



**2015 Michigan Commercial Motor Vehicle  
Educational Needs Assessment**

**Lidia P. Kostyniuk, Lisa J. Molnar,  
Jennifer S. Zakrajsek, Daniel Blower, Renée M. St. Louis**

**The University of Michigan Transportation Research Institute  
2901 Baxter Road  
Ann Arbor, MI 48109-2150**

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16. Abstract <p>This report assesses the extent to which the educational and training needs of commercial vehicle truck drivers in Michigan are met and identifies opportunities for improvements. The assessment was based on: an analysis of recent patterns of truck-involved crashes and violations of commercial vehicle operators in the state; a review of commercial driver license (CDL) training practices in the United States and Michigan; a statewide survey of truck drivers in Michigan; and interviews with safety managers of trucking firms in the state, and a representative of the Michigan State Police Commercial Vehicle Enforcement Division. Among the recommendations developed are: support standardized minimum requirements for CDL preparation; increase the number of commercial driver training programs in Michigan's community colleges; support standards for finishing programs for entry-level drivers; emphasize training in backing maneuvers, stopping, and skid control for entry-level drivers; increase outreach and encouragement to small carriers for continued driver training; increase trucking-industry awareness of the resources of the Michigan Center for Truck Safety; develop training programs for use of advanced technologies and telematics; and develop outreach and apprenticeship programs to introduce the trucking industry as a positive career choice for high school students.</p>					
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# **2015 Michigan Commercial Motor Vehicle Needs Assessment**

## **Executive summary**

The purpose of this study was to examine the extent to which the educational and training needs of the Michigan trucking industry are currently being met, identify gaps, and develop recommendations. The multidimensional approach undertaken in the study consisted of 1) an analysis of recent patterns of crashes and violations of commercial motor vehicle (CMV) operators in the state; 2) a review of training practices in the U.S. focusing on commercial driver license (CDL) training and available CDL/CMV driver training programs in Michigan; 3) a survey of a representative sample of truck drivers whose primary jobs required a CDL; and 4) interviews with safety managers of trucking firms in the state and a representative of the Commercial Vehicle Enforcement Division (CVED) of the Michigan State Police (MSP).

### **Analysis of Recent Crash and Violation Patterns**

CMV crash records from the Michigan Crash database for the years 2012-2014 were examined. Differences in driving performances between younger and older drivers were identified based on the different distributions of crash types in which each group was involved. Hazardous actions in a driver's crash record indicate contributions to the crash, and younger drivers were more likely than older drivers to have them in their crash records. Specific hazardous actions in which younger drivers were overrepresented were: failure to yield; improper backing; and unable to stop in an assured clear distance. This overrepresentation suggests that younger truck drivers might benefit from additional training on the specific driving behaviors associated with these hazardous actions.

The analysis of violation patterns was based on over 20,500 Level 1 inspections of Michigan-based carriers in the Motor Carrier Management Information System (MCMIS) data files for years 2013 and 2014. Overall, smaller carriers had more violations per inspection than the larger carriers. Vehicle-related violations were much more common than driver-related violations for all carrier types and sizes. The single most frequent driver-related category of violations had to do with the hours-of-service regulations, with log book violations being the most frequent. The most common vehicle-related violations were associated with brakes, lights, tires and wheels. Brake violations dominated, accounting for about half of all vehicle violations identified. A substantial proportion of inspections resulted in the vehicle being placed out-of-service (OOS), regardless of carrier size or type. OOS rates were highest for smaller carriers and declined with carrier size. The patterns of violations point to areas where training of drivers should be emphasized. For example, hours-of-service violations suggest that additional emphasis on log book record-keeping requirements and training in the newer technologies of electronic log books would be beneficial to drivers. Because brake system violations are the major area of vehicle violations, drivers should have adequate training to identify brakes that are out of adjustment.

## **CDL/CMV Training in the U.S. and Michigan**

Although no formal training is currently required before taking the CDL test, the Federal Highway Administration Model Curriculum and the Professional Truck Driver Institute (PTDI) Curriculum are considered to be the basis for training adequacy by the Federal Motor Carrier Safety Administration. A driver seeking formal training in the U.S. has several options: community college or technical vocational school programs; private truck driving schools; and schools operated by trucking companies. The length of CDL training programs varies by school type and can range from short refresher courses to programs that take from 1 week up to 6 months to complete.

Available CDL/CMV education programs in Michigan in the “Certified Truck Driver Education Provider List” from the Michigan Department of State’s Driver Education Section were examined. At the time of this study, 43 programs were listed. Almost all of the programs offered multiple course options. Most schools offered one to two multi-week, basic or standard courses and several also offered short, intensive, customized training sessions targeted to CDL exam preparation or refresher training. The most common class involved 160 hours of training. Among the schools offering basic/standard courses, 22 offered a 160-hour course, nine offered more extensive and longer courses, and four offered courses shorter than 160 hours. One program was certified by the PTDI, and four were associated with community colleges. Total costs for the 160-hour programs ranged from approximately \$4,000 to \$8,000. The 160-hour programs typically consisted of classroom, lab, range, and on the road driving. Three schools offered simulator training. The broad topics covered included: vehicle inspection; load securement; basic operating skills; basic control skills; backing maneuvers; on-the-road driving; shifting; and DOT hours-of-service rules. Instruction included a mixture of one-on-one training and independent practice.

Collectively, regardless of the venue, the level of driving proficiency and knowledge required to pass the CDL test is widely regarded as well below the level required to be a safe and reliable driver in a full-time operational setting.

## **Truck Driver Survey**

A statewide telephone survey of Michigan truck drivers was conducted and the results were representative of Michigan drivers, age 70 and younger, who drive trucks that require CDLs for their primary job.

Almost two-thirds of drivers had formal training in preparation for their CDL. Community college programs averaged 14 weeks compared to an average of 5 weeks at the commercial truck driving schools and other training settings. The average amount of on-the-road practice varied from 94 hours at community college programs to 46 hours at the commercial driving schools and 55 hours at the other training settings. Drivers who did not go through a structured CDL preparation program had an average of 75 hours of pre-CDL on-the-road practice. Overall, truck drivers reported feeling well-prepared for a job as a truck driver after obtaining their CDL. Finishing programs also served an important role in driver training.

However, only about one-third of drivers reported that every employer they worked for held a finishing program, and about one-quarter reported that none of the firms they worked for had such a program.

The survey also explored where and how drivers were trained in the skills needed to be safe and reliable drivers. CDL training was the most frequently reported training setting for recognizing and reacting to hazards and emergency situations, backing maneuvers, and pre- and post-trip inspections. The finishing program on the first job was the most frequent training setting for load securement. Although drivers received some of the training for hours-of-service requirements and log book record keeping during their CDL training, most of this training was at the finishing program on the first job, as well as safety meetings in the workplace. Training for stopping and skid control occurred during CDL training, initial finishing program, safety meetings, and at the Michigan Center for Truck Safety (MCTS). Vehicle control training occurred during CDL training and continued in finishing programs. Initial finishing training was the most frequent setting for route planning training. CDL training and safety meetings were the settings for fatigue management training. Most hazmat training happened at finishing programs and safety meetings at work. Overall, drivers reported feeling very confident about their abilities with each of these skills.

Over one-half of drivers reported having adaptive cruise control and systems for communication with dispatch on their vehicles. Approximately 30 to 40 percent had GPS navigation, electronic log devices, electronic stability control, and close to 10 percent reported having collision and lane departure warning systems. Drivers reported little formal training in the use of these systems. With the exception of electronic log books, the most frequent training method reported by drivers was "figured it out myself." In the case of the electronic log book, most received training during their CDL preparation and safety meetings, and 22 percent reported "figured it out by myself."

About 20 percent of drivers indicated interest in training on advanced technology systems and approximately 16 percent expressed interest in more training in avoiding jackknifing with many wanting skid pad training, driving in hazardous weather conditions, hazmat training, and defensive driving.

### **Interviews with Safety Managers and Representative of the CVED of MSP**

Three tasks of the project involved interviews of safety managers and the MSP CVED to gain their perspectives on issues surrounding the training of truck drivers in Michigan. In the first of these, the research team held two separate group discussions with representatives from the West and East Michigan Safety Councils. In the second, the research team conducted 30 structured interviews with safety managers from a random sample of Michigan carriers. In the third, the research team interviewed a high ranking member of the MSP CVED to gain the perspective of the enforcement community about driving problems and challenges among truck drivers on the road.

### ***East and West Safety Council Group Discussions***

One theme that emerged from the discussions was that training needs are being driven by changes in the trucking industry itself, including: driver shortages, particularly among experienced drivers due to high

turnover; increased reliance on telematics; increasing numbers of middle-age displaced workers from other industries; and young people dissatisfied with current occupations. Many of these industry trends have led to large numbers of novice truck drivers (i.e., inexperienced drivers just receiving their CDL license) coming into the industry. One clear area of agreement was that in general, novice truck drivers lack adequate training in part due to the lack of a standardized curriculum in CDL training programs. There was widespread agreement that finishing programs are important for novice truck drivers, but they are not standardized across carriers and they are generally not feasible for very small carriers. Mandatory safety meetings were viewed favorably as an option for continued training. However, several challenges of continuing training efforts were identified. First, experienced drivers must recognize that there are things they do not know. Next, training is often offered only after problems arise. Additionally, costs and time are significant barriers for drivers getting the training they need. Trainers must also be seen as credible and experienced by truck drivers and the training itself must be perceived as relevant. Collectively, it was clear that all of the challenges associated with training are amplified for small trucking firms and owner/operators, with the latter not likely to offer training at all.

### ***Statewide Safety Manager Phone Interviews***

The research team completed structured telephone interviews with a sample of 30 safety managers from Michigan trucking firms. The broad topic areas covered in the interviews included information about the firm/carrier, training needs of new hires, training provided to new hires, continuing training for all drivers, and training needs related to emerging vehicle technologies

Overall, the annual driver turnover rate within Michigan carriers ranged from 20 percent to 50 percent. Most carriers require 2-3 years of experience for new hires. Except for some small carriers, most of the carriers provided an orientation or finishing training for all new hires. Most of the new-hire training included a basic program that lasted 2 hours to 1 day which generally included a human resources orientation, presentation of company policies and procedures, and safety topics. All of the safety managers interviewed have regular safety meetings. Topics typically covered during safety meetings include: changes in policy/regulations; incidents/areas to improve; and good performance recognition. All of the safety managers reported that in-vehicle/skills training is usually need-based; that is, provided individually, based on performance reviews. Additional training is sometimes initiated by the carrier and sometimes by the carrier's insurance provider.

Close to two-thirds of the safety managers reported that they have not started implementing or training for emerging advanced technologies but plan to in the future. Those that started training for advanced technologies have relied on vendors to train their driver-trainers who then train the other drivers. The most commonly implemented technologies to date are GPS, electronic log devices, and driver monitoring. Most safety managers expressed concern about reluctance by older drivers to adopt new technologies.

MCTS programs and resources were known and viewed them favorably by all safety managers interviewed. However, most sent drivers only if the need was determined by performance records or if

drivers expressed an interest in completing the training. The most frequently expressed barrier to sending drivers was that most carriers run lean operations and cannot spare drivers to attend training. Finally, most safety managers expressed concern about the driver shortage. Almost one-half expressed a need for more to be done to present driving as a positive career option and to prepare individuals to be career drivers.

### ***Interview with Representative of MSP CVED***

A high-ranking representative of the MSP CVED made several observations about driver performance and industry practices during a telephone interview with members of the project team. One of the main problems the respondent identified was the failure of many truck drivers to slow down under inclement weather conditions such as snow and ice. He noted that large truck fleets tend to be the safest, with drivers being “a little more professional, better trained, and more likely to have their paper work in order.” He stated that one of the major barriers facing smaller carriers is the cost for drivers to attend training. Because of this, he recommended that efforts be made to do more outreach to these companies. He specifically mentioned the opportunity to provide smaller carriers with copies of the Truck Driver Guidebook; a resource that many companies are not even aware exists.

### **Recommendations**

As a context for understanding the findings of the study and organizing the recommendations, it is important to note that there are at least three phases in the training and education of truck drivers. The first phase leads to the acquisition of a CDL and preparation for a truck driving career. The second involves initial on-the-job training of entry-level drivers. The third phase covers continued training and knowledge updates over the course of a driver’s career. These are needed to hone and improve driving skills, to keep current on rules and regulations, and to learn about new technologies and advances and changes in the field. In addition, the need for training in new technologies and telematics cuts across all three phases, and should be addressed in each. Finally, there is a need to address the concerns of the trucking industry about driver shortage issues and that careers in trucking are not seen as desirable career paths by young people.

### ***CDL Training***

- Encourage and support CDL training programs in community colleges and technical schools to increase their numbers in the state of Michigan. A possible approach would be to promote commercial driver training as part of workforce development programs in Michigan’s community colleges.
- Support minimum training standards for training to obtain a CDL. This includes adoption of a standardized curriculum that goes beyond preparation for passing the CDL test, but also prepares the student for a career as a commercial vehicle driver.
- Advocate and support increased behind the wheel time for CDL students, as well as training in the use of new technologies and telematics. This could be part of the minimum training standards, or part of a standardized curriculum.

### ***Training of the Entry-level Driver***

- Support standardized training of entry-level drivers during finishing programs and in subsequent safety meetings to include not only driving skills, but also state and federal regulations.
- Emphasize training in backing maneuvers, stopping, and skid control for entry-level drivers.
- Provide more outreach and encouragement to smaller carriers to provide training for their young drivers. Publicize and encourage their participation in MCTS programs and resources.

### ***Continuing Training***

- Advocate for finishing programs for new hires at all carriers. These programs should include not only the basic human resource requirements and carrier policies and procedures, but also an assessment of driving and training if needed.
- Advocate for periodic safety meetings at all carriers. A possible approach for small carriers would be to hold joint meetings where common safety topics could be covered.
- Stress brake systems and tires in training on vehicle mechanical parts, so that drivers can identify problems before their vehicle is OOS in an inspection.
- Develop a program for teaching drivers how to use the new telematics and technologies. This program could be developed or coordinated by MCTS and aimed at drivers directly or by training trainers.
- Increase utilization of MCTS by making carriers more aware of the programs, website, and especially the simulator through marketing and publicity. Reaching out to small carriers would be especially important.
- Promote MCTS outreach to small carriers, making sure that they are aware of the resources available to them, as well as through the distribution of the MCTS Truck Driver's Guidebook.
- The loss of the skid pad facility for driver training in Michigan is very unfortunate. It was a valuable training resource and there are only a few such facilities available for truck driver training left in the U.S. Because of the high costs involved in running such a facility, other skid pads have been replaced by high-fidelity simulators. The economic feasibility of opening another facility in Michigan should be examined, and options based on the findings should be pursued.

