UMTRI Report 2014-24

Evaluation of the Michigan TACT Program

FINAL REPORT

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September 2014

Content disclaimer

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Technical Report Documentation Page

1. Report No. UMTRI 2014-24	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Evaluation of the Michigan TACT Program		5. Report Date September, 2014 6. Performing Organization Code
7. Author(s) Lidia P. Kostyniuk, Daniel Blower, Lisa J. Molnar, David W. Eby, Renée M. St. Louis, Nicole Zanier		8. Performing Organization Report No. UMTRI-2014-24
9. Performing Organization Name and Address The University of Michigan Transportation Research Institute 2901 Baxter Road Ann Arbor, Michigan 48109-2150 U.S.A.		10. Work Unit no. (TRAIS) 11. Contract or Grant No.
12. Sponsoring Agency Name and Address Michigan Office of Highway Safety Planning Michigan State Police 333 South Grand Avenue Lansing, Michigan 48909-0634		13. Type of Report and Period Covered Final 14. Sponsoring Agency Code
15. Supplementary Notes		

16. Abstract

This report documents the evaluation of the Michigan Ticketing Aggressive Cars and Trucks (TACT) program. The TACT program was conducted in three 2-week waves in the fall of 2013 near Grand Rapids, Michigan. Comparable sites in southeast Michigan served as a comparison area. The TACT program combined high visibility enforcement with a public information and education (PI&E) campaign focused on unsafe driving behaviors of cars and trucks near each other. An evaluation of the TACT implementation found that that the enforcement and PI&E plans were followed reasonably well. Outcomes in terms of driver behaviors, attitudes, and traffic safety were tested by means of surveys of motorists and truck drivers; an observational study of passing and merging behaviors of passenger cars near large trucks; and analysis of crash data. A before/after with comparison design was used to measure any effect in each outcome. Results indicated that the PI&E messages reached the drivers in the program area. Analysis of the survey data did not identify any statistically significant changes in self-reported behaviors among the drivers in the program area. The proportion of safe passing and merging maneuvers recorded in the observational study were quite high before the program and did not change significantly after the program. A Poisson crash rate model adjusted for over-dispersion and using six-years of monthly crash data from the program and comparison areas was developed. It accounted for traffic volumes, proportion of trucks in the traffic, snowfall and precipitation, and the economy. The crash data analysis did not identify significant effects of the program on crash rates.

17. Key Words		18. Distribution Statement Unlimited	
19. Security Classification (of this report) Unclassified	20. Security Classification (of this page) Unclassified	21. No. of Pages 126	22. Price

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Acknowledgements

We would like to acknowledge the many people we turned to in the course of this project and thank them for their help. We are indebted to Larry Archer of Modular Transportation and Larry Fennell of Con-way Freight for providing the trucks and personally driving researchers in the observation portion of this project. We are grateful to Laurent Fournier in the Data Collection and Analysis Section of Michigan Department of Transportation for providing us with detailed traffic volume data. Dennis Kahlbaum of the University of Michigan provided us with meteorological data. We thank our colleague Dr. Paul E. Green of UMTRI for lending his statistical expertise to help develop the crash rate models used in this study. We thank Sergeant Ryan Schoonveld of the Michigan State Police (MSP) Niles Post, MSP Trooper Patrick Gallagher, Michigan State Police Motor Carrier Officer Robert Lechtanski, and Sergeant Mark Thompson of the MSP Brighton Post, for allowing members of the UMTRI research team to ride along as they patrolled the roads. These experiences provided invaluable insight into patrols from the perspective of law enforcement. We are also grateful to Sharon Conklin of Van's Delivery for her help in recruiting the safety managers of trucking firms to administer the truck driver survey, and we thank safety managers for carrying out that task. Finally, we would like to acknowledge Kathy Farnum, Pat Eliason, Melody Kindraka, and Charlotte Kilvington of OHSP for their help and cooperation throughout all phases of this project.

Evaluation of the Michigan TACT Program

1.0 Introduction

Although the number of crashes involving large trucks has been decreasing in Michigan since 2006, they continue to represent a serious traffic safety issue in the state. According to the Michigan Traffic Crash Facts database (OHSP, 2013),[1] crashes involving trucks decreased from 8,370 in 2006 to 6,857 in 2012. However, the percentage of truck crashes involving a light-vehicle increased from 68 percent in 2006 to 76 percent in 2012. In addition, 74 percent of serious and fatal injuries from truck-involved crashes in 2012 were from crashes that involved a light-vehicle.

In an effort to reduce the fatality rate of truck-related crashes, the Federal Motor Carrier Safety Administration (FMCSA) and other administrations within the United States Department of Transportation are working to educate motorists on how to share the road safely with commercial motor vehicles. One result of these efforts was the development of a high visibility enforcement program called Ticketing Aggressive Cars and Trucks (TACT; FMCSA, 2012).[2] The TACT program aims to reduce large truck-related crashes, injuries, and fatalities by combining outreach, education, and evaluation with targeted enforcement activities to raise awareness among light-vehicle and truck drivers about safe driving behaviors. The Michigan Office of Highway Safety Planning (OHSP) identified TACT as a program particularly well suited to address the state's problem of truck/light-vehicle crashes.

OHSP received a TACT planning grant in 2011 from FMCSA, and with the assistance of the University of Michigan Transportation Research Institute (UMTRI), applied for a grant to implement a Michigan TACT program. In March 2013, Michigan received the implementation grant from FMCSA. The Michigan TACT program combined targeted enforcement of aggressive light-vehicle and large truck interactions with a concerted public information and education (PI&E) campaign. Enforcement occurred on two 25-mile segments of freeways near the city of Grand Rapids in the western part of the state during three 2-week waves between October and December 2013.

Evaluation of the TACT program was an integral part of the project grant, and included process and program outcome evaluations. A before/after comparison design was used in the evaluation of program outcomes. This involved gathering performance measures before and after program implementation in the TACT program area, and on another set of comparable freeway segments at which no TACT program activities were conducted, and which were far enough away not to be affected by the program. Two 25-mile segments of freeways in southeast Michigan served as comparison sites. Appendix A describes the selection of the TACT program sites and the comparisons sites.

[1] Office of Highway Safety Planning (2013). *Michigan Traffic Crash Facts*. URL: http://www.michigan trafficcrashfacts.org/

[2] Federal Motor Carrier Safety Administration (2012). About TACT. URL: http://www.fmcsa.dot.gov/safety-security/tact/AboutTACT.htm

The evaluation of the Michigan TACT program consisted of the process evaluation, which detailed how the program was implemented, and the program outcome evaluation, which assessed how well the program met the objectives stated in the Michigan TACT grant of 2013. Grant objectives are listed below:

1. Communicate TACT program messages to a statistically significant percentage of drivers in the program area between baseline and the program's completion when compared to an area with no TACT program activities.

2. Increase knowledge among the driving population about the dangers and consequences of unsafe driving behaviors around large trucks (lane changes, merges, and following too closely) by a statistically significant amount between baseline and the program's completion.

3. Increase the self-reported safe driving behaviors around large trucks between baseline and the program's completion as compared to an area with no TACT program activities.

4. Increase the observed safe driving behaviors around large trucks between baseline and the program's completion as compared to an area with no TACT program activities.

5. Decrease by a statistically significant amount the number of truck crashes involving a light-vehicle in the TACT program as compared to an area with no TACT activities.

The extent to which the first three objectives were met was assessed through separate surveys of motorists and truck drivers who travel through the TACT and comparison corridors. Both the motorist and truck driver surveys were conducted in two waves, once before and once after implementation of the TACT program. The surveys were designed to elicit information on motorists' driving behavior, awareness of the TACT program enforcement and communication activities, perceived threat of enforcement when engaging in unsafe driving behaviors, knowledge of unsafe driving behaviors that could lead to truck/light-vehicle crashes, and opinions related to unsafe driving behaviors. Statistical methods appropriate for survey data were used to assess changes and differences in the knowledge and self-reported behaviors between the before and after waves and between the TACT program and comparison sites.

The fourth objective, changes in unsafe driving behaviors, was assessed through a direct observation study of driving interactions between trucks and light-vehicles in both the TACT program and comparison corridors before and after the TACT program. Trained observers rode as passengers in the cabs of large trucks and recorded data on passing and merging of light-vehicles around the truck. Using appropriate statistical methods, the data were analyzed to detect changes in the rates of observed safe and unsafe driving behaviors between the before and after periods and between the TACT program and comparison sites.

The fifth objective was assessed through a statistical analysis of truck/light-vehicle crash data from the TACT and comparison corridors using monthly data from January 2008 through April 2014. The analysis accounted for other factors known to affect crash rates (e.g., unemployment, weather), and tested for the significance of the TACT intervention on the crash rates.

The next section of this report contains information about the process evaluation, including a description of the program as planned, documentation of the actual enforcement and PI&E program activities carried out over the course of the program, and findings from structured interviews conducted with law

enforcement personnel who participated in the program. The third section of the report describes the before/after analyses of both the motorist and truck driver surveys, as well as comparisons between them. The description and analysis results of the observational study of safe and unsafe driving behaviors are in the fourth section. The fifth section presents findings from the truck/light-vehicle crash analysis. The summary, conclusions, and recommendations are in the last section of the report. Appendices contain additional supporting information.

2.0 TACT Program Process Evaluation

The purpose of the process evaluation was to examine how the TACT program was implemented, and to determine whether components identified as critical to the success of the program were implemented as planned. As part of the process evaluation, UMTRI collected and analyzed data on law enforcement, media, and outreach PI&E activities over the course of the TACT program. After the program, UMTRI also conducted structured interviews with representatives of participating law enforcement agencies to explore perspectives about the program.

The Michigan TACT program was planned as three waves of highly visible and concentrated law enforcement activity on two 25-mile sections of freeway near Grand Rapids coupled with media and PI&E outreach in the area. The intent was for local law enforcement agencies, as well as the Michigan State Police, to patrol 25 miles on US-131 from 10 Mile Road NE to 100th Street and 25 miles on I-196 from US-131 to Ottogan Street in both directions, specifically targeting aggressive and unsafe behaviors between cars and large trucks. The TACT enforcement waves were set for October 7-18, 2013, November 4-15, 2013 and December 2-13, 2013. Each wave was to be preceded by media and PI&E events to raise public awareness of the safety problem of unsafe actions between cars and trucks while driving near each other, as well as publicize the enhanced enforcement efforts.

This section of the report describes the methods used to collect and analyze TACT program data and provides an overview of enforcement and media activities. It also contains a summary of findings from structured interviews with a particular emphasis on general themes that came up in the discussions. More detailed information about these activities is in Appendices B-J.

2.1 TACT Enforcement Activities

After receiving the TACT implementation grant, OHSP held meetings with officials from the Michigan State Police (MSP), representatives of law enforcement agencies local to the Grand Rapids area, and the Michigan Trucking Association Western Safety Council to discuss the overall TACT program and seek participation and support in implementing the program in Michigan. In preparation for the Michigan TACT program, OHSP also held a conference call with personnel from Washington State Police with extensive TACT experience to learn about their experience in planning and implementing such a program.

Six law enforcement agencies from the Grand Rapids area agreed to participate in the TACT enhanced enforcement program. These were: MSP Commercial Vehicle Enforcement Division (CVED), MSP Rockford Post, Kent County Sheriff, Ottawa County Sheriff, and the Grand Rapids, Walker and Wyoming Police Departments. In preparation for the program, the law enforcement agencies were sent a brief video describing the TACT program and its objectives.

Nearly 2,800 enforcement hours were planned for the program. Law enforcement personnel on TACT patrol were to work a minimum of four-hour shifts between the hours of 6:00 am and 8:00 pm and were assigned to road segments in both directions of travel on the TACT corridors. The intent of the enforcement portion of the program was to use both marked and unmarked units, and to stop both passenger vehicles and large truck drivers for aggressive driving behaviors near each other, including, but not limited to improper lane use, careless and reckless driving, following too closely, speeding, failure to yield the right of way, and improper passing. Violators were to be stopped and issued a citation, and given a TACT information card (See Appendix B). A detailed assignment of hours and locations by

agency was developed for the first wave of enforcement by OHSP and the law enforcement agencies (see Appendix C).

An assessment of how well the program was proceeding was made at the end of Wave One in a debriefing meeting of participating law enforcement agencies and OHSP on October 21, 2013. Enforcement activities were reviewed and potential changes to make enforcement more efficient and effective were discussed. Representatives of all participating law enforcement agencies either met in person or provided comments via email for this meeting. While several positive comments were made about the first wave of enforcement, several issues which detracted from the program's effectiveness were raised. These issues included lack of coordination and communication between agencies (e.g. no coordinated radio communication across agencies), difficulty stopping vehicles on the highway due to heavy traffic at rush hours and cable barriers in areas, and difficulty pursuing violators due to saturation of law enforcement on the corridors. Closer communication with other agencies, eliminating enforcement during the morning rush hour, and using unmarked vehicles were identified as methods to address these issues. In addition, some officers reported a preference for using "wolf packs", i.e., an enforcement tactic in which a number of patrol vehicles (possibly from different jurisdictions) work together as a team to identify and stop violators. However, they noted that issues regarding e-tickets prevented them from doing so (i.e. all agencies use an e-ticket that is automatically linked to the court in their jurisdiction and one agency cannot assign a ticket to another court). One identified solution to this problem was to use paper citations instead of e-tickets, but there was not enough support for this due to cost and lack of availability.

Gathering Law Enforcement Activity Information

UMTRI worked with OHSP to obtain data on TACT law enforcement activities. An electronic reporting form was developed by OHSP and UMTRI that would aid in this effort but not pose a burden to the law enforcement agencies (FY2014 Summary Enforcement Reporting Form; see Appendix D). The form allowed for collection of data about the number of hours of enforcement, total vehicles stopped, citations given, and other information needed by OHSP. It also provided space for additional comments from the agency. At the end of each enforcement wave, these data sheets along with law enforcement daily reports were sent to OHSP by each agency, and OHSP forwarded these reports to UMTRI. Although most agencies completed the Summary Enforcement Reporting Form, there were some missing data and in some cases, the total stops and citations were not broken out by passenger vehicles and trucks, as requested. One agency did not use the FY2014 Summary Enforcement Reporting Form, but submitted information on their own form for Wave One enforcement. Three agencies did not provide total hours for enforcement in Wave Two and three did not provide this information for Wave Three. In these cases, a member of the UMTRI research team read each data sheet and compiled the needed information.

The three enforcement waves were carried out during the planned two-week periods. Throughout the three enforcement waves, participating law enforcement agencies totaled 2,570 hours of enforcement on the TACT corridors. Wave One enforcement accounted for 41 percent of the enforcement hours with 31 percent spent in Wave Two, and 37 percent in Wave Three. One participating law enforcement agency did not engage in any TACT enforcement activities in Wave Two. In all, 3,000 vehicles were stopped and 2,528 citations were issued. Of the vehicles stopped, 86 percent were passenger vehicles and 14 percent were trucks. Of citations issued, 90 percent were to light-vehicle drivers and 10 percent to truck drivers.

Most of the citations were for speeding and following too closely. There were also 96 arrests, which were mostly unrelated to TACT-target violations (e.g., possession of marijuana, suspended license). Nine comments were included on the report forms. They explained reasons for the arrests, if any were included on the summary form, and also noted inclement weather during patrol. Table 2.1 shows the overall totals for hours of enforcement, vehicles stopped, citations issued, and arrests made by wave.

Table 2.1 TACT Enforcement Measures by Wave

	Hours	Vehicles Stopped	Citations	Arrests
Wave One	1,048.25	1,081 PV* 201 CMV**	988 PV 128 CMV	30
Wave Two	817.25	871 PV 139 CMV	694 PV 86 CMV	49
Wave Three	703.75	622 PV 86 CMV	599 PV 33 CMV	17
Total	2,569.25	2,574 PV 426 CMV	2,281 PV 247 CMV	96

*PV=Passenger Vehicle, **CMV= Commercial Motor Vehicle

Table 2.2 shows the overall totals in all categories by participating agency. For more details regarding specific agency totals by wave, see Appendix E.

Table 2.2 TACT Enforcement Measures by Wave and Agency

Agency	Total Hours	PV Stopped	Citations (PV)	CMV Stopped	Citations (CMV)	Total Arrests
Grand Rapids Police	277	375	476	0	0	24
Kent County Sheriff	447	385	176	11	5	32
MSP-CVED	386	6	0	364	198	0
MSP-Rockford	380	471	656	14	15	1
Ottawa County	427.25	707	426	24	19	16
Walker Police	274	205	168	0	0	11
Wyoming Police	378	425	379	13	10	12
TOTAL	2,569.25	2,574	2,281	426	247	96

2.2 Public Information and Education Campaign

A PI&E campaign started just before and ran during each wave of the TACT enforcement wave to raise awareness about the program. The themes of the campaign focused on leaving more space around large trucks, safe driving behavior around large trucks, and the presence of extra enforcement ticketing aggressive vehicles. While the messages were intended for all drivers, some aspects of the campaign specifically targeted men between the ages of 16 and 25 driving light vehicles. The total cost of the PI&E campaign was $100,000. The following sections detail the type of media activities conducted during each wave of the TACT program.

Public Information and Education Activities

OHSP provided UMTRI with information regarding the media activities that took place over the three waves of the TACT program. In addition to this information, the UMTRI research team performed online

searches for news articles or videos related to Michigan's TACT program. The following section summarizes the media activity for each wave. Further details of the media campaign, such as the specific dates and times of TACT media activities, can be found in Appendices F-I.

Wave One October 7-18, 2013

Wave One of the media campaign consisted of a press conference to kick off the program, billboards, radio advertisements, television news stories, and printed news stories.

Press Conference

A press conference was held on October 7, 2013 at Van's Delivery Service in Grand Rapids with speakers from OHSP, Kent County Sheriff's Department, the Michigan State Police Commercial Vehicle Enforcement Division, and the Michigan Trucking Association Western Safety Council. Representatives from FMCSA, the Michigan Truck Safety Commission, the Ottawa County Sheriff's Office, and the Grand Rapids, Walker and Wyoming Police Departments were present. OHSP representatives spoke about the purpose of the TACT program, how it would be conducted, and the corridors in which enforcement would take place. They also displayed the public information materials for the TACT program, including the billboard and radio commercial. The Michigan Trucking Association Western Safety Council supplied large trucks for the event and experienced truck drivers were available for interviews with the media. "Ride-a-longs" with truck drivers and law enforcement officials were also available upon request. Other speakers at the event discussed the planned patrols targeting aggressive driving, as well as highlighted the times and locations that enforcement would be taking place for the program.

Billboards

Billboards (see Figure 2.1) with the statement "Trucks Need Extra Yards to Stop; Leave More Space for Trucks" were placed at 16 locations along the TACT corridors during the first wave of the TACT program. These billboards were especially aimed at men age 18-34, and were placed in the Grand Rapids/ Kalamazoo/Battle Creek designated market area between September 30 and October 27, 2013. An Eyes on Expressions rating (E.O.I), a marketing measure of the number of people to likely notice the billboard, was obtained by OHSP, and indicated nearly nine million people over age 18 and slightly more than 1.5 million men age 18-34 saw the billboard. The cost of the billboards was $33,350. More detailed information the billboard locations, E.O.I. ratings, and costs can be found in Appendix F.

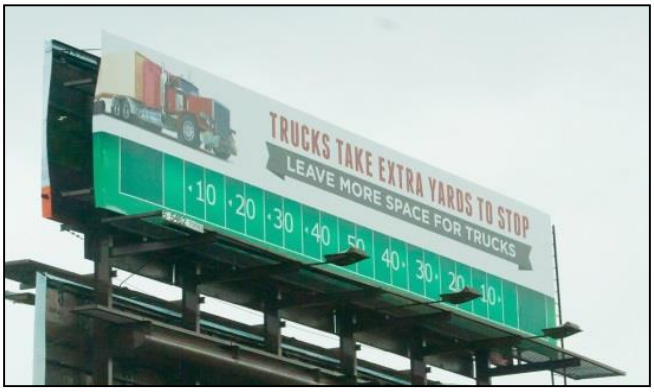

Figure 2.1 The TACT Program Billboard

Radio Advertisement

A 60-second radio advertisement aired 350 times from October 1 to October 18, 2013 in the Grand Rapids/Kalamazoo/Battle Creek designated market area. The radio advertisement's message focused on leaving plenty of space when crossing lanes near a large truck, specifically one car length for every 10 miles of speed (see Appendix G for radio script). The advertisement was aimed at men age 18-34 and cost $24,030. The size of the audience that heard the radio advertisement was measured by gross rating points (GRP). Gross rating points are the product of the percentage of the audience reached by an audience multiplied by the frequency that they see it in a campaign. Information about GRP, reach, and, further cost details of the radio advertisement is provided in Appendix H.

Television News Stories

OHSP put out a news release on the TACT program on October 7, 2013. Television and radio stations aired stories describing the program and its purpose, and where, when, and in what locations officers would be ticketing motorists. News stories aired October 7 and October 8, 2013 on the morning, noon, and evening news to a Grand Rapids area viewership of 362,348 households. News stations also aired interviews with police officers and truck drivers on the most serious unsafe driving behaviors observed on the roadways around large trucks, and how light vehicles and large trucks can safely interact on the road. Detailed descriptions of the news stories are contained in Appendix I.

Print and Radio Stories

Numerous print and online articles were also posted in newspapers and on various websites. The following media outlets released print stories in newspaper, website or both: Cedar Springs Post, Holland Sentinel, FOX17 West Michigan (2 stories), WHTC.com, WZZM13, WOOD TV8 (Website and Facebook page), ABC News Radio, 1340 AM WJRW News Talk Radio, WOOD News radio, Bredell and Bredell Attorneys at Law, and WZTK 105.7 FM. Radio stories were aired on the following stations: WOOD (two stories), WHTC, and WKZO.

Wave Two November 4-15, 2013

To kick off the Wave Two media campaign, OHSP issued a news release as well as a media advisory detailing information about a community event to be held on November 2, 2013. This event was held at the Wal-Mart Supercenter in Comstock Park to give members of the community an opportunity to experience what a truck driver's vantage point is by sitting in the driver's seat of a large truck (provided by the Wal-Mart Road Team), understand how passenger vehicles can disappear in a large truck's blind spot, learn about safe driving near trucks, and ask questions and get safety tips from representatives from the trucking industry and law enforcement officials from the Kent County Sheriff's Office and the Michigan State Police.

Television News Stories

Television news stories aired November 2-4, 2013 on the morning (WOOD and WXMI, WZZM) and evening (WZZM, WXMI) news programs in the Grand Rapids area with a viewership of over 180,000 people. The news stories promoted the Wal-Mart community event, the dangers of large trucks' blind spots, and details on the TACT program's enforcement efforts. A total of 14 news stories with an estimated viewership of over 180,000 people aired in the Grand Rapids area. Details on the television news stories that aired during this wave was collected by the television media monitoring service with whom OHSP contracted are contained in Appendix I.

Print and Radio Stories

Numerous print and online articles were also posted in newspapers and on various websites. There were two Community Calendar posts on two television stations' websites, as well as posts on the Michigan State Police's Facebook page that reached an estimated 16,000 people and garnered over 200 "likes". The following media outlets released print stories in a newspaper, website or both: Michigan State Police, Highbeam Research, WZZM13 (three stories), MLive, Grand Rapids Press (two stories). In addition, the following outlets aired radio stories: WKZO and WHTC.

Wave Three: December 2-13, 2013

On December 2, 2013, OHSP sent out a news release regarding the third and final wave of TACT enforcement. The release resulted in two television evening news stories to an estimated viewership of more than 75,000 describing the TACT program and the where and when the extra patrols would be on the highway. Appendix I contains details of the television news stories that aired during this wave as collected by the television media monitoring service with whom OHSP contracted.

Freeway Message Boards

OHSP also partnered with the Michigan Department of Transportation to provide freeway message boards that encouraged leaving more space for trucks. The freeway message boards, which read "Leave More Space for Trucks", were up in four locations in December 2013 only: Northbound US-131 at 36th Street; Southbound US-131 at Ann Street; Westbound I-196 at Plymouth Avenue; and Eastbound I-196 at Chicago Drive.

Print and Radio Stories

Numerous print and online articles were also posted in newspapers and on various websites. The following media outlets released print stories in a newspaper, website or both: Michigan State Police, WZZM13, Cedar Springs Post, Michigan News, STAR 105.7, and WOOD Radio. Additionally, WOOD ran two radio stories.

Post-Program

Following the three waves of the media campaign, OHSP sent out a news release on January 14, 2014 summarizing the results of the enforcement campaign of the TACT program. The news release resulted in two evening news stories (WZZM and WXMI) on the results of the TACT program to an estimated viewership of 75,000. The details of the television news stories that aired during this wave as collected by the television media monitoring service with whom OHSP contracted can be found in Appendix I.

Print and Radio Stories

Numerous print and online articles discussing the results of the program were also posted in newspapers and on various websites. The following media outlets released print stories in a newspaper, website or both: Michigan State Police; World News Network; WOOD TV; CDL Life: Trucking News & Entertainment; Minews26; OHSP Safety Network Publication; WZZM13; Michigan News; West Michigan Reader; and the OHSP Newsletter. In addition, a representative from OHSP did an interview with WOOD Radio following completion of the TACT program.

Overall Program Media

Table 2.3 and Table 2.4 shows the media outreach for the TACT program's PI&E campaign by wave. The tables represent a close depiction of the media activities that took place during each wave. The tables are

based on information provided by OHSP and UMTRI's manual searches of the internet for Michigan TACT-related articles.

Table 2.3 TACT Program Earned Media by Wave

Enforcement Dates	Television News Stories	Print/Online articles	Radio Stories	Community Calendar Posts	Freeway Message Boards
Wave 1One Oct. 7-19	11	18	4	0	0
Wave Two Nov. 4-15	14	7	2	2	0
Wave Three Dec. 2 -13	2	7	2	0	4 Locations
Post-program	2	8	0	0	0
Total	29	40	8	4	4

Table 2.4 TACT Program Paid Media by Wave

Enforcement Dates	Billboards	Radio Ads
Wave One Oct. 7-19	16 locations	1 advertisement aired 350 times
Wave Two Nov. 4-15	0	0
Wave Three Dec. 2-13	0	0

2.3 Structured Interviews with Law Enforcement

During the month of April 2014, two group interviews were held with law enforcement officers[3] who participated in the TACT enforcement program. The first was with officers from the Kent County Sheriff's and Wyoming Police Department and the second was with officers from the Ottawa Sheriff's Department. Law enforcement officers from the Michigan State Police Motor Carrier Division, and Grand Rapids Police Department were also scheduled to participate but did not appear for the interview. Collectively, a total of six officers were interviewed.

Each group interview lasted approximately 1.5 hours and was held at the Wyoming Police Department. Participants were given a set of questions prior to the interviews to help focus the discussion on topics of interest (see Appendix J). The same set of questions formed the framework for discussion during the interviews. Discussion was moderated by a member of the UMTRI research team, with two additional team members present to take notes and help guide discussion.

Prior to conducting the group interviews, members of the UMTRI research team participated in "ride-alongs" with troopers from the MSP Brighton and Niles Posts to directly observe light-vehicle and large

[3] In this report, the terms, "law enforcement officers" or "officers" refer to all sworn police personnel regardless of their agency, title, or rank.

truck interactions on the roadway, and become conversant with the ways in which law enforcement officers think about and describe unsafe driving actions by drivers of light vehicles and trucks. Knowledge gained from this experience helped inform development of the interview guide for the structured interviews.

2.3.1 Key Themes and Findings from Interviews

Key themes and findings that emerged from the structured interviews are summarized here. The themes and findings are largely organized around the topics contained in the interview guide, with some topics grouped together as appropriate, based on how the actual discussions evolved.

Agency Involvement and Coordination

All agencies interviewed participated in all three waves of the TACT Program (October, November, and December 2013). Each agency had designated areas for enforcement of the program. A debriefing meeting of participating agencies was held after the first enforcement wave in October, in which enforcement activities and challenges were discussed. Beyond that, there was little or no formal coordination among agencies during the enforcement waves. The initial vision for the enforcement program was that it would be a fully integrated multijurisdictional effort between agencies. However, it turned out that the radio communication system necessary to support real-time communication between agencies (i.e., patched radio system) was not in place. Because of this, each agency ended up working separately to enforce the program. A representative from the Wyoming Police Department did assist OHSP in recruiting agencies into the program at the beginning. Nevertheless, once each agency began its participation, it essentially “did its own thing” and had a person who organized the effort for that particular agency.

Program Training

A consistent theme that emerged from the interviews was that officers would have liked to receive more training for the program. While officers did not remember every detail of the training they did receive, most characterized it as informal rather than formal, consisting mainly of a short video describing the program. This was of special concern because many of the officers had no prior knowledge of the TACT program. One reported suggestion for improving the TACT program was to offer more formal and extensive training (e.g., two hours) with officers that explicitly addresses the requirements and expectations for overtime grant hours. In addition, some officers called for detailed information on the sections of the vehicle code that correspond to driving infractions targeted by the program to provide a better understanding of the enforcement actions required by the program. The explanation offered for this suggestion was that officers tend to think about enforcement actions within the context of specific vehicle codes, and therefore, that language would resonate more strongly than more general descriptions of violations. It was noted that an added benefit of a more formalized training would be that officers without sufficient commitment to the effort required throughout the program would likely be deterred by the time commitment to the training and less likely to end up participating and undermining the effectiveness of the effort.

The area that officers reported feeling the least comfortable with was enforcement of unsafe actions by large trucks. In fact, it was noted by one participant that many officers were reluctant to sign up for overtime for the program because they were not used to enforcing unsafe actions of truck drivers or were intimidated by heavy trucks. More training was seen as a potential strategy for overcoming this reluctance. For example, it was noted that if the program was going to focus on heavy trucks, it would

have been helpful to have detailed guidelines on what to look for in terms of specific truck violations, as well as give officers a chance to clarify questions and issues with regard to enforcement. Providing this information as part of a formal session with the motor carrier division was suggested by at least one officer.

Enforcement Tactics Used During Program

Specific enforcement tactics varied across agencies. However, participants generally reported using marked versus unmarked vehicles, and targeting enforcement efforts on portions of the designated corridors rather than its entirety. One agency had a single vehicle on the road at most times. The other two agencies had between two and four vehicles out at a time, although the patrols generally operated independently of each other rather than in "wolf packs[4]". The participants also noted that they did not use "spotter" vehicles, that is vehicles dedicated to identifying violators and sending the information to downstream vehicles to make the stop, because that would take the vehicle out of traffic. The most common form of enforcement was stationary rather than moving enforcement with some officers concentrated in construction zones watching for unsafe driving behaviors.

While several kinds of violations were targeted during the program, officers in two of the jurisdictions reported focusing primarily on speeding. One stated reason for this was that drivers change actions around marked cars making it less likely that violations such as improper lane use and lane change will occur. Participants from these jurisdictions also reported focusing mainly on light vehicles and not large trucks. The rationale for this was the belief that it is really passenger cars that are the problem, not large trucks. This was especially true with regard to speeding, as illustrated by a participant's observation that police will seldom see trucks speeding, as it takes so much longer to get started and stopped. The main concerns about drivers of large trucks had to do with fatigue. At the same time, at least one officer noted that he would have welcomed input from the motor carrier enforcement unit about what driving behaviors to focus on. One of the agencies gave information cards about the TACT program to light vehicle drivers pulled over for unsafe driving. The other agency did not use the information cards.

Law enforcement officers from the third jurisdiction reported targeting both light vehicles and large trucks. They also mentioned employing a system for identifying "following too closely" using a set of two cones to mark off an area constituting an unsafe following distance. If two vehicles were within the two-cone area, the following vehicle would be pulled over and ticketed for following too closely. These ticketed drivers were given the information cards containing information about the TACT program. In addition to following too closely, these officers targeted seat belt and lane violations as well as speeding. They noted, however, that "the word was out with truck drivers" and they could not even get a belt violation.

