are introduced to the system or expansions made in the number of devices. Presently CHART and MDTA have access to:

- 800+ CCTV Cameras which include video feeds from other agencies.
- 300+ Speed Detectors (including those shared through public/private partnerships).
- 200+ Dynamic Message Signs (DMS).
- 60+ Roadway Weather Information Systems (RWIS).
- 50+ Traveler Advisory Radios.
- 15+ Variable Toll Rate Signs