### ***Addressing the Driver Shortage***

- There is need to examine the trucking industry in a broader societal context to identify what can be done to present driving as a positive career option and prepare individuals to be career drivers.
- Develop and support approaches to introduce the trucking industry as a career choice in high school and help institute outreach programs and apprenticeships for high school students to learn about the industry and consider it as a career choice.
- Review national efforts of the trucking industry aimed at driver shortage issues and identify and support those that are reasonable and beneficial for Michigan.

# 2015 Michigan Commercial Motor Vehicle Educational Needs Assessment

## 1. Introduction

The Michigan Truck Safety Commission (MTSC) serves as the trucking industry's advocate for addressing significant truck safety issues. Its mission includes improving truck safety by providing Michigan's trucking industry with effective educational programs. To this end, the MTSC sponsors educational and training programs for the trucking industry through a grant to the Michigan Center for Truck Safety (MCTS). MCTS programs are open to all truck drivers in the state. There are also other educational and training programs in the state including those offered by privately-owned commercial driving schools, public community colleges, and trucking companies that prepare drivers for professional truck driving careers. In addition, many trucking companies provide continued training for their drivers through "in-house" safety programs.

The overarching goal of these training and educational programs is to provide commercial motor vehicle (CMV) drivers with the skills and knowledge to drive safely under all conditions, thereby reducing the number of truck-related crashes, fatalities, and injuries. Although a recent evaluation of the MCTS training programs identified quantifiable safety benefits (Kostyniuk et al., 2013), it is not clear if collectively, the presently available programs are sufficient to meet the training needs of the trucking industry in Michigan. Accordingly, MTSC asked for an assessment of educational and training needs of the Michigan trucking industry, so that any gaps could be identified and addressed. The University of Michigan Transportation Research Institute (UMTRI) was selected to conduct this study.

## 2. Approach

The UMTRI research team used a multidimensional approach to assess the state of CMV driver training in Michigan. Because unusually high rates of particular crash types or violations can point to lack of knowledge or training for these situations, recent patterns of crashes and violations of CMV operators in the state were reviewed. To establish a reference point for CMV driver training in Michigan, the research team reviewed the literature on training practices in the United States (U.S.) focusing on Commercial Driver License (CDL) training. The research team next examined available CMV driver training programs in Michigan by contacting CDL training providers to ask about their CDL preparation programs and any other training offered. Next, the research team conducted a telephone survey of a representative random sample of professional truck drivers in Michigan about the training they received while preparing for their truck driving career, and any subsequent training.

Safety managers at trucking companies are responsible for monitoring driver performance and providing or arranging additional training as necessary. They have first-hand knowledge of how well drivers are prepared for truck driving careers and what type of updates and continued training are needed. The UMTRI team met with two groups of safety managers from the West and East Safety Councils of the

Michigan Trucking Association (MTA) to discuss their opinions, concerns, and thoughts about truck driver training in Michigan. Using the information gained from these meetings, the research team carried out structured telephone interviews with safety managers from a sample of trucking companies in the state. A representative of the Michigan State Police Commercial Vehicle Enforcement Division (MSP CVED) was also interviewed about truck driving problems and challenges from the perspective of law enforcement. Results of the component studies were integrated to develop a mapping of the state of CMV education and training in Michigan, identify gaps, and propose recommendations to address the gaps.

This report documents the research activities conducted in the assessment of CMV driver educational needs in the state of Michigan and is organized as follows. Results of the analysis of recent truck-related crashes and violations are reported in section 3. Findings from the review of the literature are in section 4, followed by the inventory of the CDL programs available in Michigan in section 5. Section 6 describes the statewide truck driver survey and presents the results. Section 7 summarizes the interviews with members of the West and East Safety Councils of the MTA. Section 8 reports on the structured interviews with safety managers from Michigan's trucking companies, and section 9 summarizes the interview with the representative of the MSP CVED. The overall findings and recommendations are presented in section 10. References are listed in section 11. The interview guides and survey questions used in this research can be found in the appendices.

### **3. CMV Crash and Violation Patterns**

The identification of crash patterns can be useful for discerning underlying problems in vehicle control under specific environmental circumstances. Similarly, the identification of violation patterns can lead to important insights about systemic problems in driver or vehicle conditions, some of which could be addressed with training. Thus, this study examined recent truck-involved crashes in Michigan and violations from inspection records of Michigan-based carriers to identify crash and violation patterns.

#### **3.1 Analysis of Crash Patterns**

CMV crash records from the Michigan Crash database for the years 2012-2014 were examined. Because the CMV classification includes buses, and the focus of the study is on truck driver training, crashes involving buses were excluded.<sup>1</sup> Truck-involved crashes were first examined by driver age. The selection of the age categories was guided by CDL age requirements. A person must be at least 21 years of age to obtain a CDL that allows interstate operation or the transport of hazardous materials. Drivers age 18-20 can receive a CDL with the restriction that allows operation of CMVs only within the state. Examination of the State of Michigan Driver License database showed that less than 1 percent of CDL drivers were age 18-20; 1.2 percent were age 21-25, 75 percent were age 26-60, and 23 percent were over 60 years of

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<sup>1</sup> In the Michigan crash data, the field "trk\_type\_cd" classifies vehicles by the type of CDL they require. To exclude buses, crashes involving CMV's requiring CDL with endorsement P (required for buses with seating for 16 or more) were excluded from the analysis file.

age. While every CDL holder is not necessarily a truck driver, this distribution provides a plausible estimate of the age distribution of truck drivers.

Table 1 shows the number and distribution of truck-involved crashes between 2012 and 2014 by driver age category, and also shows the number and distribution of active CDL drivers by the same age categories.

**Table 1. Number of truck crashes and CDL drivers by driver age**

Driver age (Years)	Truck-involved crashes (Percent)	Active CDL records (Percent)
16-20 <sup>2</sup>	201 (0.7)	434 (0.1)
21-25	1,274 (4.4)	6,228 (1.7)
26-60	23,435 (81.0)	271,012 (74.8)
61+	2,529 (8.7)	84,400 (23.3)
Unknown	1,492 (5.2)	---
Total	28,931 (100.0)	362,074 (100.0)

Overall, there were 28,931 CMV crashes involving trucks in Michigan from 2012 through 2014. The greatest proportion of crash-involvements (81 percent) was by truck drivers age 26-60. This is not surprising as this age group comprises 75 percent of CDL drivers. Drivers age 21 to 25 accounted for less than 2 percent of all CDL drivers and just over 4 percent of drivers in truck-crash involvements. Drivers over age 60 constituted 23 percent of CDL drivers and accounted for 9 percent of drivers in truck crashes. Less than 1 percent of CDL drivers were age 20 or younger, and they accounted for less than 1 percent of drivers in truck-crashes. Although the distribution of CDL drivers in the active driver license records is only an approximation of the age distribution of truck drivers, there appeared to be an overrepresentation in crash involvement of younger (age 21-25) truck drivers and an underrepresentation of the older truck drivers (age 61+) relative to their proportions in the CDL population.

Table 2 shows the distribution of truck crashes by severity and year. Overall, crashes involving trucks increased by 38 percent between 2012 and 2014. During that time, fatal crashes increased by 38 percent, injury crashes by 32 percent, and property damage only (PDO) by 39 percent. These increases can possibly be attributed (at least in part) to the increase in trucking activity brought about by a recovering economy.

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<sup>2</sup> Although age 18 is the minimum age for a CDL, drivers in some of the truck crashes were underage and driving illegally.

**Table 2. Truck crashes by severity, 2012-2014**

Crash severity	2012	2013	2014	Total
Fatal	67	92	92	251
Injury	1,489	1,711	1,970	5,170
PDO	6,606	7,697	9,207	23,510
Total	8,162	9,500	11,269	28,931

Table 3 shows the percent distribution of crash types by driver age group. The proportion of single-vehicle crashes did not vary much and accounted for about 17 to 18 percent of crashes for each age group. There appeared to be slight over-involvements in head-on and angle crashes for drivers age 21 to 25. Younger drivers also were involved in more rear-end crashes than older drivers. However, this group had a lower proportion of sideswipe, same direction crashes than the older drivers. It should be noted that the crash type variable does provide information about which driver in a multi-vehicle crash did the striking or was struck. Differences in the proportions of crash types suggest that there were differences in driving performance between the younger and older truck drivers.

**Table 3. Percent distribution of crash type by driver age**

Crash type	Driver age					Total
	16-20	21-25	26-60	61+	Unknown	
Single-vehicle	17.9	17.3	16.	17.7	6.3	16.2
Head on	0.5	2.7	2.0	2.2	1.5	2.0
Angle	16.9	14.3	12.7	13.6	6.6	12.5
Rear-end	35.3	27.4	24.3	22.5	20.0	24.1
Sideswipe, same direction	12.9	22.5	29.6	29.9	45.8	30.1
Sideswipe, opposite direction	2.5	3.5	3.7	3.3	4.3	3.7
Other/unknown	13.9	12.2	11.2	10.9	15.5	11.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

A more telling measure of differences in crash involvement may be the hazardous actions associated with a crash. A hazardous action code is entered in the crash record by the investigating police officer and captures his or her judgment of the actions that contributed to the crash. Table 4 shows the percent distribution of hazardous actions attributed to truck drivers in crashes by age of driver.

**Table 4. Percent distribution of hazardous action in truck crashes by driver age, 2012-2014**

Hazardous action	Driver age					Total
	16-20	21-25	26-60	61+	Unknown	
None	31.3	41.9	52.3	48.9	33.5	50.5
Speed too fast	4.5	5.6	5.4	5.0	0.3	5.1
Speed too slow	0.0	0.2	0.0	0.0	0.1	0.1
Failed to yield	10.9	6.0	5.3	6.4	2.8	5.4
Disregard traffic control	3.0	2.3	1.1	0.9	0.3	1.1
Drove wrong way	0.0	0.2	0.0	0.0	0.1	0.0
Drive left of center	0.5	0.5	0.4	0.5	0.7	0.5
Improper passing	0.0	0.9	0.4	0.8	0.9	0.5
Improper lane use	3.0	4.9	4.4	5.3	9.2	4.7
Improper turn	1.0	4.4	3.1	3.7	2.7	3.2
Improper/no signal	0.0	0.2	0.3	0.4	0.1	0.3
Improper backing	10.4	4.8	4.1	3.9	1.7	4.1
Unable to stop in assured clear distance	19.9	12.8	8.8	8.1	1.4	8.6
Reckless driving	0.0	0.1	0.1	0.1	0.2	0.1
Careless/negligent	2.5	3.6	2.2	2.6	2.3	2.3
Other	10.4	9.0	8.3	9.0	7.5	8.4
Unknown	2.5	2.7	3.6	4.4	36.0	5.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Younger drivers were more likely to have a hazardous action coded than older drivers. Among drivers age 21-25, 42 percent were not assigned a hazardous action in their crash, compared with 52 percent in the 26-60 age group. The hazardous actions *failure to yield*, *improper backing*, and *unable to stop in an assured clear distance* were over-represented for younger drivers. The hazardous action *unable to stop in assured clear distance* is an indication of following too closely and involvement in a rear-end crash.

Hazardous actions are an indication of the contribution to the crash. The overrepresentation of younger drivers in certain hazardous actions suggests that this age group might benefit from training on the specific driving behaviors associated with these hazardous actions.

### **3.2 Analysis of Violation Patterns in Truck Inspections**

The analysis of violation patterns was based on 20,528 Level 1 inspections of Michigan-based carriers in the Motor Carrier Management Information System (MCMIS) data files for years 2013 and 2014. Because many of these carriers are in interstate operation, the inspections were not necessarily performed in Michigan. Although there was a total of 96,265 inspections of Michigan carriers in the data file, Level 1 inspections were selected because they are the most thorough, and cover all Federal Motor Carrier Safety Regulations (FMCSR) concerned with the driver and vehicle, thereby providing a consistent measure for comparison.

Table 5 shows the distribution of the 12,043 Michigan carriers in the 2014 MCMIS file according to categories based on carrier size with respect to the number of CDL drivers and number of vehicles. Carriers with at least five CDL drivers are of primary interest when assessing training programs because they are more likely than those with fewer drivers to engage in or support any type of training program. Thus, carriers with fewer than five CDL drivers were put into the “Other” category that includes all the carriers that do not fit the four carrier size categories used here. Of the “Other” carriers, one-half have only one truck, and 30 percent have two or three trucks. Thus, while they constitute a large portion of carriers in the state, they account for only a small portion of the trucks and truck drivers. This is similar to the national pattern<sup>3</sup>, where about 73 percent of the nation’s carriers have between one and three trucks and account for 13 percent of the trucks in the national fleet. These very small carriers are included in the analysis of violations for completeness.

**Table 5. Number and percent distribution of trucks in carrier analysis categories**

Trucks in fleet	Carrier size category (CDL drivers, trucks)					Total
	1 (5-9, <21)	2 (10+, <21)	3 (20-99, ≥21)	4 (100+, ≥21 )	Other (<5, 1+)	
1	23 (2.4)	2 (0.4)	0 (0.0)	0 (0.0)	5,086 (50.6)	5,111 (42.4)
2 to 3	79 (8.2)	9 (1.8)	0 (0.0)	0 (0.0)	3,152 (31.3)	3,240 (26.9)
4 to 20	864 (89.4)	491 (97.8)	0 (0.0)	0 (0.0)	1,532 (15.2)	2,887 (24.0)
21 to 100	0 (0.0)	0 (0.0)	408 (97.1)	17 (17.3)	200 (2.0)	625 (5.2)
>100	0 (0.0)	0 (0.0)	12 (2.9)	81 (82.7)	8 (0.1)	101 (0.8)
Unknown	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	79 (0.8)	79 (0.7)
Total	966 (100.0)	502 (100.0)	420 (100.0)	98 (100.0)	10,057 (100.0)	12,043 (100.0)

Table 6 shows the experience of Michigan-based carriers with Level 1 inspections in the years 2013 and 2014. The proportion of carriers receiving at least one Level 1 inspection increased with carrier size, as did the number of inspections per carrier. Overall, 72 percent of carriers with more than four CDL drivers had at least one Level 1 inspection, with an average of about ten inspections per carrier. Only 25 percent of the “other” carriers received at least one Level 1 inspection with an average of 0.6 inspections per carrier. The low number of inspections per carrier for the “other” group is not surprising since these are very small carriers, with 80 percent operating three or fewer trucks.

