

## Safety Planning

### Background

Safety means the ability to satisfy a trip purpose via any mode of travel without incurring personal harm or damage to property. Safety must be considered as a key goal in the development of metropolitan transportation plans and programs. Great efforts have been made to increase safety in the BCD region and throughout the state. Traffic safety laws have been passed or reinforced to address traveler behaviors. The Seatbelt Law, DUI Law, and driver education programs all are steps that have been made to improve safety on South Carolina’s roadways. Other strategies have involved new roadway designs and the implementation of various Intelligent Transportation System (ITS) technologies. Rumble strips have helped reduced roadway departures, and roadway cameras have helped authorities respond and manage major incidents. Some National, State, and regional statistics are given below to frame the challenges at hand regarding safety problems for varying modes of transportation. Although there have been improvements and the rates of fatalities and injuries have declined on the national level over the years, there are still needed improvements. Design standards, projects, and initiatives to enable motorists, patrons of transit, trucking companies, bicyclists, and pedestrians to safely share the roadways are crucial.

### Federal Mandate

With the passage of SAFETEA-LU in 2005, all states were required to prepare a Strategic Highway Safety Plan (SHSP). Also, SAFETEA-LU requires that “metropolitan transportation plans should include a safety element that incorporates or summarizes the priorities, goals, countermeasures, or projects for the MPO contained in the Strategic Highway Safety Plan required under 23 U. S. C. 148.”

In the CHATS area, efforts have been made to strengthen emergency response and services through coordination. Discussions on safety planning were incorporated into the evacuation planning conducted in the CHATS region. A communication system, response plan, and evacuation plan improved the coordination and communication between emergency response agencies. Key participants in these meetings have been response personnel representing South Carolina Department of Transportation (SCDOT) Incident Management Program and personnel representing the governmental entities of the region. Coordination included the urban transit provider, CARTA, to provide vehicles for evacuation. Additional issues discussed in these meetings include best practices in communication, response time, accident investigation, and efficient removal of stalled or crashed vehicles from the travel way. One important issue is acquiring communication equipment that uses a common frequency. Accomplishments from these meetings will greatly increase the safety and security of motorized and non-motorized uses of the highway system.

The consideration of the goals, performance measures, and planning factors identified in the SC SHSP, regarding the safety of motorized and non-motorized users of the transportation system, are reflected in all aspects of the metropolitan planning process, including the development of the LRTP and the Transportation Improvement Program (TIP). Safety has been factored into the development of the TIP, all short range planning studies, strategic planning studies, and all transportation needs studies.

Safety planning for all users of the transportation system is a priority for CHATS. CARTA has embarked on a transit facilities plan that evaluates bus stops for safe access and furniture needs. Coupled with the Complete Streets initiative, pedestrians, bicyclists, and transit customers will have safe access to the transportation system.

All municipalities within the CHATS area are exploring measures to address safety and the MPO is presently coordinating with these municipalities to include their efforts into the transportation planning process.

Traffic collisions are responsible for billions of dollars in economic loss, yet worse, are the injuries and fatalities associated with these incidents. **Table 8.1** presents national statistics on traffic crashes for 2002, 2005, and 2008.

**Table 8.1  
Annual Traffic Related Accidents: 2002, 2005 and 2008**

	2002	2005	2008
Total Fatalities	42,815	43,443	37,261
Total Injuries	2,926,000	2,699,000	2,346,000
Crashes that Resulted in Property damage:	4,348,000	4,304,000	4,146,000
<b>Non-motorists</b>			
Pedestrians killed	4,808	4,749	4,378
Pedestrians injured	71,000	70,000	69,000
Bicyclists killed	662	622	716
Bicyclists injured	48,000	46,000	52,000