Differences between TACT Enforcement Tactics and Other Enforcement Efforts

In general, TACT enforcement was considered to be similar to regular traffic enforcement with the exception that the specific areas patrolled differed somewhat. Supporting this view was the observation by one participant that people's reactions to the TACT enforcement were not that different from regular enforcement. At the same time, some participants noted that TACT enforcement differed from other specialized enforcement efforts, particularly impaired driving. For example, impaired driving enforcement was reported to involve observing for slow driving, weaving, variable speeds, and signs of intoxication. In

[4] A" wolf pack" refers to an enforcement tactic where a large number of police vehicles work together in a particular area with the intention of stopping as many violators as possible.

addition, in impaired driving enforcement, police go to locations where it is occurring. By contrast, in TACT, the focus was on staying stationary and protecting construction zones.

Enforcement Tactics that Worked Especially Well for Carrying Out TACT Program

One successful aspect of TACT enforcement was considered to be the "high visibility" of the police on the road. Of particular note was the visibility of having two to four police vehicles out at a time in a relatively small geographical location. This was seen as being effective from both a general deterrence and specific deterrence perspective. In terms of specific deterrence, it was mentioned that because drivers generally revert back to their "old behaviors" once a police car passes by, having a second police car available to follow up once drivers think they can revert back to unsafe behavior increases the likelihood that these violators can be apprehended. One participant reported that his agency was only able to have one vehicle out at a time, but noted that even one car on the road represented a bigger presence. Another enforcement tactic considered to be effective was the use of the orange traffic cones to help identify the "following too closely" violators.

Challenges in Carrying Out TACT Program

One of biggest challenges faced in carrying out the program was seen as the relatively harsh winter weather that occurred during the enforcement periods of the program. The inclement weather made it particularly difficult to pull drivers over. In addition, it forced drivers to drive more carefully, thereby masking unsafe driving actions that might have occurred under other circumstances. Another challenge was finding locations and times of day conducive to identifying and stopping aggressive drivers. The most obvious aggressive driving behavior was generally considered to be speeding, and this was the reason given by some participants for concentrating on this particular violation. Other violations such as weaving were considered harder to see, and tailgating was considered by at least one participant to be quite subjective. One reported limitation of stationary patrols was the difficulty of catching up with a vehicle that committed an infraction because of traffic. Areas and times with high levels of congestion were viewed as particularly problematic, not only making it difficult for officers to pull people over who had committed a violation, but also reducing the likelihood of people being able to commit violations in that particular driving environment. That is, a congested environment characterized by many cars close together, in and of itself, reduced people's capacity to engage in aggressive driving such as speeding.

Effectiveness of Program in Getting Cars and Trucks to Drive More Safely Around Each Other

One common view expressed was that the program was likely quite effective while it was going on, given that people tend to drive more safely when they see police on the road, but that once the program ended, it was likely drivers went back to their old ways of driving. Views were mixed on whether drivers pulled over knew specifically about the TACT program, although there was general agreement many people "knew something was up" because so many police were out on the road. Thus, the feeling was that people recognized the increased police presence even if they were not aware specifically of the TACT program. In addition, some participants attributed any positive changes in driving resulting from the program to drivers looking out for police on the road rather than learning to drive more safely. Thus, one conclusion reached was that although the program got people's attention while it was running, the effects were likely gone by now, although a few drivers might still be thinking about it.

Suggestions for improving program and advice to other communities

Several suggestions for improving the enforcement program were offered by participants. As noted earlier, participants thought that a more formalized training would be helpful. Gaining familiarity with driving violations by large truck drivers was seen as especially important if officers are being asked to target unsafe driving by both light-vehicle and truck drivers. In addition, several participants saw value in greater specification in the grant expectations. One example of this was the general observation that grants are better with more direction, and that police want to know what the grantor is looking for. More specifically, one participant noted that if the grant had explicitly called for a formal multijurisdictional approach, then only a few unmarked cars would have been necessary, and it might have been easier to free them up. Another benefit of a more formalized multijurisdictional approach was seen as the opportunity it would afford officers to go outside of their home jurisdictions, something that officers like to do, according to one participant. In addition, it was noted that a multijurisdictional approach would likely create more of a buzz among the public, as well as result in more efficient enforcement for relatively short stretches of highway. Another participant suggested that having specific guidelines for numbers of stops to be made in an hour might help unify police departments during the program who otherwise often have very different philosophies for writing tickets. The issue of whether verbal warnings should be allowed as part of enforcement also came up. One participant felt that excluding warnings from the program enforcement discouraged some law enforcement from fully buying into the program. His perspective was that all that is needed for general deterrence is for drivers to see a vehicle stopped by police. Accordingly, he argued that drivers have no way of knowing whether a citation is actually being written and therefore, warnings are as effective as citations for general deterrence.

3.0 Changes in Knowledge and Awareness

The effects of the TACT program on drivers' knowledge and awareness of unsafe driving behaviors that could lead to truck/light-vehicle crashes were evaluated using parallel surveys of light-vehicle drivers and truck drivers in the TACT program and comparison areas. Separate but similar surveys of each group were conducted before the implementation of the TACT program (Survey Wave One) and repeated after the TACT program was over (Survey Wave Two). Topics addressed in the surveys were identified based on information found in the review of other TACT programs, other driving behavior surveys, and UMTRI's background with driver behavior research. These topics included light-vehicle driving behavior near trucks, knowledge of unsafe driving behaviors that could lead to truck/light-vehicle crashes, and awareness of the TACT and other traffic safety programs. The survey of motorists was conducted through telephone interviews by Abt/SRBI, a professional survey research company contracted by UMTRI to administer the survey. The survey of truck drivers used a pencil-paper questionnaire format developed by UMTRI and was administered by safety managers of trucking companies recruited for the survey.

3.1 Survey of Motorists

3.1.1 Questionnaire

The motorist questionnaire developed by UMTRI asked respondents about their driving behavior near other light vehicles and trucks including passing, merging, use of signals, awareness of the TACT and other traffic safety programs, perceived threat of enforcement when engaging in unsafe driving behaviors, and knowledge of unsafe driving behaviors that could lead to truck/light-vehicle crashes. The questionnaire was first tested at UMTRI with seven light-vehicle drivers using a "cognitive interview" technique designed to provide insights into how people are interpreting questions and the response categories. Abt/SRBI programmed the questionnaire into a Computer Aided Telephone Interview (CATI) system, tested it for accuracy, and further pilot tested it in the field with five interviews. The final questionnaire instrument for the motorist survey can be found in Appendix K.

3.1.2 Sample

For each wave of the motorist survey, a sample size of 100 drivers in each of the four study corridors, representative of the population of drivers who use those corridors, was specified for a total sample of 800 (400 in each survey wave). Power analysis indicated that this sample size would allow detection of moderate effects with a power of at least 0.90; that is, there would be at least a 0.90 probability that the tests would find a statistically significant difference when such a difference actually existed. Because the precise distribution by driver gender on these corridors was not known, and because the numbers of licensed female and male drivers in Michigan are relatively close,[5] equal numbers of men and women drivers were specified in the sample design.

The population of interest for the survey was adult drivers (over age 18 years) who drove on a study corridor at least once a week. To reach this population, a geographically based, random digit dialing (RDD) dual sampling frame that considered both landline and cell phones was implemented by Abt/SRBI. The zip codes in a 10-mile buffer zone of the centerlines of the four study corridors were identified. Because landline telephone exchanges are associated with zip codes, these were used directly in developing the landline RDD sampling frame. The cell phone RDD sampling frame was based on the

[5] Table DL-22 FHWA, Office of Highway Policy Information (2011), *Highway Statistics. 2010* reports 3.6 million female and 3.5 million male licensed drivers in Michigan in 2010.

relationship between zip codes and telephone exchanges, followed by a process that matched selected cell phone numbers with billing addresses, thus better identifying those in the zip codes of interest. The final sampling frame allocation was 35 percent cell phone and 65 percent landline phone. For landline contacts, the interview was conducted with the eligible adult who had the next birthday. For cell phone contacts, the person who answered the phone was interviewed, providing that he/she met the eligibility criteria.

3.1.3 Survey Administration

The first wave of the motorist survey was conducted from September 13-27, 2013 before the start of the first TACT media and PI&E campaigns. This first wave survey is referred to as the TACT Before program survey in tables in this report. The second wave of the survey was conducted from January 6- 21, 2014, after the completion of the last TACT enforcement period. In tables in this report, it is referred to as the TACT After survey wave. Prior to the start of telephone interviews, the interviewers and the field supervisors underwent training by the Abt/SRBI project staff that covered the project description and study protocols, and included mock interviews using the CATI system. Once the interviews started, each telephone number was called up to three times. These calls were staggered over times of day and days of week, and the schedule was set to reduce chances of noncontact. The overall response rate was nine percent as calculated using methods recommended by the American Association for Public Opinion Research (AAPOR) that account for the number of completed interviews, the number of incompletes, the number of eligible refusals, and noncontacts of unknown eligibility.

Once data collection was complete, final survey weights to compensate for differential sampling rates, subsampling of travelers by corridor, and a dual-frame sample design were developed to align the full sample to match the population parameters of the adult non-institutionalized population in the TACT program and comparison regions. The complete data file, along with the data dictionary, was delivered to UMTRI.

3.1.4 Data Analysis

Motorist survey response data were analyzed using survey analysis techniques in SAS 9.4 statistical analysis software. The data from respondents in both TACT corridors were pooled for analysis as were data from respondents in the comparison corridors. This was done because the two TACT corridors in the Grand Rapids area were very close geographically, and a large portion of survey respondents drove on both corridors. In addition, the two TACT corridors were similar in traffic composition and volumes, geometry, and crash experience. Because each of the two comparison corridors had been originally matched to one of the TACT corridors, and the TACT corridors were similar to each other, pooling data from the comparison corridors was considered to be quite reasonable. Analysis consisted of comparing responses between each site in both survey waves, and at both sites in each survey wave; that is: 1) the TACT sites before and after the TACT program; 2) the comparison sites before and after the TACT program; 3) between the TACT and comparison sites before the TACT program; and 4) between the TACT and comparison sites after the TACT program.

Many of the questions on the survey asked for responses to be given on an anchored five-point scale; that is, a scale in which only the end points were defined. For these questions, the mean of the response values and the 95th percent confidence intervals for the mean were calculated. The differences in the means were tested for statistical significance using a SAS “proc surveyreg” modeling technique that yields F statistics to test the null hypothesis of no difference between the means. Other questions called

for respondents to select a category that best fit their response. In such questions, the percent (and standard error of percent) of respondents in each response category was calculated. The Rao-Scott chi square (a design-adjusted version of the Pearson chi-square) test was used to test the null hypothesis of independence in survey responses between waves at the TACT program and at the comparison sites, and at the TACT and comparisons sites in each of the survey waves.

3.1.5 Results

There were 200 respondents in the TACT sites and 204 respondents in the comparison sites for the Before TACT program survey and 200 respondents in the TACT sites and 202 respondents in the comparison sites in the After TACT program survey.

Table 3.1 shows the demographics of the survey respondents for the TACT and comparison sites for both survey waves. Each of the four groups of respondents was approximately 50 percent male, with average ages from 43-46. The respondents in the TACT sites were 85-86 percent White by race, while the respondents in the comparison area were 65-68 percent White with notable percentages of Black African Americans.

Table 3.1 Demographics of Respondents by Survey Area and Wave

	TACT Before	TACT After	Comparison Before	Comparison After
Number of Respondents	200	200	204	202
Average Age (95th percent CI)	42.9 (40.1-45.8)	44.3 (41.7-46.8)	43.1 (40.3 4-5.8)	46.3 (43.8-48.9)
Percent Male	51.76	50.27	52.76	49.68
	Percent of respondents (standard error of percent)			
Race				
White	85.1 (3.55)	86.4 (2.99)	65.0 (4.86)	68.3 (4.38)
African American	3.7 (1.54)	6.2 (2.17)	26.7 (4.57)	16.8 (3.68)
Asian	1.0 (0.71)	0.4 (0.42)	1.0 (0.62)	3.8 (1.74)
Native American	1.1 (0.84)	0.0 (0.00)	0.5 (0.48)	2.4 (1.89)
Household Income in 2012				
Less than $25,000	17.4 (4.22)	19.2 (3.76)	18.7 (4.63)	9.8 (2.64)
$ 25,000 – $50,000	24.4 (4.32)	21.2 (3.68)	28.2 (4.57)	15.9 (3.50)
$ 50,000 – $75,000	25.7 (4.02)	18.8 (3.15)	20.7 (3.83)	25.9 (4.30)
$ 75,000 – $100,000	13.6 (2.84)	10.6 (2.40)	10.6 (2.88)	16.5 (3.59)
$100,000+	9.0 1.86)	16.4 (2.93)	13.6 (2.58)	19.3 (3.67)
Refused	9.1 1.86)	12.9 (2.59)	8.0 (1.87)	11.0 (2.26)
Education				
Less than High School	1.1 (0.54)	6.5 (2.51)	5.0 (2.89)	2.6 (1.70)
High School Graduate	20.1 (3.87)	21.4 (3.57)	20.0 (4.08)	18.9 (3.98)
Vocational/Tech	4.5 (1.86)	5.2 (2.12)	0.6 0.45)	1.4 (0.71)
Some College (including Associates degree)	31.6 (4.42)	25.7 (3.71)	27.5 (4.29)	22.9 (4.08)
College Graduate (4+ yr.)	41.7 (4.58)	39.6 (4.02)	45.7 (4.86)	53.1 (4.70)

Respondents in the TACT sites for both survey waves and respondents in the comparison sites in the first survey wave had similar income distributions with approximately one-quarter reporting annual household incomes over $75,000. Comparison group respondents in the second survey wave were more affluent with 36 percent reporting household incomes exceeding $75,000. The education levels among the TACT area respondents were consistent across waves with 42-46 percent being college graduates. The education level in the comparison area was higher with four-year college graduates comprising 46 percent and 53 percent of respondents in first and second survey waves, respectively.

Table 3.2 shows vehicle and driving-related descriptors of the respondents. The majority of respondents in both sites and survey waves reported driving 15,000 miles or less in a year and 70-80 percent drove either a passenger car or sports utility vehicle. Approximately 10 percent drove pickup trucks. Overall, about 15 percent had held a Class A or B commercial driver license at some time in their lives, and approximately 20 percent had driven a large truck as part of their jobs.

Table 3.2 Mileage and Vehicles of Motorists by Survey Area and Wave

	TACT Before N=200	TACT After N=200	Comparison Before N=204	Comparison After N=202
	Percent of respondents (standard error of percent)			
Miles driven last year				
Less than 5,000	12.7 (2.73)	8.7 (2.33)	10.8 (4.26)	12.1 (2.88)
5,001-10,000	14.5 (2.86)	21.6 (3.49)	22.4 (4.49)	19.0 (3.66)
10,001-15,000	24.0 (3.88)	29.6 (3.68)	25.0 (4.19)	26.4 (4.20)
15,001-20,000	18.8 (3.84)	11.5 (2.55)	15.8 (3.17)	20.7 (3.93)
More than 20,000	30.0 (4.56)	28.3 (4.05)	24.8 (4.22)	20.0 (3.58)
Vehicle type driven most often?				
Passenger Car	52.7 (4.68)	51.2 (4.22)	67.2 (4.37)	57.9 (4.56)
Pickup Truck	11.4 (2.95)	10.1 (2.61)	9.5 (2.83)	9.8 (2.63)
SUV	16.6 (3.88)	19.8 (3.00)	12.8 (2.72)	22.4 (3.89)
Mini Van	9.3 (2.36)	10.5 (2.50)	6.6 (2.38)	3.1 (1.14)
Full Van	2.1 (1.06)	3.5 (1.81)	1.9 (1.29)	1.0 (0.70)
Medium sized Truck 10000-26000 lb.	4.5 (2.15)	1.2 (0.87)	1.2 (0.85)	2.2 (1.16)
Large Truck> 26,000 lb.	0.8 (0.46)	2.2 (0.87)	0.2 (0.23)	3.0 (1.82)
Motorcycle	1.3 (1.02)	0.3 (0.26)	0.3 (0.29)	0.0 (0.00)
Have held Class A or B Commercial Driver's License	10.7 (2.44)	18.6 (3.59)	15.7 (3.87)	9.9 (2.18)
Have driven a large truck as part of job	22.6 (3.68)	24.4 (3.79)	21.0 (4.26)	16.3 (3.28)

Respondents were asked about their driving behaviors when passing vehicles or merging onto the freeway. The first question asked how often they used their turn signals to convey their intention to pass other passenger cars and trucks. Respondents were asked to respond on a scale of 1 to 5, with 1

indicating never and 5 indicating always.[6] Table 3.3 shows the number of respondents who answered the question, the mean response value, and the 95th percent confidence interval of the mean.

Table 3.3 Respondent Use of Turn Signals for Passing by Survey Area and Wave

How often do you use turn signals when 1=never, 5=always	TACT Before	TACT After	Comparison Before	Comparison After
	(Number responding, mean, 95th percent confidence interval of mean)			
Passing another car on the road?	N=200 4.48** (4.31-4.66)	N=200 4.59*** (4.49-4.70)	N=204 4.72** (4.61-4.83)	N=202 4.75*** (4.68-4.83)
Passing a truck on the road?	N=200 4.67# (4.558-4.774)	N=200 4.64** (4.529-4.574)	N=203 4.80# (4.732-4.877)	N=202 4.79** (4.722-4.866)

***p=.015, ** p= .027, *p=.038, #p=.054

Respondents consistently indicated that they used their turn signals most of the time to show their intent to pass both cars and truck. All groups reported using their signals more often when passing trucks than when passing other passenger vehicles. Overall, respondents in the comparison area report using their turn signals more frequently for passing both cars and trucks than respondents in the TACT area. There was a significant difference between the TACT and comparison groups in the first survey wave for passing cars ($F(1,403) = 4.96$, $p=.027$) and trucks ($F(1,399)=5.92$, $p=.054$) and also in the second wave for passing cars ($F(1,402) = 4.35$, $p=.038$) and trucks ($F(1,401) = 4.97$, $p=.027$). However, there was no increase in the use of turn signals for passing at either the TACT or comparison between survey waves.

Passing behavior was further explored by asking respondents how they decided when it was safe to pull back into the lane in front of the vehicle they had just passed on the freeway. Respondents answered in their own words that were then coded into preset response categories in the CATI system by the interviewer. Respondents could list several ways by which they determined it was safe to pull into their travel lane. Table 3.4 lists the various ways respondents reported making the decision and the percent of respondents who indicated that they used that method.

[6] Although it should not be assumed that the scale is seen as linear by each respondent, a reasonable interpretation of the overall scale values is to consider 2 as about 25 percent, 3 as about 50 percent, and 4 as about 75 percent of the time when considering the frequency of some event.

Table 3.4 Respondent Behavior Passing Another Car on Freeway by Survey Area and Wave

When PASSING ANOTHER CAR on the freeway, how do you decide that it is safe to pull back in front of the car?	TACT Before N=192	TACT After N=192	Comparison Before N=178	Comparison After N=195
	Percent of respondents (standard error of percent)			
When I see the car in my side mirror	25.90 (4.22)	26.17 (3.93)	26.57 (4.65)	29.53 (4.35)
When I see the car in my rear mirror	47.13 (4.78)	45.95 (4.30)	39.97 (5.11)	27.98 (4.11)
When I am a number of car lengths ahead of the car that I am passing	15.49 (2.99)	27.39 (3.74)	25.20 (4.42)	30.53 (4.47)
When I am a number of feet ahead of the car that I am passing	0.72 (0.46)	1.66 (1.05)	2.62 (1.23)	5.21 (1.73)
After I turn my head to see if I am past the car	19.37 (3.88)	14.29 (3.05)	12.67 (3.88)	26.93 (4.55)
When I can see the headlights of car passed	1.25 (0.73)	1.18 (0.88)	0.00 (0.00)	1.08 (0.64)

Overall, 40 percent of respondents reported that they pull back into the travel lane when they see the vehicle they have just passed in their rear view mirror. This was the most frequent response at each area in each wave, and there were no statistical differences between areas and waves. The next most frequent response (27 percent) among all respondents was “when I see the car I passed in my side mirror.” There also were no statistical differences in this measure across the areas or waves. A similar overall proportion of respondents (27 percent) indicated that they decide to pull in “when I am some distance in front of the car I passed.” Again, there were no significant statistical differences in the proportion of respondents across sites and waves who responded this way. These respondents were further asked about the distance they left. The number of respondents who provided this information was small, but overall, the mean of those who gave a distance in car lengths was five car lengths, which is approximately 100 feet. A total of only 30 respondents from both survey sites and waves provided the information on distance in feet. The mean across the sites and waves ranged from 40 feet to 240 feet.

About 20 percent of respondents overall said that they turn their head to see if they are past the car. Again, there were no statistical differences across the sites and waves. A small number included the information that when they can see the headlights of the car they are passing, they pull into the travel lane.

Respondents were also asked to report the ways in which they gauge that it is safe to pull in front of a truck they have just passed. As in the previous question, respondents answered in their own words and could give multiple answers, with their responses being coded into preset categories in the CATI system. The distribution of the ways that drivers gauge the safety of returning into the travel lane after passing a truck was very similar to that of passing a car (see Table 3.5). There also were no significant differences between the TACT and comparison areas at each survey wave or any changes in either area between the survey waves. Interestingly, the overall distance in car lengths that motorists reported leaving when

they pull in front of a truck on a freeway was four, which is equivalent to 80 feet. This distance is less than that reported for passing another passenger car. Again, few respondents gave the distance directly in feet. Of those who did, the average was 160 feet, which is equivalent to about eight car lengths. It is possible that motorists have trouble accurately gauging distance in numbers of car lengths or feet when moving at 70 miles per hour (mph) or faster. About 5 percent of motorists overall replied that they will move into their lane when a truck driver signals with his or her horn.

Table 3.5 Respondent Behavior Passing a Truck by Survey Area and Wave

When PASSING A TRUCK on the freeway, how do you decide that it is safe to pull back in front of the car?	TACT Before N=194	TACT After N=192	Comparison Before N=182	Comparison After N=196
	Percent of respondents (standard error of percent)			
When I see the truck in my side mirror	22.73 (3.84)	25.02 (3.88)	22.21(4.19)	26.64 (4.27)
When I see the truck in my rear mirror	36.56 (4.59)	37.83 (4.19)	34.43 (5.08)	24.15 (3.76)
When I am a number of car lengths ahead of the truck that I am passing	17.25 (3.28)	24.83 (3.56)	28.5 (4.54)	35.12 (4.65)
When I am a number of feet ahead of the car that I am passing	3.94 (1.84)	5.24 (1.98)	2.49 (1.22)	5.56 (1.79)
When the truck honks	6.69 (2.80)	6.74 (2.22)	2.64 (1.31)	4.99 (2.49)
After I turn my head to see if I am past the truck	13.58 (3.17)	14.74 (3.14)	16.99 (4.46)	18.44 (4.03)

The next question was concerned with how motorists merge onto the freeway when there is a truck in the travel lane (Table 3.6). Approximately 90 percent of respondents reported that they adjust their speed to pull ahead or behind the truck, and about seven percent stated that they rely on the truck to either adjust its speed or move over into another lane. There were no significant differences between the areas at either wave, or in the areas by survey wave. A very small proportion of the motorists mentioned stopping on the ramp until there was enough space to pull in.

Table 3.6 Respondents' Merging Behavior Near Trucks by Survey Area and Wave

In general, which of the following best describes how you merge into freeway traffic when there is a truck in the lane you are merging into?	TACT Before N=198	TACT After N=200	Comparison Before N=203	Comparison After N=202
	Percent of respondents (standard error of percent)			
Adjust speed in order to pull in ahead or behind truck	91.68 (2.64)	85.81 (3.11)	89.21 (3.16)	90.29 (2.58)
Stop at the ramp and wait for enough space to pull in	1.69 (0.82)	5.22 (2.04)	2.24 (1.17)	1.28 (0.87)
Rely on the truck to pull over into the next lane or adjust its speed to let you in	5.71 (2.43)	5.68 (2.59)	6.59 (2.16)	7.45 (2.40)

Motorists' perceptions of unsafe driving actions of light-vehicles and trucks were explored in the next section of the survey. Respondents were asked about the likelihood of various unsafe actions being contributing factors to crashes between light-vehicles and large trucks. Table 3.7 shows the mean of responses and 95th percent confidence intervals for each unsafe action by survey area and survey wave.

Table 3.7 Likelihood of Unsafe Action Contributing to Car/Truck Crash by Survey Area and Wave

Thinking in general about crashes BETWEEN trucks and cars on the freeway – how likely is each of the following to be a contributing factor (1=very unlikely, 5=very likely)	TACT Before	TACT After	Comparison Before	Comparison After
	(Number responding, mean, 95th percent confidence interval of mean)			
A passenger car speeding near a truck	N=197 3.54 (3.36-3.73)	N=198 3.38** (3.21-3.55)	N=196 3.59 (3.35-3.83)	N=194 3.65** (3.45-3.86)
A truck speeding near passenger car	N=195 2.78 (2.54-3.02)	N =197 2.57 (2.37-2.77)	N=196 2.75 (2.48-3.02)	N)=194 2.77 (2.53-3.02)
Passenger car tailgating a truck	N=197 3.60 (3.39-3.82)	N=198 3.48 (3.30-3.67)	N=200 3.58 (3.37-3.79)	N=198 3.43 (3.20-3.67)
A truck tailgating a passenger car	N=200 2.73 (2.48-2.97)	N=199 2.69 (2.48-2.89)	N=199 2.92 (2.66-3.19)	N=197 2.88 (2.65-3.11)
A passenger car improperly passing a truck – cutting off the truck being passed	N=195 3.65 (3.40-3.88)	N=195 3.51 (3.32-3.70)	N=198 3.64 (3.40-3.88)	N=197 3.69 (3.52-3.86)
Improper passing by a truck – cutting in and out of the lanes	N=200 2.92 (2.67-3.17)	N=198 2.73 (2.53-2.94)	N=199 3.11 (2.83-3.38)	N=201 2.82 (2.57-3.06)
Inappropriate merging onto a freeway by a passenger car near a truck	N=196 3.40 (3.19-3.62)	N=199 3.37 (3.18-3.56)	N=197 3.60 (3.37-3.82)	N=197 3.46 (3.26-3.65)
Inappropriate merging onto a freeway by a truck near a passenger car	N=196 2.64 (2.40-2.89)	N=195 2.61 (2.43-2.79)	N=193 2.88 (2.62-3.14)	N=199 2.77 (2.55-3.00)
Distracted driving by passenger car driver	N=193 4.00 (3.80-4.20)	N=197 3.97** (3.80-4.14)	N=193 3.83*** (3.62-4.08)	N=198 4.18*** ** (4.02-4.34)
Distracted driving by the truck driver	N=192 2.81 (2.56-3.06)	N=191 2.73 (2.53-2.93)	N=191 2.82 (2.55-3.09)	N=191 2.83 (2.55-3.09)
Passenger car staying in truck's blind spot	N=192 3.82 (3.62-4.02)	N=194 3.75 (3.56-3.94)	N=196 3.71 (3.46-3.95)	N=194 3.80 (3.60-4.01)

*** p=.024, ** p= .052, *p=.079

The only statistically significant difference between and over sites and waves was an increase over survey waves in the likelihood rating of distracted driving contributing to a car/truck crash ($F(1,390)=5.14$, $p=.024$) in the comparison sites. There were marginally significant differences in the contribution of speeding by passenger cars ($F(1,391)=3.80$, $p=.052$) and distracted driving by passenger car driver ($F(1,394)=3.10$, $p=.079$) to car/truck crashes between the TACT and comparison sites in the second survey wave. Unsafe actions committed by cars were consistently judged to be more likely to contribute to a crash than similar actions by a truck. For unsafe light-vehicle actions, all the mean values for likelihood were over the value of 3, indicating a positive likelihood. The mean likelihood values for truck actions were all under the value of 3 indicating that they were considered to be somewhat unlikely to contribute to a crash. Although the respondents were not asked to rank the unsafe actions in any way, ranking their responses based on the scores given provides a way of examining the perceptions of seriousness of these actions. Examined in that way, the unsafe actions by order of highest to lowest likelihood of contributing to a crash between cars and trucks were: distracted driving by car driver, passenger car staying in truck's blind spot, a passenger car inappropriately passing a truck (i.e., cutting off the truck being passed), passenger car speeding near truck, passenger car tailgating a truck, and inappropriate merging onto a freeway by a passenger car near a truck.

Respondents were asked about how often they witnessed these unsafe actions while driving on freeways. They were instructed to give their response on a scale of 1 to 5 with 1 indicating never and 5 indicating always (Table 3.8).

Table 3.8 Frequency of Observing Unsafe Actions by Survey Area and Wave

How often do you see this occur when you are on the freeway? (1=never, 5=always)	TACT Before	TACT After	Comparison Before	Comparison After
	Number responding, mean, 95th percent confidence interval of mean			
A passenger car speeding near a truck	N=197 3.49 (3.30-3.68)	N=196 3.36 (3.42-3.93)	N=199 3.67 (3.42-3.93)	N=199 3.47 (3.30-3.64)
A truck speeding near passenger car	N=197 2.28 (2.10-2.47)	N=200 2.21 (2.04-2.39)	N=202 2.30 (2.05-2.54)	N=196 2.31 (2.14-2.49)
Passenger car tailgating a truck	N=198 3.26 (3.05-3.48)	N=199 3.13 (2.94-3.32)	N=201 3.25 (3.00-3.49)	N=201 3.18 (2.96-4.30)
A truck tailgating a passenger car	N=199 2.19 (1.98-2.41)	N=199 2.13 (1.97-2.29)	N=200 2.36 (2.12-2.60)	N=200 2.22 (2.02-2.42)
A passenger car improperly passing a truck – cutting off the truck being passed	N=196 3.03 (2.81-3.25)	N=196 2.90 (2.70-3.10)	N=198 3.21 (2.98-3.45)	N=200 3.00 (2.79-3.22)
Improper passing by a truck – cutting in and out of the lanes	N=199 2.21 (2.02-2.39)	N=198 2.16 (1.96-2.35)	N=201 2.34 (2.10-2.39)	N=201 2.23 (2.04-2.42)
Inappropriate merging onto a freeway by a passenger car near a truck	N=198 2.94 (2.72-3.16)	N=199 2.88 (2.71-3.05)	N=199 3.13 (2.90-3.35)	N=199 2.92 (2.73-3.11)

How often do you see this occur when you are on the freeway? (1=never, 5=always)	TACT Before	TACT After	Comparison Before	Comparison After
	Number responding, mean, 95th percent confidence interval of mean			
Inappropriate merging onto a freeway by a truck near a passenger car	N=198 2.29 (2.10-2.48)	N=198 2.18 (2.02-2.34)	N=197 2.26 (2.06-2.47)	N=201 2.28 (2.09-2.46)
Distracted driving by passenger car driver	N=193 3.57 (3.36-3.79)	N=199 3.61 (3.44-3.78)	N=200 3.46 (3.20-3.71)	N=199 3.58 (3.40-3.76)
Distracted driving by the truck driver	N=194 1.97 (1.70-2.14)	N=190 1.92 (1.78-2.06)	N=193 2.14 (1.94-2.34)	N=193 1.93 (1.74-2.12)
Passenger car staying in truck's blind spot	N=192 3.08 (2.85-3.32)	N=195 3.10 (2.89-3.31)	N=193 3.19 (2.95-3.44)	N=196 3.07 (2.86-3.28)

There were no significant differences in the reported frequency of observation of these actions in the study areas between survey waves or between areas in each survey wave. Unsafe actions by light-vehicles were reported to be more frequent than similar actions by trucks with most mean values exceeding the midpoint value of 3, indicating that this action was moderately frequent. The order of unsafe actions by passenger car drivers in order of decreasing reported frequency were: distracted driving by passenger car driver, passenger car speeding near a truck, passenger car tailgating a truck, passenger car staying in truck's blind spot, a passenger car improperly passing a truck (cutting off a truck), and inappropriate merging onto a freeway by a passenger car near a truck. Although the frequency of unsafe actions by trucks were rated as somewhat infrequent, their order from highest to lowest frequency was: distracted driving by truck driver, truck tailgating a passenger car, improper passing by a truck, cutting in and out of lanes, inappropriate merging onto a freeway by a truck, and a truck speeding near a passenger car.