<sup>3</sup> Our analysis of the November 2014 MCMIS carrier file showed that 379,328 of the 544,927 carriers in the file had one to three trucks for a total of 584,923 of the 4,338,638 trucks in the file.

**Table 6. Percent of carriers receiving Level 1 inspection and average number of inspections per carrier by carrier size category**

Carrier size category			Percent inspected	Inspections per carrier
	CDL drivers	Vehicles		
1	5-9	<21	57.2	2.2
2	10+	<21	77.7	4.3
3	20-99	≥21	90.7	14.1
4	100	≥21	96.9	105.2
Other	<5	≥1	25.0	0.6
Total of carrier size categories 1-4			71.5	10.3
Total of all carriers			32.6	2.2

Most inspections uncovered at least one violation of the FMCSR, and the percentage of inspections with no violations varied by carrier size (Table 7). The largest carriers were the most likely to have clean inspections. Over 36 percent of the largest carriers had no violations, in contrast to about 20 percent of the smallest carriers.

**Table 7. Percentage of Level 1 inspections with no violations**

Carrier size category			Percent inspections with no violations
	Drivers	Vehicles	
1	5-9	<21	20.1
2	10+	<21	22.5
3	20-99	≥21	28.7
4	100	≥21	36.1
Other	<5	≥1	21.6

Up to 50 different violation types are identified in the MCMIS inspection data, and they are organized into driver-, vehicle-, and hazmat- (hazardous materials) related items. Table 8 shows the number of violations per 100 Level 1 inspections by violation area and carrier category.

**Table 8. Number of violations per 100 Level 1 inspections by violation area and carrier size category**

Carrier size category (CDL drivers, vehicles)	1 (5-9, <21)	2 (10+, <21)	3 (20-99 ,>20)	4 (100+, >20)	Other (<5, 1+)
Violation area					
Driver	50.8	47.4	37.3	22.4	64.4
Vehicle	330.9	284.1	220.3	179.0	306.5
Hazmat	0.5	1.1	0.9	1.8	1.0
Unknown	0.4	0.1	0.2	0.1	0.5
Total	382.7	332.7	258.7	203.4	372.4

Overall, smaller carriers had more violations per inspection than the larger carriers. Vehicle-related violations were much more common than driver-related violations and the largest carriers had about half the number of violations per inspection as the smallest carriers for driver and vehicle related items. Overall, the incidence of violations related to hazardous materials was low, and not all carriers transported hazardous materials. Larger carriers may have had higher numbers of these violations per inspection on average because they are more likely than smaller carriers to transport hazardous materials.

Table 9 provides additional detail on type of violations, showing the number of violations per 100 Level 1 inspections for the carrier groups.

**Table 9. Violations per 100 Level 1 inspections by type and carrier size category**

Carrier size category (CDL drivers, vehicles)	1 (5-9,<21)	2 (10+,<21)	3 (20-99,>20)	4 (100+,>20)	Other (<5, 1+)
<b>Driver-related violations</b>					
Medical certification	3.0	2.4	1.2	0.5	6.0
All hours of service	26.3	24.6	18.1	9.9	31.9
Traffic violations	2.8	2.8	2.0	1.4	3.4
Drugs/alcohol	0.1	0.3	0.1	0.0	0.2
Size & weight	7.8	8.7	7.7	5.0	7.1
Other	10.8	8.6	8.2	5.6	15.8
All driver violations	50.8	47.4	37.3	22.4	64.4
<b>Vehicle-related violations</b>					
Brakes	163.9	144.4	111.0	90.7	135.6
Lights	62.3	50.9	43.3	31.8	59.6
Tires/wheels	27.0	19.9	15.6	13.4	23.6
Load securement	5.5	4.4	3.8	2.2	6.0
Steering/suspension	6.1	5.8	4.5	4.2	5.2
Emergency equipment	9.3	8.0	6.0	4.1	11.2
Periodic inspection	6.4	4.4	2.4	1.1	11.0
Other	50.3	46.4	33.7	31.5	54.3
All vehicle violations	330.9	284.1	220.3	179.0	306.5

The single most frequent driver-related category of violations had to do with the hours of service regulations, and most were log book violations. Although the specific violation was not specified further, it was most likely the failure to keep duty logs up to date. Violations of truck size and weight regulations were also relatively frequent, even though Michigan's weight regulations are among the nation's most generous. Rates of drug and alcohol violations were very low. The category "other" under driver violations consists of assorted unspecified violations. It is notable that for virtually every category of driver violations, smaller carriers had higher frequencies of violations per inspection than larger carriers.

The lower half of Table 9 shows counts of vehicle-related violations per 100 Level 1 inspections. The most common violations were associated with brakes, lights, and tires and wheels. Brake violations dominated, accounting for about half of all violations identified. Violations of the lighting requirements (head lamps, tail lamps, side markers, and so on) averaged about one-third of brake violations but were still substantial. Violations related to tires and wheels were next in order. The "other" violations consisted primarily of other unspecified vehicle violations.

Consistent with all other inspection data results, smaller carriers had significantly more violations per inspection than larger carriers. Note, for example, that the smaller carriers (20 or fewer trucks, five to nine

drivers) averaged almost 80 percent more brake-related violations as the largest carriers, and at least twice as many violations for lights, tires/wheels, and load securement.

The carriers were also categorized as *for-hire* or *private*. *For-hire* means that the carriers identified themselves as exclusively providing freight-hauling services; *private* carriers are those that use their trucks for their own business, rather than transporting freight for others. It is useful to distinguish the two, because for-hire carriers may be more likely to use their trucks for longer distances and may be more versed in the world of truck regulation than private carriers.

Table 10 shows the experience of the two carrier types—private and for-hire—in terms of overall inspection results. Private carriers tended to have higher proportions of “clean” inspections than for-hire carriers. Interestingly, the patterns for the two categories of carriers with less than 10 drivers (category 1 with five to nine drivers and less than 21 vehicles, and the “other” category that includes carriers with fewer than five CDL drivers) are very similar. For both, about 20 percent of truck inspections of for-hire carriers were clean, compared with about 25 percent of inspections of private carriers. It should also be noted that, consistent with previous findings, larger carriers had higher rates of inspections with no violations than smaller ones, whether private or for-hire.

**Table 10. Percentage of inspections with no violations by size and carrier type**

Carrier size category	CDL drivers, vehicles	For-hire (Percent)	Private (Percent)
1	5-9, <21	19.6	23.3
2	10+, <21	20.5	30.8
3	20-99, ≥ 21	28.0	33.4
4	100+, ≥ 21	35.6	40.7
Other	<5, 1+	19.7	25.0

Overall, for-hire carriers averaged more violations per 100 Level 1 inspections than private carriers (251.6 vs. 239.8), but private carriers averaged more driver violations, while for-hire carriers averaged more vehicle violations (Table 11). The reasons for this pattern are unknown, but could be related to operations and awareness. For-hire carriers likely use their vehicles more intensely, because, clearly, they are in the business of trucking. Private carriers may be less aware of some of the regulations with which they must comply.

**Table 11. Number of violations per 100 inspections by carrier type**

Violation type	For-hire	Private
Driver	31.1	40.8
Vehicle	219.1	197.0
Hazmat	1.2	2.0
Unknown	0.1	0.1
Total	251.6	239.8

Table 12 shows some interesting differences in the details of the types of violations for-hire and private carriers accumulated.

**Table 12. Driver and vehicle violations per 100 Level 1 inspections by carrier type**

Carrier type	For-hire	Private
Driver-related violations		
Medical certification	0.8	4.7
All hours of service	16.2	10.8
Traffic	1.7	3.7
Drugs/alcohol	0.1	0.2
Size & weight	5.8	8.5
Other driver	6.5	12.9
All driver	31.1	40.8
Vehicle-related violations		
Brakes	111.9	82.8
Lights	39.8	45.7
Tires/wheels	17.0	9.6
Load securement	2.8	7.2
Steering/suspension	4.9	1.7
Emergency equipment	5.3	8.3
Periodic inspection	1.8	7.0
Other vehicle	35.6	34.7
All vehicle	219.1	197.0

Note that private carriers had a much higher rate of medical certification violations than for-hire carriers. Private carriers may be less aware of the requirement to comply with the medical certification rules. Private carriers also had much higher rates of failure to comply with the periodic inspection rules. In contrast, for-hire carriers had significantly higher rates of hours of service violations than private carriers. The operations of private carriers are probably less likely to be constrained by the hours of service rules than for-hire carriers. Private carriers also had higher rates of size and weight violations. In terms of vehicle violations, brakes, lights, and tires and wheels, again, were the primary areas of violations for both private and for-hire carriers. For-hire carriers had higher rates of brake violations (private carriers may

operate more single-unit trucks which are more likely to have hydraulic brakes and fewer brake problems than the pneumatic S-cam brakes of heavy trucks). Private carriers had higher rates of violations related to lights, but fewer violations related to tires and wheels.

The above analysis includes all violation severities, regardless of whether they resulted in an out-of-service (OOS) condition. Analysis of the severity of violations showed that, for each carrier size group, about 20 percent of all violations were severe enough to place the vehicle in an OOS condition. The actual proportion varied by only tenths of a percent for each carrier size.

Thus, a substantial proportion of inspections resulted in the vehicle being placed in OOS condition, regardless of carrier size or type. Table 13 shows that 41 percent of inspections of trucks operated by carriers with 20 or fewer trucks and five to nine drivers resulted in the vehicle being placed OOS. OOS rates declined with increased carrier size, yet 26 percent of inspections of the largest carrier trucks resulted in placing the vehicle OOS. It should be noted that Michigan is a “probable cause” state, meaning that police officers must have some articulable reason for stopping and inspecting a vehicle. A truly random sample of trucks on the road may produce lower rates of OOS.

**Table 13. Percentage of Level 1 inspections resulting in OOS condition by carrier size and type**

Carrier size category	CDL drivers, vehicles	For-hire	Private	All
1	5-9, <21	41.6	38.9	40.7
2	10+, <21	37.6	30.8	35.9
3	20-99, ≥ 21	31.5	26.4	30.9
4	100+, ≥ 21	26.1	20.1	25.7
Other	<5, 1+	40.7	33.1	38.5

Table 13 also shows rates for for-hire and private carriers. For-hire carriers had somewhat higher rates of OOS than private carriers, and, as found earlier, smaller carriers had higher OOS rates than larger ones.

Table 14 provides a more detailed look at the OOS violations per 100 Level 1 inspections by carrier size. Among driver-related violations, the primary area was hours of service, and that was mainly for exceeding the number of hours of driving was permitted daily. Among vehicle violations, brakes and tires accounted for most of the OOS conditions, with brakes being by far the most significant. Again, it is noteworthy that for all of the items, bigger carriers had lower rates and smaller carriers had higher rates. There were very few exceptions to this general rule.

**Table 14. OOS violations per 100 Level 1 inspections by violation type and carrier size category**

Carrier size category (CDL Drivers, vehicles)	1 (5-9,<21)	2 (10+,<21)	3 (20-99,>20)	4 (100+,>20)	Other (<5, 1+)
<b>Driver-related violations</b>					
Medical certification	0.1	0.0	0.1	0.0	0.3
Hours of service	5.9	6.3	4.7	2.1	8.2
Drugs/alcohol	0.1	0.2	0.1	0.0	0.2
Size & weight	0.0	0.0	0.0	0.0	0.0
Other	1.7	1.2	1.0	0.9	2.3
All driver violations	7.9	7.9	6.0	3.1	11.1
<b>Vehicle-related violations</b>					
Brakes	35.3	30.5	22.6	18.5	33.9
Lights	5.7	5.4	5.8	4.4	6.4
Tires/wheels	10.6	8.1	7.2	6.7	9.0
Load securement	4.6	3.7	3.2	1.6	4.9
Steering/suspension	3.9	3.6	2.8	2.4	3.3
Periodic inspection	0.0	0.0	0.0	0.0	0.1
Other	8.8	8.5	4.6	3.8	6.8
All vehicle violations	68.9	59.8	46.3	37.3	64.2

The patterns of violations point to areas where training of drivers should be emphasized. For example, hours of service violations suggest that additional emphasis on logbook record-keeping requirements and on training in the newer technologies of electronic log books could be beneficial to drivers.

The vehicle violation patterns also point to training needs. Mechanics are responsible for fixing problems, but drivers share responsibility for identifying them. Drivers are responsible for pre-trip inspections, so they should be apprised of the areas that comprise the most frequent violations. Brake system violations appear to be the major vehicle violation area. Drivers should be able to identify brakes that are out of adjustment. Most air brakes currently have “automatic slack adjusters,” which still must be checked for adjustment. When out of adjustment, trained personnel are needed to determine why an automatic slack brake has gone out of adjustment and then correct the problem.

#### **4. CDL/CMV Training in the U.S.**

Since 1992, drivers have been required to have a CDL to drive certain CMVs<sup>4</sup>. The Federal Motor Carrier Safety Administration (FMCSA) has developed and issued standards for state testing and licensing of

<sup>4</sup> CDLs are required for drivers of the following CMV types

- **Class A:** Any combination of vehicles which has a gross combination weight rating or gross combination weight of 26,001 pounds or more whichever is greater, inclusive of a towed unit(s) with a gross vehicle weight rating or gross vehicle weight of more than 10,000 pounds whichever is greater.

CDL holders. States can issue CDLs to drivers only after they pass knowledge and skills tests administered by the state. The knowledge test contains questions on general knowledge required of all commercial drivers and specialized knowledge required of operators of particular classes of vehicles or vehicles hauling particular types of cargo. The purpose of the skills test is to determine if drivers are able to ascertain the condition of key operational and safety systems of the vehicle, have the fundamental psychomotor and perceptual skills needed to control and maneuver heavy vehicles, and are capable of safely driving the vehicle in a variety of road environments and traffic conditions.

Although at the present time no formal training is required before taking the CDL test, the Federal Highway Administration Model Curriculum (FHWA, 1985) and the Professional Truck Driver Institute Curriculum (PTDI, 2015) are considered to be the basis for training adequacy (Federal Motor Carrier Safety Administration, 2003).

