



SOUTH CAROLINA SAFETY DATA IMPROVEMENTS THROUGH ELECTRONIC CRASH SYSTEM DEPLOYMENT

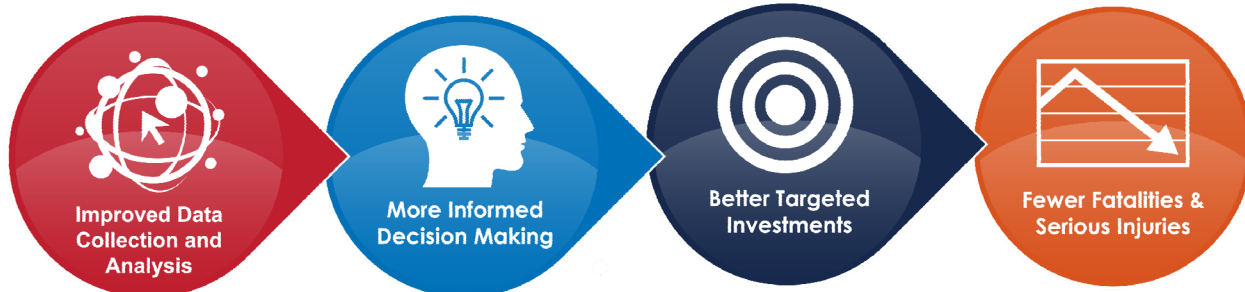
ROADWAY SAFETY DATA AND ANALYSIS

CASE STUDY
FHWA-SA-16-109

Federal Highway Administration Office of Safety

Roadway Safety Data Program

<http://safety.fhwa.dot.gov/rsdp/>



November 18, 2016

Notice

This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the use of the information contained in this document.

The U.S. Government does not endorse products or manufacturers. Trademarks or manufacturers' names appear in this report only because they are considered essential to the objective of the document.

Quality Assurance Statement

The Federal Highway Administration (FHWA) provides high-quality information to serve Government, industry, and the public in a manner that promotes public understanding. Standards and policies are used to ensure and maximize the quality, objectivity, utility, and integrity of its information. FHWA periodically reviews quality issues and adjusts its programs and processes to ensure continuous quality improvement.

TECHNICAL DOCUMENTATION PAGE

1. Report No. FHWA-SA-16-109	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle South Carolina Safety Data Improvements through Electronic Crash System Deployment: Roadway Safety Data and Analysis Case Study		5. Report Date Month Year	
		6. Performing Organization Code	
7. Author(s) Robert A. Scopatz and Richard Brown		8. Performing Organization Report No.	
9. Performing Organization Name and Address VHB 8300 Boone Blvd., Suite 700 Vienna, VA 22182-2626		10. Work Unit No.	
		11. Contract or Grant No. DTFH61-10-D-00022	
12. Sponsoring Agency Name and Address Federal Highway Administration Office of Safety 1200 New Jersey Ave., SE Washington, DC 20590		13. Type of Report and Period Draft Report ,October 2016–	
		14. Sponsoring Agency Code FHWA	
15. Supplementary Notes The contract manager for this report was Esther Strawder.			
16. Abstract The South Carolina Department of Transportation (SCDOT) and the South Carolina Department of Public Safety (SCDPS) implemented the South Carolina Collision and Ticket Tracking System (SCCATTS), a long-term initiative to improve law enforcement data quality. SCCATTS supports decision making with quality data and efficient data sharing among stakeholders. The benefits of SCCATTS include providing a standardized way for law enforcement to process crash and citation data through a streamlined electronic process, obtaining more timely, accurate, and complete crash and citation data, data-driven decision-making, and delivering data to stakeholder agencies electronically, further eliminating the paper-based process.			
17. Key Words: safety data, electronic crash report, citation data, crash data		18. Distribution Statement No restrictions.	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 15	22. Price

Form DOT F 1700.7 (8-72) Reproduction of completed pages authorized

TABLE OF CONTENTS

INTRODUCTION	1
BACKGROUND.....	1
OBJECTIVE	2
AUDIENCE.....	2
DEVELOPMENT OF SCCATTS.....	3
RESULTS	5
FUNDING	5
BENEFITS	5
BARRIERS AND HOW THEY WERE OVERCOME.....	7
LESSONS LEARNED.....	7
NEXT STEPS.....	7
REFERENCES.....	8
AGENCY CONTACT INFORMATION	8