**2000 Economic cost of traffic crashes**

**(2000)- \$230.6 billion**

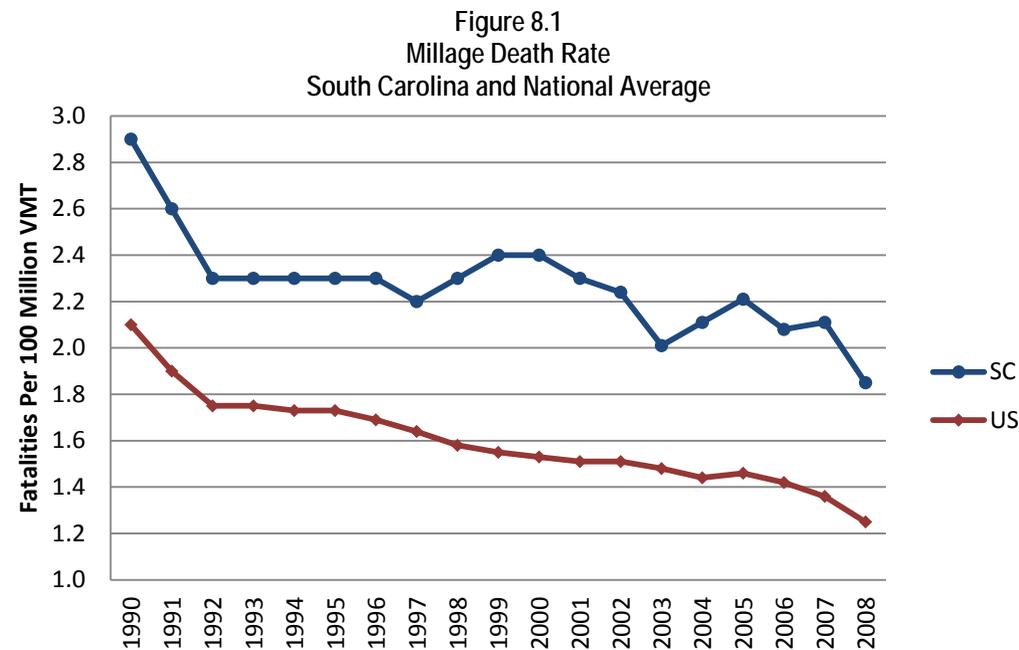
Source: National Highway Traffic Safety Administration (NHTSA) National Statistics

As evidenced by the table, traffic related fatalities and injuries as well as property damage resulting from vehicular accidents has decreased since 2002. However, bicycle related injuries and fatalities have increased over this same timeframe. Pedestrian fatalities and injuries have remained relatively constant.

### Statewide Traffic Incidents

South Carolina ranked well above the national average for fatal accidents, as shown in the subsequent graph, which displays the South Carolina millage death rate or traffic fatalities per 100 million vehicle miles traveled (VMT) compared to national averages. In fact, according to 2008 statistics, there is a fatal accident every 9.5 hours in the State of South Carolina (2005 data). Secondary roads accounted for 72 percent of the traffic fatalities. A major objective of the SHSP targets safety improvements on secondary roadways. In 2007, this target on safety was institutionalized by in a 2007 legislative action that added safety as a weighted criteria for ranking transportation projects statewide. Additionally, South Carolina is ranked number four in the nation for the rate of pedestrian fatalities per 100,000 people<sup>1</sup>. South Carolina is preceded by Florida, Delaware, and Louisiana, respectively, in this listing.