The following is the outline of the PTDI Curriculum for CDL training program:

Unit 1 - Basic Operation Orientation

- Control systems
- Vehicle inspections
- Basic control
- Shifting

Unit 2 - Safe Operating Practices for Basic Operation

- Visual search
- Vehicle communication
- Speed management
- Space management

Unit 3 – Advanced Operating Procedures

- Night operation
- Extreme driving conditions
- Hazard perception
- Emergency maneuvers/skid avoidance
- Skid control and recovery
- Passive (unmarked/uncontrolled) RR crossings

Unit 4 – Vehicle Systems and Reporting Malfunctions

- Identification and maintenance

- 
- **Class B:** Any single vehicle which has a gross vehicle weight rating or gross vehicle weight of 26,001 pounds or more, or any such vehicle towing a vehicle with a gross vehicle weight rating or gross vehicle weight that does not exceed 10,000 pounds.
  - **Class C:** Any single vehicle, or combination of vehicles, that does not meet the definition of Class A or Class B, but is either designed to transport 16 or more passengers, including the driver, or is transporting material that has been designated as hazardous under 49 U.S.C. 5103 and is required to be placarded under subpart F of 49 CFR Part 172 or is transporting any quantity of a material listed as a select agent or toxin in 42 CFR Part 73.

- Diagnosing and reporting malfunctions

#### Unit 5 – Non-Vehicle Activities

- Handling and documenting cargo
- Environmental issues
- Hours of service requirements
- Accident procedures
- Managing life on the road/personal resources
- Trip planning
- Communication skills

While there is general consensus in the trucking industry about the topics to be covered in a CMV driver-training program, there is less agreement on how these should be taught and how effectiveness of the programs should be evaluated. The following five types of skill training methods are used in CMV driver training programs (Staplin et al., 2004):

- Demonstration of skills by instructor – classroom instruction;
- Driving simulator;
- Range driving – enclosed course, skid pad;
- Behind the wheel (BTW) training with instructor;
- Computer-based instruction (CBI)

According to Staplin et al. (2004), BTW is considered the best and most effective approach for training new drivers as well as for in-service training to help experienced drivers to sharpen their driving skills. Range driving (also referred to as driving in an off-road space), is also a “hands-on” training condition, and considered effective for learning and practicing new skills. Skid pad training is seen as an invaluable opportunity to learn about vehicle control in low friction conditions by providing experience in real but controlled conditions.<sup>5</sup>

Simulators are generally considered to be effective training tools, especially if combined with other training methods. Simulators have been used for flight training for decades, and range from simple desktop devices to full-motion units. Simulators expose drivers to hazardous situations under controlled conditions to help them develop appropriate reactions. High fidelity simulators are useful for teaching effective scanning, vehicle control in adverse weather, defensive driving, and docking. Recently, researchers have been working on simulations of vehicle dynamics on skid pads (Meyer et al., 2007). If successful, these “simpads” could become cost effective substitutes for skid pads. Unfortunately, simulators are not appropriate for all trainees, as some individuals experience simulator sickness.

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<sup>5</sup> In conducting this review, the research team identified 4 programs in the US that used skid pads in truck driver training. We also found 4 more programs no longer use skid pads because of their high costs.

CBI has also been used for training. It can reduce training costs, provide uniform training, and free up time for “hands-on” training. Topics that have been covered include:

- Vehicle control systems
- Pre, post, en-route vehicle inspections
- Identifying and maintaining vehicle systems
- Preparing vehicle for adverse weather
- Cargo securement
- Proper lifting techniques
- Effective communication skills
- Defensive driving through dynamic examples

If well-designed, CBI can provide information through sounds, video, and graphics, and can increase the amount of information learned and retained. It can also be tailored to an individual’s pace of learning. In their survey of driver training practices of motor carriers, Staplin et al. (2004) found that 90 percent of carriers used some BTW for CDL and in-service training, 80 percent of carriers used classroom instruction, and 66 percent used range driving.

The ultimate measure of effectiveness of any driver-training program is the safety benefits of the program. However, demonstrating safety effects of particular types of training is difficult. Evaluations of CDL training programs have mostly been limited to measures such as the CDL-test passing rate or the hiring rate of program graduates (Brock, 2007). A 2008 study by the American Transportation Research Institute (ATRI, 2008) examined the relationship between driver training and new entrant driver safety performance, but was not able to identify any meaningful safety outcomes. A more recent UMTRI study (Kostyniuk et al., 2013) found a significant difference in the lower proportion of hazardous actions in CMV crashes attributed to young CDL drivers in Michigan who had additional post-CDL training compared to a sample of similar young CDL drivers without such training. To address the lack of knowledge on the effectiveness of CMV driver training programs, FMCSA is sponsoring a large national study that is currently underway. The study is collecting data on the amount and type of training of CMV drivers who obtained a CDL in the past three years, and their driver histories in the Commercial Driver License Information System (CDLIS).

There are several national trucking organizations associated with truck driver training. Key among them is the PTDI. As noted earlier, PTDI has a specific truck-driver-training curriculum. PTDI certifies training programs that meet its standards. At the present time, 66 driver-training programs across the U.S. are certified according to PTDI standards. These programs are operated by motor carriers, public education institutions, and private companies. The Commercial Vehicle Training Association (CVTA) is another organization engaged in CMV driver training. CVTA members operate private- and carrier-based instructional schools at over 180 locations, graduating approximately 50,000 students annually. CVTA does not publish a detailed training curriculum for its members. However, it does evaluate schools based on adherence to the Model Curriculum. The National Association of Publicly Funded Truck Driving

Schools (NAPFTDS) represents approximately 70 training programs operated within public education institutions. While the association does not promote a standardized training curriculum, members discuss training advancements and regulations at annual and regional meetings.

The venues in which truck driver training programs are offered can be classified into one of three groups: community college or technical vocational school programs; private truck driving schools; and schools operated by trucking companies. The length of CDL training programs varies from school to school. Training can range from short refresher courses to programs that range from one week up to six months to complete. There are about 350 programs in the U.S. that are at least four weeks in duration.

Community college programs tend to be longer in length and lower in costs than other programs. These programs prepare drivers for the CDL test, but also prepare individuals for careers in the truck driving industry. Community colleges may also have more advanced facilities, and a few have access to skid pads for skid control training.

Private truck driving schools, including privately-owned for-profit colleges, are in the for-profit business of training. Programs vary from very short refresher courses to more comprehensive programs covering more advanced skills. However, the general aim of most of these programs is to prepare drivers to pass the CDL test. They also tend to be the most expensive programs. Many private truck driving schools offer financial aid and job placement assistance. Some private schools work only with certain employers and provide training on behalf of those employers. In these situations, some or all of the up-front costs of training are paid to the school by the employer, and students reimburse their employer during a period of employment as a driver.

Programs in schools operated by trucking companies are usually shorter than both community college and private school programs, lasting about 2-4 weeks. Drivers usually agree to drive for the carrier for at least one year in exchange for the training, and there can be tuition reimbursement costs and penalties for drivers who fail to complete this obligation.

Collectively, regardless of the venue, the level of driving proficiency and knowledge required to pass the CDL test is widely regarded as well below the level required to be a safe and reliable driver in a full-time operational setting (Knipling et al., 2003). Thus, many carriers put their entry level drivers and other new hires through a "finishing program" in which drivers are given additional training to improve their driving skills and company-specific instruction on non-driving aspects of the job such as managing the carrier's paperwork, working with its dispatchers, and interacting with customers. The drivers continue to advance their driving skills and knowledge through experience and other on-the-job training.

## 5. CDL/CMV Training in Michigan

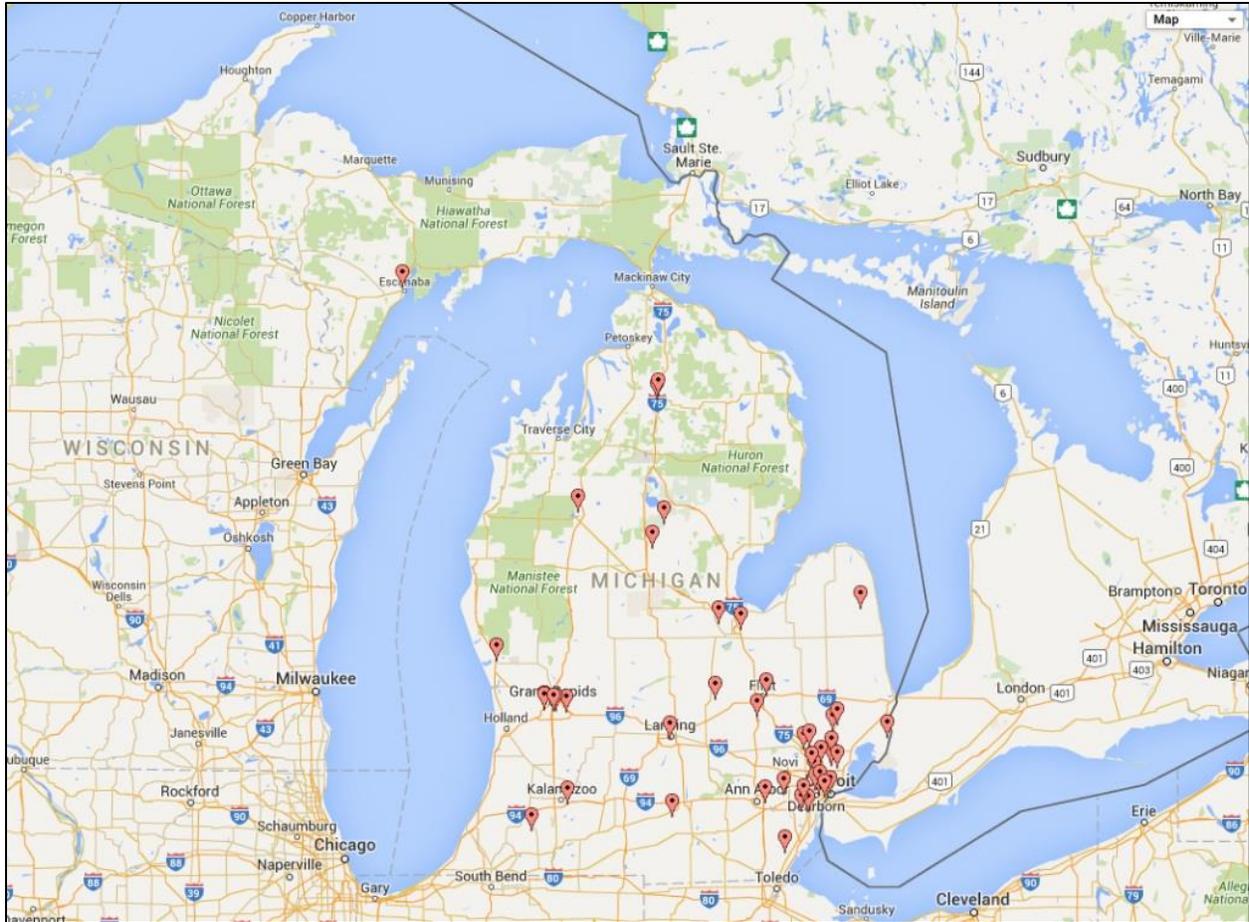
For this task, the research team examined truck driver education programs in Michigan to inventory the CMV/CDL training options available to new and experienced drivers from professional driver education providers.

The research team used the “Certified Truck Driver Education Provider List” from the Michigan Department of State’s Driver Education Section (prepared on June 18, 2015) to identify driver education programs that could be examined. A total of 43 schools were identified on the list as providing CDL education (see Appendix A for complete list).

The research team attempted to obtain information about each school’s program via a combination of telephone interviews with representatives of the schools (see Appendix B for interview guide), reviewing the schools’ websites, and searching the State of Michigan’s Career Education Consumer Report Database available at [michigan.gov](http://michigan.gov) and [mycareereducation.org](http://mycareereducation.org). The following information was sought for each school:

- An overview of the classes/training offered, including the number of training hours provided per course and curriculum
- The class format and equipment used
- Cost
- Financial assistance offered/facilitated by the driver education provider
- Enrollment numbers
- Pre-requisites for enrollment
- Employment assistance offered to students after course completion

The research team was able to establish contact with and/or obtain information from 35 of the 43 schools (83 percent) on the list. Three of the schools appeared to be no longer providing CDL training. A map showing the distribution of schools throughout Michigan is provided in Figure 1.



**Figure 1. Location of Certified Truck Driver Education Providers in Michigan**

### 5.1 Classes/Training Offered

Almost all of the programs offered multiple course options. Most schools offered one to two multi-week, basic or standard courses. Several schools also offered short (typically 4-20 hours), intensive, customized training sessions intended to be targeted to CDL exam preparation or refresher training. The most common class involved 160 hours of training. Among the schools offering basic/standard courses, 22 offered a 160-hour course, nine offered more extensive courses (ranging from 170 hours to 6 months-full time), and four only offered courses shorter than 160 hours. Sixty-five percent of the schools reported that their programs were intended to prepare students to obtain a CDL license/endorsement (several advertised their ability to get students employed quickly) and 35 percent stated that their programs were intended to prepare students for a successful career as a truck driver.

Baker College’s program was the most extensive and the only program in the state to be certified by PTDI. One additional school is currently attempting to obtain PTDI certification. The Baker College program is a 30 credit-hour, 13-class program that typically takes 6 months to complete. This program has the highest cost of any CDL program (about \$10,200). The curriculum includes:

- Community first aid

- CDL preparation I (introduction to requirements to obtain a CDL and preparation to obtain a Commercial Learner's Permit<sup>6</sup> [CLP])
- Basic operating procedures (including 21 hours behind the wheel)
- Safe operating procedures (including hazard perception and healthy road lifestyle topics)
- Vehicle maintenance
- Technology in transportation
- Behind the wheel practicum (33 hours behind the wheel)
- Applied practice in Decision Driving (previously conducted at the Michigan Center for Decision Driving)
- CDL preparation II (preparation for CDL exams)
- Regulations and procedures
- Two courses in career experience (presentations about various career opportunities and interaction with professional drivers)
- Professional career strategies

Two schools' programs are certified by the Commercial Vehicle Training Association (International Trucking School and MTC Truck Driver Training). None of the Michigan programs are currently certified by the National Association of Publicly Funded Truck Driving Schools. The International Trucking School's program is affiliated with North Central Michigan College. Three additional providers are affiliated with community colleges: ABC Training and Testing LLC with Jackson Community College; CDL Training Services and Consulting LLC with Muskegon Community College; and Trainco, Inc. with Washtenaw Community College.

## **5.2 Class Format and Equipment Used**

The 160-hour programs were typically reported to consist of classroom, lab, range, and on the road driving. Three schools offered simulator training. The broad topics covered included mandated Department of Transportation (DOT) Entry Level Training, vehicle inspection, load securement, basic operating skills, basic control skills, backing maneuvers, on-road driving, shifting, and DOT hours of service rules. Instruction included a mixture of one-on-training and independent practice. Most of the schools specified that their curriculum followed FMCSA guidelines.