List of Figures

Figure I. Point and click location interface for SCCATTS..... 4

ACRONYMS

DDACTS	Data Driven Approaches to Crime and Traffic Safety
LRS	Linear reference system
LTAP	Local Technical Assistance Programs
MOA	Memorandum of agreement
MPO	Metropolitan Planning Organizations
RIMS	Roadway Inventory Management System
RPC	Regional Planning Commissions
SCCATTS	South Carolina Collision and Ticket Tracking System
SCDMV	South Carolina Department of Motor Vehicles
SCDOT	South Carolina Department of Transportation
SCDPS	South Carolina Department of Public Safety
TRCC	Traffic Records Coordinating Committee
TTAP	Tribal Technical Assistance Programs

EXECUTIVE SUMMARY

The South Carolina Department of Transportation (SCDOT) and the South Carolina Department of Public Safety (SCDPS) implemented the South Carolina Collision and Ticket Tracking System (SCCATTS), a long-term initiative to improve law enforcement data quality. SCCATTS supports decision making with quality data and by efficiently sharing data among stakeholders. The benefits of SCCATTS include providing a standardized way for law enforcement to process crash and citation data through a streamlined electronic process, obtaining more timely, accurate, and complete crash and citation data, data-driven decision-making, and delivering data to stakeholder agencies electronically, eliminating the paper-based process.

INTRODUCTION

South Carolina sought to improve the quality of crash data for more than 20 years, but data quality problems persisted despite numerous projects implementing new technology. The State found it particularly concerning that they were unable to pinpoint crashes based on the location information collected by officers in the field. The State could not use its linear referencing system (LRS) to locate crashes, which hindered safety analyses that required integrated crash, roadway, and traffic data. Law enforcement agencies' use of Global Positioning System (GPS) devices to gather location coordinates did not meet South Carolina Department of Transportation's (SCDOT) accuracy requirements because, in too many cases, the system recorded the crash location as where the officer completed the report.

In December 2005, South Carolina passed a primary seatbelt law, which made the State eligible for approximately \$10 million in grant funds. SCDOT and the South Carolina Department of Public Safety (SCDPS) used this new funding to implement the South Carolina Collision and Ticket Tracking System (SCCATTS), a long-term initiative to improve law enforcement data quality. SCCATTS supports decision making with higher quality data and more efficient data sharing among stakeholders. The State Traffic Records Coordinating Committee (TRCC) supported this initiative, which led to the development of a number of related projects aimed at tracking and improving data quality.

The purpose of this case study is to highlight the methods used for deployment, training, and implementation of SCCATTS and document its benefits to law enforcement, crash data management, and highway safety programs.

BACKGROUND

SCCATTS began in 1997 as a project outlined by the State's Traffic Records Steering Committee (the predecessor to today's TRCC). Lack of funding and approvals stalled the initial SCCATTS effort. After almost a decade, and through the support of a re-formed TRCC, SCDPS and SCDOT used a commercial off-the-shelf software program to provide an electronic data capture solution for crash, personal contacts, and citation data. The two agencies also collaborated to provide funds for in-car computers and associated hardware to the SC Highway Patrol and over 100 local law enforcement agencies.

Before the initiative, South Carolina had attempted to address a number of crash data management issues, including:

- Poor location accuracy provided on crash reports and incompatibility with the SCDOT LRS.

- Outdated Adaptable Data Base System (ADATABASE) system that provided the data to SCDOT for their Roadway Inventory Management System (RIMS) just once a year.
- Backlogged manual crash data entry over 60 days.
- Complex and time-consuming processes for passing paper crash reports between SCDPS, SCDOT, and the South Carolina Department of Motor Vehicles (SCDMV). The multiple steps in handling crash reports also increased the likelihood of errors and inconsistencies among the agencies' versions of the data.

SCCATTS eliminated paper reporting and manual data entry, and improved efficiency by supporting simultaneous access by multiple agencies. SCCATTS is more than just the crash data repository. It provides a solution for law enforcement agencies to use the SCDOT LRS to map the crash location. This makes it simpler for the State to link crash data with roadway inventory and traffic volume data. The system also stores the collision data for the State and creates aggregate reports for any data element within the system. SCCATTS applies business rule validations and edit checks for the State's police crash report form, public contacts, and the Uniform Traffic Ticket. SCCATTS sends the raw data back to the law enforcement agencies and interfaces with SCDOT, SCDMV and other stakeholder agencies' systems. The result is improved access to more timely, accurate, and complete data that adheres to a statewide uniform standard and is integrated with existing safety data systems and analysis tools.