Respondents were asked about the likelihood that a light-vehicle or a truck driving unsafely would be stopped by police (Table 3.9). Overall, respondents reported that it was unlikely that either passenger cars or trucks driving unsafely would be stopped by police, although the likelihood for trucks being stopped was slightly higher than for passenger cars being stopped. The only statistical difference in this table was between the TACT and comparison sites in the second survey wave ($F(1,387) = 3.98$, $p = .049$), where respondents in the comparison area indicated that cars driving unsafely were more likely to be stopped by police than did respondents in the TACT areas.

Table 3.9 Motorists' Perceptions of Likelihood of Police Stop for Unsafe Action by Survey Area and Wave

How likely is each of the following (1=very unlikely, 5=very likely)	TACT Before	TACT After	Comparison Before	Comparison After
	(Number responding, mean, 95th percent confidence interval of mean)			
Passenger car driving unsafely around a truck will get stopped by the police	N=193 2.10* (1.853-2.353)	N=194 2.22 (2.010-2.423)	N=195 2.47* (2.209-2.737)	N=196 2.15 (1.912-2.385)
Truck driving unsafely around passenger car will get stopped by police	N=193 2.50 (2.243-2.753)	N=195 2.79 (2.502-3.086)	N=194 2.61 (2.388-2.828)	N=196 2.65 (2.377-2.930)

*p= .049

The next question asked respondents if they had heard or seen any public safety messages about how cars and trucks can drive safely around each other on various media in the past three months. Table 3.10 shows the percent (and standard error of percent) of respondents who indicated that they did hear or see such messages.

Table 3.10 Motorists Exposure to Public Safety Messages about Safe Driving of Cars Near Trucks by Survey Area and Wave

In the last three months, have you heard or seen any public safety messages about how cars and trucks can drive more safely around each other in the following formats?	TACT Before N=200	TACT After N=200	Comparison Before N=204	Comparison After N=202
	Percent of respondents (standard error of percent)			
Newspaper	9.16 (2.93)	10.33** (2.55)	8.46* (2.89)	3.28 ** * (1.23)
Radio	15.89 (3.68)	24.93 (3.83)	17.16 (4.23)	16.30 (3.64)
Television	19.58*** (3.66)	31.52*** ** (3.97)	17.47 (4.03)	18.43** (3.68)
Changeable message signs on freeway	44.33 (4.63)	52.99*** (4.20)	37.41 (4.88)	38.26*** (4.60)
Brochure	6.61 (2.32)	7.53 (2.21)	10.07 (3.71)	8.07 (2.68)
Police	10.11* (3.33)	3.75* (1.53)	7.80 (3.33)	4.20 (2.05)
Billboard	27.80 (4.17)	28.88 (3.87)	32.80 * (4.84)	21.43* (4.09)
Poster	9.53 (3.110)	7.81 (2.46)	12.40 (3.92)	6.45 (2.55)
Banner	6.80** (2.51)	8.12 (2.35)	1.13** ## (0.58)	6.62 ## (2.73)

In the last three months, have you heard or seen any public safety messages about how cars and trucks can drive more safely around each other in the following formats?	TACT Before N=200	TACT After N=200	Comparison Before N=204	Comparison After N=202
	Percent of respondents (standard error of percent)			
Truck Wrap	16.88 (3.60)	25.34 (3.86)	16.19*** (3.16)	29.63*** (4.41)
Public media event	5.00 (2.35)	9.13 (2.52)	5.46 (2.23)	4.12 (1.73)

***p <.02, **p <.03, ## p<.05, *p<.1

The portion of respondents in the TACT sites who reported hearing and seeing messages on television about safe driving of cars and trucks near each other, increased significantly from 20 percent to 32 percent between survey waves (X^2=5.861, df=1, p=0.016) and was significantly different when compared to the comparison area in Wave Two (X^2=4.909, df=1, p=0.027). In Wave Two, the proportion of respondents in the TACT area was significantly greater than the proportion of respondents in the comparison areas who saw the message in newspaper articles (X^2=6.210, df=1, p=0.013) and on changeable message signs on the freeways (X^2=5.678, df=1, p=0.017).

The percent of motorists in the TACT area who heard the messages on the radio went from 16 percent to 25 percent, an increase that was marginally significant (X^2=2.91 4, df=1, p=0.087). There was an increase from five percent to nine percent in the percent of respondents in the TACT area who said they heard the message about cars and trucks in a public media event, but the increase did not approach statistical significance.

There was a significant increase between survey waves at the comparison sites in the proportion of respondents who reported seeing the message on a truck wrap (X^2=6.176, df=1, p=0.013). This was puzzling, because we were not aware of any truck wrap programs in the area during the time. One explanation is that the idea of a truck wrap was not clear to the respondents, and they may have misinterpreted the signs on backs of trucks warning motorists about wide turns or driving in the blind spot as truck wrapping. There was a marginally significant decrease in reported sighting of billboards in the comparison area between survey waves from 32 percent to 21 percent (X^2=3.24, df=1, p=.072). The percent of respondents who reported seeing banners with the safe driving messages was significantly different between the TACT and comparison site in wave 1 (X^2=4.96, df=1, p=0.027) and increased significantly between waves in the comparison sites (X^2=3.881, df=1, p=0.047).

Respondents were asked if they heard or saw a series of specific safety messages in the past three months. All respondents reported hearing or seeing the impaired driving message “Over the Limit, Under Arrest” and 90 percent of respondents indicated that they saw or heard the “Click it or Ticket” message. In addition, 72 percent of respondents heard or saw the message “Drive Now, Text Later” and 61 percent heard or saw the message “Share the Road”. The message “Leave More Space” was directly associated with the TACT program. Before the TACT program, 23 percent of TACT site respondents and 28 percent of comparison site respondents reported that they had heard or seen this message. After the TACT

program, the percent of respondents who said they heard or saw this message in the comparison sites remained at 28 percent, while it increased significantly (X^2=5.7344, df=1, p=0.017) in the TACT sites to 37 percent.

Table 3.11 Motorists Exposure to Traffic Safety Messages by Survey Area and Wave

In the past three months, did you hear or see any of these specific slogans?	TACT Before N=200	TACT After N=200	Comparison Before N=204	Comparison After N=202
	Percent of respondents (standard error of percent			
Share the Road	64.70 (4.23)	63.88 (3.99)	60.98 (4.86)	56.09 (4.65)
Click it or Ticket	91.98 (2.80)	89.94 (2.25)	92.05 (2.52)	94.38 (1.700
Leave More Space	23.35* (3.78)	36.54*(4.030)	28.26 (4.800	28.56 (4.25)
Over the Limit, Under Arrest	100 (0.00)	100 (0.00)	100 (0.00)	100 (0.00)
Drive Now, Text Later	78.13 (3.40)	70.26 (3.75)	69.08 (4.45)	69.03 (4.32)

*p = 0.017

Table 3.12 shows the distribution of responses (percent and standard error of percent) for the question about who is responsible for crashes between passenger cars and trucks. The majority of respondents (about 60 percent overall) indicated that it is more often the driver of the car. Close to one-third stated that car and truck drivers are equally responsible, four percent stated that it is more often the truck, and close to three percent replied that it is always the car. These allocations were consistent and there were no significant differences in the percent of respondents in each category at each site by wave, or between sites in each wave.

Table 3.12 Motorists Perceptions of Responsibility for Crashes by Survey Area and Wave

Thinking about crashes between cars and trucks, who do you think in general is more responsible for the crash?	TACT Before N=192	TACT After N=196	Comparison Before N=200	Comparison After N=199
	Percent of respondents (standard error of percent			
Almost always the truck	0.59 (0.587)	0.00 (0.00)	0.00 (0.00)	0.58(0.58)
More often the truck	5.69 (2.67)	2.65 (1.30)	5.39 (2.23)	2.61 (1.11)
Equally responsible	30.77 (4.16)	33.99 (3.91)	31.81 (4.49)	36.20 (4.58)
More often the car	60.41 (4.61)	62.07 (4.02)	58.23 (4.83)	57.03 (4.69)
Almost always the car	2.54 (1.68)	1.29 (0.67)	4.56 (2.04)	3.58 (2.06)

3.2 Truck Driver Survey

3.2.1 Questionnaire

A survey of truck drivers who drove the TACT and comparison corridors was also conducted before and after the implementation of the TACT program. UMTRI developed a pencil/paper survey instrument with questions that paralleled those on the motorist survey, including items on truck drivers' perceptions about how drivers of light-vehicles passed trucks on the freeway and merged onto the freeway near trucks,

unsafe driving actions by light-vehicle and trucks that lead to crashes, the likelihood that light-vehicles and trucks will be stopped by police for an unsafe action, and whether or not truck drivers were aware of the media and PI&E messages of the TACT program. Questions were pilot tested at UMTRI. To minimize shipping costs and respondent burden, the questionnaire was short and printed as a brochure on both sides of one legal sized sheet of paper. The questionnaire used in the truck driver survey can be found in Appendix L.

3.2.2 Sample and Survey Administration

Safety managers from trucking companies with motor carrier fleets that operated in the TACT and comparison areas were recruited by UMTRI to administer the survey. Companies selected had both a local and national presence, as well as good representation of the types of large trucks that travel along the study corridors. Safety managers were asked to inform their drivers of the survey, distribute the questionnaires, and collect and return them to UMTRI upon completion. Packets of questionnaires were sent to the safety managers, along with prepaid courier-service return envelopes. Safety managers were instructed to carry out the distribution and collection of the questionnaires in a manner that was most efficient for them and least disruptive to their company.

Seven companies in the western part of the state near the TACT sites and five companies in the southeastern part of the state near the comparison sites participated in the before TACT-program survey. Surveys were conducted between September 10 and October 4, 2013, resulting in a total of 101 and 82 completed questionnaires in the TACT and comparison areas, respectively. Six companies in the TACT sites and four in the comparison sites participated in the after TACT-program survey between January 9 and March 25, 2014. A total of 67 and 64 surveys were collected from the TACT and comparison sites, respectively in the second survey. The original plans for the second truck driver survey called for a completion date at the end of January so as to be consistent with the timing of the second wave of the motorist survey. However, safety managers at several of the companies reported that the inclement weather immediately after the completion of the TACT program disrupted their operations and normal routines, which left them little time to attend to the survey. Thus, it took longer to complete the second wave of the truck driver survey and there were fewer respondents.

3.2.3 Data analysis

Upon receipt of the completed survey packages from the safety managers, data from all questionnaire forms were coded and entered electronically into a database at UMTRI. Initial examination of the data showed that most of the drivers from the trucking companies in the western and southeastern parts of the state drove on both the TACT and comparison corridors although with different frequencies. Consequently, for analysis purposes, drivers were assigned to the TACT group if they drove on the TACT sites more frequently than on the comparison sites. Similarly, drivers were assigned to the comparison group if their frequency of driving on comparison sites was greater than their frequency of driving on the TACT sites. Drivers who had the same frequencies on both the TACT and comparison sites were not included in the analysis. A total of 164 respondents were included in the analysis of the before TACT program survey with 73 respondents in the TACT sites and 91 respondents in the comparison sites. There was a total of 102 respondents in the after TACT program survey with 36 respondents in the TACT area and 66 respondents in the comparison area.

The analysis was conducted using SAS Version 9.4 procedures for surveys and consisted of comparing responses between: 1) the TACT sites before and after the TACT program; 2) the comparison sites

before and after the TACT program; 3) between the TACT and comparison sites before the TACT program; and 4) between the TACT and Comparison sites after the TACT program. The differences in each comparison were tested for statistical significance using Rao-Scott chi square statistic to test proportions, and an F statistic to test for significant differences between means.

3.2.4 Results

Table 3.13 shows the demographics of survey respondents in the TACT and comparison areas for the before and after TACT-program surveys.

Table 3.13 Demographics of Truck Driver Survey Respondents

	TACT Before N=73	TACT After N=36	Comparison Before N=91	Comparison After N=66
Age (mean)	48.8	50.5	48.6	47.9
95thpercent CI for mean	(46.3-51.3)	(46.7-54.4)	(47.0-50.2)	(45.4-50.4)
Percent Male	91.8 (3.2)	97.2 (2.8)	91.2 (3.0)	89.4 (3.8)
	Percent of respondents (standard error of percent)			
Race				
White	90.4 (3.5)	88.9 (5.3)	83.5 (3.9)	90.9 (3.6)
Black/African American	2.7 (1.9)	0.0	8.8 (3.0)	4.5 (2.6)
American Indian	1.4 (1.4)	2.8 (2.8)	0.0	1.5 (1.5)
Asian	0.0	0.0	1.1 (1.1)	0.0
HH Income in 2012				
25,000 – 50,000	39.7 (5.8)	33.3 (8.0)	33.0 (5.0)	15.2 (4.4)
50,000 – 75,000	32.9 (5.5)	30.6 (7.8)	19.8 (4.2)	33.3 (5.8)
75,000 – 100,000	13.7 (4.1)	13.9 (5.8)	20.9 (4.3)	28.8 (5.6)
100,000+	5.5 (2.7)	11.1 (5.3)	15.4 (3.8)	16.7 (4.6)
Education				
Less than HS	6.8 (3.0)	0.0	5.5 (2.4)	4.5 (2.6)
HS Graduate	50.7 (5.9)	47.2 (8.4)	49.5 (5.3)	37.9 (6.0)
Vocational/Tech	16.4 (4.4)	22.2 (7.0)	14.3 (3.7)	22.7 (5.2)
Two-yr. College (including Associate degree)	19.2 (4.6)	22.2 (7.0)	21.98 (4.37)	31.8 (5.8)
Attended Four-yr. College	4.1 (2.3)	2.8 (2.8)	4.40 (2.16)	0.0

Overall, the average age of respondents was 48-50 years. They were predominantly male and White, although there was a notable presence (five to nine percent of Black African American truck drivers in the comparison areas. Respondents in the TACT sites reported slightly lower levels of household annual income before and after the TACT program. Education was similar for both the TACT and comparison sites with most respondents attaining at least a high school diploma and a large portion having attended vocational/technical or two-year college program.

The types of trucks driven by the respondents and their annual truck mileage are show in Table 3.14.

Table 3.14 Type of Truck and Miles Driven by Truck Driver Respondents

	TACT Before N=73	TACT After N=36	Comparison Before N=91	Comparison After N=66
Driving truck is primary job	100.0%	97.2%	100.0%	98.5%
How long have you been a truck driver? Years -Mean (95% CI for mean)	17.6 (15.1-20.4)	20.6 (17.7-22.7)	20.4 (18.4-22.5)	20.1 (17.1-23.0)
What type of truck do you normally drive?	Tractor/1 trailer 95.9%	Tractor/1 trailer 100%	Tractor/1 trailer 84.7% Tractor/2trailer 7.7%	Tractor/1 trailer 83.4% Tractor/2 trailer 15.2%
About how many miles did you drive a truck last year? Mean (95th percent CI for mean)	115,511 (89,650–41,371)	107,036 (79,272-34,800)	84,622 (74,785-95,460)	83,980 (73,956-94,005)

Nearly all respondents reported driving a truck as their primary job in both study areas for both survey waves. The average number of years driving a truck was about 20, with respondents in the TACT area reporting a shorter length of time driving a truck in the first survey wave. Nearly all respondents in TACT area reported normally driving a tractor with one trailer, while a notable percentage of respondents in the comparison sites reported driving a tractor with two trailers in addition to a tractor with one trailer. On average, truck drivers in the TACT area reported driving more miles than drivers in the comparison sites.

In the first question about the behavior of light-vehicle drivers near a truck, respondents were asked about passing maneuvers, specifically about the frequency of light-vehicle drivers signaling their intent, and how often the truck drivers felt that the passing maneuver was unsafe. They were asked to give their response on a scale of 1 to 5, with 1 being never and 5 being always in terms of how often car drivers use their turn signals when passing a truck. The intermediate values on this scale can be roughly interpreted as the midpoint 3 signifying about 50 percent of the time, with values of 2 and 4 signifying about 25 percent and 75 percent of the time respectively.[7]

Drivers in both the TACT and comparison areas in both survey waves reported that turn signals were infrequently used by light-vehicles when passing trucks. There was no significant change at the TACT sites after the TACT-program implementation. There were also no significant differences between the TACT and comparison sites before and after the TACT program. However, there was a statistically significant increase ($F(1,156) = 5.36$, $p = .022$) in the reported use of turn signals in the comparison area between the survey waves.

When asked how often they considered light-vehicle passing maneuvers to be unsafe, respondents in both sites reported an average value over 3, which can be interpreted as truck drivers perceiving passing maneuvers to be unsafe just over one-half of the time. There was a marginally significant difference

[7] The rough interpretation is based on the assumption that the respondent perceives the scale as linear. Although not necessarily true, this does provide a basis for interpretation and comparison.

between the TACT and comparison sites before the TACT program in which those in the TACT sites rated the car's passing actions as more often unsafe (F(1,162) =3.54, p=0.062). There were no statistical differences among the other comparisons.

Table 3.15 Behavior of Light-Vehicles while Passing Truck

Thinking about the times when a car passed you on the freeway and pulled back in front of you: (1=never, 5=always)	TACT Before	TACT After	Comparison Before	Comparison After
	(Number responding, mean, 95th percent confidence interval of mean)			
How often did they use their turn signals?	N=72 2.60 (2.39-2.80)	N=36 2.72 (2.43-3.01)	N=91 2.37 (2.16-2.59)**	N=66 2.76 (2.51-3.01)**
How often did you consider the car's actions to be unsafe?	N=72 3.43 (3.20-3.66)*	N=36 3.39 (2.30-3.78)	N=91 3.73 (3.52-3.93)*	N=66 3.50 (2.39-2.80)

**p=.022, *p=.062

Truck drivers were asked to consider the actions of light-vehicles merging onto the freeway near their truck. They were asked how often light-vehicle performed various actions, using a scale of 1 to 5 (with 1 being never and 5 being always). Table 3.16 shows the total number of respondents who answered the question, the mean scale value for each group, and 95th percent confidence interval of the mean.

Table 3.16 Merging Behavior of Light-Vehicles Near Trucks

Thinking about the times when you are in the right lane and a car is merging onto the freeway, how often does the car: (1=never, 5=always)	TACT Before	TACT After	Comparison Before	Comparison after
	(Number responding, mean, 95th percent confidence interval of mean)			
Adjust its speed in order to pull in ahead or behind you	N=73 2.33 (2.11-2.55)	N=36 2.61 (2.30-2.93)	N=91 2.45 (2.25-2.66)	N=65 2.58 (2.36-2.81)
Stop on the ramp and wait for you to go by before pulling into the lane	N=73 1.84* (1.64-2.04)	N=26 1.83 (1.54-2.13)	N=91 2.15* (1.92-2.39)	N=65 2.08 (1.83-2.32)
Rely on you to pull over into the next lane	N=73 3.68 (3.44-3.93)	N=36 3.75 (3.46-4.04)	N=91 3.79 (3.58-3.99)	N=64 3.83 (3.59-4.07)
Rely on you to adjust your speed to let them in	N=73 3.85 (3.60-4.10)	N=36 3.78 (3.44-4.11)	N=91 3.95 (3.75-4.14)	N=66 3.92 (3.69-4.16)

*p=.045

Truck drivers were asked how often light-vehicles merging onto a freeway adjusted their speed to pull in front or behind the truck. The mean responses for both the TACT and comparison areas, before and after the TACT program, were 2.3-2.6, which can be interpreted as less than half of the time. Although there was a slight increase in this measure at both TACT and comparisons sites between survey waves, the increases did not achieve statistical significance. The maneuver of a light-vehicle stopping on the ramp and waiting for the truck to go by was reported as infrequent, but there was a statistical difference ($F(1,155) = 4.06$, $p=0.045$) in the reported frequency of this maneuver between the TACT and comparison sites in the before-TACT survey, with this action reported to be less frequent on the TACT sites.

Truck drivers were also asked how often light-vehicle relied on the truck driver to pull over into the next lane to allow the car to enter the highway, and also how often light-vehicle drivers relied on the truck to adjust its speed to let them in. Truck drivers' responses consistently indicated that these actions occurred very frequently. No significant differences were found between sites and survey waves on these measures. In general, truck drivers reported that light-vehicle drivers merging onto the freeway near a truck more often expected the truck to pull over or adjust speed, rather than adjusting their own speed for the merge.

In the next series of questions, truck drivers were asked to think generally about crashes between trucks and cars and to rate the likelihood of various unsafe actions being contributing factors to a crash. They were asked to rate the likelihood on a scale of 1 to 5, with 1 being very unlikely and 5 being very likely. Table 3.17 shows the mean scale value of the responses, and 95th percent confidence interval of the mean for each driving action.

Table 3.17 Contributing Factors of Crashes Between Trucks and Cars

Thinking in general about crashes BETWEEN trucks and cars – how likely is each of the following driving actions to be a contributing factor? (1=very unlikely, 5=very likely)	TACT Before	TACT After	Comparison Before	Comparison After
	(Number responding, mean, 95th percent confidence interval of mean)			
A car speeding near a truck	N=73 3.79 (3.55-4.04)	N=36 3.61 (3.21-4.01)	N=91 3.86 (3.65-4.07)	N=66 3.82 (3.59-4.05)
A truck speeding near a car	N=72 2.88 (2.63-3.13)	N=36 2.75 (2.40-3.10)	N=91 2.73 (2.51-2.95)	N=66 2.80 (2.60-3.01)
A car tailgating a truck	N=73 3.85 (3.62-4.08)	N=36 3.69 (3.32-4.07)	N=91 3.99 (3.78-4.20)	N=66 4.000 (3.78-4.23)
A truck tailgating a car	N=73 3.30 (3.02-3.58)	N=36 3.53 (3.13-3.92)	N=91 3.21 (2.96-3.46)	N=65 3.28 (3.01-3.54)
A car improperly passing a truck – cutting off the truck being passed	N=73 4.10 (3.89-4.30)	N=36 4.00 (3.67-4.332)	N=90 4.13 (3.94-4.33)	N=66 3.95 (3.71-4.20)
Improper passing by a truck – cutting in and out of the lanes	N=72 3.03 (2.74-3.32)	N=36 3.22 (2.79-3.66)	N=89 3.08 (2.80-3.35)	N=65 2.92 (2.65-3.20)
Inappropriate merging onto a freeway by a car near a truck	N=71 3.96 (3.77-4.15)	N=36 3.78 (3.45-4.10)	N=89 4.04 (3.85-4.24)	N=66 3.97 (3.76-4.18)

Thinking in general about crashes BETWEEN trucks and cars – how likely is each of the following driving actions to be a contributing factor? (1=very unlikely, 5=very likely)	TACT Before	TACT After	Comparison Before	Comparison After
	(Number responding, mean, 95th percent confidence interval of mean)			
Inappropriate merging onto a freeway by a truck near a car	N=73 3.11 (2.84-3.38)	N=35 3.23 (2.83-3.63)	N=89 2.84 (2.61-3.07)	N=64 2.91 (2.64-3.17)
Distracted driving by the car driver	N=73 4.37 (4.15-4.59)	N=36 4.25 (3.94-4.56)	N=90 4.51 (4.32-4.70)	N=66 4.35 (4.14-4.56)
Distracted driving by the truck driver	N=73 3.27 (2.97-3.58)	N=36 3.19 (2.80-3.59)	N=90 3.26 (2.99-3.52)	N=66 3.15 (2.88-3.42)
Car staying in truck's blind spot	N=73 4.12 (3.91-4.33)	N=36 4.17 (3.84-4.49)	N=90 4.12 (3.91-4.34)	N=66 4.09 (3.88-4.31)
A car failing to yield the right of way	N=73 4.12 (3.91-4.34)	N=36 3.94 (3.62-4.23)	N=90 4.16 (3.93-4.38)	N=66 4.08 (3.85-4.31)
A truck failing to yield the right of way	N=73 3.16 (2.89-3.44)	N=36 3.22 (2.83-3.61)	N=90 3.09 (2.81-3.36)	N=66 3.05 (2.79-3.31)

Truck drivers' perceptions of the likelihood of each action contributing to a crash were consistent, and no significant differences were found across the two study sites and survey waves. The likelihoods of car driver actions were consistently rated as more likely to contribute to a crash than similar actions by truck drivers. Distracted driving by the light-vehicle was given a higher likelihood to contributing to a crash than any other driving action listed in the table. Truck speeding near car was reported by the truck drivers as the driving action least likely among those listed to contribute to a crash between a truck and light-vehicle.

The order of decreasing likelihood of unsafe actions contributing to light-vehicle/truck crashes as rated by the truck drivers was: distracted driving by car driver, car cutting off truck being passed, inappropriate merging onto freeway by car near truck, car tailgating truck, car speeding near truck. Distracted driving by truck driver was rated as having the highest likelihood of contributing to a crash from among the unsafe truck driver actions. However, its likelihood was still below that of the light-vehicle driver action with the lowest likelihood rating.

Next, truck drivers were asked how often they see these unsafe driving actions. Again the responses are on a scale of 1 to 5, with 1 being never and 5 being always. The number of responses to each action, the mean of the scale values and the 95th percent confidence interval of the mean are shown in Table 3.18.

Table 3.18 Frequency of Unsafe Driving Actions

How often do you see these driving actions when you are on the road? (1=never, 5=always)	TACT Before	TACT After	Comparison Before	Comparison After
	(Number responding, mean, 95th percent confidence interval of mean)			
A car speeding near a truck	N=73 4.30 (4.13-4.47)	N=36 4.28 (4.05-4.51)	N=91 4.45 (4.32-4.58)	N=66 4.26 (4.05-4.47)
A truck speeding near a car	N=73 2.67 (2.46-2.89)	N=36 3.00 (2.71-3.29)	N=91 2.70 (2.50-2.91)	N=66 2.71 (2.50-2.92)
A car tailgating a truck	N=72 3.90 (3.68-4.13)	N=36 3.92 (3.58-4.25)	N=91 4.08 (3.89-4.26)	N=66 4.09 (3.87-4.31)
A truck tailgating a car	N=73 2.92 (2.68-3.15)	N=36 2.83 (2.52-3.15)	N=91 2.91 (2.69-3.13)	N=66 3.15 (2.90-3.40)
A car improperly passing a truck – that is cutting off the truck being passed	N=73 3.88 (3.67-4.09)	N=36 3.86 (3.54-4.19)	N=91 3.99 (3.83-4.15)	N=66 3.94 (3.72-4.16)
Improper passing by a truck – that is cutting in and out of the lanes	N=73 2.56 (2.37-2.76)	N=35 2.71 (2.38-3.05)	N=90 2.56 (2.35-2.76)	N=66 2.62 (2.39-2.85)
Inappropriate merging onto a freeway by a car near a truck	N=73 3.99 (3.78-4.19)	N=36 4.08 (3.87-4.30)	N=90 4.17* (3.99-4.34)	N=66 3.80* (3.57-4.03)
Inappropriate merging onto a freeway by a truck near a car	N=72 2.51 (2.32-2.71)	N=36 2.64 (2.33-2.94)	N=90 2.48 (2.29-2.66)	N=66 2.52 (2.31-2.72)
Distracted driving by the car driver	N=73 4.23 (4.05-4.42)	N=35 4.17 (3.89-4.46)	N=90 4.44 (4.30-4.59)	N=66 4.23 (4.02-4.44)
Distracted driving by the truck driver	N=73 2.77 (2.55-2.98)	N=36 2.92 (2.60-3.23)	N=91 2.82 (2.60-3.05)	N=66 2.79 (2.55-3.03)
Car staying in truck's blind spot	N=73 3.78 (3.55-4.02)	N=36 3.89 (3.58-4.20)	N=91 3.89 (3.692-4.09)	N=66 3.85 (3.62-4.07)
A car failing to yield the right of way	N=73 3.85 (3.63-4.07)	N=36 3.92 (3.61-4.22)	N=91 4.08 (3.89-4.27)	N=66 3.94 (3.69-4.19)
A truck failing to yield the right of way	N=73 2.59 (2.37-2.81)	N=36 2.72 (2.40-3.04)	N=91 2.62 (2.43-2.80)	N=66 2.71 (2.49-2.94)

*p=0.015

Truck drivers' responses were very consistent across the study sites and survey waves. With one exception, there were no statistical differences before and after the TACT program, or between the TACT and comparison sites in each survey wave. The driving behaviors in which the actions of the light-vehicle driver were unsafe, were rated as occurring more frequently than the similar actions by truck drivers. The light-vehicle driver unsafe actions in order of highest to lowest reported frequency were: car speeding near a truck, distracted driving by the car driver, inappropriate merging onto freeway by a car near a truck, car tailgating a truck, car failing to yield right-of-way, car improperly passing a truck, and car staying in truck's blind spot. All the unsafe actions by truck drivers were rated as infrequent. The only significant difference found in this table was the reduction of inappropriate merging by a car near a truck in the comparison sites in the after-TACT program survey ($F(1,155) = 6.11$, $p=0.015$).

Respondents were also asked if there were other types of unsafe actions between cars and trucks that they see on the freeway and how often they see them. Each respondent could report up to three additional unsafe actions. In all, additional unsafe actions were mentioned 71 times by the respondents at the TACT sites in the before TACT program survey and 33 in the post TACT program survey. Respondents in the comparison group provided 69 mentions of additional unsafe actions in the before TACT program survey and 37 in the post-TACT program survey. These unsafe actions included: cell-phone use and texting, cutting trucks off by crossing multiple lanes to get to exit, passing and moving into lane too close to truck, weaving in and out of traffic lanes, not allowing signaling truck to change lanes, improper lane use and using the center lane, speeding up and slowing down erratically. There were multiple entries of some of the reported actions and some actions were only mentioned once. The following table shows four actions (or groups of related actions) that were mentioned most often in response to this question. The respondents also provided an indication of how often they observed this action on a 5-point scale, with 1 being never and 5 being always. The mean of the frequency of observation of the action and the 95th percent confidence interval are also given in the table.

Table 3.19 Additional Unsafe Actions Seen by Truck Drivers

What other unsafe driving actions do you see and how often do you see them when you are on the road?	TACT site before	TACT site after	Comparison site before	Comparison site After
	(Number responding, mean, 95th percent confidence interval of mean)			
Texting and cell phone use	n=17 4.47 (4.16-4.78)	N=4 4.5 (3.92-5.00)	N=13 4.69 (4.34-5.00)	N=7 4.43 (3.99-4.86)
Cutting off truck or moving in too close in front of truck	N=12 4.25 (3.89-4.61)	N=7 4.43 (3.80-5.00)	N=13 4.38 (4.10-4.67)	N=6 4.67 (4.23-5.00)
Distracted driving	N=8 3.75 (3.10-4.40)	N=5 3.00 (3.00-3.00)	N=7 3.14 (2.31-3.97)	N=4 4.50 (3.89-5.00)
Aggressive driving including: weaving in and out of traffic, not allowing signaling truck to change lanes, and driving on shoulder.	N=3 3.67 (2.34-5.00)	N=3 4.33 (3.45-5.00)	N=6 4.17 (3.10-5.00)	N=2 4.00 (4.00-4.00)

It should be noted that the additional actions mentioned by the respondents were already listed in the previous question. For example, cell phone use and texting are cases of distracted driving. One possible explanation for respondents specifically mentioning these actions again could be that they see these actions often and feel strongly that these actions greatly increase the risk of a crash.

Respondents' perceptions of the likelihood that light-vehicle drivers and truck drivers would be stopped by police if they engaged in an unsafe action were explored next. Survey respondents gave their responses on a scale of 1 to 5 with 1 being very unlikely and 5 being very likely. Table 3.20 shows the total number of respondents answering the question, the mean response, and 95th percent confidence interval of the mean. There were no significant differences between sites or survey waves, but truck drivers reported that they are much more likely than light-vehicles to be stopped by police if they drive unsafely.