Specific classroom topics covered typically included: CLP preparation; DOT rules and regulations; log book procedures; hours of service; map reading; trip planning; hazard perception; night operation; extreme driving conditions; railroad crossing safety; accident reports; securing cargo; and weight/load distribution. Skills practiced on the range and/or in the yard typically included: pre-trip inspection; coupling/uncoupling; hooking trailers of various lengths; straight line 45/90 degree backing; parallel parking; blindside parking; alley docking; and dock and trailer door alignment and operation. Skills

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<sup>6</sup> Drivers have to pass a knowledge test and vision test to get a CLP and must have a CLP to take the CDL skills test. They must wait at least 14 days between acquisition of CLP and CDL skills test.

practiced on the road typically included: shifting; double clutching; city driving; intersections; railroad crossings; left and right turns; lane changes; highway/freeway driving (2, 4, and 5 lanes); entrance and exit ramps; uphill and downhill driving; hazard perception; speed and space management; rural driving; and proficiency in the skills needed to pass the Class A road exam/skills test.

### **5.3 Cost and Financial Assistance**

Total costs for the 160-hour programs ranged from approximately \$4,000-\$8,000. The average cost per hour of training was \$29 (median = \$28; mode = \$25). More extensive programs had higher total costs but the cost per hour of training was notably less than shorter programs. For example, one 602-hour course was \$8,428 (\$14/hour of training) and a 680-hour course was \$6,120 (\$9/hour of training). The shorter, targeted CDL preparation/refresher courses were typically less than \$1,000 in total costs but dollars per hour of training provided were as high as \$260.

Approximately 45 percent of the driver education providers helped students secure financial aid from sources such as Michigan Works!, Michigan Rural Rehabilitation Corporation, the Veterans Administration, UAW-GM Tuition Assistance Plan, TARFF Loans, and partnerships with various financial and loan services. Assistance was in the form of tuition reimbursement and/or loans. Some trucking firms hire prospective drivers before the drivers complete CDL training. The firms either pay drivers' tuition or reimburse them pending successful completion of CDL training and maintenance of good standing as an employee of the trucking firm for a specified amount of time. Those opportunities are available to prospective drivers directly through the trucking firms or through partnerships between trucking firms and some of the larger driver education providers.

### **5.4 Enrollment and Pre-requisites**

Enrollment data were challenging to obtain and interpret. In general, most schools trained approximately 15-20 students per year in the 160-hour programs (with schools ranging from five to 75 students per year). Enrollment in the short CDL preparatory/refresher courses was higher at 100-150 students per school per year.

All programs required students to have current, valid driver's licenses at enrollment. Most also required that students be able to pass the DOT drug screen and medical exam and be 18 years old. Approximately 20 percent had additional requirements including that they meet all FMCSR qualifying standards, have a clean driving record and clean criminal record, and have no recent history of alcohol-impaired driving. Most of the short CDL preparatory/refresher courses also required that students already have a CLP prior to enrollment. Longer courses typically helped students obtain a CLP as part of the course.

### **5.5 Employment Assistance**

Approximately 35 percent of the schools provided job placement assistance to students. Some guarantee lifetime assistance as long as the student remains in "good standing." About 20 percent have partnerships with trucking firms and offer prospective students the ability to pre-hire with firms prior to training.

## 6. Truck Driver Survey

As part of this research, a statewide telephone survey was conducted of Michigan residents who had a CDL and drove large trucks as their job or part of their job. The objective of the survey was to gain a better understanding of the population of Michigan truck drivers and to learn more about how, when, and where they developed the skills and knowledge required of professional truck drivers. The survey questions and instrument were developed by the UMTRI research team based on review of literature and the interviews with the MTA Safety Councils (described in Section 8 of this report). Abt SRBI, a professional survey research company, was selected through a competitive bid process to administer the survey using a computer-aided telephone interview (CATI) system. Tasks performed by Abt SRBI included developing the CATI program, pilot testing the instrument, contacting and screening potential respondents, conducting the telephone interviews, and preparing the survey data file for analysis by the UMTRI team. The survey instrument can be found in Appendix C.

### 6.1 Survey Sample and Respondents

The population sampled for the survey consisted of drivers who held an active Michigan CDL, were age 70 or younger, and drove a truck that required a CDL for their primary job. Current holders of Michigan CDLs were identified from the Michigan Driver License database<sup>7</sup>. While not all drivers with a CDL license drive trucks, all Michigan professional truck drivers must hold a CDL, and thus would be in this database. Screening questions in the recruitment portion of the telephone survey were designed to eliminate holders of CDLs who currently do not drive CMV trucks.

Abt SRBI drew a random sample of 35,000 CDL drivers from the Michigan driver license database, and successfully matched telephone numbers (land line and/or cell phones) for 20,400 of them. The telephone interviews were conducted in August 2015. In all, 16,304 numbers were called. Of these 10,039 were determined to be *good*<sup>8</sup> numbers. Each good number was called up to three times, and calls were staggered over times of the day and days of the week to maximize chances of making contact. In all, 1,098 contacts were made and screened, yielding 302 respondents who were interviewed. However, 20 of these respondents turned out to be bus drivers (despite having indicated that they drove a large truck for a living in the screening) and were therefore eliminated from further analyses.

### 6.2 Results

There were 282 respondents who held a Michigan CDL and drove trucks as their primary job and were age 70 or younger. Their ages ranged from 21 to 70 years; 96 percent were male; 83 percent reported their race as White and 10 percent as African American. All respondents stated that driving a large truck that required a CDL was their primary job.

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<sup>7</sup> The Driver License Database is an active database maintained by the Michigan Department of State. The data used in this research were from a snapshot of the database taken in June 2015.

<sup>8</sup> Active non-business phone numbers were considered to be *good* numbers.

The survey data were analyzed using statistical methods for surveys in SAS 9.2. The survey responses were weighted to reflect the age and sex distribution of truck drivers in Michigan, whose primary job was driving a truck that required a CDL.<sup>9</sup> The following tables and analyses are based on weighted responses. The standard errors of percent (SE) are also given whenever percent distributions are estimated. The 95 percent confidence intervals (95% CI) are given whenever means are estimated. When appropriate, differences between means were tested for statistical significance using a t-test.

The first set of questions was concerned with the description of Michigan’s truck drivers, their ages, endorsements, what vehicles they drive, what type of employers they work for and how far they drive. The second set of questions was concerned with their preparation for their CDL, and the third set of questions was concerned with where and how they obtained their knowledge and skills needed for driving a large truck.

### 6.3 Description of Truck Drivers

The average age of drivers was  $48.9 \pm 1.6$  years, with 24 percent of drivers in the 21-40 age group, 45 percent in the 41-55 age group, and 30 percent in the 56-70 age group. The average tenure on the job as a truck driver was  $19.6 \pm 1.6$  years. Table 15 shows the average age and years of experience of the truck drivers in each age category.

**Table 15. Average age and years as truck driver by age category**

	Truck drivers n=275	Age n=275	Years as truck driver n=274
Age group	Percent (SE)	Mean (95% CI)	Mean (95% CI)
21-40	24.4 (3.3)	33.0 (31.9-35.5)	8.3 (6.3-10.1)
41-55	45.3 (3.2)	48.7 (47.9-49.4)	19.7 (17.8-21.4)
56-70	30.3 (2.7)	61.4 (60.7-62.1)	29.1 (26.7-31.5)

The majority of drivers (82.1 percent, SE =2.5) had a Class A CDL, 14.9 percent (SE=2.3) held a Class B CDL, and 2.1 percent (SE =.9) held a Class C CDL. Endorsements on the CDL are needed to drive certain types of CMVs such as double and triple trailers, tankers, and vehicles carrying hazardous materials (hazmat) or 16 or more passengers. Endorsements increase a driver’s qualifications, and a driver can have several endorsements. Almost one-quarter of the drivers had no endorsements on their CDL and approximately one-third held endorsements for driving double and triple trailers, and tankers.

<sup>9</sup> The age and sex distribution of CDL holders were used in developing weights for the analysis of survey responses because these metrics are not known for professional truck drivers.

Table 16 shows CDL endorsements in each age category. The youngest age group had the highest proportion of drivers with no endorsements--31 percent compared to 22 percent of drivers in both the middle and older age groups. The middle age group had the greatest proportion (37 percent) of drivers endorsed for double and triple trailers compared to 27 and 28 percent of the younger and older age groups.

**Table 16. Proportion of endorsements in each age group (Percent, SE)**

Type of endorsement	All n=282	Age 21-40 n=36	Age 41-55 n=123	Age 56-70 n=116
None	24.2 (2.8)	31.3 (8.0)	22.0 (3.7)	21.6 (3.8)
T -Double/triple trailers	31.7 (2.9)	26.7 (7.4)	37.4 (4.4)	28.4 (4.2)
P -Transporting passengers	15.0 (2.2)	13.8 (5.7)	14.6 (3.2)	18.1 (3.6)
N -Tank vehicle	31.6 (3.0)	34.8 (8.0)	30.1 (4.2)	32.7 (4.3)
H -Hazmat	16.4 (2.4)	18.7 (6.5)	15.4 (3.3)	17.2 (3.5)
X - Combination of tank vehicle and hazardous materials	15.2 (2.3)	13.4 (5.7)	16.3 (3.3)	16.4 (3.5)
Other	21.6 (2.7)	23.3 (7.4)	21.2 (3.7)	21.6 (3.8)

Table 17 shows the distribution of the types of vehicles driven by truck drivers in each age group. Overall, about one-third of the drivers drove straight trucks and close to one-half drove tractors with single trailers. The proportions of trucks driven by the two older age groups of drivers were similar to each other and differed from those driven by drivers in the youngest age group. A greater proportion of younger drivers drove straight trucks compared to the two older groups (47 percent vs. 28-30 percent). Over one-half of drivers in the older age groups drove tractors with one trailer compared to 37 percent of drivers in the young age group. No survey respondents in the younger age category reported driving tanker vehicles at the time of the survey. However, about 8 percent had endorsements to do so, indicating that some Michigan CDL drivers in the younger age category were qualified to drive tankers. Considering that the sample size of drivers in that age category was small, it is reasonable to assume that there are some drivers age 21-40 in Michigan who drive tankers, but that their number is small.

**Table 17. Truck types by age group (Percent, SE)**

Primary truck configuration	All n=282	Age 21-40 n=36	Age 41-55 n=123	Age 56-70 n=116
Straight truck	34.0 (3.1)	47.3 (8.5)	30.1 (4.2)	28.4 (4.2)
Tractor with 1 trailer	47.4 (3.2)	36.6 (8.3)	52.0 (4.5)	50.9 (4.7)
Tractor with 2 or 3 trailers	6.9 (1.7)	10.7 (5.1)	3.3 (1.6)	8.6 (2.6)
Straight truck with trailer	3.6 (1.2)	5.3 (3.8)	4.1 (1.8)	1.7 (1.2)
Tanker	(3.7 (1.1)	-	4.1 (1.8)	5.3 (2.1)
Other	3.5 (1.1)	-	5.7 (2.1)	3.4 (1.7)

Overall, just over one-third of truck drivers worked for carriers or carrier brokers, and just over one-quarter worked for shipper carriers, also known as private carriers (Table 18). The proportion of drivers that worked for these employers did not vary much across the age groups. However, drivers in the younger age category were more likely than drivers in the two older age groups to work as independent contractors with their own authority (16 percent vs. 12 percent).

**Table 18. Distribution of employers in each age group (Percent, SE)**

Do you currently work for?	All n=282	Age 21-40 n=36	Age 41-55 n=123	Age 56-70 n=116
Yourself as independent contractor leased to a motor carrier	7.7 (1.6)	8.0 (4.5)	7.3 (2.4)	8.6 (2.6)
Yourself as independent contractor with own authority	12.8 (2.1)	16.1 (6.1)	11.4 (2.9)	12.1 (3.0)
Carrier or carrier broker	34.5 (3.1)	33.1 (8.2)	35.8 (4.3)	31.9 (4.3)
Shipper carrier (private carrier or house carrier)	27.5 (2.8)	26.7 (7.4)	28.5 (4.8)	26.7 (4.1)
State, county, city, municipal	5.8 (1.5)	5.3 (3.7)	5.7 (2.1)	5.9 (2.7)
Other	7.7 (1.6)	5.3 (3.7)	8.1 (2.5)	9.5 (2.7)

Drivers were asked about the number of vehicles in their employer's fleet. Overall, about 30 percent of the truck drivers worked for companies with fleets of 10 or fewer vehicles, and 5 percent worked for firms with a fleet size of one vehicle (Table 19). Approximately 38 percent worked for firms with a fleet size between 11 and 100 vehicles, 9 percent worked for firms with 101 to 500 vehicles and 19 percent work for firms with large fleets of more than 500 vehicles. The patterns for fleet size within each driver age group were similar to the overall pattern.

**Table 19. Distribution of fleet size of drivers' employers in each age category (Percent, SE)**

Number of vehicles in fleet	All n=275	Age 21-40 n=36	Age 41=55 n=123	Age 55-70 n=116
1	5.1 (1.3)	2.7 (2.7)	6.5 (2.2)	5.1 (2.1)
2-10	24.5 92.7	24.1 (7.2)	26.0 (4.0)	26.7 (4.1)
11-100	37.9 (3.1)	38.5 (8.5)	35.8 (4.3)	41.4 (4.6)
101-500	9.5 (1.9)	10.7 (5.1)	10.6 (2.8)	5.2 (2.1)
>500	18.8 (2.45)	18.7 (6.5)	17.9 (3.5)	20.7 (3.8)

Drivers were also asked if they drove locally, regionally, or “long-haul” (also known as over-the- road). Just under two-thirds of drivers reported driving only locally, 16 percent reported driving regionally, and 20 percent reported driving long-haul. Of the long-haul drivers, almost all also drove regionally and locally, and most of the regional drivers also drove locally. Table 20 also shows the average age of drivers in each of the driving distance categories. Regional drivers were more likely than either the long-haul or just local drivers to be older with an average age of 53. The average age of long-haul drivers was 50, and the average age of local only drivers was 48. However, the bigger 95 percent confidence interval of the long-haul drivers indicates a wider spread of ages among long-haul drivers than among those who drove only locally.