OBJECTIVE

SCCATTS meets the following objectives:

- Provide a standardized way for law enforcement to process crash and citation data through a streamlined electronic process.
- Avoid costs for licensing and hardware for the investigating agencies.
- Obtain more timely, accurate, and complete crash and citation data.
- Provide law enforcement agencies with simple reporting tools that encourage data-driven decision making.
- Deliver data to fellow stakeholder agencies through an electronic system, thereby eliminating the paper-based processes.

AUDIENCE

This case study will be of interest to the following audiences:

- State, and local law enforcement agencies.

- State Departments of Transportation: especially the Safety Engineering, Design, Planning, Maintenance, GIS, and Asset Management Units.
- City and County Public Works/Engineering/Transportation Departments, Metropolitan Planning Organizations (MPO), and Regional Planning Commissions (RPC).
- Traffic Records Coordinating Committees.
- Local and Tribal Technical Assistance Programs (LTAP and TTAP).
- University-based and private consultants involved with safety.

DEVELOPMENT OF SCCATTS

South Carolina began attempts to start this project in the late 1990s, but funding was lacking. Once the primary seatbelt law passed, the State used Section 406 Occupant Protection Incentive Program grant funds to move the project forward. In August 2007, SCDPS hired a dedicated project coordinator. In September 2007, the State's TRCC was re-formed and actively promoted the creation of SCCATTS. Agency leads from the SCDOT, SCDPS, SCDMV, South Carolina Judicial Department, and South Carolina Department of Health and Environmental Control backed the new SCCATTS initiative led by SCDPS and SCDOT.

In the process of creating the scope for the project, SCDPS consulted users and technology leaders within the SCDPS and SCDOT, crash data system managers, State and local law enforcement, roadway data managers, the traffic engineering section within SCDOT, and data entry operators who were responsible for both manual data entry and quality control. These system users recommended requirements for a system that supported field data collection and allowed for future expansion. SCDOT used the police crash report form, the instruction manual, and map layers from the State-maintained roadway file as primary sources for creating the crash data collection tool.

The crash report form and the manual provided most of the business rules for the SCCATTS data collection screens. There are 242 fields on the crash report form. Data definitions specify the field type, character length, and validation rules. SCCATTS implements validation rules as edit checks prompting the officer to verify or correct any data value that fails to meet any of the validation rules. Throughout application development, law enforcement suggested creating data elements that they could enter once and then use to populate multiple data fields on the form. This saved officers' time in filling out the report. On average, these improvements decreased the roadside time for police crash investigation from 33 minutes down to 12 minutes. Some of the same data elements were also shared between crash, citation, and personal contact forms saving the officers even more time at the scene.

With the mapping solution, SCDOT and SCDPS both understood the need for accurate location data. In 2007, before the new system was in place, the SCDOT location database

included only State-maintained roadways. SCDOT worked with several municipalities to create a map file with data layers showing line work for all State-maintained roads with county ID, route type, and route number, plus a county-supplied E-911 layer that included the street names for all local streets. With complete location information on all public roads, law enforcement officers using SCCATTS can pinpoint the crash location on the map that pops up as part of the location data entry section of the crash report form. A single mouse-click not only provides accurate latitude/longitude on the report, but also populates the other location information data fields on the crash report (names of roadways, distances from intersections, route type, route number, and county). Figure I shows the final product as officers see it in the field.