Source: South Carolina Budget and Control Board, Federal Highway Administration



### MPO Regional Crash Statistics

According to 2008 traffic fatalities data obtained from the South Carolina Department of Public Safety, of the 46 counties in South Carolina, both Berkeley and Charleston Counties are ranked within the top ten counties for total traffic fatalities. These top ten counties account for nearly half of the total traffic fatalities in South Carolina. Charleston County was ranked third, preceded by Greenville and Lexington Counties. Berkeley County was ranked number eight, closely following Richland and Florence Counties. Nearly 60% of these fatal traffic accidents occurred on primary arterials. Furthermore, according to 2007 traffic collision data, Charleston County had the most traffic collisions with, 11,872; a number that was just slightly more than the number two and three counties, Greenville (11,425) and Richland (10,905). In fact, Charleston County has been the number one ranking county for traffic collisions since 1999. Additionally, Charleston County had the most injury collisions and persons injured, with 3,228 and 4,687, respectively, in 2008. The high number of collisions in Charleston County is largely a result of the large population and larger amounts of travel compared to other SC counties. Berkeley County and Dorchester County ranked 10<sup>th</sup> and 13<sup>th</sup> in the State, respectively. According to statistics from the South Carolina Department of Public Safety, the majority of accidents in the BCD region occurred on secondary roadways. A major objective of the SHSP targets safety improvements on secondary roadways. This target on safety was institutionalized in a 2007 legislative action that added safety as a weighted criteria for ranking transportation projects statewide.

Table 8.2  
2008 Motor Vehicle Traffic Collisions by County

COUNTY	Collision Type			Total	Persons	
	Fatal	Injury	PDO*		Killed	Injured
Berkeley	37	992	2,408	3,437	41	1,536
Charleston	55	3,228	8,589	11,872	59	4,687
Dorchester	23	700	1,922	2,645	25	1,040

Source: 2008 Traffic Collision Fact Book, South Carolina Department of Public Safety

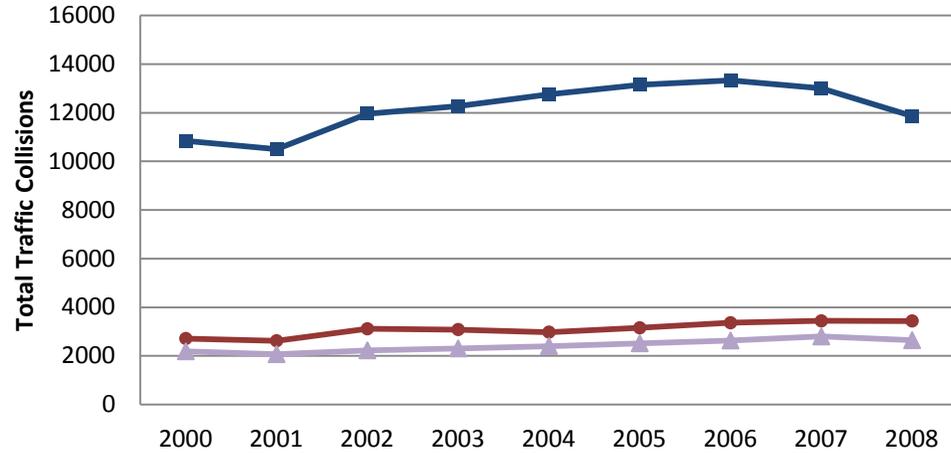
\*Property Damage Only

Figure 8.2 displays the total amount of traffic collisions for the BCD region from 2000 to 2007. After increasing at a decreasing rate since 2005, the total number of traffic collisions in Charleston County displayed a slight decline in 2008. Furthermore, Berkeley County has displayed only marginal fluctuations in total traffic accidents and Dorchester County has remained relatively constant during this same timeframe. These trends have occurred despite annual increases in daily vehicle miles traveled (VMT). In fact, from 2002 to 2007, total traffic collisions in the BCD region have increased by 10% whereas daily vehicle miles traveled have increased by 14%. Despite slight improvements in transportation safety, the percentage of traffic accidents involving pedestrians or bicyclists from 2000 to 2006 has remained moderately unvarying.

**Figure 8.3** displays the distribution of traffic related fatalities in the BCD region for 2008. Over 45% of fatalities involved the influence of alcohol, with a blood-alcohol level exceeding the legal limit. Furthermore, over 60% of total fatalities resulted from single-vehicle accidents. Nearly 40% of total fatalities involved cargo trucks. Lastly, nearly 20% of total fatalities resulted from vehicle and pedestrian or bicyclist collisions.