Table 3.20 Likelihood of Being Stopped by Police for Unsafe Driving

How likely is it that	TACT Before	TACT After	Comparison Before	Comparison After
	(Number responding, mean, 95th percent confidence interval of mean)			
A car driving unsafely around a truck will be stopped by the police?	N=73 1.59 (1.40-1.78)	N=35 1.63 (1.36-1.90)	N=91 1.81 (1.59-2.03)	N=66 1.73 (1.47-1.98)
A truck driving unsafely around a car will be stopped by the police?	N=72 3.83 (3.56-4.11)	N=35 3.60 (3.19-4.01)	N=91 4.07 (3.84-4.29)	N=64 3.86 (3.61-4.11)

Survey respondents were next asked if and how they saw or heard public safety messages about how cars and trucks can drive more safely around each other. Table 3.21 shows the percent of respondents that indicated that they saw or heard the message by that delivery method. The value in parenthesis is the standard error of percent.

Table 3.21 Percent of Respondents Receiving Truck Safety Messages by Delivery Method

In the last three months, have you heard or seen any public safety messages about how cars and trucks can drive more safely around each other in the following formats?	TACT Before N=73	TACT After N=36	Comparison Before N=91	Comparison After N=66
	Percent of respondents (standard error of percent)			
Newspaper	1.37*(1.37)	13.89* (5.85)	9.89 (3.15)	4.55 (2.58)
Radio	15.07 (4.22)	30.56 (7.79)	15.38 (3.80)	27.27 (5.52)
Television	6.85***(2.98)	27.78***(7.57)	12.09 (3.44)	15.15(4.45)
Changeable message signs on freeway	47.95 (5.89)	55.56(8.40)	37.36 (5.10)	45.45 (6.18)
Brochure	5.48 (2.68)	5.56(3.87)	5.49 (2.40)	1.52 (1.52)
Police	2.74 (1.92)	2.78(2.78)	1.10 (1.10)	4.55 (2.58)

In the last three months, have you heard or seen any public safety messages about how cars and trucks can drive more safely around each other in the following formats?	TACT Before N=73	TACT After N=36	Comparison Before N=91	Comparison After N=66
	Percent of respondents (standard error of percent)			
Billboard	46.58**(5.88)	66.67**(7.97)	40.66 (5.18)	45.45 (6.18)
Poster	8.22 (3.24)	2.78 (2.78)	2.20 (1.55)	3.03 (2.13)
Banner	6.85 (2.98)	8.33(4.67)	2.20 (1.55)	1.52 (1.52)
Truck Wrap	26.03 (5.17)	16.67(6.30)	31.87 (4.91)	19.70 (4.93)
Public media event	4.11 (2.34)	5.56(3.87)	4.40 (2.16)	1.52 (1.52)

*p=.04, **p=.03, ***p<.01

There were several significant differences found when examining survey responses by TACT site and survey wave. There were significant increases in the proportions of truck drivers indicating that they had seen newspaper articles (X^2=4.423, df=1, p=0.035), television spots (X^2=6.787, df=1, p=0.009), and billboard messages (X^2=4.927, df=1, p=0.029) in the TACT sites between the before and after TACT program implementation surveys. Although the percent of respondents who mentioned that they heard the message on the radio increased from 15 to 31 percent, the increase was only marginally significant (X^2=3.325, df=1, p=0.068). No significant differences were found when comparing the TACT sites with comparison sites at each wave, and in the comparison sites between waves.

Interestingly, a sizeable portion of respondents in the before TACT program surveys indicated having seen a truck wrap and a smaller, but considerable portion indicated having seen a truck wrap during the after TACT program survey wave in both the TACT and comparison sites. A wrapped truck driving on the TACT corridor was not included in the media campaign, so this response was puzzling. The research team pursued this issue with a safety manager of a trucking company involved in the survey. She suggested the survey respondents may not have clearly understand what was meant by truck wrap, and could have considered decals commonly seen on trucks (i.e. Wide Right Turns, If You Can't See My Mirrors, I Can't See You) as truck wraps.

Table 3.22 shows the percent of respondents (and the standard error of percent) that indicated seeing or hearing various traffic safety slogans in the three months preceding each survey. No significant differences were found between the TACT and comparison sites before the TACT program. However, there was an increase in the percent of truck drivers after the completion of the TACT program in both the TACT and comparison sites that noticed slogans for "Leave More Space". The increase in the group of truck drivers that drove the TACT sites more frequently was greater and approaching statistical significant at (X^2=3.358, df=1, p=0.067).

Table 3.22 Percent of Respondents Seeing or Hearing Traffic Safety Slogans

In the past three months, did you hear or see any of these specific slogans?	TACT Before N=73	TACT After N=36	Comparison Before N=91	Comparison After N=66
	Percent of respondents (standard error of percent)			
Share the Road	58.90 (5.80)	55.56 (8.40)	47.25 (5.26)	50.00 (6.20)
Click it or Ticket	95.89 (2.34)	86.11 (5.85)	94.51 (2.40)	90.91 (3.57)
Leave More Space	27.40* (5.26)	44.44* (8.40)	29.67 (4.82)	36.36 (5.97)
Over the Limit, Under Arrest	82.19 (4.51)	75.00(7.32)	80.22 (4.20)	71.21 (5.62)
Drive Now, Text Later	79.45 (4.76)	83.33(6.30)	76.92 (4.44)	74.24 (5.42)

*p=.067

Respondents were asked to allocate responsibility for crashes between light-vehicles and trucks. Table 3.23 shows the percent distribution of responses and the standard error of percent. There were no statistical differences between study sites or survey waves. Most truck drivers indicated that car drivers are more often responsible for crashes between cars and trucks, and very few allocated any responsibility to truck drivers. About 12 percent or respondents split the responsibility equally between light-vehicles and trucks, and approximately two-thirds reported that car drivers are more often responsible. Between 14 percent and 20 percent of respondents indicated that the light-vehicle driver is almost always responsible.

Table 3.23 Proportions of Respondents Indicating Responsibility for Crashes between Cars and Trucks

Thinking about crashes between cars and trucks, who do you think in general is more responsible for the crash?	TACT Before N=66	TACT After N=33	Comparison Before N=87	Comparison After N=63
	Percent of respondents (standard error of percent			
Almost always the truck	1.52 (1.52)	0.00	1.15 (1.15)	4.76 (2.70)
More often the truck	3.03 (2.13)	0.00	0.00	3.17 (2.23)
Equally responsible	12.12 (4.05)	12.12 (5.77)	11.49 (3.44)	12.70 (4.23)
More often the car	68.18 (5.78)	69.70 (8.12)	67.82 (5.04)	65.08 (6.05)
Almost always the car	15.15 (4.45)	18.18 (6.82)	19.54 (4.28)	14.29 (4.44)

3.3 Comparison of Findings from Surveys of Motorists and Truck Drivers

Data the motorist and truck driver surveys were compared with regard to three primary issues: the extent to which drivers in the TACT program area received and understood the TACT messages about safe driving behavior of cars and trucks near each other; 2) whether there was an increase in knowledge about the dangers and consequences of unsafe driving behaviors; and 3) whether there was an increase in self-reported safe driving behaviors around large trucks that could be attributed to TACT program activities.

Analysis of the survey data indicates that the TACT messages were successfully transmitted to and received by drivers of both passenger cars and trucks. After the TACT program, approximately 40 percent

of passenger car drivers and truck drivers were aware of the slogan, “Leave More Space” that refers to safe driving practice near large trucks. This was a significant increase from before the TACT program, and can be attributed to the TACT PI&E campaigns. There were also significant increases between the start and end of the TACT program in the proportion of motorists and truck drivers who reported hearing and seeing public safety messages about how cars and trucks can drive more safely around each other on television and in newspaper stories, changeable message boards, and billboards.

The second issue is concerned whether there was an increase in knowledge about the dangers and consequences of unsafe driving behaviors near large trucks. This was addressed in the surveys by asking respondents about the likelihood of being stopped by police for an unsafe action and about likelihood of various unsafe actions contributing to crashes between passenger cars and trucks. Overall, both the passenger car drivers and truck drivers indicated that it was unlikely that cars would be stopped by police for unsafe actions near trucks. Both car drivers and truck drivers thought it was more likely that a truck driving unsafely would be more likely stopped by police than a car driving unsafely. The TACT program did not appear to change this perception.

The respondents were asked about their likelihood of a set of unsafe actions contributing to a car/truck crash. These actions included, speeding, tailgating, improper passing, inappropriate merging, and distracted driving (each by passenger car and by truck) and also passenger car staying in truck’s blind spot. There were no significant differences in the ratings of the likelihoods of crash contribution of each of these unsafe actions after the TACT program when compared to the baseline measured before the program, or when compared to the comparison sites. However, it should be noted that every unsafe action by car drivers was rated as at least somewhat likely to contribute to a car/truck crash both by passenger car drivers and truck drivers. Truck drivers tended to assign higher values for likelihood of crash contribution to the unsafe actions of passenger car drivers, than did passenger car drivers for the same actions.

Although the respondents were not asked to rank order the unsafe actions, post-hoc rank ordering shows a pattern that may reflect of the perceptions of crash risk associated with these actions. The order of decreasing likelihood of contribution to a car/truck crash in responses of motorists were: distracted driving by car driver, passenger car staying in truck’s blind spot, a passenger car inappropriately passing a truck (i.e., cutting off the truck being passed), passenger car speeding near truck, passenger car tailgating a truck, and inappropriate merging onto a freeway.

The third issue had to do with changes in self-reported behaviors. Analysis of the survey data found no significant statistical differences in self-reported driver behaviors of light-vehicle drivers in the TACT sites associated with the TACT program. The behaviors of light-vehicle drivers, as self-reported and also as reported by truck drivers, did not change as a result of the TACT program. It is interesting to note, however, that light-vehicle drivers’ self-reports differed from truck driver’s reports of light-vehicle drivers in many cases. Overall, light-vehicle drivers reported proper and appropriate behaviors when changing lanes around trucks or when merging near trucks. For example, light-vehicle drivers reported that they almost always use their turn signals to indicate intent to pass trucks, whereas truck drivers reported that light-vehicle drivers use their turn signals less than one-half of the time they pass their truck. Approximately 90 percent of light-vehicle drivers reported that they adjust their speed to pull in front or behind a truck while merging. Truck drivers reported that light-vehicle drivers rely on the trucks to adjust their speeds or pull into another lane more than one-half of the time.

When asked to describe their passing maneuvers around trucks, most light-vehicle drivers described the appropriate actions. The majority reported that they use their rear and/or side view mirrors and turn their head to check that they are past the truck. Those that responded with distance measures stated that on average, they pull in about four car lengths ahead of the truck they passed. Truck drivers on the other hand reported that the passing actions around them are very often unsafe.

Both the survey of the general motoring public and the survey truck drivers asked the respondents how often they see unsafe actions by cars and trucks on the road. There were no statistical differences in the observed frequencies that could be attributed to the TACT program. Unsafe driving actions by light-vehicle drivers were rated as occurring more frequently than the similar unsafe actions by truck drivers. Light-vehicle drivers and truck drivers rated speeding and distracted driving by passenger cars as the most frequent unsafe actions of passenger cars near trucks. Motorists rated the frequency of unsafe actions by light-vehicle drivers in order of decreasing: distracted driving by passenger car driver, passenger car speeding near a truck, passenger car tailgating a truck, passenger car staying in truck's blind spot, a passenger car improperly passing a truck (cutting off a truck), and inappropriate merging onto a freeway by a passenger car near a truck. Truck drivers rated the frequency of passenger car unsafe actions in the following order of decreasing frequency car speeding near a truck, distracted driving by the car driver, inappropriate merging onto freeway by a car near a truck, car tailgating a truck, car failing to yield right-of-way, car improperly passing a truck, and car staying in truck's blind spot. All the unsafe actions by truck drivers were rated as infrequent by both light-vehicle drivers and truck drivers.

There were no statistical differences over time or between the TACT sites and comparisons sites as to who in general is more responsible for crashes between cars and trucks. There was agreement between the light-vehicle drivers and truck drivers that in crashes between cars and trucks, it is more often the car that is responsible. Approximately two-thirds of truck drivers and about 60 percent of car drivers reported that it is mostly the car that is responsible. However, about 16 percent of truck drivers stated that it is always the car, compared to only three percent light-vehicle drivers who agreed with that statement. About one-third of light-vehicle drivers and 12 percent of truck drivers stated that both the car and truck is equally responsible.

4.0 Observational Study of Driving Behavior

4.1 Methods

The surveys of light-vehicle drivers and truck drivers measured self-reported behaviors from before the start to the end of the TACT program implementation. However, self-reported behaviors are not necessarily the same as actual behaviors, but may be influenced by respondents' desire to give socially acceptable responses or be biased by high self-perception values of respondents. Therefore, it was important to also include objective measures in the assessment of the effects of the TACT program on driving behaviors. To that end, an observational study focusing on passing and merging maneuvers of light-vehicles near large trucks was carried out. To determine if any changes in the safe driving actions of light vehicles near large trucks occurred as a result of the TACT program, the observational study focused on observing the events of interest before and after the implementation of the TACT program at the TACT program and comparable sites. The driving actions were classified as either safe or unsafe and changes in the rates of safe actions were assessed for statistical significance through the use of the Chi Square statistic to test the null hypothesis of independence. Comparisons of the proportion of safe events were made on the TACT site before and after the TACT program, at comparisons sites before and after the TACT program, and between the TACT and comparison site before the TACT program and also after the TACT program.

After considering and testing several different methods of collecting data, use of observers riding in the cab of a tractor trailer was determined to be the most efficient, effective, and innovative technique of measuring car driver behavior around a large truck. The vantage point of the passenger seat allowed observers to monitor passenger vehicle driver behavior from the truck driver's perspective, and also allowed observers to witness the actions that the truck driver may have to take as a result of light-vehicle driver actions around the truck. As the trucks traveled on the freeway, the observers watched for passing and merging events by light vehicles around the study truck and recorded data about the event on customized data collection forms programmed into personal digital assistants (PDAs). The following driving behaviors were considered events and were recorded if the action occurred in close proximity to the truck: 1) merges of other vehicles onto the freeway; 2) lane changes by vehicles in front of study truck; 3) the behaviors of the vehicles already on the freeway when study truck was merging onto the highway (labeled "truck merges"); and 4) actions around the study truck that did not fall into the previous three categories, but were deemed unsafe (labeled "other"). Data collected included safety ratings, location of events, and vehicle information.

The study protocols required the observers to classify and record each of the four types of events of as "safe", "unsafe", and "maybe unsafe". Merges and lane changes near the study truck were classified as "safe" when made at a distance far enough from the truck that the truck driver did not have to react with quick and/or unsafe (e.g. hard braking, swerving) actions. Driver behavior requiring quick actions from the truck driver to avoid the risk of a crash were labelled as "unsafe". The "maybe unsafe" classification was given to those actions that were not as extreme as those classified as "unsafe", but could lead to a potentially risky situation. For "truck merge" events, the actions of vehicles affected by the merging maneuver of the study truck were classified. If the vehicle slowed down and gave the study truck ample room to enter the freeway or moved to the left lane, the event was classified as "safe". Otherwise it was classified as "unsafe" or "maybe unsafe" depending on the extent of response needed from the truck to avoid a crash.

Two observers from UMTRI conducted the field observations. Before the start of the observational study, the observers went for a ride-along with Michigan State Police from the Niles Post to obtain the law enforcement perspective on what driver actions were considered safe or unsafe, and which actions might be candidates for citations. They also reviewed the data collection procedures and practiced field observations. In addition, they made practice runs aboard a tractor-trailer available temporarily at UMTRI, and were able to achieve a high inter-rater reliability while practicing. Both observers went to the study sites prior to the start of data collection to ensure entrance and exit points were suitable for use during the study, as well as to discuss potential areas of conflict along the routes (i.e. areas that would experience a high volume of events). For the observational study, the UMTRI observers rode in the passenger seats of cabs of tractor trailers that were driven by safety managers of two freight companies who volunteered their time and trucks for the study. The observers determined the safety classification of events based on discussion with the truck drivers, knowledge gained from the ride-along with Michigan State Police, and their best judgment and knowledge of safe driving and safe driving around large trucks. Signal use during the maneuvers was recorded separately for each behavior.

The first wave of the observational study (before the implementation of the TACT program) was carried out during September 16-20, 2013 at the two TACT-program sites near Grand Rapids and the two comparison sites in southeast Michigan. The second wave of the observational survey (after TACT program) took place February 17, 24-25, 27-28 and March 19-21, 2014. The original plans called for the observational study to be carried out the week of January 6, 2014 to coincide with both the motorist and trucker surveys. However, inclement weather, heavy snow, and ice affected normal traffic flow in January and throughout February and the second wave of the observational study was not completed until March. Each of the four sites was observed for two 8-hour periods during each wave, and each observer recorded data at each site once per wave. All observations were completed between 7 am and 7 pm to capture both the morning and evening rush hours as well as normal traffic during the daytime hours. There were 128 hours of observation (64 hours in each wave).

Data from the PDAs were downloaded into a database. Data from both TACT corridors were pooled for analysis as were data from the comparison sites. Because the emphasis was on changes in safe behaviors, maybe unsafe actions were merged with unsafe actions for analysis.

4.2 Results

Table 4.1 shows the total number of lane change events observed at the TACT site and comparison sites, the proportion of safe lane changes, and the proportion of vehicles that used a turn signal.

Table 4.1 Lane Change Events in Observational Study

	TACT Before	TACT After	Comparison Before	Comparison After
Events observed	1,199	1,004	954	665
Percent Safe	97.1*	95.2*	90.7**	94.3**
Percent Using Signal	57.1	59.7	61.8	69.9

** p=.008 *p=.022

A total of 1,199 lane change events were recorded during first observational wave in the TACT sites. Of the events recorded, 97.1 percent were judged as safe, and of the total, 57 percent used a turn signal. Of those using a turn signal, 97.1 percent were safe lane changes. During the second observational wave, 1004, lane changes were recorded, with 95.2 percent safe and 59.7 percent using a turn signal. Of those using a turn signal, 95.3 percent were safe lane changes. A chi-square test revealed a statistically significant difference in safe lane changes at the TACT sites between waves (X^2=5.224, df=1, p=.022) with a higher proportion of safe lane changes recorded during Wave One. Although there was a significant difference in the proportions of safe lane changes across waves, the proportion of safe lane changes in the second observational wave was still quite high.

Lane change events in the comparison sites totaled 945 in the first observational wave with 90.7 percent safe, and 665 in the second observational wave with 94.3 percent safe. Signal usage was approximately 62 percent in the first wave and nearly 70 percent in the second wave. Of those using their turn signal in the first wave, 75.2 percent were safe, and in the second wave, 94.6 percent were safe lane changes. There was a statistically significant difference in safe lane changes between the first and second wave in the comparison site, with more lane changes recorded as safe in the second wave (X^2=7.004, df=1, p=0.008).

Chi-square tests were also conducted to examine differences between the TACT and comparison sites during the first and second waves. There were no statistically significant differences found between sites during either wave of data collection.

Observers also recorded merging events, defined as passenger vehicles merging onto the highway around the study truck. The safety of these events was rated and signal use was recorded. Table 4.2 shows the total number of merging events observed at the TACT site and comparison sites, the proportion of safe merges, and the proportion of vehicles that used a turn signal.

Table 4.2 Merging Events in Observational Study

	TACT Before	TACT After	Comparison Before	Comparison After
Events observed	203	132	97	69
Percent Safe	90.6	87.9	87.6	95.7
Percent Using Signal	71.9	72.0	49.5	50.7

Observers recorded a total of 203 and 132 merging events in the TACT site during the first and second waves, respectively. The proportion of merging events rated as safe during both waves was quite high, with approximately 91 percent in the first wave and 88 percent in the second wave. The proportion of vehicles using signals was moderately high, with approximately 72 percent for both waves of data collection. In the first wave, 93.2 percent of merging events in which a signal was used were recorded as safe, and in the second wave, 88.4 percent of those using a signal were rated as safe. There were no statistically significant differences found when examining safe merging events across waves of data collection.

Merging events in the comparison site totaled 97 for the first wave with 87.6 percent rated as safe. The second wave yielded 69 total merge events with 95.7 percent rated as safe. Signal use was

approximately 50 percent during both waves. In the first wave, 91.7 percent of merging events in which a signal was used were rated as safe, while in the second wave, 94.3 percent of those events in which a signal was used were rated as safe. A Fisher's Exact test was performed to assess differences in the comparison site between waves of data collection. This revealed no statistically significant differences in safe merging events across waves.

A chi-square test showed no statistically significant difference in safe merging events during the first observational wave for the TACT and comparison sites. Similarly, a Fisher's Exact test showed no statistically significant differences between the TACT and comparison sites during the second wave.

In addition to recording lane changes and merging events, observers also recorded the behavior of passenger vehicles as the study truck entered the highway from an entrance ramp. Specifically, observers recorded events from passenger vehicles that did or did not initiate maneuvers that allowed for the study truck to safely enter the highway (e.g., a passenger vehicle not adjusting its speed or moving to the next lane to allow the study truck to enter the highway). Table 4.3 shows the total number of these events observed at the TACT and comparison sites, the proportion of safe events, and the proportion of vehicles that used a turn signal. The total number of observations was much lower in this category compared to lane changes and passenger cars merging due to the low frequency of study trucks entering the highway (approximately twice per hour).

Table 4.3 Passenger Car Merging near Study Trucks in Observational Study

	TACT Before	TACT After	Comparison Before	Comparison After
Events observed	18	14	19	3
Percent Safe	83.3	85.7	94.7	66.7
Percent Using Signal	55.6	28.6	68.4	66.7

During the first wave in the TACT site, observers recorded 18 instances of passenger vehicle maneuvers around the study truck as it was entering the highway. Fourteen were recorded during the second wave. These events were rated safe 83.3 percent and 85.7 percent during the first and second waves, respectively. Signal use during the first wave was approximately 60 percent while signal use during the second wave was about 29 percent. Of the events that were recorded as safe across both waves, a signal was used 100 percent of the time. There were no significant differences found between the first and second waves when examining safe passenger vehicle behavior near a merging study truck.

In the comparison sites, observers recorded a total of 19 events in in the first wave in which a light vehicle was in the travel lane as the study truck was entering the freeway. In 94.7 percent of these cases, the light vehicle adjusted its speed and the maneuver was rated as safe. Only three such events were recorded in the comparison sites in the second wave with 66.7 percent rated safe. Signal use was similar between waves, with 68.4 percent and 66.7 percent during the first and second waves, respectively. As in the TACT site, for those events rated safe, a signal was used every time.

Due to the low number of observations in this category, Fisher's exact tests were performed to assess any statistically significant differences between the TACT and comparison sites throughout both waves. There were no statistically significant differences found.

In summary, the objective of the observational study was to determine if there was an increase in the observed safe driving behaviors around large trucks between baseline and the program's completion and when compared to an area with no TACT program activities. To that end, an observation study of passenger car behaviors related to changing lanes to pass a large truck and merging onto a freeway near a large truck was carried out. The maneuvers were rated for safety, and the rates of safe lane change and merging maneuvers were compared from the baseline to a time after the completion of the TACT program in the TACT area and in the comparison area.

Overall, the analysis of the data collected in the observational study did not indicate that the TACT program had any real effect on the driving behaviors of passenger cars near trucks with respect to the passing and merging behaviors. However, the portion of safe passing and merging actions was quite high even before the TACT program. The percentages of safe passing maneuvers in the TACT area before and after the program were 97 percent and 95 percent, respectively. The percentages of passengers who signaled their intent to pass were 57 percent to 60 percent. While this is not "almost always" which was the self-reported value in the motorist survey, it was not as low (less than half of the time) as reported in the survey of truck drivers. The portion of safe merges of passenger cars near large trucks was also quite high at approximately 90 percent before and after the TACT program.

Thus, while there was not much change in safe driving behaviors of light vehicles with respect to changing lanes and merging attributable to the TACT program, the proportion of these behaviors that were safe was very high before the TACT program. There is room for improvement, so perhaps identifying the drivers who engage in the unsafe behaviors and targeting the program specifically to them might have more of an effect on increasing safe driving behaviors near trucks.

5.0 Analysis of Safety Outcome

The purpose of the analysis of crash data was to determine the effect of the TACT public service announcements and enforcement program on the number and rate of truck-involved crashes. The enforcement waves occurred in October, November, and December of 2013. These enforcement waves and the associated public service campaign are collectively referred to here as the Intervention. The hypothesis tested is that the enforcement waves resulted in fewer crashes related to aggressive driving between light vehicles (LVs) and trucks.

The challenge in the crash analysis was to identify and separate the effect of the Intervention from all other factors that affect truck crashes. A number of factors were considered, based on a fundamental understanding of risk factors in truck crashes as well as the availability of data. Many environmental and operational factors are considered to affect truck crashes. Most fundamentally, the number of truck crashes is related to the amount of truck travel. The more trucks operate on the roads, the more they are exposed to the risk of crashes, and the greater number of crashes occur. Because trucks are operated for commercial purposes, the state of the economy affects the level of truck operations. Environmental factors such as weather are also associated with crash risk, such that heavy precipitation and snowfall are associated with higher crash rates.

Crash data from January 2008 through April 2014 were used in the analysis. In addition, data series were obtained to control for environmental and exposure factors that affect crashes, to detect the residual effect of the Intervention. These data include counts of trucks and LVs on the affected roads, precipitation and snowfall in the area, and the unemployment rate.

5.1 Data

Crash data: Crash data covering the period from January 2008 through April 2014 were obtained for the analysis. This period covered the Intervention waves in the fall of 2013 and as much of the period after them as were available. A crash data series was constructed back to January 2008, encompassing six years and four months. This lengthy period was used to be able to identify and control for any trends in crashes and truck safety on the affected roadways.

The crash data were extracted from the computerized files of police crash reports as recorded on Michigan's UD-10 crash form. In those data, each crash was geolocated by longitude and latitude. In addition, the roadway name or designation was recorded. This information was used to identify all truck crashes that occurred on the TACT and comparison road segments over the period January 2008 to April 2014. Figure 5.1 displays a map of the geolocated truck crashes. At the scale of the map shown, the dots denoting truck crashes in the TACT and comparison areas effectively delineate the segments of road where the TACT enforcement waves occurred, along with the corresponding comparison roads.

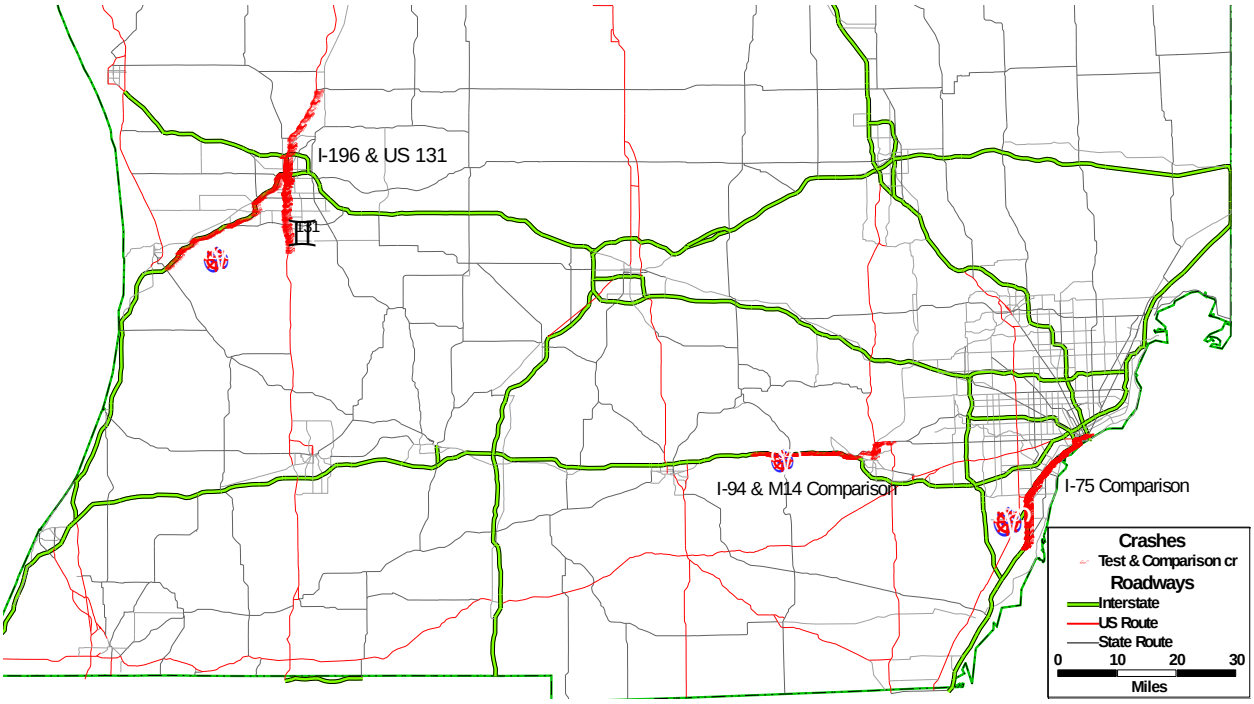

Figure 5.1 Geolocated Truck Crashes in TACT and Comparison Road Segments January 2008 to April 2014

Vehicle count data: Vehicle count and classification data for the TACT and comparison road segments were used to compute crash rates. Vehicle counting and classification stations use inductive loops and piezo-electric sensors embedded in the pavement to count axles, estimate vehicle weights, and classify the vehicles into standard configurations. These data came from three counting stations, one on a TACT segment and two on comparison segments. TACT area counts were supplied from a count station on I-196 near South Haven. Count stations on I-75 and on I-94 were used for the comparison area. (Table 5.1) These stations were the only ones available along the TACT and comparison road segments. The data included vehicle counts in both directions. Vehicle count data from the two stations in the comparison area were aggregated.

Table 5.1 Station and Location of Vehicle Classification Stations

Station number	Location	Area
7319	I-196 near South Haven	TACT
9699	I-75 near Vreeland Road overpass	Comparison
7029	I-94 near Grass Lake	

The data included monthly counts of vehicles classified by the Federal Highway Administration's 13-level vehicle classification system (Table 5.2). Counts for classes 5 through 13 were aggregated as trucks.

Table 5.2 FHWA Vehicle Classification

Class	Vehicle description
1	Motorcycles
2	Passenger cars
3	Four-tire, single-unit (pickups and vans)
4	Buses
5	Two-axle, six-tire single-unit trucks
6	Three-axle single-unit trucks, includes bobtail tractors
7	Four or more axle, single unit trucks
8	Four or fewer axle, single-trailer trucks
9	Five-axle, single trailer trucks
10	Six or more axle, single trailer
11	Five or fewer, multi-trailer
12	Six-axle, multi-trailer
13	Seven or more axle, multi-trailer

The data also included the number of days with valid counts for each month. Monthly average daily counts for all vehicles, passenger cars, and trucks were computed by dividing monthly total counts by the number of days with valid counts. The percentage of trucks in the traffic stream was computed by dividing each month's average daily count of trucks by the total average daily count of all vehicles.

Weather data: Monthly totals of precipitation and snowfall were obtained for the Gerald R. Ford International Airport near Grand Rapids, which is near the TACT roadways, and Detroit Metropolitan Airport, which is located near the comparison roadways. Monthly snow and precipitation estimates were obtained for January 2006, through April 2014. The snow data were expressed as inches of snowfall for each month. The precipitation data give the inches of liquid water in the precipitation for each month. Therefore, when the precipitation fell as rain, it included just the amount of rain. For days where precipitation fell as snow, the precipitation number was the inches of liquid water in the snow.

Unemployment data: Unemployment rates in Michigan by month were obtained for January 2008 through April 2014. These data provide the statewide unemployment rate for each month. The unemployment rates were not specific for the TACT and comparison areas.

5.2 Methods

The goal of the crash analysis was to test the hypothesis that the Intervention resulted in lower crash rates in the TACT area. A statistical model was developed to attempt to identify any safety effect in the crash data from the Intervention, controlling for other factors. Crash rates were computed using monthly counts of relevant crashes and the monthly average daily counts of vehicles. Factors used as the predictor variables—the variables that are expected to affect crash rates—included precipitation, percentage of trucks in the traffic counts, the unemployment rate, a dummy variable for TACT or comparison area, and a variable for the intervention.

Poisson regression is a standard method for modeling crash rates. However, an assumption of Poisson regression is that the mean of the outcome variable is equal to its variance. This assumption is often violated in observational data. Counted data, such as crash counts, frequently have more variability so

the variance of the counts exceeds their mean. As a result, standard errors for parameter estimates can be too small.