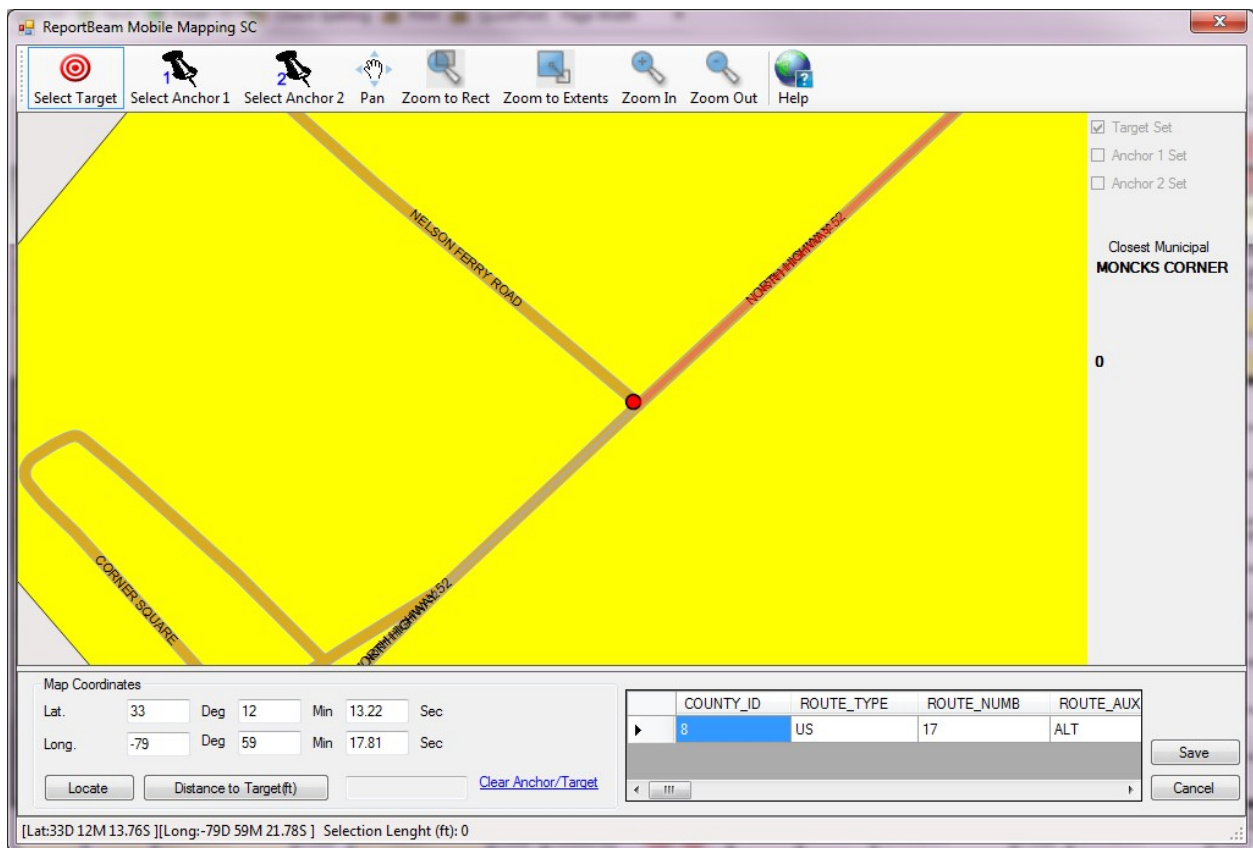


Figure I. Point and click location interface for SCCATTS.

Law enforcement officers can also use the line work from the mapping application as a basis for the crash scene diagram, saving time and reducing errors.

SCDPS purchased 832 mobile computing solutions for the South Carolina Highway Patrol (SCHP), which included laptop computers, printers, and barcode scanners for reading information coded on driver licenses and vehicle registrations. Members of the SCDPS Office of Highway Safety and Justice trained members of the SCHP for a pilot deployment in November

2009, and for four local law enforcement agencies in June 2010. After completing the pilot studies, the SCDPS staff began training SCHP troops in all seven Districts, as well as any interested law enforcement agencies that already had sufficient hardware available to their officers. In 2012, the State began providing hardware to other local law enforcement agencies prioritized based on the number of crashes investigated per year. SCDPS drafted a memorandum of agreement (MOA) for State and local law enforcement agencies requiring the agencies to use the State-provided software in exchange for computer hardware.

A key goal of SCCATTS was to eliminate the need for paper reports and manual handling of the hard copy documents. SCDPS and SCDOT attempted one of the first data exchange efforts in 2011. SCDPS transformed the data into an acceptable format for importing into RIMS. Since SCCATTS houses the State collision master file, it also merged these files with all electronically submitted crash reports and the remaining paper reports that the data entry team keyed. As a result, the data transfer included all crash data, not just the electronically reported data. Since that time, SCDPS has supported electronic data transfers from the SCCATTS servers to State and local law enforcement and local engineering agencies. Today, the State collects 80 percent of its crash reports electronically, and this effort will continue to incrementally eliminate paper crash report submissions.

RESULTS

FUNDING

SCDOT began with Section 406 funding to support this effort, but continued with several other funding streams. To fund personnel with this effort, SCDPS used National Highway Safety and Traffic Administration (NHTSA) Section 408 funds and later Section 405c. Hardware procurements after the initial purchase for the SCHP also used traffic records program grant money. Some hardware purchases used SAFETEA-LU Section 1906 funds, but these law enforcement agencies were primarily interested in using the hardware for the Public Contact form. SCDOT encouraged these agencies to use the State crash report software, but it was not a requirement for use of hardware purchased under this grant. SCDOT supported projects that required data exchange between law enforcement and SCDPS as TRCC projects. Most of these data exchange projects obtained high priority rankings in the Traffic Records Strategic Plan. Traffic records grants funds provided the funding for all of the high priority projects (Section 408 and later 405c).

