SCDOT Research Summary
South Carolina Department of Transportation
Office of Materials and Research

Project Information

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Research Administration

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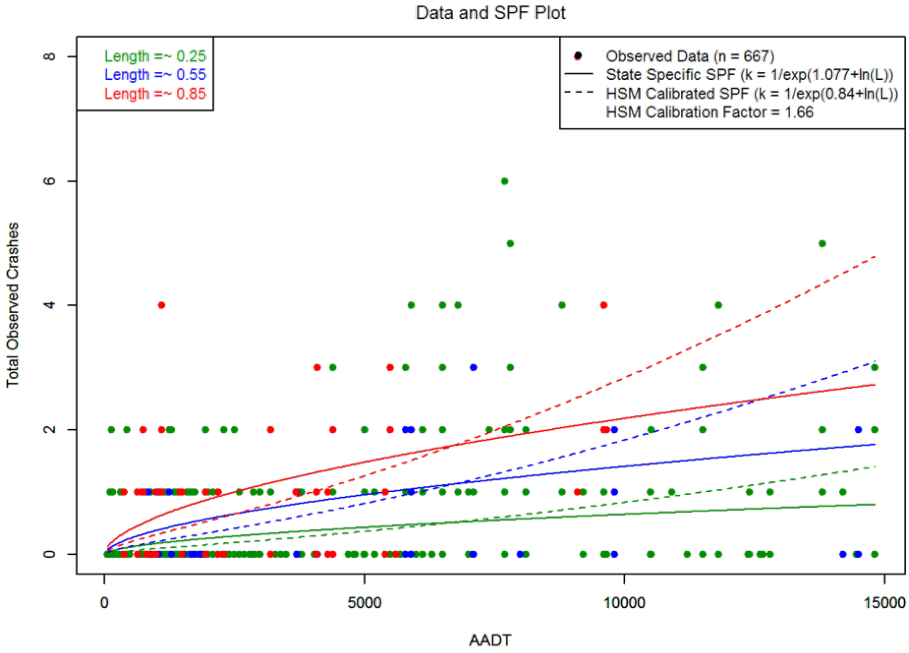
This final report is available online at:

http://www.scdot.scltap.org/projects/completed/

Development of South Carolina Databases and Calibration Factors for the Highway Safety Manual

The goal of most safety-related researches is to reduce the number and severity of crashes on the roadways. This research aids in accomplishing this goal by providing knowledge and data to undertake better decision making on safety in improvements through the methods of the Highway Safety Manual (HSM). The objectives for this research were threefold: 1) provide calibration factors for each safety performance function (SPF) in the HSM predictive models to account for jurisdictional variations such as crash reporting, driver populations, topography, and climate; 2) provide crash distributions specific to South Carolina to increase the reliability of predictive models; and 3) develop state-specific safety performance functions and test against calibrated HSM models.



South Carolina Specific SPF for U2U vs Calibrated HSM SPF

Most the work associated with this research involved collection and compilation of all the various data necessary to calibrate each of the 18 SPFs in the HSM and basic freeway segments. While some of these data variables could be found in the SCDOT Roadway Inventory Management System (RIMS), others had to be obtained from other sources, such as aerial LiDAR and Google Street View. Calibration factors were developed for three distinct areas within the state – coastal areas, midlands, and the upstate, as well as dense and sparsely populated counties. Each of these areas has different terrain, weather patterns, and traffic patterns and these variations were expected to produce varying calibration factors. While some calibration factors were significantly different across areas of the state, others were not, and a single statewide calibration factor was recommended for use.

In this project 2,700 roadway segments (684 miles) and 6,824 intersections were selected for data collection. The vast number of samples and comprehensive data also allowed the team to develop state-specific safety performance functions. The models themselves are limited in predictive capability at the site level because they have few significant variables – AADT being among significance in all models. Also, the models predict only total crashes and not crashes by severity level. However, these models and their limited variables allow them to provide a valued function as network screening models.

The products resulting from this research will allow the SCDOT safety office to confidently use the HSM with expectations that the resulting predictions are going to be a fair estimate of the effects of safety improvements in different areas of South Carolina. While better data will always produce better results, the calibration factors, safety performance functions and crash distributions provided herein are derived from the best possible data from South Carolina and currently represent the best opportunity for improving safety decisions.

Calibration Factors Recommended for Statewide Use in South Carolina (2013-2015)

Type	Sample Size	Total Length	Average AADT Major	Average AADT Minor	Total Observed Crashes	Total Predicted Crashes	Calibration Factor	Calibration Factor C.V.
Roadway Segments								
R2U	1,841	1,117.73	753	--	447	451	0.99	5.10%
R4D	508	161.16	9,934	--	253	413	0.61	8.17%
R4U	484	126.25	3,921	--	58	189	0.31	14.24%
U2U	667	201.65	2,109	--	261	157	1.66	7.95%
U3T	73	15.73	9,697	--	82	56	1.47	15.01%
U4U	349	76.57	8,602	--	275	367	0.75	8.70%
U4D	352	85.02	19,172	--	321	387	0.83	6.87%
U5T	673	155.59	16,059	--	1,035	1,348	0.77	5.15%
Intersections								
R3ST	7,000	--	892	205	907	2,253	0.40	3.98%
R4ST	2,785	--	995	233	787	1,660	0.47	4.97%
R4SG	97	--	6,104	1,497	131	287	0.46	11.76%
RM3ST	613	--	8,061	357	261	471	0.55	10.91%
RM4ST	284	--	6,438	271	63	244	0.26	17.52%
RM4SG	80	--	11,619	1,375	272	682	0.40	9.42%
U3ST	5,607	--	1,765	287	2,136	1,782	1.20	3.92%
U4ST	2,992	--	1,702	324	1,650	1,719	0.96	5.00%
U3SG	299	--	16,181	3,170	1,255	629	2.00	5.05%
U4SG	538	--	12,870	2,725	3,334	1,362	2.45	4.52%
Interstates								
R4F	138	59.38	35,055	--	785		2.59	5.77%
U4F	105	36.34	49,218	--	902		2.69	6.82%
U6F	126	38.33	73,592	--	1,972		3.66	5.22%

*Note that the sample size provided in the above table represent the number of observations in the analysis which is the multiplication of location of sites and years of crash data. Basically, the number of locations for each year is the above sample size divided by 3 years of crash data.

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