Existing Conditions

**Figure 8.2**  
Total Traffic Collisions  
BCD Region



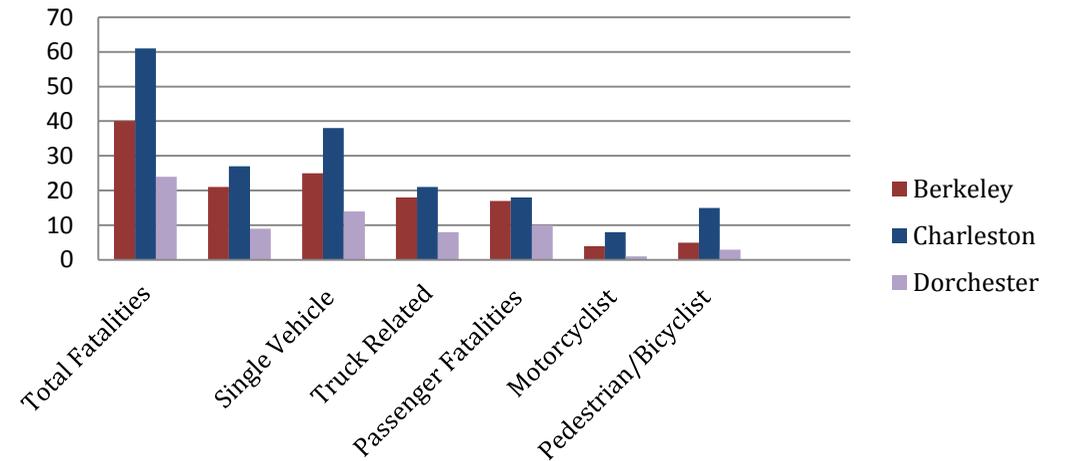
*High Crash Locations*

The MPO compiled information from the SC Department of Public Safety to identify high crash locations on major roadways in the Region. Although data were not analyzed by MPO staff in order to determine the specific causes of crashes at particular locations, the following observations were made:

- Most of the high crash locations listed were located at isolated spots or intersections rather than on longer segments of roadways; and
- More high crash locations occurred on uncontrolled access roadways than on controlled access roadways such as interstates, particularly secondary roads.

From a policy and programming perspective, the MPO seeks to address high crash locations by funding safety-conscious design principles into roadway improvement projects that are planned in order to promote safe transportation facilities for all modes of travel. Based on the observations above, perhaps one of the single most important elements that can be addressed to improve safety is access management. Access management consists primarily of limiting the number driveways and conflict points on the roadway system and serves to both reduce the number of crashes as well as

**Figure 8.3**  
2008 Traffic Fatalities  
BCD Region



reduce congestion.

More information on high crash locations and maps can be found in Chapter 3 of this document.

*Safety in Transit Operations*

Local transit agencies have always placed an emphasis on providing a safe, secure, and reliable service for its passengers and employees. These efforts are continuing and are an integral part of providing transit service. While transit must be concerned about safety as it relates to the provision of service, transit itself can be a valuable resource to a community in providing rescue or evacuation services. Local transit providers participate as part of the larger community emergency preparedness efforts. Basic goals of transit agencies in regards to safety and security include:

- Being prepared for and well-protected against attacks;

- Being able to respond rapidly and effectively to natural and human-caused threats and disasters;
- Being able to appropriately support the needs of emergency management and public safety agencies; and,
- Being able to quickly and efficiently be restored to full capability

### *Safety Planning Progress*

Many steps have been taken to improve safety in the transportation system in the CHATS Region. In February 2007, the state adopted a Strategic Highway Safety Plan with the mission to develop, implement, and manage an integrated multi-stakeholder process to improve highway safety.