BENEFITS

South Carolina identified the following benefits of SCCATTS:

- **Crash Data System**
 - Improved accuracy and timeliness from date of crash to date of data available in collision master file.
 - Reduced the number of required key entry staff from ten operators to five. Staff is now doing quality checks on the data 30 days after the submission.
 - Average investigation time of a collision report from date of incident to final acceptance in the crash data file is 8.7 days, down from a 60-day backlog for paper report processing.
 - Crash diagrams more closely resemble the roadways on which the incident occurred.
- **Roadway System**
 - SCDOT receives collisions mapped on the plane of coordinates used within RIMS.
 - More accurate crash diagrams create a better point for the roadway analyst to understand what events led up to the crash.
 - SCDOT can analyze work zone crash data in near real time due to pre-defined reports made available within the State System.
 - Crash data is available to SCDOT monthly with access to reports and diagrams. This data is more timely and more useful for highway improvement projects.
- **County and Municipal Agencies**
 - Law Enforcement is able to tie the data to other initiatives such as the Data Driven Approaches to Crime and Traffic Safety (DDACTS).
 - Provides a common tool for law enforcement and other users to share tips and understanding in the use of the application.
 - Supports crash data quality discussions at Law Enforcement Network meetings.
 - Agencies now have access to a reporting software solution available at no licensing cost.
- **Driver and Vehicle Records**
 - A web service transmits data from the State system electronically to SCDMV, eliminating the sequential passing of paper reports.
 - Most crash reports submitted use the SCDMV source credentials—driver license and vehicle registration—barcodes to populate the information. Data is a one-to-one relationship with the data in SCDMV databases, which eliminates manual validation steps for SCDMV.
- **Traffic Records Coordinating Committee**
 - Created a collaborative link with the State TRCC.
 - Electronic crash reporting spawned several additional TRCC-led efforts to improve crash data quality.

BARRIERS AND HOW THEY WERE OVERCOME

Lack of funding delayed the project for several years. Passage of the primary seatbelt law gave the State access to funds to pay for the technical portion of the project. The State was ready with a project description and plan and was therefore able to take immediate advantage of the new funding source.

Throughout the course of the project, stakeholder agencies in this effort faced the challenge of deciding which agency would serve as the custodian-of-record for crash data. The State TRCC discussed the issue and prioritized this project in its strategic plan. The TRCC voted to fund aspects of the project using traffic records grant funds. Ultimately, a series of memoranda of agreement provided the solution that worked best for the TRCC and the stakeholder agencies.

LESSONS LEARNED

More data does not necessarily equal better quality data. With more timely data, South Carolina has achieved faster turnaround on analyses. The software program allows for tailoring to reduce errors introduced by the human factor by eliminating multiple data entry/handling steps and by prompting officers with potential problem data at the time the report is submitted. Improved accuracy and completeness increase the reliability of the data for safety decision making.

Gaining support from local law enforcement agencies to use the software is key because they are responsible for a large percentage of crash reports. Their data is the primary source for crash information on local roads. One of the largest issues for agencies getting on board was the ability to have access to the data within their own records management systems. While the State solution had no licensing cost, a number of agencies have invested in software that they preferred to use to meet their own analytic needs. SCDPS and local agencies worked together to create the interfaces required to share data back to the local agencies' records management systems.

NEXT STEPS

SCDPS continues to increase the number of agencies using SCCATTS and improving the application with updates and new modules. They have now deployed the citation data collection module to local law enforcement agencies, and it is in a pilot group with SCHP troops of all seven Districts. Companion legislation will require that law enforcement agencies and SCHP submit all citations to the State electronically. The point-and-click map will include functional classification in the next mapping update.

REFERENCES

- I. SCDPS Office of Highway Safety and Justice Programs – Emily Thomas and Susan Berry. Telephone Interview. January 22, 2016.

AGENCY CONTACT INFORMATION

Doug Connelly
Traffic Records Manager
Office of Highway Safety and Justice Programs
South Carolina Department of Public Safety
10311 Wilson Blvd
Blythewood, SC 27016
DougConnelly@scdps.gov
803-896-0624

Emily Thomas
Strategic Highway Safety Plan Manager / Statistical Analysis and Research Manger
Office of Highway Safety and Justice Programs
South Carolina Department of Public Safety
10311 Wilson Blvd.
Blythewood, SC 29016
EmilyThomas@scdps.gov
803-896-2390

Susan Berry
Traffic Safety Data Analyst
Office of Highway Safety and Justice Programs
South Carolina Department of Public Safety
10311 Wilson Blvd
Blythewood, SC 27016
SusanBerry@scdps.gov
803-896-9940