In the particular method here, the normal model was used, which estimates the mean and variance independently. Thus, there is no assumption that the mean equals the variance. The modeling approach was a weighted log-linear regression model of truck crash rates, using counts of crashes as the weight. This form provides the same parameter estimates as a full Poisson model and standard errors that account for the variability of the crash rates. As a result, the statistical significance of the model estimates are more robust. The log of truck rates is taken to make the dependent variable in the model linear and satisfy an assumption of the normal model.

Time series models were considered but rejected as unnecessary. Analysis of the crash data and crash rates showed no underlying trend in the data and no significant autocorrelation that needed to be accounted for. Crash counts and crash rates in the TACT and comparison roadways showed no long-term trends. Figure 5.2 shows the number of truck crashes with a hazardous action coded for either a truck or LV driver by month from January 2008 to April 2014 on the TACT roadway. A fitted regression line over the period shows no overall trend. The slope parameter for the line is close to zero, and R^2 is also close to zero. The counts show significant variability from month to month, as well as regular peaks in December and January. As will be shown, these peaks in crash counts coincided with peaks in precipitation, particularly snow.

In addition, the Durbin-Watson (DW) statistic was computed to test for the presence of autocorrelation in the residuals of the regression analysis (below). Autocorrelation means that the residuals are serially correlated (i.e., that, when ordered sequentially, adjoining observations vary together). Significant autocorrelation in the residuals would indicate that a time series model was more appropriate than standard regression. The DW statistic showed no evidence of any significant autocorrelation, meaning a time series model was not needed.

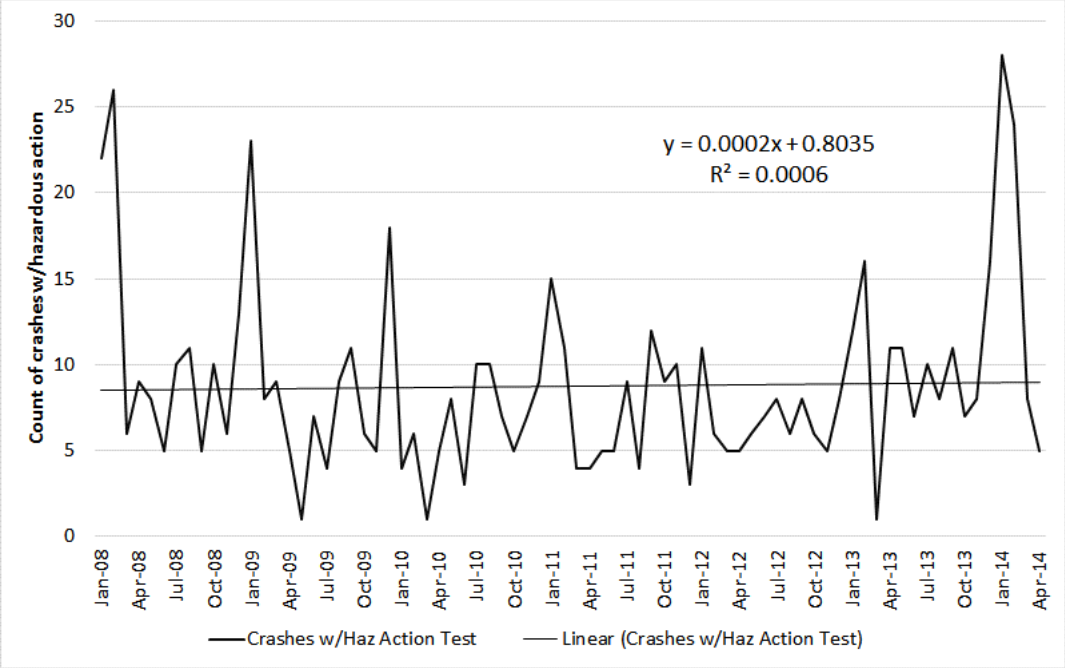

Figure 5.2 Counts of Truck Crashes with Hazardous Actions by Month, 2008-2014 with Trend Line

5.3 Data for modeling

This section presents a description and discussion of each data series used to model crash rates. The data series included environmental factors such as monthly snowfall and precipitation, the unemployment rate, truck and total travel on the TACT and comparison road segments, and truck crash rates on the TACT and comparison road segments. These data were used to develop a statistical model of truck crash rates in order to understand the major factors that affect crash rates and to help identify any effect from the Intervention.

Snowfall and precipitation differed significantly between the TACT and comparison areas. The TACT area gets more snow and also more total precipitation than the comparison area. With respect to the average number of inches of snowfall, the TACT area, as measured at the Grand Rapids Airport, averaged over two inches more per month, or almost 25 inches more per season, than the comparison area. (Table 5.3) The TACT area also had a higher maximum monthly total of 54.6 inches of snow (December 2008), compared with 39.1 inches (January 2014) in the comparison area. The TACT area also averaged about a half-inch more total precipitation as water than the comparison area (3.45 inches to 2.96 inches) as well as higher monthly total precipitation, 11.1 inches (April 2013) to 7.66 inches (July 2011).

Table 5.3 Snowfall and Precipitation in Inches, TACT and Comparison

Parameter	Area	Mean	Std. Dev	Minimum	Maximum
Snow	TACT	7.41	13.11	0.00	54.60
	Comparison	5.35	9.03	0.00	39.10
Precipitation	TACT	3.45	2.00	0.49	11.10
	Comparison	2.96	1.67	0.27	7.66

Figure 5.3 shows the monthly pattern of snowfall and total precipitation over the period, for the TACT and comparison areas. Snow is shown by the dashed lines, the darker line for the TACT area and lighter line for the comparison area; precipitation is shown by solid lines. Precipitation varies within a relatively narrow range, but snowfall obviously is highly seasonal, with peaks regularly occurring in December and January. For example, the TACT area had 2.2 inches in November 2013, 34.7 inches in December 2013, and 41.9 inches in January 2014. Over those same three months, the comparison area had 1.2 inches in November, 39.1 inches in December, and 23.4 inches in January. In the modeling of crash rates (discussed below), inches of precipitation and snow were summed to make an aggregate variable. Both rain and snow affect crash risk because they impair driver visibility and reduce roadway friction, and snow obviously is riskier than just rain. However, using snow alone in the models would result in many months dropping out because of zero snowfall. To keep the higher risk of snow in the model as well as reflect the risk of rainfall, the two were summed in the model developed below.

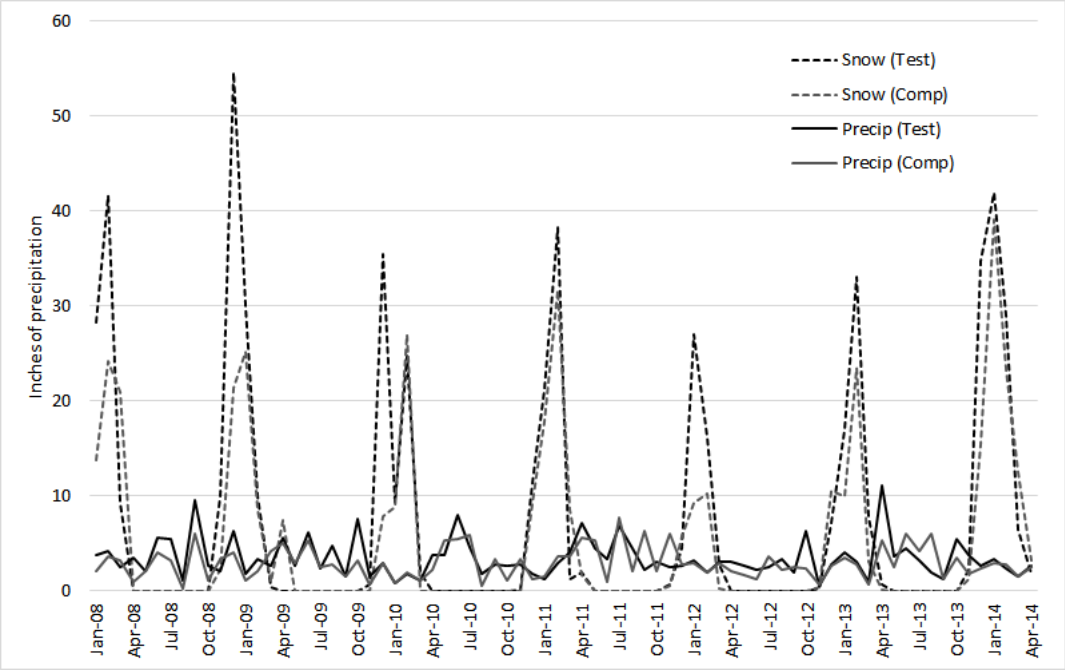

Figure 5.3 Monthly Total Snowfall and Precipitation, TACT and Comparison Areas

The unemployment rate is thought to affect crash rates in a number of ways. The unemployment rate is related to the overall level of economic activity. Trucks are operated for commercial purposes; high unemployment rates reflect reduced economic activity and accordingly less truck travel. In addition, higher unemployment produces less discretionary income and therefore probably less discretionary travel. Thus, higher unemployment would be expected to be associated with fewer truck crashes and lower crash rates. Higher unemployment may also result in lower crash rates if poorer drivers are let go first as motor carriers reduce their workforce in response to economic decline. Figure 5.4 shows the statewide unemployment rate in Michigan from January 2008 through April 2014. Unemployment peaked at over 14 percent in the recession years of late 2008 and 2009. Since then, there was a gradual decline to about 10 percent in late 2011 and then the rate fluctuated between 9.2 percent and 8.8 percent between January 2012 and September 2013. Since then, the rate has declined to 7.4 percent in April 2014.

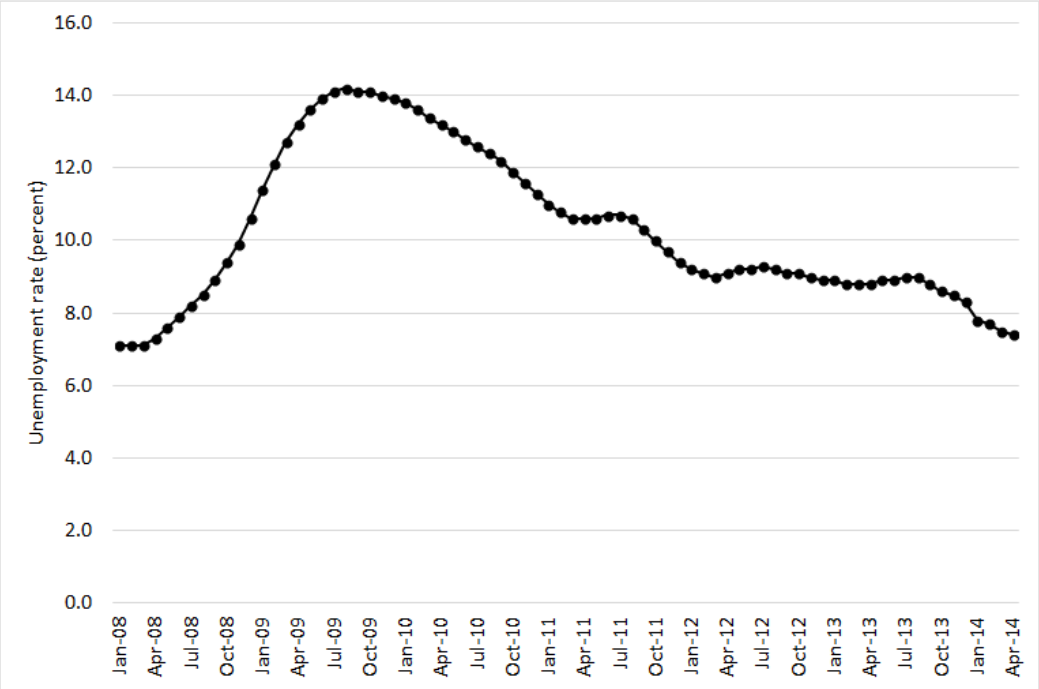

Figure 5.4 Statewide Unemployment Rate, Michigan January 2008 to April 2014

The TACT and comparison road segments had significant differences in mean (average) daily counts of vehicles on the roads. Table 5.4 shows statistics on the monthly average daily traffic (MADT) count for trucks, LVs, and the aggregate of all vehicle types. In addition, the truck percentage of the traffic stream was computed. Truck and LV counts were lower in the TACT area. The comparison roadway segment was more heavily traveled on average, with over twice as many trucks daily and almost three times more LVs daily. On the other hand, the truck percentage of the traffic stream was somewhat higher in the TACT area, 21 percent to 17 percent in the comparison area.

Table 5.4 Truck, Light Vehicle, and Total Vehicle Counts, TACT and Comparison Roadways

Parameter	Area	Mean	Std. Dev	Minimum	Maximum
Truck MADT*	TACT	2,112	211	1,583	2,555
	Comparison	4,732	778	3,109	6,540
LV MADT	TACT	6,441	1,579	3,916	10,250
	Comparison	18,145	3,043	12,071	29,381
Total ADT	TACT	10,084	2,024	6,618	14,858
	Comparison	27,598	4,426	18,968	42,308
Percent truck	TACT	21%	3%	14%	28%
	Comparison	17%	1%	14%	21%

* MADT = Monthly Average Daily Traffic
Counts of trucks and LVs do not sum to the totals because other vehicle types, such as buses, light trucks, and motorcycles, are not included in either truck or LV types.

Overall, the average number of trucks on the TACT roadway segments was relatively flat over the period considered, with no overall trend either up or down, although there is some indication of a seasonal

pattern, with January typically registering the annual low and highs in July or August. Figure 5.5 shows the MADT (monthly average daily traffic) for trucks from January 2008 through April 2014. Counting stations were down in November and December 2008, so counts were not available for those two months. For the comparison area, there is greater variance in the truck counts, but some evidence of an upward trend, particularly from 2012 going forward. Because of its location in southeastern Michigan, which has a major port of entry with Canada, the comparison roadways may be more sensitive to changes in international trade. However, even though the comparison roadways consistently had higher counts of trucks traversing them, as a proportion of the overall traffic stream, the percentage of trucks was higher on the TACT roads.

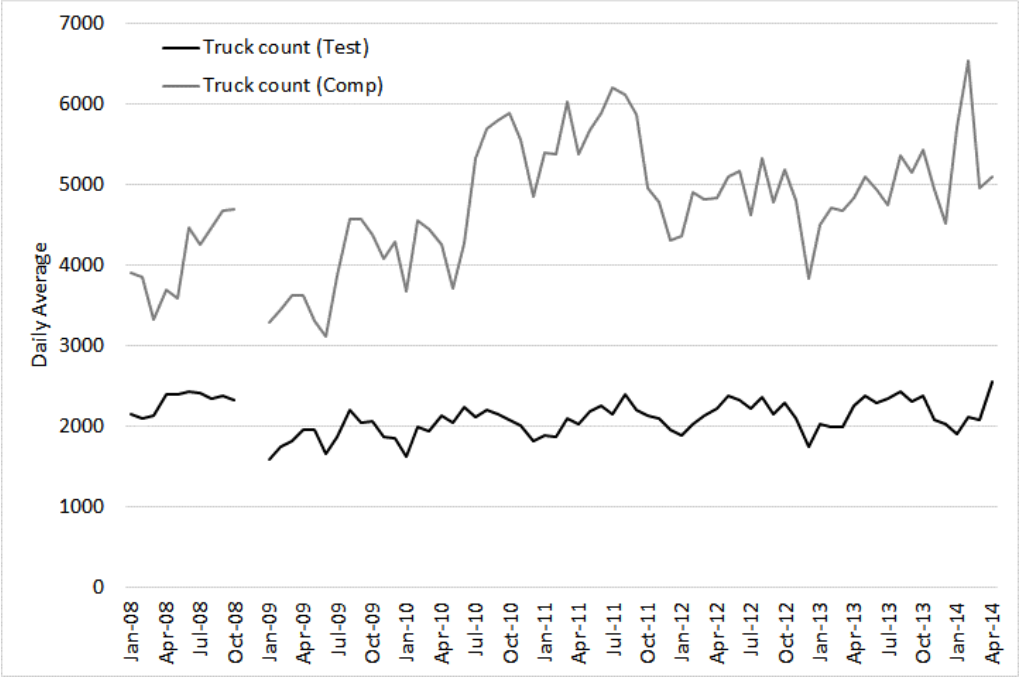

Figure 5.5 Daily Average Truck Counts for TACT and Comparison Road Segments

In terms of safety, the most salient measure is the number of truck-involved crashes. In particular, because the intent of the TACT pilot was to reduce aggressive actions by LV and truck drivers, the goal was to reduce crashes caused by hazardous actions by either trucks or passenger cars. In this analysis, a truck crash was defined as a traffic crash involving one truck. The limitation to one truck accounts for about 97 percent of all truck-involved crashes, but simplifies the analysis by eliminating certain complex and highly unusual crashes. Truck crashes with a hazardous action include actions by either LV drivers or truck drivers. The crash could have been caused by either the truck or the LV driver. This is the set of crashes at which the TACT program was most directly aimed.

Table 5.5 shows summary statistics about truck crashes and crashes related to a truck- or LV-hazardous action. Over the period covered by the analysis, (January 2008 through April 2014), there was a monthly average of 10.6 truck crashes, and 8.8 truck crashes with a hazardous action. Average crash numbers were about 50 percent higher in the comparison area, with an average of 15.3 truck crashes and 12.4 truck crashes with a hazardous action. Higher numbers of truck crashes in the comparison area is expected because of the greater truck traffic on those roads. Note that the monthly variation in the number of crashes was relatively wide. The standard deviations were large relative to the averages, and

the spread between the minimum and maximum observed number of crashes was also broad. On the TACT road segments, the number of truck crashes related to a hazardous action ranged from one to 28. There was only one hazardous crash recorded in each of three months: May 2009, May 2010, and March 2013. The highest number recorded was 28 in January 2014. In the comparison area, there were two months with the minimum three hazardous action truck crashes: July and September 2008. The greatest number observed was 43, in January 2014.

Table 5.5 Average Monthly Counts of Truck-Involved Crashes and Truck Crashes with a Hazardous Action

Parameter	Area	Mean	Std. Dev	Minimum	Maximum
Number of truck crashes	TACT	10.6	5.9	1.0	32.0
	Comparison	15.3	6.9	6.0	47.0
Number of truck crashes with hazardous action	TACT	8.8	5.4	1.0	28.0
	Comparison	12.4	6.6	3.0	43.0

Graphing the crash counts illustrates the variability of the crashes month to month (Figure 5.6). Overall, there was no evidence of a trend in the number of hazardous truck crashes on the TACT road segments. There was considerable volatility over the period, but no trend. Local peaks tended to occur in January, and the greatest number seems to coincide with the period of the TACT Intervention and the months just after. Crashes on the comparison road segments showed similar volatility. There appears to be a slight upward trend in the counts over the period, but also significant month-to-month variation. In addition, as on the TACT roads, the greatest number of hazardous action truck crashes occurred in January 2014, with 43. There were also 33 (the third greatest over the period) in the following month.

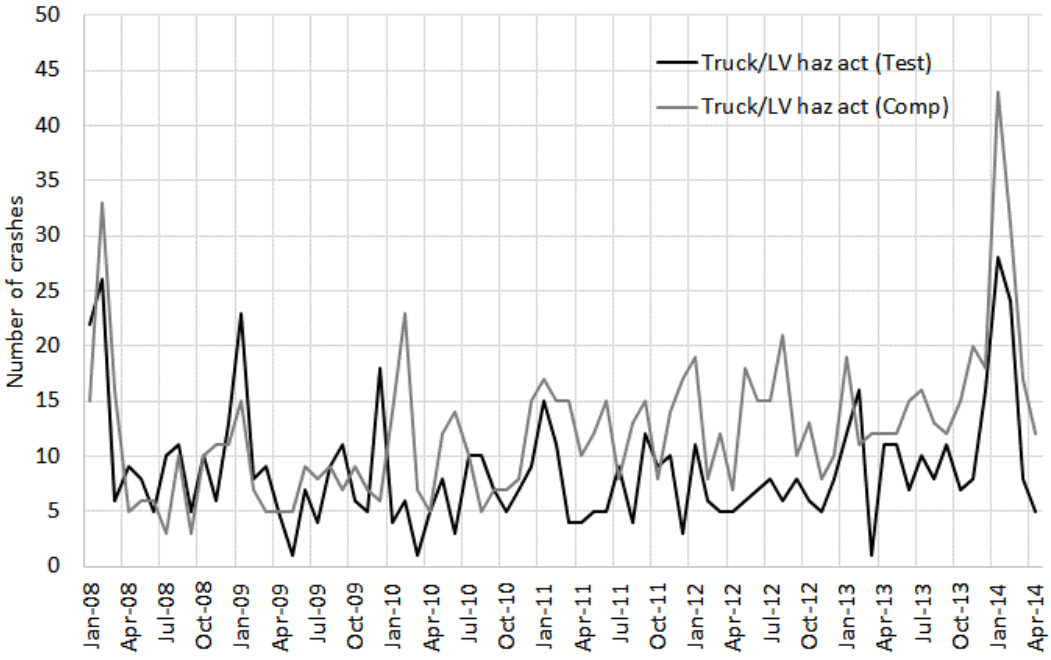

Figure 5.6 Counts of Crashes, Truck or LV Hazardous Action, TACT and Comparison Areas

Finally, Figure 5.7 shows the rates for truck crashes with hazardous actions by either trucks or LVs for the TACT and comparison roads. The rates were computed using the monthly average daily counts of all vehicles on the roads. Crash rates were missing for November and December 2008, because the counting stations were down then. Overall, there was no trend to the crash rates, although there was some variability month to month. For the comparison road segment, crash rates fluctuated within a relatively narrow range and with no notable pattern, although the highest rate was observed in January 2014. The hazardous action crash rate was more variable, although also with no overall trend over the period, either up or down. However, the rates hit local peaks in the month of January for most years, except for 2010, when the peak occurred the month before, in December 2009. There was no overall trend, but peaks occurred in the middle of winter.

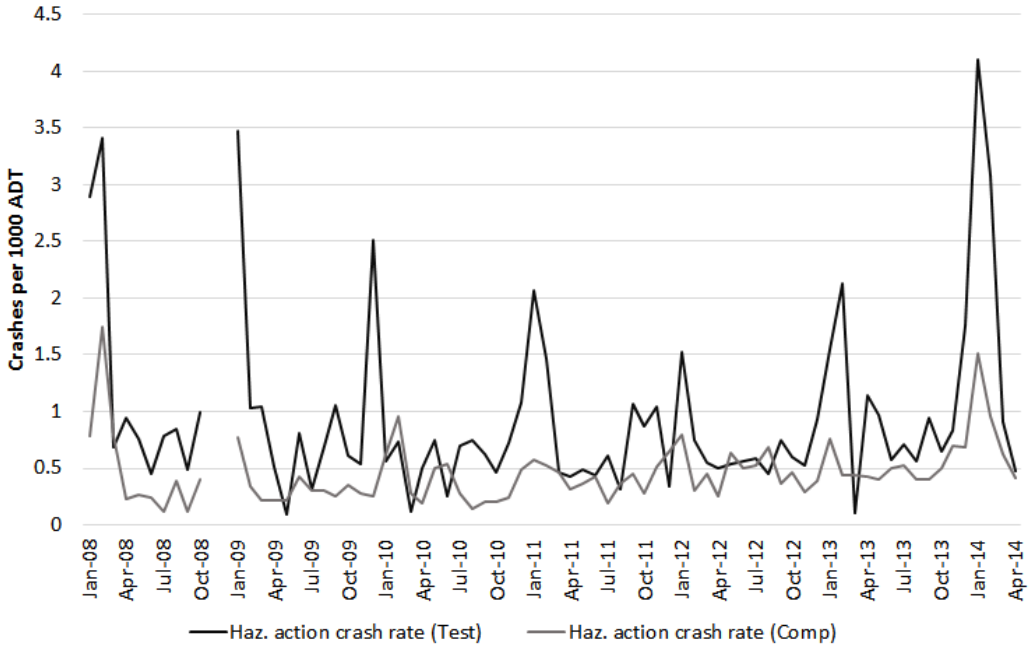

Figure 5.7 Truck Crash Rate with Hazardous Actions, TACT and Comparison Roads

The peaks in the crash rate aligned very well with distribution of snowfall, such that the months with highest crash rates coincided almost perfectly with the months that had the greatest amount of snowfall. Figure 5.8 graphs the rate of truck crashes related to hazardous actions over the period along with monthly snowfall totals in the TACT area. Each of the peaks in crash rate coincided almost exactly with the months that had the greatest snow accumulations. Excluding the peak snow months would result in a much flatter truck crash rate.

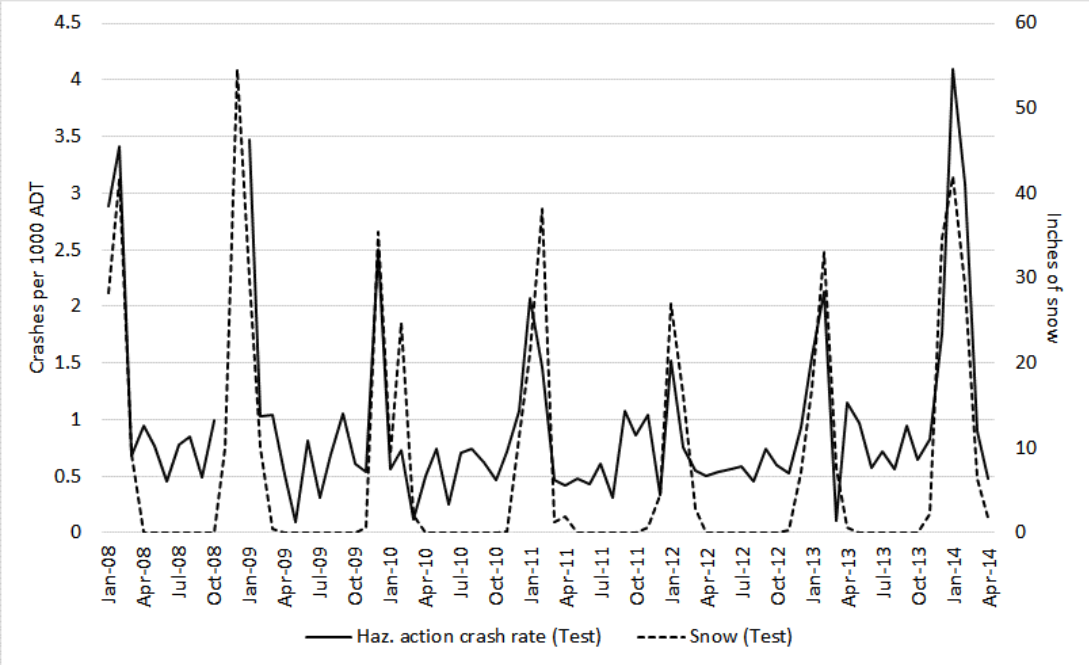

Figure 5.8 Truck Crash Rate Related to Hazardous Actions and Monthly Snowfall

Figure 5.8 provides strong evidence that the observed periodicity in the truck crash rate was substantially related to the amount of snowfall, rather than to any recurring pattern or trend in truck operations or safety. It appears that the amount of snowfall significantly influenced truck crash rates. In addition, the figure illustrates that the timing of the Intervention occurred during a period of one the largest snow falls in years.

5.4 Model results

The general form of the standard regression model is given in Equation 1.

$$\gamma_i = \beta_0 + \beta_1 X_i + \beta_2 X_i + \cdots + \epsilon_i$$

Equation 1

Where γ is the dependent variable, in this case the log of the truck rate
β_0 is the intercept
β_1 is the parameter of the first predictor variable
X_i is the first predictor variable, and so on
and ε_i is the error term.

A regression model was developed to identify the primary factors that affected the truck hazardous action crash rate. In the model, the dependent variable was the natural log of the truck crash rate. The independent (predictor) variables included the variables discussed above.

Table 5.6 Parameters and Definitions

Variable	Definition
Rain_snow	Sum of the total snowfall and precipitation.
Pct_truck_log	Natural log of the percentage of trucks in monthly traffic counts.
TACT road	TACT or comparison road segments. 1=TACT segment 0=Comparison segment
Unempl_lag1	Statewide unemployment rate, lagged 1 month.
TACT*unempl	Interaction of TACT * Unempl_lag1.
Intervention	Intervention or non-intervention. 1= October 2013 and subsequent in the TACT segment 0 = All other observations.

A full regression model was developed, including all factors that are significantly related to the truck crash rate as well as a term to test the effect of the Intervention. Table 5.7 shows parameter estimates, standard errors, and statistical significance of the parameters for this model. The primary purpose of this model was to determine if there was any evidence for an effect of the Intervention (TACT enforcement waves and public service announcements), controlling for other factors that affect the truck crash rate. The Intervention interval is defined as the period beginning in October, 2013, and subsequent, in this case to the end of April, 2014, because that is the extent of the data available.

Table 5.7 Variables and Parameters for Intervention Model

Variable	DF	Parameter estimates	Standard error	t Value	Pr > |t|
Intercept	1	-2.561	1.039	-2.46	0.015
Rain_snow	1	0.030	0.003	9.74	<.0001
Pct_truck_log	1	0.749	0.351	2.13	0.035
TACT road	1	-0.064	0.330	-0.19	0.846
Unempl_lag1	1	-0.059	0.020	-3.01	0.003
TACT*Unempl_lag1	1	0.049	0.030	1.62	0.108
Intervention	1	0.101	0.142	0.71	0.478

Overall, the model fit the data quite well, except for the Intervention variable, which was non-significant, and would not be included in the final model. The R-square for the model was 0.76, which is interpreted as indicating that the model accounts for 76 percent of the variation in the truck crash rate. As would be expected, the rain_snow parameter was highly significant, as was pct_truck_log, and unempl_lag1.

The main effect of TACT was not significant (p=0.846), but it was included in the model because there was a significant interaction between the unemployment rate and the two areas being studied (TACT and comparison). The data available on unemployment were statewide, but there was probably a difference in the unemployment rate between the TACT area and southeastern Michigan, which is where the comparison roads were, and which is dominated by Detroit. The overall relationship of unemployment to the crash rate in the model was that as the unemployment rate increased, the crash rate decreased (the sign of the parameter for unemployment is negative). If unemployment was higher in the Detroit area than in the Grand Rapids area, the result would be to depress the crash rate more on the comparison roads than the TACT roads. This interaction was captured in the model.

Except for Intervention, the variables were all statistically significant. The model showed no detectible effect of Intervention. The parameter for Intervention was small, positive, and highly non-significant. This result is not unexpected, given the other results shown above. Figure 5.8 illustrates the substantial effect of snow/precipitation on the truck crash rate.

A final model was developed to estimate the relationship of the set of predictor variables to the truck crash rate. Table 5.8 shows the final model estimates, the best model of the truck crash rates for the TACT and comparison sites. Intervention was not included in the model. Most of the parameter estimates are close to those in Table 5.7. The TACT variable was non-significant but included because of the interaction with Unempl_lag1 (unemployment rate lagged 1 month). The p-value for the interaction term (TACT*Unempl_lag1) increased to 0.14, which is fairly high for inclusion. However, excluding this interaction resulted in the parameter for TACT becoming significant, implying a difference in the crash rate between the TACT and comparison roads. Including the interaction term results in that difference entirely going away, or rather being explained by differences in the unemployment rate between the two areas, which is highly plausible. The fact that the p-value is marginal is concerning, but the data are observational, rather than from a controlled experiment. Our judgment is that the p-value is high but not excessively so, and is outweighed by the explanatory value of including the interaction.