### *Safety Planning Issues*

- Some of the challenges involved in planning for safety include creating an innovative region-wide and/or state-wide system for collecting, analyzing, and sharing important information like crash data and integrating safety conscious planning into long range planning and short-term programs. Some other issues surrounding incorporating safety in the LRTP are as follows:
- Recognizing regional safety needs and local isolated problems;
- Building stakeholder partnerships;
- Continuing multi-agency coordination and communication;
- Disseminating important real-time incident information to motorists;
- Implementing design factors in new infrastructure that enhances the safety and extends the life of structures, minimizing construction zone periods;
- Improving interconnectivity of the transportation system, across and between modes, for people and goods;
- Implement Complete Streets concepts;
- Address safety issues at railroad crossings;
- Improving the accessibility and safety of transit stops and transfer points;
- Continuing efforts to promote truck safety such as restricted lanes, speed limits, and proper loading to prevent turnovers;
- Implementing ITS technologies on transit and emergency vehicles; and
- Finding financial resources to fund safety improvements

The State of South Carolina SHSP details five emphasis areas that will be focused on to obtain its mission. The CHATS MPO is a partner in this endeavor and will work cooperatively to achieve the mission.

1. Serious Crash Types
2. High Risk Drivers
3. Special Vehicles
4. Vulnerable User
5. Management Information

### *Safety Conscious Planning*

Regional- growth strategies, major network strategies, etc.;

- City/County- community plans, zoning and subdivision regulations, transportation plans, etc.;
- Small area plans- sector/neighborhood plans, area transportation strategies, corridor and access management strategies, pedestrian and bicycle facilities development, etc.; and
- Site- site plan review, site impact studies, etc.

Safety conscious planning is needed in land use planning decisions and processes to influence policies that shape the direction of land uses to the specifics of urban form, mix, and density of use. Safety conscious planning is also an integral part of transportation planning for all modes of travel in order to shape the amount of travel as well as the mix of transportation modes.

The following strategies have been identified to address safety issues in the CHATS planning area. These strategies will be implemented, as appropriate, in the land use planning phase, LRTP policies and project selection, TIP project selection, or project design, construction, and operation.

### *Strategies*

- Vehicle and pedestrian crash data analysis (CHATS)
- Bicycle LOS study, with safety as core element (CHATS)
- Project review by the CHATS Facility Design Committee (CHATS)
- Implement Complete Streets criteria (CHATS)
- Implement SHSP Educational Programs (SCDOT)
- Continue Safe Routes to School Program (CHATS)
- Roadway Incident Management (SCDOT)
- Improve Intersection Safety (SCDOT)
- Improve Work Zone Safety (SCDOT)
- Freight Movement Planning (CHATS / SCDOT / Truckers Assoc.)
- Improve Driver Behavior (SCDOT / SC Dept of Public Safety)
- Legislation (SC Government)
- Roadway/Intersection Lighting (SCDOT)
- Shoulder Rumble Strips and Striping (SCDOT)
- All Weather Pavement Markings (SCDOT)
- Longitudinal and Median Barriers (SCDOT)
- Speed appropriate Road-Side CHATS / SCDOT)
- Guardrail placement and End Treatment Upgrades (SCDOT)
- Highway signage (e.g. chevrons for problem curves, etc.) (SCDOT)
- Raised pavement markers (RPMs) (SCDOT)
- Roadway Design (FHWA / SCDOT / CHATS)
- Achieve Safety through Design and Technology (SCDOT / CHATS)
- Enforcement (SC Dept. of Public Safety)
- Work Zone Safety programs (SCDOT)

- Educate Young drivers and Elderly Drivers (SC DMV)
- DUI and Aggressive Driving Prevention (SC Dept. of Public Safety)
- ITS and Emergency Response (SCDOT / Municipalities)
- Safe Access to Transit Facilities (Transit Providers / Municipalities)
- Pedestrian Facilities (SCDOT / CHATS / Municipalities)

### *L RTP and TIP Project Selection*

The project selection criteria for the Long Range Transportation Plan include safety as a prioritization factor. The MPO requires that all parties pursuing projects funded with federal funds show how the project meets the goals and objectives of this plan, including Safety.