**Table 20. Drivers by long-haul, regional, and local driving distance**

	Long-haul	Regional	Local only
n= 280 Drivers in distance group (Percent, SE)	20.3 (2.5)	16.6 (2.2)	62.1 (3.0)
Age of drivers n	n=59	n=52	n=169
Mean years (95% CI)	49.9 (46.5-53.3)	53.2 (50.2-56.8)	47.6 (45.5-49.7)

Drivers were also asked about the vehicle miles of travel (VMT) they drove in one year (Table 21). The pattern was not surprising with the long–haul drivers having the highest proportion that drove more than 100,000 miles/year and the lowest proportion that drove less than 25,000 miles/year. By comparison, the mileage pattern of the drivers who drove only locally was just the opposite, with the largest proportion driving 25,000 miles/year or less and the smallest proportion driving over 100,000 miles/year.

**Table 21. Distribution of annual VMT by long-haul, regional, and local only drivers (Percent, SE)**

VMT/year	Long-haul n=59	Regional n=52	Local only n=169
≤ 25,000 miles	5.7 (3.5)	8.3 (3.7)	42.3 (4.1)
25,001-50,000	15.7 (5.1)	18.3 (6.0)	24.14 (3.4)
50,001-75,000	10.9 (4.4)	11.1 (4.4)	8.4 (2.1)
75,001-100,000	24.9 (6.3)	18.8 (5.3)	4.4 (1.5)
>100,000	41.9 (6.7)	33.4 (4.4)	8.2 (2.4)

**6.4 Preparing for the CDL**

The next set of questions was concerned with drivers' preparation for the CDL test. Table 22 shows the distribution of years in which Michigan drivers obtained their CDL.

**Table 22. Decade of obtaining CDL within each age group (Percent, SE)**

What year did you obtain your CDL?	All N=201	21-40 n=32	41-55 (n=102)	56-70 (n=62)
1981-1990	19.4 (2.7)	Not applicable	27.5 (4.4)	29.0 (5.81)
1991-2000	29.5 (2.7)	15.0 (6.3)	36.3 (4.78)	32.7 (6.0)
2001-2010	34.3 (3.6)	50.9 (9.1)	24.5 (4.3)	33.9 (6.0)
2010-2015	16.8 (3.2)	34.1 (8.9)	11.2 (3.2)	4.8 (2.8)

As expected, members of the oldest age group tended to receive their CDLs earlier than members of the middle and younger age groups. However, the table also shows that some members of the older age groups obtained their CDLs more recently. If novice drivers are defined as drivers who have held a CDL for 5 or fewer years, then the youngest age group had 17 percent novice drivers, the middle age group had 11 percent novice drivers, and the oldest age group had 5 percent novice drivers.

Almost two-thirds of drivers reported that they had formal training in preparation for their CDL (Table 23). Only one-half of the drivers in the oldest group had formal training prior to taking their CDL exam, while 63 percent of the youngest age group reported undergoing a training program. This may be an indication of a developing trend toward more structured CDL driver training.

**Table 23. Training for CDL (Percent, SE)**

Did you receive training before getting your CDL?	All n=282	Age 21-40 n=36	Age 41-55 n=128	Age 56-70 n=130
Yes	58.2 (3.1)	63.4 (8.5)	60.9 (4.3)	50.0 (4.4)

Drivers who received CDL training were asked if it was through a community college program or a commercial truck driving school (Table 24). Almost 10 percent reported attending a program at a community college, 38 percent reported that their training was obtained at a commercial truck driving school, and about one-half noted “other” and were given an opportunity to specify where they got the training. Analysis of their responses found that about one-quarter of these drivers received on-the-job training before getting their CDL, 5 percent obtained training during military service, and about 13 percent stated that they were trained by family members. The remaining respondents in the “other” category did not provide any additional information.

**Table 24. Location and length of CDL training**

	Community college	Truck driving school	Other
Place of CDL training, n=159 (Percent, SE)	9.9 (2.3)	38.4 (4.2)	51.7 4.2
Weeks of program mean 95% CI	13.9 (7.0-20.7)	5.0 (3.7-6.0)	5.4 (3.3-7.5)
Hours on-the-road training mean 95% CI	94.4 (56.3-132.5)	46.3 (34.7-58.1)	54.7 (38.2-71.3)
Received financial aid (percent, SE)	40.2 (5.9)	39.0 (5.8)	-

In terms of length of the CDL training programs, community college programs averaged 14 weeks compared to an average of 5 weeks at the commercial truck driving schools and other training settings. The community college programs also had the most on-the-road practice hours with an average of 94 hours compared to 46 at the commercial driving schools and 55 at the other training settings. Drivers who did not go through a structured program in preparation for their CDL were also asked about on-the-road practice. These drivers reported an average of 74.5 (CI 60.9-88.1) hours of on-the-road practice before taking their CDL test. Approximately 40 percent of truck driver students attending community college programs or commercial truck driving schools in Michigan received financial support from programs such as Michigan Works!, Michigan Rural Rehabilitation Corporation, and the Veterans Administration.

All truck drivers were asked about the extent to which they felt prepared for a job as a truck driver after obtaining their CDL. The question included a scale of 1 to 5 where 1 was not at all prepared and 5 were completely prepared (Table 25).

**Table 25. Rating of feeling prepared after CDL**

To what extent did you feel prepared for a job as a truck driver when you got your CDL?	Mean and 95% CI for each age group			
	All (n=280)	Age 21-45 n=36	Age 46-55 n=123	Age 56-70 n=115
Mean Score (95% CI)	4.3 (4.2 – 4.4)	4.2 (3.9-4.6)	4.2 (3.9-4.6)	4.6 (4.4-4.7)

Overall, drivers were very positive about their preparation for the CDL, and felt that they were prepared for their jobs as truck drivers. Although the average rating from the oldest age group appeared slightly higher than for the other two age groups, the difference was not statistically significant.

### **6.5 Developing Further Knowledge and Skills**

Drivers were next asked where and how they got training in specific skills needed by truck drivers, and how confident they were in their abilities related to these skills. They were also asked about their experience with training for advanced technologies, attitudes of their top management about training and safety, and their familiarity with the MCTS training programs.

The first set of questions was concerned with training in 10 different skills. Administration of these questions involved a complex path through possible multiple responses for each question. To keep the survey within the budget constraints, each respondent was asked the series of questions about only four of the 10 skill areas. The assignment of the skill questions to respondents was random. This approach did not bias the resulting estimates of proportions, but did result in a larger standard error of the estimate of proportions due to use of a smaller sample.

Table 26 lists 10 skill areas important for driving trucks and shows what proportion of drivers had training on each of these skills. The training could have been obtained during CDL preparation or prior military training, during the finishing training at the first job, or at subsequent jobs. It also could have been received during safety meetings at work or other special training sessions at work or at the MCTS. For each skill area, it is possible for a driver to receive training in one or more settings.

The skill areas in Table 26 are ordered by the decreasing proportions of drivers who reported having training for that topic. Columns 3-8 of Table 26 show the distribution of settings in which training for each skill area took place. The proportion of drivers who reported receiving training on each of the 10 skill areas ranged from 86 percent for pre- and post-inspections to 46 percent who report training for handling hazardous materials. Inspection of the training settings for the top three skill areas in Table 26 (pre- and post-trip inspection, recognizing and reacting to hazards and emergency situations, and backing maneuvers) shows that the most frequent setting for training for these skills was the CDL training.

Finishing training on the first job and safety meetings at work also figured prominently as training settings for these skills.

Finishing training on the first job was the most frequent training setting for load securement. Although drivers received some of the training for hours of service requirements and log book record keeping during their CDL training, it appears that most of the training on this topic was part of finishing training on the first job and at safety meetings at work. Training for stopping and skid control occurred during CDL training, initial finishing training, safety meetings at work, and at the MCTS. Vehicle control training occurred during CDL training and continued at the initial and subsequent finishing programs. Initial finishing training was the most frequent setting for route planning training, followed by CDL training and safety meetings. CDL training and safety meetings were the settings for fatigue management training. Most hazmat training happened at finishing programs and safety meetings at work.

**Table 26. Driver training for specific skills**

Skill area	Had training Percent (SE)	Distribution of driver-training settings for each skill (Percent, SE)					
		CDL training	Finishing training in first job	Other finishing training	Safety meeting or special session at work	Previous military training	Michigan Center for Truck Safety
Pre- and post-trip inspection	86.1 (3.7)	31.2 (5.7)	26.4 (5.4)	1.9 (1.3)	20.6 (4.8)	7.1 (2.9)	2.3 (1.6)
Recognizing and reacting to hazards and emergency situations	75.3 (4.8)	36.8 (6.6)	19.8 (5.9)	16.5 (4.4)	20.5 (5.2)	3.8 (2.2)	1.5 (1.5)
Backing maneuvers	74.0 (4.8)	40.5 (6.7)	19.9 (5.6)	13.7 (4.8)	12.9 (4.1)	6.8 (3.0)	1.1 (2.6)
Load securement	70.4 (5.6)	16.9 (5.4)	30.1 (6.7)	16.9 (4.7)	18.0 (5.5)	8.5 (3.4)	3.0 (2.1)
Hours of service requirements and log book record keeping	69.7 (5.0)	17.9 (5.2)	31.7 (6.5)	11.8 (4.5)	20.7 (5.4)	1.2 (1.2)	3.3 (2.3)
Stopping and skid control	65.3 (5.7)	27.0 (7.7)	28.8 (7.4)	5.08 (3.0)	20.0 (5.9)	8.7 (3.9)	12.1 (5.3)
Vehicle control under various loading conditions	61.2 (5.4)	28.8 (7.1)	26.7 (6.6)	18.60 (5.7)	13.5 (5.5)	8.6 (3.8)	3.9 (2.7)
Route planning	54.2 (5.45)	28.3 (7.3)	37.7 (7.6)	6.6 (3.3)	21.7 (6.2)	2.1 (2.1)	0.0
Fatigue management	52.6 (5.6)	29.9 (7.4)	16.8 (6.2)	10.9 (4.4)	27.3 (7.2)	6.4 (3.6)	2.1 (2.1)
Handling hazardous materials	48.2 (6.1)	12.0 (5.3)	19.3 (7.1)	18.3 (6.2)	25.8 (7.5)	5.8 (4.1)	5.0 (3.6)

For each skill area, drivers were asked about the type of instructional approach. Table 27 shows the distribution of the instruction methods for each of the 10 skill areas.

**Table 27. Distribution of instruction methods for each skill**

Training topic	How Taught				
	On my own (videos, on line, reading materials)	With peer driving instructor	In classroom	With formal driving instructor	Other
Pre- and post-trip inspection (n=68)	36.4 (6.3)	22.5 (5.2)	6.4 (3.36)	22.8 (5.4)	8.3 (3.3)
Recognizing and reacting to hazards and emergency situations? (n=65)	3.8 (2.9)	12.6 (4.4)	42.7 (6.5)	34.5 (6.4)	3.7 (2.2)
Backing maneuvers (n=63)	10.1 (3.5)	27.3 (6.1)	16.8 (4.9)	42.0 (6.7)	3.9 (2.8)
Load securement (n=52)	16.9 (5.5)	28.0 (7.1)	10.7 (4.0)	28.1 (6.8)	11.3 (4.2)
Hours of service requirements and log book recordkeeping (n=51)	18.4 (5.7)	35.6 (7.3)	18.5 (6.8)	24.2 (6.3)	1.4 (1.4)
Stopping and skid control (n=47)	11.0 (4.4)	22.2 (6.6)	34.0 (6.6)	24.4 (6.7)	8.5 (4.4)
Vehicle control under various loading conditions (n=54)	14.9 (5.1)	21.3 (5.7)	29.9 (6.9)	28.9 (6.4)	5.0 (3.6)
Route planning (n=40)	21.6 (7.2)	36.4 (8.4)	8.5 (4.2)	27.3 (7.3)	2.5 (2.5)
Fatigue management (n=46)	29.8 (8.1)	16.9 (6.3)	8.4 (4.2)	38.4 (8.5)	4.9 (3.4)
Handling hazardous materials (n=39)	19.0 (7.5)	30.4 (11.2)	14.2 (6.3)	29.0 (8.9)	7.4 (5.2)

Examination of Table 27 shows that although all the instructional methods listed were used in each skill area, one or two methods dominated in each skill area. Learning by one's self through computer-based videos and tutorials and reading materials were the most frequent teaching methods for pre- and post-inspections and fatigue management. Instructions from peer drivers and formal instructors were the most frequent instructional methods for backing maneuvers, load securement, hours of service/log books, route planning and handling of hazardous materials. Classroom instruction and driving with a formal instructor were the most frequent methods for training in vehicle control under various loading conditions and stopping and skid control.

To determine how much finishing training a driver can expect, drivers were asked how many trucking companies they worked for, what proportion of these companies had a finishing program, and how long it was. This question and all remaining questions were asked of the entire sample of respondents. Table 28 shows the proportions of drivers by the number of employers.

**Table 28. Drivers by number of employers**

About how many different	n=278
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trucking companies have you worked for?	Percent, (SE)
1	26.9, (3.00)
2	21.2, (2.59)
3	20.0, (2.55)
4	12.7, (2.06)
5	6.2, (1.55)
6+	13.0, (2.00)

While 13 percent of the drivers worked for six or more employers, 68 percent worked for three or fewer employers. Examining the number of employers by driver age, (Table 29) shows that on average, younger drivers (age 21-40) worked for two to three employers, and drivers over age 40 worked for between three and four employers.

**Table 29. Average number of employers for by age category**

Age category years	Mean, (95% CI)
21-40	2.4, (1.9-2.8)
41-55	3.5, (3.0-4.0)
56-70	3.4, (3.0-3.8)

Drivers were asked to estimate the proportion of their employers that provided them with a formal orientation or finishing program when they started at the firm. Table 30 shows that about one-quarter of the drivers reported none of the firms they worked for had such a program and close to one-third of drivers said that every employer they worked for provided a finishing program.

**Table 30. Distribution of employers that provided finishing programs**

What portion of these companies provided a formal orientation training or finishing program period?	n=282 Percent, (SE of Percent)
none	24.4, (2.7)
about one-quarter	9.9, (1.9)
about one-third	7.7, (1.6)
about one-half	12.1, (1.9)
about two-thirds	4.1, (1.4)
about three-quarters	3.8, (1.3)
all	31.7, (3.0)

Drivers were also asked about the length of the finishing training program. Table 31 shows the length of the time allocated to the formal orientation or finishing programs by employers that had them. About 7 percent of finishing programs were less than one-day in length. In those cases, it is very likely that only

Human Resource types of matters were taken care of, and little if any training occurred. Almost 14 percent reported 1-day programs. The remaining reported programs from 2-4 days to over 2 weeks.