Table 5.8 Variables and Parameters for Final Crash Rate Model

Parameter	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-2.615	1.035	-2.53	0.013
Rain_snow	1	0.031	0.003	9.99	<.0001
Pct_truck_log	1	0.764	0.350	2.18	0.031
TACT road	1	0.009	0.313	0.03	0.976
Unempl_lag1	1	-0.058	0.019	-2.98	0.003
TACT*Unempl_lag1	1	0.043	0.029	1.48	0.142

Interpretation of the individual parameters can be obtained by computing the effect of changes in individual parameters on the overall predicted crash rate. The model estimates the following equation:

$$\text{Log(crash rate)} = -2.615 + 0.031*\text{Rain\_snow} + 0.764*\text{Pct\_truck\_log} + 0.009*\text{TACT} - 0.058*\text{Unempl\_lag1} + 0.043*\text{TACT}*\text{Unempl\_lag1}$$

Substituting different values for each of the parameters and computing the resulting crash rate provides some insight into the size of the effect of changes in the parameters. Note that the log of the crash rate and Pct_truck_log are the natural logs. The model shows the following relationships between predictor variables and truck crash rates:

- One inch of precipitation was associated with an increase of 3.1 percent in the truck crash rate.
- One percent increase in the percentage of truck's in the traffic stream was associated with 2.8 percent increase in the truck rate.
- One percent increase in the rate of unemployment resulted in a decrease in the truck crash rate by 1.5 percent.

The model was a good fit to the data. R-square for this model is 0.76, which means that the parameters in the model account for 76 percent of the variation in the truck rate. This is the best available model for truck crashes related to hazardous actions obtainable from the available data.

In summary, the purpose of the crash data analysis was to determine the safety effect of the TACT program's enforcement waves and public service campaigns (the Intervention). It was hypothesized the TACT program would reduce the number of truck crashes related to aggressive driving on the TACT road segment during and after the Intervention compared with the comparison road segments. For that purpose, data series were constructed of truck crashes with hazardous actions by truck drivers or other drivers on the TACT and comparison roads. In addition, data were assembled to control for other factors that affect the number of crashes, including truck and total traffic on the roadways; the proportion of trucks in the traffic stream; weather, in terms of rain and snow; and the state of the economy, as reflected in the unemployment rate. The data covered a period from January 2008 through April 2014. The Intervention occurred in October, November, and December 2013. April 2014 was the latest date for which all the data elements (crash and other data) were available.

Robust statistical models of crash rates were developed to test the hypothesis. The models were relatively powerful, explaining about three-quarters of the variation in truck crash rates over the period. However, the models did not show that the Intervention had a significant effect on crashes in the data. The other factors in the data had a much larger effect.

6.0 Conclusions

Evaluation of the Michigan TACT program consisted of a process evaluation to determine how the program was carried out, and an evaluation of outcomes to assess the extent to which study objectives were met. The TACT program consisted of high visibility enhanced enforcement targeted at unsafe actions associated with light-vehicle/truck crashes and an outreach and PI&E campaign to raise awareness about the safety problem of unsafe actions of cars and trucks while driving near each other, as well as to publicize the enhanced enforcement efforts. The TACT program was implemented in the western part of the state near the city of Grand Rapids in three 2-week waves during October 7-18, November 4-15, and December 2-13, 2013.

Six law enforcement agencies including MSP Commercial Vehicle Enforcement Division, MSP Rockford Post, Kent and Ottawa County Sheriffs' Departments, and Grand Rapids, Walker, and Wyoming Police Departments received overtime grants to conduct the enhanced enforcement on the TACT program corridors. The enforcement was intended to target aggressive driving behaviors between light-vehicles and trucks including: improper lane use, careless and reckless driving, following too closely, speeding, failure to yield the right of way, and improper passing. Violators were to be stopped and issued a citation, and given an information card about the TACT program and safe driving around trucks.

Overall, the enforcement program reasonably adhered to the program plan. There was a total of 2,569 enforcement person hours on the TACT program corridors, with 3,000 stops, and 2,281 citations written. The information cards about safe driving around trucks were distributed by some agencies but not all. The initial vision for the enforcement program that the enforcement be a fully integrated multijurisdictional effort between agencies was not realized. Each agency had designated areas for enforcement and an allocation of hours. Beyond that, there was little coordination among agencies. Some of this could be traced to the lack of the radio communication system necessary to support real-time communication between agencies (i.e., patched radio system). Another issue was related to training. Some law enforcement officers participating in the TACT program commented that a more formal training for this program would have been helpful as they were being asked to target unsafe driving by both passenger car and truck drivers, and they were not familiar with driving violations by large trucks. Their training for the TACT program consisted of a brief video. Some police officers suggested that detailed information on the sections of the vehicle code that correspond to driving infractions targeted by the program would have provided better understanding of the enforcement actions required by the program because officers think about enforcement actions within the context of specific vehicle codes.

The outreach activities and PI&E campaign were implemented as planned. In all, the campaign included paid radio ads, and billboards with the "Leave More Space for Trucks" message in 16 locations, press conferences, public media events, and changeable signs on four freeway locations with the "Leave More Space for Trucks" message. Over the course of the program, there were approximately 30 television news stories, 40 print/online articles, eight radio stories, and four community posts about the Michigan TACT program.

The second part of the evaluation, the outcome evaluation assessed how well the program met the five objectives specified in the TACT program grant. A before and after with comparison design was used in the outcome evaluation. This design entailed statistical comparisons of the measures of interest obtained in the program area before and after the implementation of the program and also in a comparison area

similar to the program site, which did not have a TACT program, and would not be affected by the program. Two freeway segments in southeast Michigan served as the comparison sites.

To assess the extent to which each objective was met, three distinct studies were conducted. The first study consisted of two separate but parallel surveys; the first was of the general motoring public that regularly travels on the study and comparison corridors and the second was of truck drivers who also routinely drive on the study and comparison corridors. The second study was an observational study of lane change and merging behaviors of passenger vehicles near large trucks. The third study was an analysis of crashes that occurred on the program and comparison corridors. Analysis of the data developed in these studies was used to assess the extent that each objective was met.

Objective 1 – Communicate TACT program messages to a statistically significant percentage of drivers in the program area between baseline and the program's completion and when compared to an area with no TACT program activities.

Analysis of the survey data indicated that the TACT messages were successfully received by drivers of both passenger cars and trucks. After the TACT program, approximately 40 percent of light-vehicle drivers and truck drivers were aware of the slogan, "Leave More Space for Trucks", that refers to safe driving practice near large trucks. This was a statistically significant increase from before the TACT program, and can be attributed to the TACT PI&E campaigns. There were also significant increases between the start and end of the TACT program in the proportion of motorists and truck drivers who reported hearing and seeing public safety messages about how cars and trucks can drive more safely around each other on television and in newspaper stories, changeable message boards, and billboards.

Objective 2 – Increase knowledge among the driving population about the dangers and consequences of unsafe driving behaviors around large trucks (lane changes, merges, and following too closely) by a statistically significant amount between baseline and the program's completion.

Consequences and dangers of unsafe driving behavior around large trucks include the chance of being stopped and ticketed by police, and also of being involved in a crash with a potential for injuries or death. Questions on the motorist and truck driver surveys asked about the likelihood of being stopped by police for an unsafe action. The surveys also asked about the likelihood that specific unsafe actions will contribute to a car/truck crash.

Overall, both the light-vehicle drivers and truck drivers indicated that it was unlikely that cars would be stopped by police for unsafe actions near trucks. Both car drivers and truck drivers thought it was more likely that a truck driving unsafely would be more likely stopped by police than a car driving unsafely. There were no significant differences from the baseline The TACT program did not appear to change this perception. It should be noted that second surveys were carried out after the completion of the TACT program, when the high visibility enforcement had ended, and the police presence on the freeway was similar to what it was before the TACT program in the Grand Rapids area.

Respondents were asked about the likelihood of each of the following being a contributing factor to a car/truck crash: speeding, tailgating, improper passing, inappropriate merging, and distracted driving (each by passenger car and by truck) and passenger car staying in truck's blind spot. Analysis of the survey data showed no significant differences in the likelihoods of crash contribution of each of these unsafe actions from before to after the TACT program, or when compared to the comparison sites.

However, it should be noted that every one of these unsafe action by car drivers was rated as at least somewhat likely to contribute to a car/truck crash both by light-vehicle drivers and truck drivers. Thus, the general driving population does know that these unsafe actions of cars and trucks in each other's vicinity can lead to crashes. A large majority was aware of this before the TACT program, and the program did not change their perceptions, but it could well have reinforced them.

Objective 3 – Increase the self-reported safe driving behaviors around large trucks between baseline and the program's completion and when compared to an area with no TACT program activities.

The analysis of the survey data found no significant statistical differences in self-reported driver behaviors of light-vehicle drivers in the TACT sites associated with the TACT program. Behaviors of light-vehicle drivers as self-reported and also as reported by truck drivers did not change as a result of the TACT program. It is interesting to note, however, that light-vehicle drivers' self-reports differed from that of truck driver's reports of passenger car in many cases. Overall, light-vehicle drivers reported proper and appropriate behaviors when changing lanes around trucks or when merging near trucks. For example, light-vehicle drivers reported that they almost always use their turn signals to indicate intent to pass trucks, whereas truck drivers reported that light-vehicle drivers use their turn signals less than one-half of the time in passing trucks. Approximately 90 percent of light-vehicle drivers reported that they adjust their speed to pull in front or behind a truck while merging. Truck drivers reported that light-vehicle drivers rely on the trucks to adjust their speeds or pull into another lane more than one-half of the time. When asked to describe their passing maneuvers around trucks, most light-vehicle drivers described the appropriate actions. The majority reported that they use their rear and/or side view mirrors or turn their head to check that they are past the truck. Those who responded with distance measures stated that on average, they pull in about four car lengths ahead of the truck they passed. Truck drivers on the other hand report that passing actions around them are very often unsafe.

Objective 4 – Increase the observed safe driving behaviors around large trucks between baseline and the program's completion and when compared to an area with no TACT program activities.

An observation study of passenger cars changing lanes to pass a large truck and also of merging onto a freeway near a large truck was carried out. Trained observers rode as passengers in large trucks that traveled on the TACT and comparison corridors for an overall total of 128 hours. They identified the maneuvers of interest and rated their safety. The analysis of these data compared the rates of safe maneuvers before and after the TACT program dates at the TACT program corridors and at the comparison corridors. Overall, the analysis did not identify any meaningful statistical differences in these measures that could be attributed to the TACT program. However, it should be pointed out the portion of safe passing and merging actions was quite very high even before the TACT program. Percentages of safe passing maneuvers in the TACT area before the program were 97 percent and 95 percent. Percentages of passengers that signaled their intent to pass were 57 percent to 60 percent. While this is not "almost all always", the self-reported value in the motorist survey, it was not as low (less than half of the time) as reported in the survey of truck drivers. The portion of safe merges of passenger cars near large trucks was also quite high at approximately 90 percent before and after the TACT program. Thus, while there was not much change in the passenger car safe driving behavior with respect to changing lanes and merging attributable to the TACT program, the proportion of these behaviors that were safe was very high before the TACT program. However, these percentages can still be improved. Identifying

the attributes of drivers who engage in unsafe behaviors and targeting the program specifically at them might have more of an effect on increasing safe driving behavior near trucks.

Objective 5 – Decrease by a statistically significant amount the number of truck crashes involving a light-vehicle in the TACT program area when compared to an area with no TACT activities.

Data series of crashes involving a truck and passenger vehicle with hazardous actions for either driver were constructed. In addition, data were assembled to control for other factors that affect the number of crashes, including truck and total traffic on the roadways; the proportion of trucks in the traffic stream; weather, in terms of rain and snow; and the state of the economy, as reflected in the unemployment rate. The data covered a period from January 2008 through April 2014. The TACT program Intervention occurred in October, November, and December 2013. April 2014 was the latest date for which all the data elements (crash and other data) were available.

Robust statistical models of crash rates were developed to test the hypothesis that the TACT program reduced truck crashes with hazardous actions by truck drivers or other drivers. The models were relatively powerful, explaining about three-quarters of the variation in truck crash rates over the period. However, the models did not show that the TACT Intervention had a significant effect on crashes. The other factors in the data had a much larger effect.

Failing to detect an effect of the Intervention does not indicate that the Intervention had no effect on crashes, just that any effect could not be detected in these data. It is possible that if the Intervention had been undertaken over a longer period of time or over a broader area (i.e., if there were more data), a statistically significant effect could have been identified.

However, the timing of the Intervention was particularly unfortunate. The models indicated that the amount of snowfall was highly influential on crash rates. The Intervention occurred at the beginning of one of the most severe winters on record. In the TACT area, the winter was the second snowiest on record, with accumulations over 40 inches greater than normal. As of March 6, 2014, Detroit needed only 9.6 more inches of snow to break the all-time accumulation record going back to 1880-81. The National Weather Service Forecast Office, part of National Oceanographic and Atmospheric Administration (NOAA), reported that Detroit broke the all-time record for snow with 94.9 inches. The prior record was 93.6 inches in 1880-81. The Detroit area also had 77 consecutive days with at least an inch of snow on the ground, exceeding the previous record of 74 in 1977-78. The winter was the coldest winter since 1977-78, with the third most days below freezing (79).[8] As a result, any effect from the Intervention may have been obscured by the coincidence of one of the coldest and snowiest winters in many years.

In light of these findings, one recommendation is that any future pilot test of the TACT program should take into account seasonal variations in snowfall. Timing of the project should avoid the months with significant snowfalls. In Michigan, a test of the program might be scheduled for the late spring or early fall. The chance of snowfall in April or later is relatively low in southern Michigan. In the Grand Rapids area, for example, the months with the greatest accumulations are December through March. Any pilot

[8]http://www.mlive.com/weather/index.ssf/2014/04/record_breaking_snowfall_last.html; http://www.mlive.com/weather/index.ssf/2014/03/a_look_at_detroits_and_michiga.html; http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=dtx&storyid=100198&source=0

scheduled for the fall should be completed by September at the latest in order to have a period to observe the effect of the program after the test but before the onset of winter.

Appendix A: Selection of TACT and Comparison Sites

As part of the activities in the earlier TACT planning project, the UMTRI project team conducted an extensive review of all TACT programs that have been or were being deployed at that time. This review included an analysis of what strategies were used, what worked, what did not work, what evaluation methods were used, and what lessons were learned. Structured telephone interviews with TACT program representatives in nine states (Kentucky, Georgia, North Carolina, Alabama, Nevada, Indiana, Montana, New Jersey, and Washington) were also conducted to discuss how programs and evaluations were conducted and the problems that were encountered. This information was synthesized and served as the basis for developing the Michigan TACT program.

In order to implement and evaluate a TACT program in Michigan, it was necessary to select a pair of sites where the program activities will take place as well as a pair of comparison sites that were as similar as possible to the program sites for evaluation where no program activity would take place. The criteria for selecting the program sites were: (1) they should have high rates of crashes involving trucks and cars which also involved an aggressive action; (2) the sites should be suitable for program activity to take place (e.g., shoulders for pulling over vehicles for violations); and (3) cooperation and involvement of state, county, and local law enforcement.

Site selection commenced with an extensive analysis of crash Michigan truck and passenger vehicle crash data. Michigan crash data from 2006-2010 were filtered for all crashes involving at least one truck and one light vehicle in which a hazardous (aggressive) action was coded for one of the drivers. These crashes were mapped onto the Michigan Department of Transportation (MDOT) Sufficiency Base Map—a database that divides Michigan roads into homogeneous road segments. For each road segment the following information was available: Highway Performance Monitoring System (HPMS) functional classification, location, traffic volume (AADT), commercial vehicle traffic volume, percent of commercial vehicles, whether the segment was part of a national truck network; roadway geometrics, and much more information. Segments were filtered to restrict to rural and urban principal arterials (interstates, expressways, freeways, and other major roadways) that had at least two crashes of interest. Principal arterials were chosen because this is where the majority of truck travel occurs in Michigan and because these roadways have shoulders in which traffic enforcement can safely occur. More than one crash was necessary on the segment so that a crash rate could be calculated. For each of the remaining segments, the project team calculated the rate of truck/light-vehicle crashes where the truck had hazardous action relative to the truck vehicle miles of travel (VMT) and the rate of truck/light-vehicle crashes where the light-vehicle had the hazardous action relative to the light-vehicle VMT. These rates allowed identification of freeway/expressway or interstate segments in Michigan with the worst truck hazardous crash rates, and with the worst light-vehicle hazardous crash rates for crashes involving both a truck and a light vehicle.

The team rank ordered the segments by the truck and light vehicle hazardous crash rates. The top 25 percent of segments with the worst crash rates were then plotted on a map of Michigan. Nine corridors (approximately 25-35 two-way miles in length) were identified by the team as candidates for the program or comparison sites. In order to have clear geographic and administrative separation between the program and comparison corridors, the team decided that the two program corridors should be located on one side of the state, while the two comparison corridors should be located on the other. Ratios between possible pairs of corridors were calculated for all traffic volumes, truck traffic volumes, percentage of

trucks, and the crash rates. These ratios were used to matching corridors in the pairs to be as similar as possible. Two sets of corridors were selected as being the most closely matched and as best meeting the other selection criteria. The comparison crash statistics for each corridor pair is shown in Table A-1.

The UMTRI and OHSP TACT project teams met with state, county, and local law enforcement in these areas to get gauge interest in the TACT project and to get cooperation. After these discussions, the decision was made to have the western Michigan corridors (near Grand Rapids) serve as the program corridors and the eastern Michigan corridors (Detroit Metro Region) to serve as the comparison corridors. Table A-2 shows data for each of the corridors. The map locations of the corridors are shown in Figure A-1. Because of the proximity of the two western Michigan corridors to each other, and the fact that the enforcement activities and schedules would treat the two corridors as one entity, the two western Michigan corridors were considered as one TACT site while the two southeast Michigan corridors were combined into the comparison sites for analysis purposes.

Table A-1: Distribution percentage of hazardous actions in crashes at candidate TACT and comparison corridors

	Hazardous action	Western Pair (US-131; I-196)	Eastern Pair (I-94/M-14; I-75)
Light Vehicles		n=190	n=108
	Speed too fast	35.8	34.3
	Failed to yield	5.3	4.6
	Improper lane use	20.5	20.4
	Unable to stop	11.6	25.9
	Other	8.4	3.7
	Careless/negligent	13.7	7.4
Trucks		n=96	n=107
	Speed too fast	2.1	3.7
	Failed to yield	5.2	9.3
	Improper lane use	28.1	27.1
	Unable to stop	37.5	32.7
	Other	19.8	21.5
	Careless/negligent	3.1	1.9

Table A-2: Information on the TACT Program and Comparison Corridors		
	Location	Length, Miles
Program		
US-131	US 131 at 10 Mile Road. NE to 100th Street SE	24.8
I-196	I-196 at US 131 to Ottogan Street	25.6
Comparison		
I-94/M-14	US 23 to M-14/I-94 to I-94 at Clearlake Road.	24.9
I-75	I-75 at 12th Street to Huron River Drive	23.2

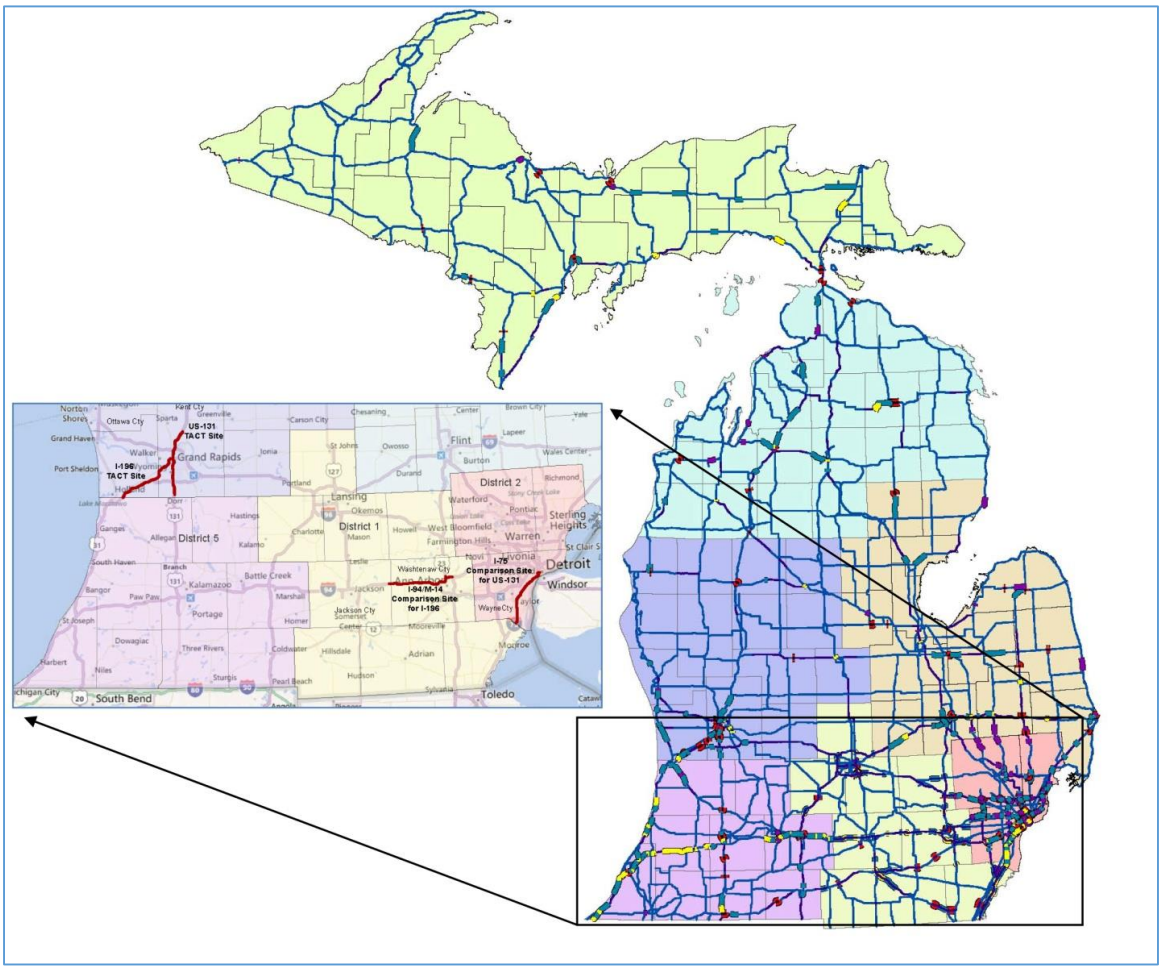

Figure A-1: The locations of the TACT program and comparison corridors in Michigan

Appendix B: TACT Information Card

LEAVE MORE
SPACE FOR TRUCKS

MICHIGAN'S TICKETING AGGRESSIVE CARS AND TRUCKS (TACT) PROGRAM

Crashes involving cars and large trucks can have catastrophic outcomes, especially for passenger vehicle occupants, no matter which vehicle is at fault.

Michigan's TACT Program aims to reduce truck-involved crashes and fatalities through outreach, education, and enforcement.

What you can do:

- Leave plenty of space when changing lanes in front of large trucks. For safety, allow one car length for every 10 miles of speed you are traveling.
- Maintain your speed when passing large trucks to avoid driving in blind spots.
- Don't tailgate. Car drivers who get too close to large trucks can't see the traffic ahead. If the truck stops suddenly drivers have no time to react and no place to go.
- Allow large trucks plenty of room when entering a highway or merging with traffic.

Michigan Office of Highway Safety Planning
P.O. Box 30634
Lansing, MI 48909
(517) 241-2500
Michigan.gov/ohsp

Not paid for with state funds.

Appendix C: Wave One TACT Enforcement Plans

Date	Start Time	County	Agency	Enforcement Location
10/7/13	6:00 AM	Kent	Walker Police Department	US 131 within City Limits
10/7/13	7:00 AM	Kent	Kent County Sheriff Office	US 131 and I-196 within County Limits
10/7/13	7:00 AM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/7/13	8:00 AM	Kent	MSP Commercial Vehicle Enforcement Division	I-196
10/7/13	8:00 AM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/7/13	8:00 AM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin, Burton)
10/7/13	8:00 AM	Kent	MSP Rockford Post	US 131 (10 Mile to Ann Street)
10/7/13	8:00 AM	Ottawa	Ottawa County Sheriff Office	I-196
10/7/13	12:00 PM	Kent	Walker Police Department	US 131 within City Limits
10/7/13	12:00 PM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/7/13	2:00 PM	Kent	MSP Commercial Vehicle Enforcement Division	I-196
10/7/13	2:00 PM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/7/13	2:00 PM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin)
10/7/13	2:00 PM	Kent	MSP Rockford Post	US 131 (10 Mile to Ann Street)
10/8/13	6:00 AM	Kent	Walker Police Department	US 131 within City Limits
10/8/13	7:00 AM	Kent	Kent County Sheriff Office	US 131 and I-196 within County Limits
10/8/13	7:00 AM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/8/13	8:00 AM	Kent	MSP Commercial Vehicle Enforcement Division	I-196
10/8/13	8:00 AM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/8/13	8:00 AM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin, Burton)
10/8/13	8:00 AM	Kent	MSP Rockford Post	US 131 (10 Mile to Ann Street)
10/8/13	8:00 AM	Ottawa	Ottawa County Sheriff Office	I-196
10/8/13	12:00 PM	Kent	Walker Police Department	US 131 within City Limits
10/8/13	12:00 PM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/8/13	2:00 PM	Kent/Ottawa	MSP Commercial Vehicle Enforcement Division	I-196
10/8/13	2:00 PM	Kent	MSP Commercial Vehicle Enforcement Division	US 131

Date	Start Time	County	Agency	Enforcement Location
10/8/13	2:00 PM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin)
10/8/13	2:00 PM	Kent	MSP Rockford Post	US 131 (10 Mile to Ann Street)
10/9/13	6:00 AM	Kent	Walker Police Department	US 131 within City Limits
10/9/13	7:00 AM	Kent	Kent County Sheriff Office	US 131 and I-196 within County Limits
10/9/13	7:00 AM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/9/13	8:00 AM	Kent/Ottawa	MSP Commercial Vehicle Enforcement Division	I-196
10/9/13	8:00 AM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/9/13	8:00 AM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin, Burton)
10/9/13	8:00 AM	Ottawa	MSP Rockford Post	I-196 (Kenowa Ave to 64th Avenue)
10/9/13	12:00 PM	Ottawa	Ottawa County Sheriff Office	I-196
10/9/13	12:00 PM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/9/13	2:00 PM	Kent/Ottawa	MSP Commercial Vehicle Enforcement Division	I-196
10/9/13	2:00 PM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/9/13	2:00 PM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin)
10/9/13	2:00 PM	Ottawa	MSP Rockford Post	I-196 (Kenowa Ave to 64th Avenue)
10/9/13	12:00 PM	Kent	Walker Police Department	US 131 within City Limits
10/10/13	6:00 AM	Kent	Walker Police Department	US 131 within City Limits
10/10/13	7:00 AM	Kent	Kent County Sheriff Office	US 131 and I-196 within County Limits
10/10/13	7:00 AM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/10/13	8:00 AM	Kent/Ottawa	MSP Commercial Vehicle Enforcement Division	I-196
10/10/13	8:00 AM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/10/13	8:00 AM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin, Burton)
10/10/13	8:00 AM	Ottawa	MSP Rockford Post	I-196 (Kenowa Ave to 64th Avenue)
10/10/13	12:00 PM	Ottawa	Ottawa County Sheriff Office	I-196
10/10/13	12:00 PM	Kent	Walker Police Department	US 131 within City Limits
10/10/13	12:00 PM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/10/13	2:00 PM	Kent/Ottawa	MSP Commercial Vehicle Enforcement Division	I-196
10/10/13	2:00 PM	Kent	MSP Commercial Vehicle Enforcement Division	US 131

Date	Start Time	County	Agency	Enforcement Location
10/10/13	2:00 PM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin)
10/10/13	2:00 PM	Ottawa	MSP Rockford Post	I-196 (Kenowa Ave to 64th Avenue)
10/11/13	6:00 AM	Kent	Walker Police Department	US 131 within City Limits
10/11/13	7:00 AM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/11/13	8:00 AM	Kent/Ottawa	MSP Commercial Vehicle Enforcement Division	I-196
10/11/13	8:00 AM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/11/13	8:00 AM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin, Burton)
10/11/13	8:00 AM	Kent	MSP Rockford Post	US 131(10 Mile to Ann Street)
10/11/13	8:00 AM	Ottawa	Ottawa County Sheriff Office	I-196
10/11/13	12:00 PM	Kent	Walker Police Department	US 131 within City Limits
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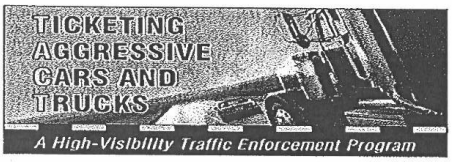
10/11/13	2:00 PM	Kent/Ottawa	MSP Commercial Vehicle Enforcement Division	I-196
10/11/13	2:00 PM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/11/13	2:00 PM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin)
10/11/13	2:00 PM	Kent	MSP Rockford Post	US 131 (10 Mile to Ann Street)
10/14/13	6:00 AM	Kent	Walker Police Department	US 131 within City Limits
10/14/13	7:00 AM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/14/13	8:00 AM	Kent	MSP Commercial Vehicle Enforcement Division	I-196
10/14/13	8:00 AM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/14/13	8:00 AM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin, Burton)
10/14/13	8:00 AM	Ottawa	Ottawa County Sheriff Office	I-196
10/14/13	12:00 PM	Kent	Kent County Sheriff Office	US 131 and I-196 within County Limits
10/14/13	12:00 PM	Kent	Walker Police Department	US 131 within City Limits
10/14/13	12:00 PM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/14/13	2:00 PM	Kent	MSP Commercial Vehicle Enforcement Division	I-196
10/14/13	2:00 PM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/14/13	2:00 PM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin)
10/15/13	6:00 AM	Kent	Walker Police Department	US 131 within City Limits

Date	Start Time	County	Agency	Enforcement Location
10/15/13	7:00 AM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/15/13	8:00 AM	Kent	MSP Commercial Vehicle Enforcement Division	I-196
10/15/13	8:00 AM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/15/13	8:00 AM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin, Burton)
10/15/13	8:00 AM	Ottawa	MSP Rockford Post	I-196 (64th Ave to Adams Road)
10/15/13	8:00 AM	Ottawa	Ottawa County Sheriff Office	I-196
10/15/13	12:00 PM	Kent	Kent County Sheriff Office	US 131 and I-196 within County Limits
10/15/13	12:00 PM	Kent	Walker Police Department	US 131 within City Limits
10/15/13	12:00 PM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/15/13	2:00 PM	Kent/Ottawa	MSP Commercial Vehicle Enforcement Division	I-196
10/15/13	2:00 PM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/15/13	2:00 PM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin)
10/15/13	2:00 PM	Ottawa	MSP Rockford Post	I-196 (64th Ave to Adams Road)
10/16/13	6:00 AM	Kent	Walker Police Department	US 131 within City Limits
10/16/13	7:00 AM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/16/13	8:00 AM	Kent/Ottawa	MSP Commercial Vehicle Enforcement Division	I-196
10/16/13	8:00 AM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/16/13	8:00 AM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin, Burton)
10/16/13	8:00 AM	Ottawa	MSP Rockford Post	I-196 (64th Ave to Adams Road)
10/16/13	8:00 AM	Ottawa	Ottawa County Sheriff Office	I-196
10/16/13	12:00 PM	Kent	Kent County Sheriff Office	US 131 and I-196 within County Limits
10/16/13	12:00 PM	Kent	Walker Police Department	US 131 within City Limits
10/16/13	12:00 PM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/16/13	2:00 PM	Kent/Ottawa	MSP Commercial Vehicle Enforcement Division	I-196
10/16/13	2:00 PM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/16/13	2:00 PM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin)
10/16/13	2:00 PM	Ottawa	MSP Rockford Post	I-196 (64th Ave to Adams Road)
10/17/13	6:00 AM	Kent	Walker Police Department	US 131 within City Limits

Date	Start Time	County	Agency	Enforcement Location
10/17/13	7:00 AM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/17/13	8:00 AM	Kent/Ottawa	MSP Commercial Vehicle Enforcement Division	I-196
10/17/13	8:00 AM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/17/13	8:00 AM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin, Burton)
10/17/13	8:00 AM	Kent	MSP Rockford Post	US 131 (10 Mile to Ann Street)
10/17/13	12:00 PM	Kent	Kent County Sheriff Office	US 131 and I-196 within County Limits
10/17/13	12:00 PM	Ottawa	Ottawa County Sheriff Office	I-196
10/17/13	12:00 PM	Kent	Walker Police Department	US 131 within City Limits
10/17/13	12:00 PM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/17/13	2:00 PM	Kent/Ottawa	MSP Commercial Vehicle Enforcement Division	I-196
10/17/13	2:00 PM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/17/13	2:00 PM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin)
10/17/13	2:00 PM	Kent	MSP Rockford Post	US 131 (10 Mile to Ann Street)
10/18/13	6:00 AM	Kent	Walker Police Department	US 131 within City Limits
10/18/13	7:00 AM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/18/13	8:00 AM	Kent/Ottawa	MSP Commercial Vehicle Enforcement Division	I-196
10/18/13	8:00 AM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/18/13	8:00 AM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin, Burton)
10/18/13	8:00 AM	Ottawa	Ottawa County Sheriff Office	I-196
10/18/13	12:00 PM	Kent	Walker Police Department	US 131 within City Limits
10/18/13	12:00 PM	Kent	Wyoming Police Department	US 131 and I-196 within City Limits
10/18/13	2:00 PM	Kent/Ottawa	MSP Commercial Vehicle Enforcement Division	I-196
10/18/13	2:00 PM	Kent	MSP Commercial Vehicle Enforcement Division	US 131
10/18/13	2:00 PM	Kent	Grand Rapids Police Department	US 131 (Leonard, Franklin)

Appendix D: Law Enforcement Summary Reporting Form



Scan w/dailies and e-mail to
eliasonp@michigan.gov within 5 days
after each enforcement period

FY2014 Summary Enforcement Reporting Form

Date of Enforcement		Location (site)	
Lead Agency Name		Grant #	
County Name			

Officer Name	Agency Name	Officer Name	Agency Name

Project Hours	

Enforcement Activity	Commercial Vehicles	Passenger Vehicles
Total vehicles stopped		
Failure to yield/merge violation		
Following too close		
Improper lane use/improper passing		
Seat belt violation		
Equipment violation		
Impeding traffic		
Speeding		
OWI/OUID		
Careless driving/reckless driving		
Suspended/revoked drivers license/no operator license		
Felony warrant/misdemeanor warrant		
Weapons		
Drugs		
Other citations		
Total citations		
Total arrests		

Provide details about notable arrests, if applicable.