### *Interagency Consultation*

The primary objective of the safety goal is to work with state and local agencies and transportation providers to identify needs and facilitate improvements. Building partnerships with stakeholders is important in the following areas:

- Developing and implementing short-term strategies that enhance the safety for all users of the transportation system;
- Creating policies and design practices that are consistent with an efficient and safe multimodal transportation network;
- Developing an information system for compiling, accessing, and analyzing crash data; and
- Establishing a long-term vision that enhances the safety of all citizens.
- The development of the SHSP Plan included a number partners and interagency coordination. These partners came together to draft this plan.

### *Hazard Mitigation*

Natural and man-made hazards are a constant concern in the BCD Region as they pose a threat the health and safety of the population, economic vitality, and environmental quality. Currently, 19 roadways within the BCD region are designated as evacuation routes by the South Carolina Department of Transportation. This network of routes, consisting of interstates as well as US and state Highways, directs motorists to the midlands of South Carolina. The roadways that are designated as evacuation routes per SC DOT are as follows:

Table 8.3  
Designated Evacuation Routes in the BCD Region

<b>Interstates</b>	SC 165
I-26	SC 171
I-526	SC 61
<b>US Highways</b>	SC 517
US 17	SC 6
US 52	SC 642
US 78	SC 402
US 178	SC 45
US 176	SC 41
<b>South Carolina Highways</b>	SC 700
SC 174	Bohicket Road (SC 20)
SC 64	SC 703

Source: SCDOT

As these routes can become congested, lane reversals extending from I-26 near the onramps of I-526 from Mount Pleasant and West Ashley through the intersection of I-77 near Columbia are instituted in order to increase mobility.

Having an efficient plan of evacuation is essential in promoting regional resilience. Highly resilient communities anticipate disturbances, reduce vulnerabilities, respond effectively to disturbances, and recover rapidly with minimized downtime to community, government, and business services. In 2007, Charleston became a partner in the Community and Regional Resilience Initiative (CARRI) to collaboratively devise the strategies necessary to enhance community resilience. A CARRI Charleston Advisory group was devised in 2008 and consists of local government officials and representatives from CARTA and TriCounty Link, local police departments, SC DOT, non-profit and faith-based organizations, as well as the business sector, which collectively play a vital role in the community, identified transportation, and mobility as a priority area for improvement in regional resilience.

This prioritization was based on the ability for individuals' to meet basic human needs and a community's ability to maintain cultural and social capital, as well as recover its economic capacity after a natural or man-made disaster. The Advisory Group identified the following deficiencies in the current transportation system that hinders community resilience:

- The tri-county has 761 bridges and overpasses, approximately 100 of which are considered substandard. These would almost certainly be destabilized, with some rendered unusable under certain disaster scenarios – particularly seismic events. Furthermore, although there is high potential for severe seismic events in the area (the threat of a major earthquake is statistically the same as for a hurricane), we do not have good data on the safety of existing or proposed roads with respect to seismic events
- Dependence on major high-volume arteries such as I-26, I-526, US 17, and Alt. US 17, as well as other critical connectors like US 52, US 78, SC 61, and US 176 retards mobility and resilience if these routes are compromised as many jobs are concentrated in Charleston County.
- The Charleston International Airport, located in North Charleston accommodates both commercial airlines and the Charleston Air Force Base—a major employer in the region. Additionally, the airport area is a major manufacturing center in the region housing companies such as Boeing. The airport, which serves more than 1.4 million passengers annually, is located directly over the most geographically disturbed area in the earthquake fault zone. (The Charleston area is the site of an active seismic zone. The Woodstock Fault runs through a 25 mile x 15 mile oval known as Middleton Place-Summerville Seismic Zone, which includes the airport.)