**Table 31. Length of finishing programs**

On average, how long were the training periods?	n=282 Percent, (SE of Percent)
< 1 day	7.1, (1.8)
1 day	13.7, (2.7)
2-4 days	25.7, (3.3)
5-7 days	4.1, (1.6)
1-2 weeks	26.7, (3.4)
> 2 weeks	19.4, (3.1)

A list of skills that a good truck driver should have is provided in Table 32. All drivers were asked to rate their confidence in their driving skills for each of these on a scale of 1 to 5, where 1 is not at all confident and 5 is completely confident. The table shows the mean responses and 95 percent confidence interval for all the drivers and for each age category.

**Table 32. Driver confidence in their driving skills (n, Mean, (95% CI)**

On a scale of 1 to 5, where 1 is not at all confident and 5 is completely confident, how confident do you feel doing each of the following?				
	All	Age 21-40	Age 41-55	Age 56-70
Stopping and skid control	n=280 4.6 (4.5-4.7)	n=36 4.6 (4.4-4.9)	n=122 4.6 (4.4-4.7)	n=116 4.7 (4.6-4.7)
Recognizing hazards	n=277 4.8 (4.7-4.8)	n=36 4.8 (4.6-5.0)	n=122 4.7 (4.6-4.8)	n=114 4.8 (4.7-4.9)
Reacting in emergency situations	n=278 4.7 (4.6-4.8)	n=36 4.6 (4.3-4.9)	n=122 4.7 (4.6-4.8)	n=114 4.7 (4.6-4.9)
Driving defensively	n=279 4.8 (4.9-5.0)	n=36 4.9 (4.8-5.0)	n=122 4.8 (4.7-4.9)	n=115 4.9 (4.9-4.8)
Avoiding jackknifing	n=260 4.6 (4.5-4.7)	n=36 4.4 (4.5-4.7)	n=111 4.7 (4.6-4.8)	n=107 4.5 (4.3-4.7)
Controlling vehicle in bad weather	n=277 4.7 (4.6-4.8)	n=35 4.6 (4.4-4.9)	n=121 4.6 (4.5-4.8)	n=116 4.8 (4.7-4.9)
Backing vehicle under various conditions	n=280 4.8 (4.7-4.9)	n=36 4.7 (4.4-4.9)	n=122 4.8 (4.8-4.9)	n=116 4.79 (4.7-4.9)
Being able to avoid crashes	n=277 4.7 (4.6-4.8)	n=36 4.7 (4.5-5.0)	n=122 4.6 (4.5-4.7)	n=114 4.8 (4.7-4.9)

On a scale of 1 to 5, where 1 is not at all confident and 5 is completely confident, how confident do you feel doing each of the following?				
	All	Age 21-40	Age 41-55	Age 56-70
Stopping on slippery surfaces	n=276 4.6 (4.5-4.7)	n=36 4.6 (4.4-4.8)	n=122 4.5 (4.4-4.7)	n=115 4.6 (4.9-4.7)
Securing loads	n=270 4.8 (4.7-4.8)	n=36 4.7 (4.8-5.0)	n=119 4.7 (4.6-4.8)	n=110 4.8 (4.7-5.0)
Driving with hazardous materials	n=232 3.9 (3.3-4.1)	n=31 3.8 (3.3-4.4)	n=100 3.88 (3.6-4.2)	n=98 4.0 (3.7-4.3)
Managing fatigue	n=276 4.7 (4.6-4.78)	n=36 4.6 (4.4-4.8)	n=122 4.7 (4.6-4.8)	n=113 4.8 (4.7-4.9)
Recordkeeping in log book	n=253 4.6 (4.5-4.7)	n=36 4.5 (4.2-4.8)	n=108 4.6 (4.4-4.7)	n=106 4.7 (4.5-4.9)
Conducting pre and post trip inspections	n=278 4.8 (4.8-4.9)	n=36 4.9 (4.6-5.0)	n=122 4.8 (4.7-4.9)	n=116 4.9 (4.8-5.0)

With the exception of driving with hazardous materials, drivers were very confident about their abilities to handle each of the skill areas. All scores were over 4.4 or higher, and they did not differ significantly across age groups. Driving with hazardous materials requires specialized training and the proper endorsement, which not all drivers had. When only drivers who had hazmat training were considered, the confidence score was 4.7 (4.3-5.0 95% CI).

Driver use of advanced technologies was explored by asking if drivers had any of a set of 10 advanced systems on the truck they drive, and if so, how they learned to use them (Table 33 and Table 34). The 10 systems included some that were already widespread, and others that were just beginning to be deployed. For example, adaptive cruise control was available on almost 60 percent of the trucks, systems for communication with dispatch were on 56 percent of the trucks, and GPS navigation systems were on 37 percent of trucks. However, collision warning systems and blind spot detection were present on only 9 percent of the trucks.

**Table 33. Presence of and learning to use new technology (1-5)**

Is the truck you drive equipped with	Collision warning system	Lane departure system	Blind spot detection	Electronic stability control	Roll stability control
Yes, equipped n=282 Percent (SE)	9.4 (1.9)	8.7 (1.9)	17.5 (2.4)	27.6 (2.9)	19.3 (2.5)
How did you learn to use this technology? (Percent, SE)					
	Collision warning system n=27	Lane departure system n=22	Blind spot detection n=49	Electronic stability control n=73	Roll stability control n =53
Safety meeting or special session at work	17.0 (8.3)	21.7 (10.2)	22.8 (6.8)	11.6 (3.9)	21.4 (6.6)
Figured it out myself	27.9 (9.2)	32.8 (10.6)	43.4 (7.2)	42.3 (6.4)	50.8 (7.4)
Another driver showed me	0.0 (0.0)	7.4 (7.2)	3.6 (3.6)	10.8 (4.1)	8.9 (4.4)
Vendor demo/training	11.9 (5.9)	11.3 (6.5)	5.0 (2.9)	6.3 (2.5)	4.5 (2.6)
CDL class	11.9 (5.9)	14.5 (8.4)	7.1 (4.3)	9.4 (3.9)	8.2 (3.6)
Refresher course or other training after CDL	6.5 (4.6)	4.15 (4.2)	7.1 (4.3)	3.2 (1.8)	1.3 (1.3)
Watched Video	13.5 (8.8)	14.7 (9.6)	5.6 (3.0)	6.9 (3.5)	3.3 (3.3)

**Table 34. Presence of and learning to use new technology (6-10)**

Is the truck you drive equipped with	Adaptive cruise control	GPS navigation	Communications with dispatch	Trailer tracking	Electronic log device
Yes, equipped n=282 Percent (SE)	59.3 (3.1)	36.8 (3.1)	55.6 (3.2)	16.0 (2.3)	30.8 (2.9)
How did you learn to use this technology? (Percent, SE)					
	Adaptive cruise control n=166	GPS navigation n=102	Communications with dispatch n=155	Trailer tracking n=47	Electronic log device n=88
Safety meeting or special session at work	11.4 (2.8)	17.1 (4.4)	22.0 (3.8)	18.5 (5.6)	33.4 (5.5)
Figured it out myself	63.5 (4.1)	59.6 (5.4)	43.9 (4.3)	28.6 (6.9)	22.3 (4.6)
Another driver showed me	7.9 (2.1)	3.6 (1.8)	9.6 (2.6)	6.1 (3.5)	9.3 (3.6)
Vendor demo/training	1.93 (1.2)	4.0 (1.8)	7.7 (2.2)	8.3 (4.1)	9.7 (3.0)
CDL class	4.3 (2.00)	8.5 (3.1)	5.4 (1.9)	12.2 (4.8)	14.4 (4.1)
Refresher course or additional training after CDL	3.1 (1.5)	5.1 (2.7)	10.2 (3.1)	12.5 (6.0)	10.1 (3.6)
Watched Video	2.4 (1.3)	5.1 (2.7)	2.1 (1.3)	5.6 (4.2)	6.1 (3.1)

Drivers' responses indicate that there was little formal training in the use of these systems. With the exception of electronic log books, the most frequent learning method reported by the drivers was "figured it out myself." The proportion for "figured it out myself" ranged from about 30 to 60 percent of drivers. In the case of the electronic log book, 33 percent learned to use it from safety meetings at work, 22 percent figured it out by themselves, and 14 percent learned to use it in their CDL training.

All drivers were asked if they would be interested in training on any of the advanced technologies, and 21 percent said they would be. About one-third of those who were interested in more training mentioned each of the technologies listed above with the exception of two for which there was little interest. These were electronic stability control and communications with dispatch. The reasons for this may be that electronic stability control is autonomous and invisible to the driver until it activates on its own, and training in communications is of little interest because the drivers do it all the time anyway. Further

examination showed that drivers asking for more training for specific technologies were likely not to have these technologies in their trucks. However, approximately one-third of the drivers asking for more training on GPS navigation and electronic log devices had these systems in their trucks. This indicates that while they may have some systems, they are not using them to the level that they would like. All drivers were also asked if there was any other training in which they would be interested. Sixteen percent expressed interest in additional training. Among the most frequent topics mentioned was training in avoiding jackknifing, with many wanting this training on the skid pad. Other frequently mentioned training topics included driving in hazardous weather conditions, hazmat training, and defensive driving.

Drivers were asked about their perceptions of their company's top managements' attitudes toward driver training and safety (Table 35).

**Table 35. Drivers' rating of managements' attitude toward training and safety**

Now think about your company's top management. How much do you agree with these statements, where 1 is strongly disagree and 5 is strongly agree?	Average score (Mean (95% CL))			
	All (n=276)	Age 21-40 (n=35)	Age 41-55 (n=123)	Age 55-70 (n=114)
Management considers training to be important	4.2 (4.0-4.4)	4.4 (4.0-4.8)	4.0 (3.8-4.25)	4.4 (4.2-4.6)
Safety is given a high priority by management	4.5 (4.4-4.6)	4.7 (4.4-4.9)	4.3 (4.1-4.5)	4.6 (4.5-4.8)

Overall, drivers reported that top management considered training to be important and viewed safety as a priority. However, the level of agreement of the age 41-55 group was somewhat lower for both items than the agreement scores of the younger and older age groups. The differences were statistically significant at ( $p < .001$ ). Although, the average agreement scores for both items were high, the overall priority on safety received a higher score ( $4.5 \pm 0.1$ ) than the overall score on importance of training ( $4.2 \pm 0.2$ ) and the difference between the means was statistically significant ( $p < .001$ ).

Finally, drivers were asked if they were familiar with the training program at MCTS. The first question did not mention MCTS specifically but asked if drivers had heard about skid pad training that was available to truck drivers in Michigan<sup>10</sup>. About one-third (35 percent, SE 3.0) responded that yes, they had heard about the skid pad. The next questions asked specifically about MCTS. Close to one-half the drivers (45.4 percent, SE 3.2) said that they had heard of MCTS. Of these, 40.8 percent (SE 4.7) stated that they knew about the programs and courses offered by MCTS.

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<sup>10</sup> The question was asked in the present tense, even though at the time of the survey, the skid pad facility was not available as part of MCTS training programs.

## **7. MTA Safety Council Group Interviews**

### **7.1 Background**

Safety managers of trucking companies deal with CMV driver-safety issues on a daily basis. In many trucking companies, they are responsible for hiring drivers, assessing performance, providing additional training, and managing risks. The MTA's East and West Safety Councils are organizations of trucking safety managers dedicated to advancing safe policies, practices, technology, and effective risk-management and accident/injury prevention in Michigan's trucking industry. They also address the trucking industry's human resource challenges, health and wellness issues, and recruitment and retention strategies. As such, members of the Safety Councils constitute a special and knowledgeable stakeholder group whose experience, opinions, and concerns are invaluable in assessing the training needs of CMV drivers in Michigan.

The research team held two separate group discussions with representatives from the West and East Michigan Safety Councils, respectively, to explore issues surrounding the training of truck drivers in Michigan. Information gathered from the group discussions not only provided direct insights into how to improve truck driver training, but also helped inform the development of data collection instruments for other parts of this research. These included the interview guide for safety managers of trucking firms and a telephone questionnaire for truck drivers in Michigan.

### **7.2 Methods**

A list of topics was developed to help guide discussion for each of the groups (see Appendix D). Topics centered around: individual characteristics of truck drivers that might influence their training needs (e.g., level of experience and amount of training before being hired, location and type of training prior to receiving CDL, sociodemographic characteristics such as age and years of driving); characteristics of trucking firms that might affect training (e.g., safety culture, established policies and practices regarding safety, incentives and disincentives for training, process for determining training needs); current training programs, existing gaps, and priorities for future training; and measures of success. The research team met with the West Safety Council in June 2015 in Grand Rapids and the East Safety Council in July 2015 in Dearborn for discussions on current truck driver training and training needs.

### **7.3 Findings**

A number of themes emerged from the two discussions and are highlighted below. Unless noted, there were few differences in opinions or perceptions between the two Councils.

#### ***Industry trends affecting training needs***

Training needs encompass not only basic driving skills but also more general safety-related competencies (e.g., keeping a log, pre-trip inspections, and mechanical aspects of equipment). One theme that emerged from the discussions was that training needs are being driven by changes in the trucking industry itself, including: driver shortages, particularly among experienced drivers due to high turnover; increased reliance on telematics; increasing numbers of middle-age displaced workers from other

industries; and young people dissatisfied with current occupations. Many of these industry trends have led to large numbers of novice truck drivers (i.e., inexperienced drivers just receiving their CDL license) coming into the industry.

### ***Differences among novice truck drivers***

The challenges facing novice truck drivers vary somewhat by age and personal situation, according to members of the Councils. For example, people changing careers may not understand the industry and/or the environment around truck driving. Young people may be more comfortable with telematics but may be less focused and require more feedback on their performance. Middle-age drivers may be more mature, as well as cautious and detail oriented, but may be more set in their ways. Military veterans are often in the position of learning a new career while at the same time dealing with other issues related to their military experience. Despite these differences, it was pointed out that all novice truck drivers must adjust to the truck driving lifestyle and learn safe driving practices.

### ***Pre-CDL training for novice truck drivers***

One clear area of agreement was that, in general, novice truck drivers lack adequate training. This is due in part to the lack of a standardized curriculum in pre-CDL training programs. Programs vary considerably in scope and quality of training, but overall program length is generally limited to 2-3 weeks. In addition, there is a limited opportunity for BTW time and most programs do not teach more general competencies (e.g., filling out log). Equipment is often outdated resulting in a lack of exposure to modern telematics for novice drivers. While programs offered through community colleges are generally better, few of these exist. Finally, pre-CDL training program can be bypassed entirely if drivers pass a third party test.