MICHIGAN OHSP
Office of Highway Safety Planning

Pat Eliason
Office of Highway Safety Planning
Phone: (517) 241-2498 Fax: (517) 241-2501

Appendix E: Enforcement Activities by Wave and Agency

Wave One (October 7-18, 2013)

Agency	Location of Enforcement	Hours	Vehicles Stopped	Total Citations	Total Arrests
Grand Rapids Police Department	US-131 and I-I96	186.75	161 PV*	140 PV	8
Kent County Sheriff	US-131 and I-196 within County Limits	155	166 PV 4 CMV**	88 PV	9
MSP- CVED	I-196 and US-131	156	168 CMV	96 CMV	
MSP Rockford Post	US 131 (10 Mile to Ann Street)	180	227 PV 8 CMV	338 PV 15 CMV	1
Ottawa County Sheriff	I-196	156	323 PV 20 CMV	211 PV 16 CMV	7
Walker Police Department	US-131 within City Limits	107	100 PV	98 PV	3
Wyoming Police Department	US 131 and I-196 within City Limits	107.5	104 PV 1 CMV	113 PV 1 CMV	2
Total	US-131 and I-196	1048.25	1,081PV 201 CMV	988 PV 128 CMV	30

*PV=Passenger Vehicles, ** CMV= Commercial Motor Vehicle

Wave Two (November 4-15, 2013)

Agency	Location of Enforcement	Hours	Vehicles Stopped	Total Citations	Total Arrests
Grand Rapids Police Department	US-131 and I-196	28	147 PV	275 PV	9
Kent County Sheriff	US-131	152.5	129 PV 5 CMV	29 PV 4 CMV	16
MSP- CVED	US-131 and I-196	140	6 PV 128 CMV	 77 CMV	
MSP Rockford Post	N/A	0	0	0	0
Ottawa County Sheriff	Ottawa I-196	217.25	285 PV 2 CMV	131 PV 1 CMV	9
Walker Police Department	US-131 within City Limits	89	65 PV	55 PV	7
Wyoming Police Department	US 131 and I-196 within City Limits	190.5	239 PV 4 CMV	204 PV 4 CMV	8
Total	US-131 and I-196	817.25	871 PV 139 CMV	694 PV 86 CMV	49

Wave Three (December 2-13, 2013)

Agency	Location of Enforcement	Hours	Vehicles Stopped	Total Citations	Total Arrests
Grand Rapids Police Department	US-131 and I-196	62.25	67 PV	61 PV	7
Kent County Sheriff	US-131	139.5	90 PV 2 CMV	59 PV 1 CMV	7
MSP- CVED	US-131 and I-196	90	68 CMV	25 CMV	
MSP Rockford Post	US-131 and I-196	200	244 PV 6 CMV	318 PV	
Ottawa County Sheriff	I-196 (Ottawa County)	54	99 PV 2 CMV	84 PV 2 CMV	
Walker Police Department	US-131	78	40 PV	15 PV	1
Wyoming Police Department	US 131 and I-196 within City Limits	80	82 PV 8 CMV	62 PV 5 CMV	2
Total	US-131 and I-196	703.75	622 PV 86 CMV	599 PV 33 CMV	17

Appendix F: Billboard Concept, Locations, Cost and E.O.I. Ratings

TACT Billboard Concept

Office of Highway Safety Planning
TACT Initiative - Outdoor
September 30 - October 27, 2013
Grand Rapids

Inventory #	Location Description	Copy Size	A 18+ E.O.I. Weekly	M 18-34 E.O.I. Weekly	A 18+ E.O.I. 4-week	M 18-34 E.O.I. 4-week	Total 4-week Net Cost	Illum	Latitude	Longitude
CBS										
5499O	US-131 .5 mi N/O Ann St WS F/S	14'x48'	191,283	37,450	765,132	149,800	$2,000.00	Yes	43.001006	-85.67692
5532O	US-131 .3 mi S/O 54th St ES F/S	14'x48'	210,487	41,130	841,948	164,520	$2,000.00	Yes	42.861418	-85.678674
5542O	I-196 .5 mi W/O US-131 SS F/E	14'x48'	132,540	27,885	530,160	111,540	$2,000.00	Yes	42.972623	-85.686276
5638O	US-131 .5 mi S/O 100th St ES F/S	14'x48'	132,438	25,184	529,752	100,736	$2,000.00	Yes	42.771317	-85.670539
5917O	I-96 .2 mi W/O 8th Ave SS F/W	14'x48'	123,095	23,211	492,380	92,844	$2,000.00	Yes	43.029743	-85.804433
6035O	US-131 .5 mi S/O M-46 ES F/N	14'x48'	78,524	14,271	314,096	57,084	$2,000.00	Yes	43.208781	-85.574366
58520	US 131 .5 mi S/O 54th St ES F/N	14'x48'	152,814	28,666	611,256	114,664	$2,000.00	Yes	42.857848	-85.67839
5551O	I-96 .25 mi E/O US-131 N/S F/W	14'x48'	138,232	25,681	552,928	102,724	$2,000.00	Yes	43.02161	-85.659102
					4,637,652	**893,912**	**$16,000.00**			
Lamar										
707	S/S I-196 .1 MILE W/O M-11(28TH ST) F/W	10' 6" x 36' 0"	185,498	16,775	741,992	67,100	$1,964.28	Yes	42.91250	-85.76717
5296	N/S I-96 .1 MILE E/O PLAINFIELD AVE F/E	14' 0" x 48' 0"	113,863	17,638	455,452	70,552	$1,964.28	Yes	43.01914	-85.63426
26749	E/S US-131 .2 MILE S/O HALL ST F/N	14' 0" x 48' 0"	239,376	46,270	957,504	185,080	$1,964.29	Yes	42.94599	-85.67550
29151	S/S I-96 1 MILE W/O WALKER ROAD F/E	10' 6" x 36' 0"	96,336	4,734	385,344	18,936	$1,964.28	Yes	43.01718	-85.74896
61080	N/S I-96 3 MILES E/O M-50 F/E	14' 0" x 48' 0"	111,815	18,560	447,260	74,240	$1,964.29	Yes	42.88032	-85.28408
70092	S/S I-96 @ MONTCALM RD F/W	12' 0" x 48' 0"	115,309	19,140	461,236	76,560	$1,964.29	Yes	42.87725	-85.31105
61000	WS US 131 1 mi N/O I-96 F/S	14' 0" x 48' 0"	124,556	19,018	498,224	76,072	$1,964.29	Yes	43.02970	-85.665
					3,947,012	**568,540**	**$13,750.00**			
Adams										
GR6552	I-96 0.1 mi E/O Kraft Rd. SS FE	14' X 48'	103,367	18,479	413,468	73,916	$3,600.00	Yes	42.90591	-85.52706
					413,468	**73,916**	**$3,600.00**			
		Grand Total Grand Rapids:			**8,998,132**	**1,536,368**	**$33,350.00**			

Note: Includes initial production and installation

Appendix G: TACT Media Event Materials

(Press Conference Materials: Radio Ad Script, Fact Sheet, Information Card, Speaker List and Remarks, Media Advisory and News Release; Wal-Mart Event News Release and Media Advisory)

Michigan's Ticketing Aggressive Cars & Trucks (TACT) Program

60 Second Radio Script

SFX: a semi moving down the road

Trucker: Big Dog to Rocket Man. Got a bear in the air and a city kitty rolling with the discos. Back off that hammer.

VO: If you think it's hard to understand truckers, than imagine what they're thinking when you don't share the road.

Trucker: Rocket Man, a four-wheeler just blew my doors off. He's headed for your 20.

VO: Imagine what they're thinking when you get too close.

Trucker: He's crossing the zipper. Brake check! Or he's going to put you greasy side up.

VO: There's an easy way to avoid a crash. Maintain your speed when you pass large trucks and leave plenty of space when you cross lanes. That means one car length for every 10 miles of speed you're traveling. Because would you rather hear this…

Trucker: You're clear, Rocket Man. Catch ya on the flip-flop.

VO: Or would you rather hear this?

SFX: a semi braking

VO: Police are cracking down on unsafe driving around trucks. Save yourself a ticket by remembering to avoid blind spots and leave more space for trucks.

A message from the Michigan Office of Highway Safety Planning.

SFX: honk, honk

Michigan's Ticketing Aggressive Cars & Trucks (TACT) Program

Fact Sheet

October 2013

- In 2012, truck-involved fatalities in Michigan increased 10 percent, from 73 in 2011 to 80.
- There were 9,388 truck-involved crashes in 2012, with 986 of those crashes occurring in Kent and Ottawa counties.
- About 70 percent of all truck crashes in Michigan involve a passenger vehicle. Of those crashes, over half of the time the hazardous action that caused the crash was committed by the passenger vehicle.
- Passenger vehicle drivers in a truck-involved crash are:
  - More likely to be men than women
  - More likely to be less than 25 years old
- Most frequent hazardous actions are:
  - Improper lane use
  - Careless and reckless driving
  - Speeding
  - Following too close
  - Failure to yield
- Over a five-year period, 90 percent of truck-involved crashes took place on weekdays. The majority occurred between 6 a.m. and 8 p.m.

Draft of TACT Information Card

TACT Press Conference Speaker List

Michigan's Ticketing Aggressive Cars and Truck (TACT) Program

October 7, 2013

Speakers

Capt. Michael Krumm, Michigan State Police Commercial Vehicle Enforcement Division

Michael L. Prince, director, Michigan Office of Highway Safety Planning

Paul Soehnlein, chairperson, Michigan Trucking Association Western Safety Council

Sheriff Lawrence A. Stelma, Kent County Sheriff's Office

Contact: Melody Kindraka, OHSP Communications Coordinator, (517) 241-1522, kindrakam@michigan.gov

TACT Kickoff Press Conference
Remarks for OHSP Director Michael L. Prince
10 a.m., October 7, 2013
Van's Delivery Service, Grand Rapids

Good morning. I'm Michael Prince, director of the Michigan Office of Highway Safety Planning.

O-H-S-P is responsible for coordinating statewide traffic safety programs and campaigns with federal funds designated for this purpose.

Joining me at the podium today will be:

- Sheriff Lawrence Stelma of the Kent County Sheriff's Office;

- Captain Michael Krumm, commander of the Michigan State Police Commercial Vehicle Enforcement Division; and

- Paul Soehnlein, chairperson of the Michigan Trucking Association Western Safety Council.

I'd also like to recognize and welcome representatives from the Federal Motor Carrier Safety Administration, and members of the Michigan Truck Safety Commission and the Michigan Trucking Association Western Safety Council.

We are also joined today by representatives of the Ottawa County Sheriff's Office and the Grand Rapids, Walker, and Wyoming police departments.

Crashes involving trucks and passenger vehicles continue to be a serious traffic safety issue in Michigan. In 2012, truck-involved fatalities increased 10 percent from 73 in 2011, to 80. About 70 percent of all truck crashes in Michigan involve a passenger vehicle.

Earlier this year, the Federal Motor Carrier Safety Administration awarded a grant to Michigan to conduct a Ticketing Aggressive Cars and Trucks program, known as TACT.

The TACT program combines outreach, education, and evaluation with targeted enforcement activities to raise awareness about safe driving around trucks. Its ultimate goal is to reduce truck-involved crashes, fatalities, and serious injuries.

Today we are kicking off the TACT program in West Michigan. This is the first time a TACT program has been conducted in Michigan.

The Grand Rapids area was selected based on a review of crash data by the University of Michigan Transportation Research Institute. This analysis identified specific corridors along U.S. 131 and I-196 as having high crash rates for trucks and passenger vehicles resulting from aggressive behavior.

Here to tell you more about the planned enforcement effort is Sheriff Stelma.

[after Sheriff speaks]

Thank you Sheriff Stelma.

I'd now like to invite Captain Krumm to talk about commercial motor vehicle safety and enforcement.

[after Krumm speaks]

Thank you Captain Krumm.

As Captain Krumm mentioned the TACT planning process has involved a great deal of support from the West Michigan trucking industry. At this time I'd like to invite the chairperson of the Michigan Trucking Association Western Safety Council, Paul Soehnlein, to tell you about what it is like to be a truck driver.

[after Soehnlein speaks]

Thank you Mr. Soehnlein.

To increase awareness and encourage compliance with the TACT program, public information and education messages began airing last week in West Michigan.

All of the TACT communications, including billboards and radio commercials, remind motorists to leave more space for trucks.

As you can see on the examples around me, we included the image of a football field to help motorists understand that trucks take more yards to stop than a passenger vehicle. This is particularly important when changing lanes in front of a truck.

To make sure you don't cut off a truck as you pass, drivers are asked to allow one car length for every 10 miles of speed. So at 70 miles per hour, allow seven car lengths before pulling in front of a large truck.

Drivers are also encouraged to maintain their speed when passing trucks to avoid driving in blind spots, and allow large trucks plenty of room when merging or entering the highway.

Finally, don't tailgate. For commercial vehicles this means following so closely that they don't have those extra stopping yards.

For passenger cars, tailgating limits visibility. Without being able to see the traffic ahead, drivers don't have time to properly react.

During the TACT project, these educational messages are just as important as the enforcement effort. We want motorists to learn to be better and safer drivers around commercial vehicles.

As we wrap up today's formal remarks I'd like to make mention of the numerous semi-trucks and law enforcement vehicles you passed on the way in.

The trucks were provided by representatives of the Michigan Trucking Association West Michigan Safety Council, including:

- Larry Archer from Modular Transportation,

- Rod Cooper from Classic Transportation,
- Cheryl Lathwell from Super Service, and
- Michelle Usselman from Star Leasing.

The drivers are available for media interviews after the press conference and they will also be providing rides upon request. Ride-alongs with law enforcement are also available.

So after the media representatives are done in here I encourage you to step outside and check out the vehicles.

A special thank you to Sharon Conklin, the safety director here at Van's Delivery Service for hosting this event.

I'd also like to thank the media and all our guests for joining us this morning to kick off Michigan's first TACT program and helping us spread the message to leave more space for trucks. Together we can reduce crashes, fatalities, and serious injuries and make the roads safer for everyone. Thank you.

TACT Kickoff Press Conference
Remarks for Captain Krumm
10 a.m., October 7, 2013
Van's Delivery Service, Grand Rapids

You may have noticed the TACT program places a great deal of emphasis on passenger vehicles. But you can't spell TACT without T for trucks.

On average, commercial motor vehicles will log five billion miles on Michigan's more than 121,000 miles of public roads each year. In 2012, there were more than 9,300 truck-involved crashes in Michigan; nearly 10 percent of those occurred in Kent and Ottawa counties.

Michigan State Police motor carrier officers are tasked with ensuring legitimate and safe travel of the nation's motor carriers through our state.

Michigan is continuously recognized throughout North America as a leader in commercial vehicle safety. A great deal of that success can be attributed to the commitment of our motor carrier officers and the job they do each and every day.

But another important contributing factor is the positive and professional relationship we maintain with Michigan's trucking industry. I am pleased this strong partnership has been part of the TACT planning process and happy there are so many industry representatives here today to share their stories and support this effort. However, as I mentioned, this project is about ticketing aggressive cars and trucks.

M-S-P motor carrier officers will be working alongside the other law enforcement agencies to conduct TACT program enforcement with a specific emphasis on commercial vehicles.

Motor carrier officers will be on the lookout for equipment requirements, driver qualifications, and violations of state laws such as speed, size, weight, and registration.

Officers will also be looking for aggressive behaviors by commercial vehicle drivers such as following too close, speeding, and texting or talking on the phone while driving.

Recently enacted federal regulations prohibit the use of all hand-held mobile devices when driving any commercial motor vehicle.

For the most part the Michigan trucking industry does a great job promoting safety and operating within the law. With their strong support of the TACT program, I have no doubt this will continue. Thank you.

TACT Kickoff Press Conference
Remarks for Sheriff Stelma
10 a.m., October 7, 2013
Van's Delivery Service, Grand Rapids

Starting today, law enforcement officers from the Kent and Ottawa County Sheriff Offices, Michigan State Police Rockford Post, and the Grand Rapids, Walker, and Wyoming police departments will conduct extra patrols focusing on aggressive driving around trucks.

Over the last five years, in crashes involving trucks and passenger vehicles, more than half of the hazardous actions causing the crash were attributed to the passenger vehicles. While drivers can be cited for any violation during TACT program enforcement, for the next two weeks officers will be paying special attention to particular aggressive behaviors.

The most frequent hazardous actions in crashes with trucks are improper lane use, careless and reckless driving, speeding, following too close, and failure to yield.

The fines associated with these violations can range from $100 to more than $500. However that is far less than the potential cost of a crash in terms of goods and services, and more importantly, human life.

Just like the enforcement locations were selected based on the crash data, we also used the University of Michigan Transportation Research Institute analysis to determine the optimal days and times for enforcement.

Enforcement will take place Monday through Friday, between 6 a.m. and 8 p.m. Under the TACT program, these patrols are above and beyond our regular enforcement activities. For the media, a specific list of TACT enforcement activity is available in your packet.

Enforcement will be particularly concentrated during high traffic times. It is no surprise these are high crash times as well.

On behalf of all the participating law enforcement officers, I'd like to urge motorists to keep an eye out for the extra law enforcement vehicles on the side of the road. When possible, move over or slow down and pass with caution. This will help ensure both you and our officers get home safely.

In addition to the enforcement planned for October, TACT enforcement will also take place November 4 through November 15, and December 2 through December 13.

Specialized enforcement efforts like this are not about writing tickets. Actually it is just the opposite.

Highly visible enforcement is an incredibly effective deterrent for traffic violations.

We are here today to publicize this enforcement as a way to educate the public about safe driving around trucks. We want you to hear our message, heed our warning, and learn to leave more space for trucks.

Thank you.

Michigan Office of Highway Safety Planning
P.O. Box 30634, Lansing, MI 48909
(517) 241-2500
Michigan.gov/ohsp

October 3, 2013Contact: Melody Kindraka

(517) 241-1522

MEDIA ADVISORY kindrakam@michigan.gov

New effort kicks off in West Michigan

DRIVING SAFELY AROUND TRUCKS IS FOCUS OF

ENFORCEMENT AND EDUCATION PROGRAM

What: Law enforcement agencies and commercial motor vehicle companies are kicking off an enforcement and education effort focused on safe driving around trucks. For the first time, Michigan will conduct a Ticketing Aggressive Cars and Trucks (TACT) program, supported with funding from the Federal Motor Carrier Safety Administration and Michigan Truck Safety Commission.

The TACT program aims to reduce truck-related crashes, injuries and fatalities by combining outreach, education and evaluation with enforcement activities. Specialized enforcement will take place Oct. 7-18 in West Michigan on U.S. 131 and I-196 in Kent and Ottawa counties.

When: Monday, Oct. 7

10 a.m.

Where: Van's Delivery Service

2280 Turner NW

Grand Rapids, Michigan 49544

Who: Capt. Michael Krumm, Michigan State Police Commercial Vehicle Enforcement Division

Michael L. Prince, director, Michigan Office of Highway Safety Planning (OHSP)

Paul Soehnlein, chairperson, Michigan Trucking Association Western Safety Council

Michigan Office of Highway Safety Planning
P.O. Box 30634, Lansing, MI 48909
(517) 241-2500
Michigan.gov/ohsp

Sheriff Lawrence A. Stelma, Kent County Sheriff's Office

Why: Crashes involving trucks and passenger vehicles continue to be a serious traffic safety issue. In 2012, truck-involved fatalities increased 10 percent, from 73 in 2011 to 80.

Visual: Semi-trucks provided by members of the Michigan Trucking Association Western Safety Council will be on display with experienced truck drivers available for interviews. Ride-alongs with truck drivers and law enforcement officers are available upon request. OHSP will also debut the TACT public information campaign materials including a billboard and radio commercial.

Michigan Office of Highway Safety Planning
P.O. Box 30634, Lansing, MI 48909
(517) 241-2500
Michigan.gov/ohsp

October 7, 2013Contact: Melody Kindraka

(517) 241-1522

FOR IMMEDIATE RELEASE kindrakam@michigan.gov

West Michigan site of new traffic safety program

DRIVERS URGED TO LEAVE MORE SPACE FOR TRUCKS

A new enforcement and education initiative in West Michigan seeks to reduce crashes, fatalities and serious injuries involving cars and trucks by reminding motorists to leave more space for trucks.

The Ticketing Aggressive Cars and Trucks (TACT) program combines outreach, education and evaluation with enforcement activities for safe driving around trucks. The Grand Rapids area was selected after a review of crash data by the University of Michigan Transportation Research Institute showed high crash rates associated with aggressive behavior.

“Crashes between cars and trucks can be catastrophic, both in terms of the loss of life and loss of goods and services, no matter which vehicle driver is at fault,” said Michael L. Prince, director of the Michigan Office of Highway Safety Planning (OHSP). “The method used in the TACT program of focusing enforcement and education efforts on car and truck drivers has been successful in other states, and we look forward to similar results in West Michigan.”

In 2012, truck-involved fatalities in Michigan increased 10 percent, from 73 in 2011 to 80. There were 9,388 truck-involved crashes in 2012, with 986 of those crashes occurring in Kent and Ottawa counties.

Officers from six West Michigan law enforcement agencies will conduct TACT program enforcement on U.S. 131 and I-196 in Kent and Ottawa counties, Oct. 7 through Oct. 18. Officers will be on the lookout for violations by both passenger vehicle and truck drivers such as improper lane use, careless and reckless driving, speeding, following too close and failure to yield the right of way.

The participating agencies are the Michigan State Police, Kent and Ottawa county sheriff offices and Grand Rapids, Walker and Wyoming police departments. Additional TACT program enforcement will take place Nov. 4-15 and Dec. 2-13.

To help increase awareness and encourage compliance, TACT advertising will be seen on billboards and heard on West Michigan radio stations throughout October. The messages encourage

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P.O. Box 30634, Lansing, MI 48909
(517) 241-2500
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drivers to leave more space for trucks by allowing one car length for every 10 miles of speed and not tailgating.

OHSP is supporting the TACT enforcement and public information effort with funds from the Federal Motor Carrier Safety Administration (FMCSA) and Michigan Truck Safety Commission dedicated for this purpose. This is the first time this type of program has been conducted in Michigan. The FMCSA has supported similar TACT programs in several other states including Kentucky, North Carolina and Washington.

This project is part of Michigan's Strategic Highway Safety Plan signed by Gov. Rick Snyder in February.

October 31, 2013 Contact: Melody Kindraka

(517) 241-1522

MEDIA ADVISORY kindrakam@michigan.gov

Public invited to see the road as a truck driver

LOCAL EVENT IS OPPORTUNITY TO LEARN ABOUT TRUCK SAFETY

What: The view from behind the wheel of a large truck is unique for what can be seen and what cannot. During a special event, community members will have the chance to sit in the driver's seat and see how passenger vehicles can seem to disappear in the blind spots. Trucking industry representatives and law enforcement officers will be available to answer questions and give important safety tips.

The event is part of the Ticketing Aggressive Cars and Trucks (TACT) program, supported with funding from the Federal Motor Carrier Safety Administration and Michigan Truck Safety Commission. The TACT program aims to reduce truck-related crashes, injuries and fatalities by combining outreach, education and evaluation with enforcement activities. Specialized enforcement will take place Nov. 4-15 on U.S. 131 and I-196 in Kent and Ottawa counties.

When: Saturday, Nov. 2

10 a.m.-2 p.m.

Where: Wal-Mart Supercenter

Michigan Office of Highway Safety Planning
P.O. Box 30634, Lansing, MI 48909
(517) 241-2500
Michigan.gov/ohsp

3999 Alpine Ave. NW

Comstock Park, Mich. 49321

Who: Kent County Sheriff's Office

Michigan State Police

Wal-Mart Stores Inc.

Why: About 70 percent of truck crashes in Michigan involve a passenger vehicle. Of those crashes, over half of the time the hazardous action that caused the crash was committed by the passenger vehicle.

Visual: Law enforcement agencies will park patrol cars in the blind spots of Wal-Mart's educational No-Zone Trailer to illustrate the dangers of driving in those areas. The trailer is provided by the Wal-Mart Road Team.

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Michigan Office of Highway Safety Planning
P.O. Box 30634, Lansing, MI 48909
(517) 241-2500
Michigan.gov/ohsp

November 1, 2013 Contact: Melody Kindraka

(517) 241-1522

FOR IMMEDIATE RELEASE kindrakam@michigan.gov

Community event highlights truck drivers' experiences

EXTRA OFFICERS IN WEST MICHIGAN FOCUS ENFORCEMENT ON

DRIVING SAFELY AROUND TRUCKS

Law enforcement agencies and trucking industry representatives are focusing outreach and enforcement efforts on passenger vehicles driving safely around trucks during the second phase of the Ticketing Aggressive Cars and Trucks (TACT) program in West Michigan. About 70 percent of truck-involved crashes in Michigan include a passenger vehicle.

As part of the outreach efforts, members of the Michigan State Police (MSP) and Kent County Sheriff's Office are joining Wal-Mart Stores, Inc. for a community safety event tomorrow at the Wal-Mart Supercenter in Comstock Park. Visitors will have the opportunity to sit in the driver's seat of a large truck and speak with law enforcement and trucking industry representatives.

"A review of crash data reveals that when a large truck and passenger vehicle are involved in a crash, more than half of the time, the passenger vehicle driver committed an action causing the crash," said Michael L. Prince, director of the Michigan Office of Highway Safety Planning (OHSP). "By combining outreach and education with dedicated enforcement, we hope all drivers learn to leave more space for trucks."

Officers from six West Michigan law enforcement agencies will conduct TACT program enforcement on U.S. 131 and I-196 in Kent and Ottawa counties, Monday through Nov. 15. Officers will be on the lookout for violations by both passenger vehicle and truck drivers such as improper lane use, careless and reckless driving, speeding, following too close and failure to yield the right of way. These patrols are in addition to regularly scheduled shifts.

The participating agencies include the MSP, Kent and Ottawa county sheriff offices, and Grand Rapids, Walker and Wyoming police departments. Additional TACT program enforcement will take place Dec. 2-13.

During the first phase, Oct. 7-18, officers issued more than 1,300 citations. The majority of the tickets were for speeding and following too close. Approximately 20 percent of those cited were commercial motor vehicle drivers.

The TACT program combines public information and enforcement efforts to promote safe driving around trucks and reduce the number of truck-related traffic crashes, fatalities and serious injuries. OHSP is supporting the TACT enforcement and public information effort with funds from the Federal Motor Carrier Safety Administration and Michigan Truck Safety Commission dedicated for this purpose. This is the first time this type of program has been conducted in Michigan.

This project is part of Michigan's Strategic Highway Safety Plan signed by Gov. Rick Snyder in February.

Appendix H: Radio and Billboard Summary

MICHIGAN OFFICE OF HIGHWAY SAFETY PLANNING
TACT INITIATIVE
FISCAL YEAR 2013 MEDIA BUY SUMMARY

Prepared: September 5, 2013

dba CHANNELS

MEDIA PLAN OVERVIEW

Media Buy Demo
- Men 18-34

Target Geography
- Grand Rapids/Kalamazoo/Battle Creek DMA

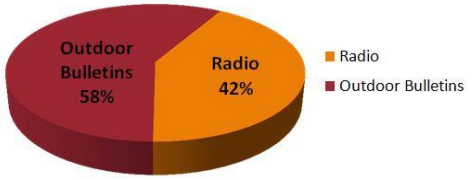
Campaign Timing
- Radio: Oct 1st-Oct 18th, 2013
- Outdoor: September 30th-October 27th

Media Platform
- Radio
- Outdoor

Planned Budget: $60,038 Net
Placed Net: $57,380 Net
Remaining Dollars: $2,658

Media	Net As Placed
Radio	$24,030
Outdoor	$33,350
Total Net Placed:	**$57,380**

% of Budget Allocation By Media Type As Placed



dba CHANNELS

Grand Rapids Radio Metro

Daypart	% GRP Distribution (As Placed)	Planned GRPs	Placed GRPs	Net CPP	Net As Placed
AM Drive	30%				
Mid-day	20%				
PM Drive	30%				
Evening	9%				
Weekends	11%				
Totals:		603	**603**	$39.83	**$24,030**
Reach:	69.6%				
Frequency:	8.1x				

Radio Added Value: $1,000 in Added Value

OUTDOOR SUMMARY

Grand Rapids Four Week Summary (weighted to Kent County) PLANNED

Type of Ad Unit	# of Faces	Net Cost
Bulletin	15	$36,000

Grand Rapids Four Week Summary (weighted to Kent County) PLACED

Type of Ad Unit	# of Faces	Net Cost
Bulletin	16	$33,350

Includes a board in Ottawa County on eastbound I-96 (facing west) as well as a board positioned on westbound I-96 entering into Ottawa County (facing east).