Furthermore, the Advisory Group identified the following measures to address regional transportation congestion and system vulnerabilities relative to disaster response and recovery (specifically for hurricane, earthquake, and pandemic scenarios):

- Identify and consider critical connector roads that link outlying population centers to high-density areas
- Assess adequacy of designated evacuation routes
- Identify particularly vulnerable bridges and overpasses
- Identify post-event alternative transportation options for post-event response and recovery including use of the port and navigable waters (such as the Cooper river) to ensure mobility of people, goods, and services during response and recovery, and
- Consider potential transportation effects of other types of scenarios/disasters besides hurricanes (ex, chemical spills).
- Both light and heavy rail have been discussed as options for future mass transit in the Tri-County areas. Given infrastructure that already exists, Heavy rail would allow use of existing infrastructure and give more transportation options.
- Adoption of policies which support a diversification of transportation modes coordinated with land use planning
- Encourage ridership of mass transit and enhance existing mass transit services.

The Berkeley-Dorchester Hazard Mitigation Plan (BDHMP), updated in 2010, delineates the planning process for the implementation of projects and programs that will avoid or reduce vulnerabilities and make the communities of Berkeley and Dorchester counties more resilient to the impacts of potential hazard events. The Disaster Mitigation Act of 2000 requires that local jurisdictions and states devise a FEMA-approved hazard mitigation plan to receive funding through the Hazard Mitigation Grant Program, which is implemented under Section 404 of the Stafford Act. This amendment shifts emergency management programs away from the response and recovery role and encourages a mitigation protocol where potential hazards are identified and prepared for in order to ameliorate harm to individuals and property. Through the development of the BDHMP, participating jurisdictions created Mitigation Action Plans, where transportation improvements were a reoccurring theme for prioritization of the incorporation of hazard mitigation measures. Similarly, the Charleston Regional Hazard Mitigation Plan, updated in 2008, identifies vulnerabilities and outlines goals to minimizing losses associated with hazards. Resilience of the transportation system was a reoccurring theme for improvement.

### *Hazardous Materials*

Hazardous material releases or spills mainly occur along transportation routes, per ships, trains, or trucks, or at hazardous storage locations. Interstates 26, 95 and 526 are the most frequently used routes to transport materials to and from points within the BCD region’s industrial and urban areas and are the most vulnerable to hazardous material releases due to the high travel demand of these roadways. The Port of Charleston and many railway corridors are also vulnerable to hazardous material releases due to their vital economic contributions. Emergency medical services personnel of Charleston, Berkeley, and Dorchester Counties are trained in hazardous material operations.