Note: Costs include production of vinyl

dba CHANNELS

Appendix I: Television News Stories

Wave One

Date	Outlet	Television Market	Title	Local Ad Value	Local Viewership
10/7/2013 5:06	WZZM-GR (ABC)	Grand Rapids	WZZM 13 Morning News @ 5am	$67.07	2,919
10/7/2013 6:04	WZZM-GR (ABC)	Grand Rapids	WZZM 13 Morning News @ 6am	$648.21	26,929
10/7/2013 12:04	WOOD-GR (NBC)	Grand Rapids	News 8 at Noon	$1,347.50	45,965
10/7/2013 12:09	WZZM-GR (ABC)	Grand Rapids	WZZM 13 News	$1,329.13	43,171
10/7/2013 17:09	WXMI-GR (FOX)	Grand Rapids	Fox 17 News at 5:00pm	$534.72	20,831
10/7/2013 17:44	WOOD-GR (NBC)	Grand Rapids	News 8 at 5:30	$2,312.96	88,979
10/7/2013 18:19	WXMI-GR (FOX)	Grand Rapids	Fox 17 News at 6:00pm	$1,570.79	35,782
10/7/2013 22:09	WXMI-GR (FOX)	Grand Rapids	Fox 17 News at 10:00pm	$4,881.52	68,568
10/8/2013 5:32	WXMI-GR (FOX)	Grand Rapids	Fox 17 Morning News	$249.90	6,074
10/8/2013 6:35	WXMI-GR (FOX)	Grand Rapids	Fox 17 Morning News	$302.43	9,080
10/8/2013 7:33	WXMI-GR (FOX)	Grand Rapids	Fox 17 Morning News	$506.69	14,050
TOTAL				$13,750.91	362,348

Wave Two

Date	Outlet	Television Market	Title	Local Ad Value	Local Viewership
11/2/2013 6:43	WOOD-GR (NBC)	Grand Rapids	News 8 Daybreak Saturday Early Edition	$686.46	26,143
11/2/2013 7:44	WOOD-GR (NBC)	Grand Rapids	News 8 Daybreak Saturday	$872.61	29,619
11/2/2013 19:11	WZZM-GR (ABC)	Grand Rapids	WZZM 13 News @ 7pm	$335.12	9,048
11/2/2013 21:08	WXMI-GR (FOX)	Grand Rapids	College Football	$723.70	8,543

Date	Outlet	Television Market	Title	Local Ad Value	Local Viewership
11/2/2013 23:45	WZZM-GR (ABC)	Grand Rapids	WZZM 13 News @ 11pm	$555.10	9,285
11/3/2013 5:36	WXMI-GR (FOX)	Grand Rapids	Fox 17 Morning News	$238.43	4,889
11/3/2013 6:35	WXMI-GR (FOX)	Grand Rapids	Fox 17 Morning News	$243.53	7,935
11/3/2013 7:33	WXMI-GR (FOX)	Grand Rapids	Fox 17 Morning News	$388.37	10,556
11/3/2013 7:33	WZZM-GR (ABC)	Grand Rapids	WZZM 13 Sunday Morning News @ 6am	$563.55	21,660
11/3/2013 8:34	WXMI-GR (FOX)	Grand Rapids	Fox 17 Morning News	$355.47	12,248
11/4/2013 5:36	WXMI-GR (FOX)	Grand Rapids	Fox 17 Morning News	$249.90	5,539
11/4/2013 6:36	WXMI-GR (FOX)	Grand Rapids	Fox 17 Morning News	$302.43	9,407
11/4/2013 7:36	WXMI-GR (FOX)	Grand Rapids	Fox 17 Morning News	$323.34	10,057
11/4/2013 8:35	WXMI-GR (FOX)	Grand Rapids	Fox 17 Morning News	$521.99	15,365
TOTAL				$6,359.97	180,294

Wave Three

Date	Outlet	Television Market	Title	Local Ad Value	Local Viewership
12/2/2013 17:36	WWMT-GR (CBS)	Grand Rapids	News channel 3 Live at 5:30pm	$1,466.56	39,233
12/5/2013 17:39	WZZM-GR (ABC)	Grand Rapids	WZZM 13 News @ 530pm	$1,424.00	36,734
Total				$2.890.56	75,967

Post-program

Date	Outlet	Television Market	Title	Local Ad Value	Local Viewership
1/30/2014 17:45	WZZM-GR (ABC)	Grand Rapids	WZZM 13 News @ 530pm	$1,077.76	41,288
1/30/2014 18:32	WXMI-GR (FOX)	Grand Rapids	Fox 17 News at 6:00pm	$978.75	34,034
Total				$2,056.51	75,322

Wave One Television News Stories Summaries

"New Campaign Urges Drivers to Leave More Room for Trucks" WWZM13 (2:16 minutes)

WZZM13's story on TACT included a ride-along with a truck driver who had spent close to 30 years driving large trucks. The truck driver commented on how drivers have become more aggressive over the years. The video also featured footage of OHSP's director stating that about 70 percent of all truck crashes in Michigan involved a passenger vehicle, and a representative from the Michigan Trucking Association explaining that with 80,000 pounds on the back of his truck, it take at least 3 times the distance to stop as a car. The video also told viewers of the particular aggressive driving behaviors around large trucks that were going to be targeted, and that light-vehicle drivers would be advised to leave one car length for every 10 miles per hour of speed. The video also reported that violations by truck drivers would be enforced.

"TACT Program Launches New Campaign" WOOD TV 8 (2:08 minutes)

Also, on October 7, WOOD TV ran a second news story telling viewers that law enforcement would be writing tickets for unsafe driving around large trucks. The story explained the goal of the TACT program, when officers would be enforcing the program (Monday-Friday 6am-8pm) and some of the specific infractions they would be looking for on the highway. The story included an interview with a truck driver who identified a car that was too close to the back of his truck. The reporter noted that police will be watching truck drivers as well.

"Protecting You on the Roads" FOX 17 (2:37 minutes)

This news story ran on October 7. The story featured a ride-along with an experienced truck driver. The story discussed new technology including electronic mirrors and a warning system that alerts the truck driver if the truck crosses white fog lines or is too close to the vehicle ahead. The story emphasized that the goal of the TACT program was not just to give citations but to educate drivers about safe driving around large trucks.

"Police Agencies Kick Off New Highway Enforcement Effort" WZZM 13 (:48 second)

This video aired during the noon news report on October 7. The TACT program's goal of reducing crashes, injuries, and deaths involving truck on local highways was highlighted. The story also mentioned the 10 percent increase in truck-involved fatalities in 2012 and pointed out that passenger vehicle drivers do not realize how much stopping distance a truck needs. The dates of TACT enforcement were also provided.

Wave Three Television News Stories Summaries

"Police Target Aggressive Drivers" (WZZM13, 2:31 minutes)

This December 5, 2013 news video informed viewers that six police agencies would be ticketing aggressive drivers, stating that "if you had a lead foot or like to tailgate, police are watching." The video reported that since October over 2,000 tickets were handed out on US-131 and Interstate 196. Featured in the news story was an interview with a Michigan State Police trooper who issued about 100 of those tickets. The reporter rode along with the trooper as he made a stop for improper lane usage. The video also reported that local agencies received $300,000 in state and federal funds to run the 10-week

program. Grand Rapids Police Department issued more than 400 tickets along 131, mostly for speeding. The trooper explained that tailgating is one of the leading causes of traffic crashes on the freeway and recommended to drivers that they be more patient on the roads.

Post-program Television News Stories Summary

“Police Target 25-Hundred Drivers in TACT Program” (WZZM13, 0:23 minutes)

This story ran on January 30, 2014 as a brief update of the TACT program. The story detailed the results of the program. The segment concluded stating it was the first time the TACT program ran in Michigan.

Appendix J: Structured Interview Questions

Police Departments/Posts:

_____

Date/Location:

_____

Introduction: Thanks again for taking the time to talk with us about your participation in the TACT Program. I'm Lisa Molnar and this is Lidia Kostyniuk and Nicole Zanier – we're from the University of Michigan. Lidia's going to tell you briefly about what our role in TACT is.

We are interested in hearing about your participation in the TACT program and your thoughts and opinions about what worked well, what didn't work well, and what lessons we can take away for the future.

1. To start our conversation, it would be helpful to hear about how you were recruited to participate in the program. Could you describe that process for us? Do you know how your agency got involved?

2. Did your agency participate in all three waves of the program – October, November, and December? If not, do you know why not? Did you coordinate with other agencies and if so, how did that occur?

3. Did you receive any specific training for the program? If so, could you tell us about the training that you went through?

4. What enforcement tactics did you use as part of the program? For example, did you do your enforcement in marked or unmarked cars or both? Did you rely on stationary patrols, moving patrols or some combination? Did you focus on just drivers of passenger cars or both passenger cars and the trucks themselves?

5. Were the enforcement tactics you used for the program different from the ones you normally use?

6. What enforcement tactics worked especially well for carrying out the TACT Program?

7. What tactics did not work out so well? And what were the biggest challenges you faced in carrying out the program?

8. What were the driving violations that you generally saw the most? And what were the violations that you were most likely to pull drivers over for? Were these different from what you normally write up?

9. Did the people you pulled over seem to know about the program?

10. How effective do you think the program was in getting cars and trucks to drive more safely around each other – both during the program period itself and now that the program is over?

11. If you were going to participate in this program again, what changes would you like to see? And on a similar note, what advice would you give to police departments thinking about participating in a TACT Program?

12. Do you have other comments about the program you would like to share with us?

Appendix K: Motorist Survey Instrument

5950 TACT Program Survey
Abt SRBI
August 27, 2013
V1-3

2013 Survey for Assessing the Effectiveness of the Ticketing Aggressive Cars and Trucks (TACT) Program

Introduction (Cell Phone Screener)

Sample read in:
Region [1= Western Michigan, 2= Southeastern Michigan]

CELL SAMPLE
SC1. Hello, my name is _____ from Abt SRBI. I'm calling on behalf of the University of Michigan Transportation Research Institute as part of a highway safety study in Michigan. This survey is for research purposes only; we are not trying to sell anything.

Are you currently driving?

1 Yes	**SKIP TO SCR2**
2 No	
9 Refused	**SKIP TO SCR2**

SC2. Are you in a safe place to talk right now?

1 Yes	
2 No, call me later	**SKIP TO SCR2**
3 No, CB on land-line	**RECORD NUMBER**
9 Refused	**SKIP TO SCR2**

LANDLINE AND CELL SAMPLE
SI1. **[CELL SAMPLE:** As I mentioned,] My name is _____ from Abt SRBI. I'm calling on behalf of University of Michigan Transportation Research Institute as part of a highway safety study in Michigan. This survey is for research purposes only; we are not trying to sell anything.
This survey will take about 10 minutes of your time.

Screener

First, I need to ask you a few questions to confirm that you are eligible to participate in the study.

S1. Are you 18 years old or older?

1 Yes
2 No **SKIP TO SCR1**
8 (VOL) Don't Know **SKIP TO SCR1**
9 (VOL) Refused **SKIP TO SCR1**

S2. In the past three months, have you driven along any part of the following SECTIONS of freeway in <REGION> in a passenger vehicle (sedan, pick-up truck, SUV, and van/minivan)?
IF Region=1, CONTINUE, ELSE SKIP TO S5

S3. US-131 about 15 miles to the north and south of Grand Rapids, from 10 Mile Rd. in Rockford to 100th St. in Byron Center

1 Yes
2 No **SKIP TO S4**
8 (VOL) Don't know **SKIP TO S4**
9 (VOL) Refused **SKIP TO S4**

S3a. During the last three months, on average, how many days per week have you driven along this section of freeway?
READ LIST

1 Less than one day a week
2 1 day a week
3 2 days a week
4 3 days a week
5 4 days a week
6 5 days a week
7 6 days a week
8 7 days a week
98 (VOL) Don't know
99 (VOL) Refused

IF S3a=98, ASK S3b, ELSE SKIP TO S4
S3b. Do you drive on this section of freeway at least one day a week?

1 Yes
2 No
8 (VOL) Don't know
9 (VOL) Refused

S4. I-196 between Grand Rapids and Holland

1 Yes
2 No **SKIP TO SCR1 IF S3=2, 8, or 9 OR IF S3a=1 or 99 OR IF S3b>1**
8 (VOL) Don't know **SKIP TO SCR1 IF S3=2, 8, or 9 OR IF S3a=1 or 99 OR IF S3b>1**
9 (VOL) Refused **SKIP TO SCR1 IF S3=2, 8, or 9 OR IF S3a=1 or 99 OR IF S3b>1**

S4a. During the last three months, on average, how many days per week have you driven along this section of freeway?

READ LIST

1 Less than one day a week	**SKIP TO SCR1 IF S3=2, 8, or 9 OR IF S3a=1 or 99 OR IF S3b>1**
2 1 day a week	
3 2 days a week	
4 3 days a week	
5 4 days a week	
6 5 days a week	
7 6 days a week	
8 7 days a week	
98 (VOL) Don't know	
99 (VOL) Refused	**SKIP TO SCR1 IF S3=2, 8, or 9 OR IF S3a=1 or 99 OR IF S3b>1**

IF S4a=98, ASK S4b, ELSE SKIP TO S7

S4b. Do you drive on this section of freeway at least one day a week?

1 Yes	
2 No	**SKIP TO SCR1 IF S3=2, 8, or 9 OR IF S3a=1 or 99 OR IF S3b>1**
8 (VOL) Don't know	**SKIP TO SCR1 IF S3=2, 8, or 9 OR IF S3a=1 or 99 OR IF S3b>1**
9 (VOL) Refused	**SKIP TO SCR1 IF S3=2, 8, or 9 OR IF S3a=1 or 99 OR IF S3b>1**

IF Region=2, ASK S5, ELSE SKIP TO S7

S5. I-94 from the city of Jackson to Zeeb Rd. in Ann Arbor and/or M-14 from Zeeb Road to Plymouth Rd.

1 Yes	
2 No	**SKIP TO S6**
8 (VOL) Don't know	**SKIP TO S6**
9 (VOL) Refused	**SKIP TO S6**

S5a. During the last three months, on average, how many days per week have you driven along this section of freeway?

READ LIST

1 Less than one day a week
2 1 day a week
3 2 days a week
4 3 days a week
5 4 days a week
6 5 days a week
7 6 days a week
8 7 days a week
98 (VOL) Don't know
99 (VOL) Refused

IF S5a=98, ASK S5b, ELSE SKIP TO S6

S5b. Do you drive on this section of freeway at least one day a week?

1 Yes
2 No
8 (VOL) Don't know
9 (VOL) Refused

S6. I-75 from M-10 (the Lodge) to Huron River Dr. in Rockwood

1 Yes
2 No **SKIP TO SCR1 IF S5=2, 8, or 9 OR IF S5a=1 or 99 OR IF S5b>1**
8 (VOL) Don't know **SKIP TO SCR1 IF S5=2, 8, or 9 OR IF S5a=1 or 99 OR IF S5b>1**
9 (VOL) Refused **SKIP TO SCR1 IF S5=2, 8, or 9 OR IF S5a=1 or 99 OR IF S5b>1**

S6a. During the last three months, on average, how many days per week have you driven along this section of freeway?

READ LIST

1 Less than one day a week **SKIP TO SCR1 IF S5=2, 8, or 9 OR IF S5a=1or 99 OR IF S5b>1**
2 1 day a week
3 2 days a week
4 3 days a week
5 4 days a week
6 5 days a week
7 6 days a week
8 7 days a week
98 (VOL) Don't know
99 (VOL) Refused **SKIP TO SCR1 IF S5=2, 8, or 9 OR IF S5a=1or 99 OR IF S5b>1**

IF S6a=98, ASK S6b, ELSE SKIP TO S7

S6b. Do you drive on this section of freeway at least one day a week?

1 Yes
2 No **SKIP TO SCR1 IF S5=2, 8, or 9 OR IF S5a=1or 99 OR IF S5b>1**
8 (VOL) Don't know **SKIP TO SCR1 IF S5=2, 8, or 9 OR IF S5a=1or 99 OR IF S5b>1**
9 (VOL) Refused **SKIP TO SCR1 IF S5=2, 8, or 9 OR IF S5a=1or 99 OR IF S5b>1**

S7. Record gender from observation (Ask only if necessary)

1 Male
2 Female

S8. What's your zip code?

1 Gave zip code
8 Don't know
9 Refused

S8a. ENTER 5 Digit Zip Code:

Range: 00000-99997
99998 (VOL) Don't Know
99999 (VOL) Refused

SI. Before we begin, I would like to assure you that your responses will be treated confidentially and that your participation is completely voluntary. Is now a good time to complete the interview, or should we schedule another time?

1 Yes	
2 Not a good time	**SCHEDULE CALLBACK**
8 (VOL) Don't know	**SCHEDULE CALLBACK**
9 (VOL) Refused	**SKIP TO SCR1**

SI1. If we come to any question that you do not want to answer, just let me know and we will go on to the next question.

Passenger vehicle and truck behavior on road

Throughout this survey, when I use the word truck, I am referring to a large commercial truck such as a single unit truck, tractor trailer, semi-trailer, car-hauler, tanker, dump truck, double-bottom truck, or other large truck. I am **NOT** talking about pickup trucks.
The first several questions have to do with how you drive near other cars and trucks when you are driving a passenger vehicle.

1a. How often do you use your turn signals when passing another car on the road?
READ LIST.

1 Always
2 Most of the time
3 Some of the time
4 Rarely
5 Never
8 (VOL) Don't know
9 (VOL) Refused

1b. How often do you use your turn signals when passing a truck?
READ LIST.

1 Always
2 Most of the time
3 Some of the time
4 Rarely
5 Never
8 (VOL) Don't know
9 (VOL) Refused

2. When PASSING ANOTHER CAR on the freeway, how do you decide that is safe to pull back in front of the car? **DO NOT READ LIST. MULTIPLE RECORD.**

1 When I see the car in my side view mirror	**SKIP TO Q3**
2 When I see the car in my rear view mirror	**SKIP TO Q3**
3 When I am a number of car lengths in front of the car	
4 When I am a number of feet ahead of the car that I am passing	
5 When the car behind me honks the horn	**SKIP TO Q3**
6 After I turn my head to see if I am past the car	**SKIP TO Q3**
7 Other, Specify	**SKIP TO Q3**
8 (VOL) Don't know	**SKIP TO Q3**
9 (VOL) Refused	**SKIP TO Q3**

IF Q2=3, ASK Q2a
2a. How many car lengths?

RANGE 1-97
98 (VOL) Don't know
99 (VOL) Refused

IF Q2=4, ASK Q2b

2b. How many feet?

RANGE 1-997
998 (VOL) Don't know
999 (VOL) Refused

3. When PASSING A TRUCK on the freeway, how do you decide that it is safe to pull back in front of the truck?

DO NOT READ LIST. MULTIPLE RECORD.

1 When I see the truck in my side view mirror	**SKIP TO Q4**
2 When I see the truck in my rear view mirror	**SKIP TO Q4**
3 When I am a number of car lengths in front of the truck	
4 When I am a number of feet ahead of the truck that I am passing	
5 When the truck behind me flashes its lights	**SKIP TO Q4**
6 After I turn my head to see if I am past the truck	**SKIP TO Q4**
7 Other, Specify	**SKIP TO Q4**
8 (VOL) Don't know	**SKIP TO Q4**
9 (VOL) Refused	**SKIP TO Q4**

IF Q3=3, ASK Q3a

3a. How many car lengths?

RANGE 1-97
98 (VOL) Don't know
99 (VOL) Refused

IFQ3=4, ASK Q3a

3b. How many feet?

RANGE 1-997
998 (VOL) Don't know
999 (VOL) Refused

4. When FOLLOWING another car on the freeway at freeway speeds, how many feet or car lengths do you leave between your car and the car ahead of you? Please answer in either feet or car lengths but not both.

READ IF NECESSARY: Freeway speed is driving at 65 mph or 70 mph or more.

1 Gave response in feet	**SKIP TO Q4a**
2 Gave response in car lengths	**SKIP TO Q4b**
3 Gave responses in seconds	**SKIP TO Q4c**
8 (VOL) Don't know	**SKIP TO Q5**
9 (VOL) Refused	**SKIP TO Q5**

4a. ENTER Number of Feet

RANGE 1-997
998 (VOL) Don't know
999 (VOL) Refused

4b. ENTER Car lengths

RANGE 1-97
98 (VOL) Don't know
99 (VOL) Refused

4c. ENTER Seconds
RANGE 1-97
98 (VOL) Don't know
99 (VOL) Refused

5. What about when you are following a truck?

1 Gave response in feet	**SKIP TO Q5a**
2 Gave response in car lengths	**SKIP TO Q5b**
3 Gave responses in seconds	**SKIP TO Q5c**
8 (VOL) Don't know	**SKIP TO Q6**
9 (VOL) Refused	**SKIP TO Q6**

5a. ENTER Number of Feet
RANGE 1-997
998 (VOL) Don't know
999 (VOL) Refused

5b. ENTER Car lengths
RANGE 1-97
98 (VOL) Don't know
99 (VOL) Refused

5c. ENTER Seconds
RANGE 1-97
98 (VOL) Don't know
99 (VOL) Refused

6. In general, which of the following best describes how you merge into freeway traffic when there is a truck in the lane you are merging into?
READ LIST.
1 You adjust your speed in order to pull in ahead or behind the truck
2 You stop on the ramp and wait for enough space to pull in
3 You rely on the truck to pull over into the next lane
4 You rely on the truck to adjust its speed to let you in
8 (VOL) You are not sure
9 (VOL) Refused

Driving Actions

The following questions ask about your observations of car and truck driving actions and your opinions about their safety.

7a. Thinking in general about crashes BETWEEN trucks and cars on the freeway – how likely is <READ ITEM> to be a contributing factor?
On a scale from 1-5 with 1 being Very Unlikely and 5 being Very Likely

READ A – M. ROTATE

7b. How often do you see this occur when you are on the freeway?
On a scale from 1-5 with 1 being Never and 5 being Always

A A passenger car speeding near a truck
B A truck speeding near a passenger car
C A passenger car tailgating a truck
D A truck tailgating a passenger car
E A passenger car improperly passing a truck – that is cutting off the truck being passed
F Improper passing by a truck – that is cutting in and out of the lanes
G Inappropriate merging onto a freeway by a passenger car near a truck
H Inappropriate merging onto a freeway by a truck near a passenger car
I Distracted driving by the passenger car driver
J Distracted driving by the truck driver
K Passenger car staying in truck's blind spot

RANGE: 1-5
98 (VOL) Don't Know
99 (VOL) Refused

8. On a scale from 1-5 with 1 being Very Unlikely and 5 being Very Likely, how likely is it that a passenger car driving unsafely around a truck will get stopped by the police?

RANGE: 1-5
98 (VOL) Don't Know
99 (VOL) Refused

9. On a scale from 1-5 with 1 being Very Unlikely and 5 being Very Likely, how likely is it that a truck driving unsafely around a passenger car will get stopped by the police?

RANGE: 1-5
98 (VOL) Don't Know
99 (VOL) Refused

10. In the last three months, have you heard or seen any public safety messages about how cars and trucks can drive more safely around each other in the following formats?
READ LIST. MULTIPLE RECORD.

1 Newspaper
2 Radio
3 TV
4 Changeable message signs on freeway
5 Brochure
6 Police
7 Billboard
8 Poster
9 Banner
10 Truck wrap
11 Public media event
12 Something else
13 None
98 (VOL) Don't know
99 (VOL) Refused

11. In the past three months, did you hear or see any of these specific slogans?
READ LIST. MULTIPLE RECORD.

1 Share the Road
2 Click It or Ticket
3 Leave More Space
4 Over the Limit, Under Arrest
5 Drive Now, Text Later
6 None
8 (VOL) Don't know
9 (VOL) Refused

12. Thinking about crashes between cars and trucks, who do you think in general is more responsible for the crash?
READ LIST.

1 Always the truck
2 Mostly the truck
3 Equally responsible
4 Mostly the car
5 Always the car
8 (VOL) Don't know
9 (VOL) Refused

Demographics

The final set of questions is for statistical purposes.

D1. Have you ever held a Commercial Drivers License (Class A or B CDL)?

1 Yes
2 No
8 (VOL) Don't know
9 (VOL) Refused

D2. Have you ever driven a large truck as part of your job?

1 Yes
2 No
8 (VOL) Don't know
9 (VOL) Refused

D3. About how many miles did you drive last year in any motor vehicle?
READ LIST

1 Less than 5,000
2 5,000 to 10,000
3 10,001 to 15,000
4 15,001-20,000
5 More than 20,000
8 (VOL) Don't know
9 (VOL) Refused

D4. What type of vehicle do you drive most often?
READ LIST

1 Passenger car
2 Pickup truck
3 Sport utility vehicle
4 Mini-van
5 Full-van
6 Medium sized truck (10,000-26,000 lbs)
7 Large truck (greater than 26,000 lbs)
8 Other (specify)
98 (VOL) Don't know
99 (VOL) Refused

D5. What is your age?

ENTER AGE: _____
RANGE: 18 to 97
97=97 or older
98 Don't know
99 Refused

If DK or REF in D5 Continue, ELSE SKIP TO D6

D5a. Please stop me when I reach the category that includes your age?
READ LIST.

1 18 to 25
2 26 to 40
3 41 to 55
4 56 to 70
5 71 or older
8 (VOL) Don't know
9 (VOL) Refused

D6. What is your race?
READ LIST AND MULTIPLE RECORD

1 White
2 Black/African American
3 American Indian/Alaska Native
4 Asian
5 Native Hawaiian or Other Pacific Islander
6 (VOL) Hispanic
7 Other (Specify)
8 (VOL) Don't know
9 (VOL) Refused

D7. Which of the following income categories best describes your TOTAL HOUSEHOLD INCOME in 2012 before taxes? **READ LIST**

1 Under $25,000
2 $25,000 to under $50,000
3 $50,000 to under $75,000
4 $75,000 to under 100,000
5 Over 100,000
8 (VOL) Don't know
9 (VOL) Refused

D8. What is the last grade of school you completed?
READ LIST

1 Grade school or less
2 Some high school
3 Graduated high school
4 Vocational or technical school
5 Some college (including completing an associate degree)
6 Completed undergraduate degree
7 Completed graduate degree
8 (VOL) Don't know
9 (VOL) Refused

READ: That completes the survey. Thank you very much for your time and cooperation.

SCR1. I am sorry but you are not eligible to participate in the survey today. Thank you for your cooperation and I hope you have a pleasant evening.

SCR2. Thank you, we will call back at a later time.

Appendix L: Truck Driver Survey Instrument

This short questionnaire is part of a highway safety study being conducted by the University of Michigan Transportation Research Institute. We are interested in your thoughts and opinions. This survey is for research purposes only. Your responses will be treated confidentially and your participation is completely voluntary. Thank you for your help and contribution to our research.

ID = number, company number code

Q1. Is driving a truck your primary job? YES (1) NO(0)

Q2. How long have you been a truck driver? _____ years _____ months converted to years with decimal

q3. What type of truck do you normally drive?

A Straight truck
B Tractor – 1 trailer
C Tractor – 2 or 3 railer
☐ D Straight truck + trailer
☐ Other _____

4. About how many miles did you drive a truck last year? _____ miles number

5. In the past three months, have you driven along any part of the following SECTIONS of freeway in a truck?

		About how many days per week? Circle one.
q5a US-131 about 15 miles to the north and south of Grand Rapids, from 10 Mile Rd. in Rockford to 100th St. in Byron	☐ 1 YES →	Less than q5a1 1 1 2 3 4 5 6
	☐ 0 NO	
q5b I-196 between Grand Rapids and	☐ YES →	q5b1 Less than 1 1 2 3 4 5 6
	☐ NO	
q5c I-94 from the city of Jackson to Zeeb Rd. in Ann Arbor and/or M-14 from Zeeb Rd. to Plymouth Rd.	☐ YES →	q5c1Less than 1 1 2 3 4 5 6
	☐ NO	
q5d I-75 from M-10 (the Lodge) to Huron River Dr. in Rockwood	☐ YES	q5d1 Less than 1 1 2 3 4 5 6
	☐ NO	

q6. Thinking about the times when a car passed you on the freeway and pulled back in front of you:

	Never				Always
q6aHow often did they use their turn signals?	1	2	3	4	5
q6bHow often did you consider the car's actions to be unsafe?	1	2	3	4	5

1

q7. Thinking about the times when you are in the right lane and a car is merging onto the freeway, how often does the car:

	Never				Always
Adjust its speed in order to pull in ahead or behind you q7a	1	2	3	4	5
Stop on the ramp and wait for you to go by before pulling into the lane7b	1	2	3	4	5
Rely on you to pull over into the next laneq7c	1	2	3	4	5
Rely on you to adjust your speed to let them inq7d	1	2	3	4	5

q8. Thinking in general about crashes BETWEEN trucks and cars – how likely is each of the following driving actions to be a contributing factor?

	Very Unlikely				Very Likely
Q8a A car speeding near a truck q8a	1	2	3	4	5
Q8b A truck speeding near a car	1	2	3	4	5
Q8c A car tailgating a truck	1	2	3	4	5
Q8d A truck tailgating a car	1	2	3	4	5
Q8e A car improperly passing a truck – that is cutting off the truck being passed	1	2	3	4	5
Q8f Improper passing by a truck – that is cutting in and out of the lanes	1	2	3	4	5
Q8g Inappropriate merging onto a freeway by a car near a truck	1	2	3	4	5
Q8h Inappropriate merging onto a freeway by a truck near a car	1	2	3	4	5
Q8i Distracted driving by the car driver	1	2	3	4	5
Q8j Distracted driving by the truck driver	1	2	3	4	5
Q8k Car staying in truck's blind spot	1	2	3	4	5
Q8Al car failing to yield the right of way	1	2	3	4	5
Q8Am truck failing to yield the right of way	1	2	3	4	5

9. How often do you see these driving actions when you are on the road?

	Never				Always
Q9a A car speeding near a truck	1	2	3	4	5
Q9b A truck speeding near a car	1	2	3	4	5
Q9c A car tailgating a truck	1	2	3	4	5
Q9d A truck tailgating a car	1	2	3	4	5
Q9e A car improperly passing a truck – that is cutting off the truck being passed	1	2	3	4	5
Q9f Improper passing by a truck – that is cutting in and out of the lanes	1	2	3	4	5
Q9g Inappropriate merging onto a freeway by a car near a truck	1	2	3	4	5
Q9h Inappropriate merging onto a freeway by a truck near a car	1	2	3	4	5
Q9I Distracted driving by the car driver	1	2	3	4	5
Q9j Distracted driving by the truck driver	1	2	3	4	5
Q9k Car staying in truck's blind spot	1	2	3	4	5
Q9l A car failing to yield the right of way	1	2	3	4	5
Q9m A truck failing to yield the right of way	1	2	3	4	5

10. Are there other types of unsafe actions between cars and trucks do you see on the freeway? If yes, please describe and tell us how often you see these actions.

	Never				Always
Q10a various codes see other document Q10c	1	2	3	4	5
	1	2	3	4	5
	1	2	3	4	5

11. How likely is it that:

	Very Unlikely				Very Likely
Q11a A car driving unsafely around a truck will get stopped by the police?	1	2	3	4	5
Q11b A truck driving unsafely around a car will get stopped by the police?	1	2	3	4	5

12. In the last three months, have you heard or seen any public safety messages about how cars and trucks can drive more safely around each other in the following formats? Check all that apply.

- ☐ Q12a Newspaper (1,0)
- ☐ Q12b Radio
- ☐ Q12c TV
- ☐ D Changeable message signs on freeway
- ☐ E Brochure
- ☐ F Police
- ☐ G Billboard
- ☐ H Poster
- ☐ I Banner
- ☐ J Truck wrap
- ☐ K Public media event

13. In the past three months, did you hear or see any of these specific slogans? Check all that apply.

- ☐ Q13a Share the Road (1,0)
- ☐ B Click It or Ticket
- ☐ C Leave More Space
- ☐ D Over the Limit, Under Arrest
- ☐ E Drive Now, Text Later

q14. Thinking about crashes between cars and trucks, who do you think in general is more responsible for the crash?

- ☐ Almost always the truck 1
- ☐ More often the truck 2
- ☐ Equally responsible 3
- ☐ More often the car 4
- ☐ Almost always the car 5

q15. What is your age? _____ years

q16. What is your sex? Male 1 Female 2

q17. What is your race?

- ☐ White 1
- ☐ Black/African American 2
- ☐ American Indian/Alaska Native 3
- ☐ Asian 4
- ☐ Native Hawaiian or Other Pacific Islander 5
- ☐ Other 6

q 18. Which of the following income categories best describes your TOTAL HOUSEHOLD INCOME in 2012 before taxes?

- ☐ 1Under $25,000
- ☐ 2 $25,000 to under $50,000
- ☐ 3 $50,000 to under $75,000
- ☐ 4 $75,000 to under 100,000
- ☐ 5 Over $100,000

q19. What is the last grade of school you completed?

- ☐ 1 Grade school or less
- ☐ 2 Some high school
- ☐ 3 Graduated high school
- ☐ 4 Vocational or technical school
- ☐ S Some college (including completing an associate degree)
- ☐ 6 Completed undergraduate degree
- ☐ 7 Completed graduate degree