### *Incident Management*

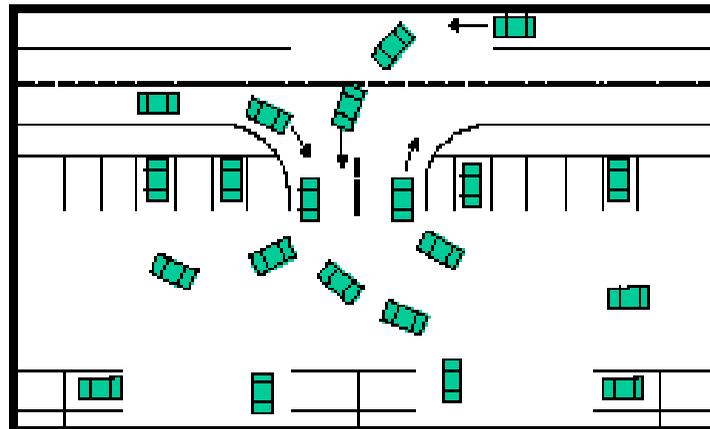
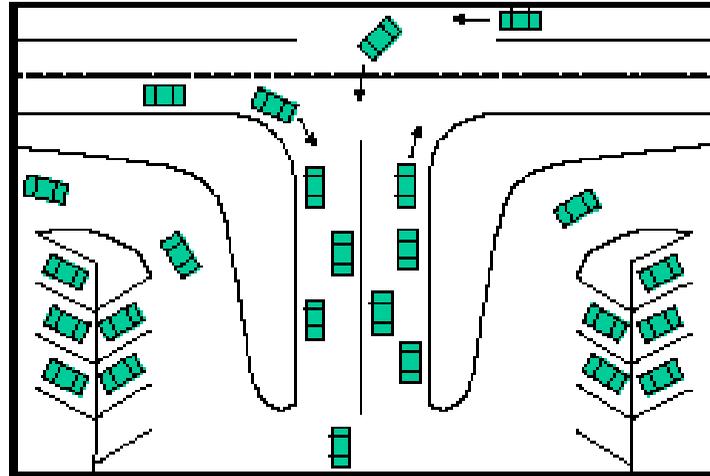
Statistics convey that traffic incidents cause nearly 25 percent of total delay on roadways because of a reduction in capacity. For instance, a lane blockage on a three-lane arterial can reduce total capacity by nearly 50%. Furthermore, if a lane blockage occurs when a roadway is already meeting its capacity, for instance, during peak-hour travel demand, congestion will not be ameliorated after the incident is cleared but after travel demand into the roadway decreases. One additional minute of lane blockage yields four additional minutes of congestion as traffic accumulates into the roadway. Additionally, lane blockages can lead to secondary incidents such as crashes and stalled vehicles due to running out of gas. The Federal Highway Administration (FHWA) has developed a Traffic Incident Management (TIM) program to assist state and local transportation agencies in reducing the time it takes to restore capacity following a traffic incident. TIM is a planned and coordinated process to detect, respond to, and remove traffic incidents and restore capacity as safely and quickly as possible. Quick and coordinated clearance increases safety for travelers and incident responders. Promoting more aggressive and widespread traffic incident management is an important strategy to improve system resilience as well as promote the safety of motorists.

SCDOT Incident Response, formerly known as SHEP, is available to serve motorists of select areas of the BCD region by providing minor repair services to disabled vehicles, traffic control and incident management during emergencies, as well as first aid to individuals injured in traffic accidents until the arrival of emergency medical services.

#### *Access Management*

As development continues to occur along major highways and prominent corridors, protecting the through capacity of these corridors will be increasingly important. Some major highways in cities and towns are reaching or already have reached the practical limits of widening and major improvement. Other corridors can be widened, but the cost of doing so is prohibitive or controversial.

Development already located along roadways is unlikely to willingly remove points of access. Meanwhile, new development will continue to locate along highways and seek direct driveway access. The increasing number of driveways and intersections will create more points of conflict, create additional points of congestion, and effectively reduce the through capacity of many of the most important travel corridors. Implementing access management policies and constructing measures has the potential to create a balance between the need for access to the transportation system and the desire to promote the safety of the many users of the transportation system as well as maintain mobility of major corridors.



With minor improvements or direct changes to driver behavior, more efficient use can be made of the existing transportation system. Minor improvements may include the construction of additional turn lanes, installation of updated or advanced signal equipment, installation of intelligent transportation systems (ITS), and identification of alternative travel patterns. Other measures to control traffic flow include: median U-turn treatment, traffic monitoring, Non-traversable medians, adaptive signal control, one-one-way frontage roads, offset left turn treatment, left-turn storage bays, minor street approach improvements, intersection and driveway curb radii, emergency vehicle preemption, minor street approach improvements, number of driveways, driveway throat length, and driveway placement and relocation.

#### *Real-Time Traveler Information Program*

511, a nationally designated telephone number, provides current information about travel conditions, allowing travelers to make better choices including time of travel, mode of transportation, and route. 511 was designated in 2000 by the Federal Communications Commission (FCC) for the dispersal of travel information available to states & local jurisdictions across the country. However, the FCC ruling leaves nearly all implementation issues & schedules to state & local agencies & telecommunications carriers. There are no Federal requirements or mandates to implement 511. Currently, no 511 services are provided in South Carolina. CARTA intends to equip 25 bus shelters that are planned for construction throughout the Charleston Metropolitan Area with real time traveler, bus location software to keep awaiting passengers informed of arrival times.