### ***Finishing programs***

There was widespread agreement that finishing programs are important for novice truck drivers by providing an opportunity for orientation and training specific to each carrier. These programs often match up new and experienced drivers. However, finding the right fit is often more of “an art” than a scientific or systematic process. In addition, experienced drivers serving as volunteer trainers may need some type of monetary incentive to compensate for the earnings they give up by making themselves available. It was pointed out that finishing programs need to focus not just on skills but also orienting drivers to state, federal, and company policies and regulations. Among the current challenges for finishing programs are that they are not standardized across carriers and they are generally not feasible for very small carriers.

### ***Continuing training***

Continuing training efforts can also be challenging. Several specific issues were identified by the Councils. First, experienced drivers must recognize that there are things they do not know. This can sometimes be difficult for drivers who have done things in a certain way for many years. Second, training is often offered only after problems arise. Therefore it becomes a reactive rather than proactive response. Third, costs and time are significant barriers for drivers getting the training they need. Vendor programs are available but can be expensive and not tied directly to what people do. Fourth, trainers must be seen

as credible and experienced by truck drivers and the training itself must be perceived as relevant. There are various options for training (e.g., simulators and skid pads), but carriers and drivers may not be not aware of them. Mandatory safety meetings were viewed favorably as a training option, as was informal interaction between safety managers and drivers. Finally, it was clear that all of the challenges associated with training are amplified for small trucking firms and owner/operators, with the latter not likely to offer training at all.

## **8. Statewide Safety Manager Phone Interviews**

For this task, the research team completed structured telephone interviews with a sample of safety managers from Michigan trucking firms. Team members trained and experienced in qualitative interviewing conducted the interviews using an interview guide of open-ended themes. This gave the respondents freedom in answering and allowed for in-depth follow up questions from the interviewers. The broad topic areas covered included information about the firm/carrier (such as the typical number of new hires annually), training needs of new hires, training provided to new hires, continuing training for all drivers, and training needs related to emerging vehicle technologies (see Appendix E for the complete interview guide). Respondents were not compensated for their participation.

Telephone interviews were selected over in-person interviews because of the wide geographic distribution of potential respondents throughout Michigan. Detailed notes were taken and analyzed using an open, focused coding process (Patton, 2001) through which team members identified code categories and themes across interviews. The UMTRI research team has extensive experience in conducting and analyzing these types of interviews and developed the interview guide based on similar themes and topics used in the survey of CMV drivers, as well as findings from the discussion groups with the MTA Safety Councils.

### **8.1 Sampling Method**

A sampling frame of carriers domiciled in Michigan that are registered in the FMCSA MCMIS Carrier file was used to randomly select participants. The MCMIS census lists about 13,000 carriers with recent activity in Michigan and its use ensured adequate representation of interstate- and intrastate-operations, different fleet sizes, and firms from both “for hire” and “private property” classifications.

The carriers in the MCMIS database were divided into four groups by size:

- 1)  $\leq 20$  vehicles and  $< 10$  drivers
- 2)  $\leq 20$  vehicles and  $\geq 10$  drivers
- 3)  $> 20$  vehicles and  $< 100$  drivers
- 4)  $> 20$  vehicles and  $\geq 100$  drivers

A random sample of 450 carriers was drawn and the number of carriers included from each group was proportional to the distribution of carriers of that size in Michigan (Group 1 = 160; Group 2 = 80; Group 3 = 170; Group 4 = 40). The carriers within each group were then randomly distributed across 10 replicates

per group. This approach allowed randomization to occur at two levels. Team members started attempting interviews with Replicate 1 of each group. Two attempts were made to contact each carrier to request an interview with the safety manager. First, an email message was sent to each carrier’s contact person in the MCMIS database. The second contact was a phone call to the identified contact person. If an email address was not available for a carrier, up to two phone calls were made instead. Additional email messages and/or phone calls were completed, as needed, to schedule and complete interviews once contact with a safety manager was established and he/she agreed to participate. New replicates were opened at weekly interviews until all 10 replicates were open and eligible for interviews.

## 8.2 Results

Interviews lasted approximately 15-30 minutes. Prior to the start of data collection, the research team determined that the number of interviews completed would be capped at 50. Preliminary analyses of the data conducted after 25 interviews had been completed revealed a consistent pattern of themes emerging from the interviews. An additional five interviews were completed and interview data collection was ended at 30 completed interviews. The distribution of completed interviews across carrier groups is presented in Table 36 . This distribution was consistent with the distribution of carriers by size in Michigan.

**Table 36. Distribution of carriers interviewed by size**

Carrier size	1 ≤20 Vehicles <10 drivers	2 ≤20 Vehicles ≥ 10 drivers	3 >20vehicles <100 drivers	4 >20 vehicles ≥100 drivers
n=30	10	6	12	2

### ***Training needs for new hires***

New driver turnover annually ranged from 20 percent to 50 percent. Those with higher retention rates attributed this to: investment made in driver training; compensation paid to drivers (which was reported to be recognized and appreciated by drivers); and the camaraderie fostered among drivers. Additionally, the carrier with the highest retention rate was primarily a local/regional carrier and its drivers were able to be home most evenings.

Most of the carriers require 2-3 years of experience for new hires. However, several have been forced to reduce that requirement to one year due to a shortage of available drivers. Most of those interviewed provide an orientation or finishing training for all new hires. Those who did not provide training for new hires were small carriers who said they did not have the resources available to do so. Most of the new-hire training included a basic program that lasted 2 hours to 1 day. The training consisted of a human resources orientation, a presentation of company policies and procedures, and safety topics. Some

carriers add demonstrations in the yard that allow new hires to operate the carriers' equipment, as well as require road tests and written tests that all new hires must pass before being allowed to drive a load. Four carriers (all from groups 3 and 4) provide a 1-week finishing program that includes local/regional trips supervised by a driver-trainer. New hires advance through the program based on the assessment of the driver-trainer. Those who offer the more extensive new-hire training felt that the higher cost (compared to more minimal programs) was offset by increased attention to safety by drivers, higher driver retention and loyalty to the carrier, and increased camaraderie among drivers. One carrier had consulted with MCTS when creating its program and found that assistance to be very helpful.

All of the new-hire programs were administered by safety managers, department heads, and driver-trainers. Safety managers varied in how they identified and compensated driver-trainers. Most preferred identifying prospective driver-trainers based on their assessment of drivers' safety performance, experience, and personality. Multiple safety managers noted that drivers who approach them and self-identify as good candidates to be driver-trainers are typically not appropriate for that role and are too often motivated by the potential for additional compensation. Most of the carriers compensated driver-trainers by paying them for their time worked administering training or paid driver-trainers a set amount as a bonus. Two carriers (one each in Groups 3 and 4) had established one driver-trainer as an executive position in the firm.

Several carriers said they find some individual differences in training needs but nothing that is consistent across driver demographic groups (young new hires, older new hires, new hires transitioning from other careers, new hires transitioning from the military). Some attempt to adjust or customize the new-hire training provided if needed.

### ***Continuing training for all drivers***

All of the safety managers interviewed have regular safety meetings. Most hold those meetings quarterly. There were equivalent numbers of carriers requiring attendance to maintain employment versus offering drivers bonuses for attending. To facilitate attendance, most carriers hold the safety meetings on weekends. Most of the carriers interviewed currently only offer safety meetings that must be attended in-person but some carriers are moving toward offering on-line options (possibly with some sort of quiz to validate attendance).

In Groups 1-3, the safety meeting content is influenced heavily by insurance providers. Carriers' insurance agents review the firm's safety and driver performance records and recommend topics and/or information to present. Topics typically covered during safety meetings include: changes in policy/regulations; incidents/areas to improve; and good performance recognition. The materials presented in safety meetings come from a variety of sources: prepared in-house; vendors (e.g., JJ Keller); insurance carriers; and MCTS/MTA. Two carriers (both from Group 2) receive training resources from large corporate clients whose products comprise almost 90 percent of their business. A few safety managers supplement the quarterly meetings with regular safety bulletins/newsletters.

All of the safety managers reported that in-vehicle/skills training is usually need-based; that is, provided on an individual basis based on performance reviews. Additional training is sometimes initiated by the carrier and sometimes by the carrier's insurance provider.

### ***Awareness and use of MCTS/MTA resources***

All of the safety managers interviewed were aware of MCTS/MTA programs and resources and viewed them favorably. The extent to which carriers used MCTS/MTA programs varied. Utilization ranged from seeking information from the MCTS website to enlisting MCTS's help in creating training programs specific to carriers. About one-third had used the skid pad. Most sent drivers only if the need was determined by performance records or if drivers expressed an interest in completing the training. One carrier sent all new hires to the skid pad. Other programs used by the safety managers interviewed included the Fatigue Management Program, the simulator, Home Run for Safety, and National Safety Council (NSC) Defensive Driving course.

The most frequently expressed barrier to sending drivers was that most carriers run lean operations and cannot spare drivers to attend training. A few safety managers also reported that they would like to utilize the programs more but struggle to get buy-in from their firms' owners. Interestingly, there was also a false perception by several safety managers that most of the programs are only offered in Lansing.

### ***How safety managers are addressing training for emerging vehicle technologies***

Most (close to two-thirds) have not started implementing advanced vehicle technologies (e.g., collision warning systems, lane departure warning, blind spot detection, electronic log book) or training for such technologies but plan to do so in the future. Those that started to implement those technologies have followed a similar strategy. First, they identified driver-trainers to be trained by vendors. Second, these driver-trainers then trained small groups of drivers. The most commonly implemented technologies to date are GPS, electronic log devices, and driver monitoring. Most safety managers expressed concern about reluctance by older drivers to adopt new technologies. Several have observed older drivers refusing to be trained or to use new technologies at all. Several also noted a trend in older drivers migrating to carriers not using new technologies yet and expressed concern that they will continue to do so until there are no firms left for which to drive.

### ***Additional concerns***

When asked if there were any additional concerns or anything else the industry should be talking about, most expressed concern about the driver shortage and the challenge of hiring and retaining experienced drivers. Approximately one-third mentioned that providing training helps with retention. Almost one-half of the safety managers expressed a need for more to be done to present driving as a positive career option and to prepare individuals to be career drivers. Safety managers observed an increasing trend of new hires that have "failed out" of multiple career attempts and view driving a truck as a last option. Several safety managers would like to see more career development programs that begin with high school

students to promote and begin career training and socialization. They suggested that high school students start with shop/mechanic work and learn about the industry before progressing to driving long haul.

## **9. Interview with Representative of Michigan State Police Commercial Vehicle Enforcement Division**

A telephone interview was conducted with a high-ranking representative of the Michigan State Police Commercial Vehicle Enforcement Division. The purpose was to gain the perspective of the enforcement community about driving problems and challenges among truck drivers on the road, and ideas about current and future training needs for truck drivers. The interview was led by an experienced moderator with an additional project team member participating in the discussion and taking notes. Major themes that emerged from the discussion are highlighted below.

One of the main problems the respondent identified was the failure of many truck drivers to slow down under inclement weather conditions such as snow and ice. He attributed this to the mistaken belief by many truck drivers that because of the weight of their trucks, they are able to maintain control in bad conditions. Another observation he made was that large truck fleets tend to be the safest, with drivers being “a little more professional, better trained, and more likely to have their paper work in order.” No individual differences among drivers due to age or other demographic characteristics were noted.

While he was not able to speak to training specific to truck drivers, he noted that Michigan State Police, as part of their police academy training, participate in skid pad training which he considered some of their most valuable training. In general, he observed that practical hands-on training is always beneficial. Although simulator training is one example of this, he mentioned that many police officers get sick when undergoing training in the driving simulator and some consider the simulator to represent too “sterile” of an environment compared to real-world conditions.

When asked about specific problems on the road that truck drivers might experience such as unsecured loads and driver fatigue, he noted that failure to secure a load properly can cause serious problems, particularly when going around curves. He did not feel that driver fatigue was a serious problem. He noted that in his experience, most companies “really try to stay on top of that” because hours of driving are so tightly regulated. He pointed to lack of seat belt use as an issue, mentioning that many truck drivers do not use their seat belts even though most companies have policies requiring seat belt use.

Another observation he shared was that the carriers that have at least the appearance of being less safe tend to operate on weekends when enforcement presence is reduced by about three-quarters, compared to safer carriers who tend to operate during normal Monday through Friday business hours. He also noted that it is usually the larger safety conscious carriers that invest in technology and training. One of the major barriers that smaller carriers face is the cost for drivers to attend training. Because of this, he recommended that efforts be made to do more outreach to these companies. He specifically mentioned

the opportunity to provide smaller carriers with copies of the MCTS guidebook (MCTS, 2015), a resource that many companies are not even aware exists. He also mentioned the importance of doing more outreach to get drivers from small carriers to come to safety demonstrations.

## **10. Results and Recommendations**

The goal of this study was to assess the extent to which the educational and training needs of the Michigan trucking industry are currently being met, and to identify any gaps that should be addressed. Several tasks were completed as part of this assessment including: 1) an analysis of recent patterns of crashes and violations of CMV operators in the state; 2) a review of training practices in the U.S. focusing on CDL training and available CMV driver training programs in Michigan; 3) a survey of a representative sample of truck drivers whose primary jobs required a CDL; and 4) interviews with safety managers of trucking firms in the state and also with a representative of the CVED of the Michigan State Police.

As a context for understanding and organizing the findings, it is important to note that there are at least three phases in the training and education of truck drivers. The first phase leads to the acquisition of a CDL and preparation for a truck driving career. The second involves initial on-the-job training of entry-level drivers. The third phase covers continued training and knowledge updates over the course of a driver's career. These are needed to hone and improve driving skills, to keep current on rules and regulations, and to learn about new technologies and advances and changes in the field. In addition, the need for training in new technologies and telematics cuts across all three phases, and should be addressed in each. Finally, there is a need to address the concerns of the trucking industry about driver shortage issues and that careers in trucking are not seen as desirable career paths by young people.

### **10.1 Phase 1 - Obtaining the CDL**

#### **Summary of results**

Currently, there are no specific formal training requirements prior to taking the CDL test. A driver can take the CDL skills test 14 days after obtaining a Commercial Learner's Permit. However, among current truck drivers in Michigan, approximately 60 percent prepared for the CDL test by enrolling in programs at community colleges, private truck driving schools, or schools operated by trucking companies. The training programs vary considerably in scope and quality of training. Overall, most programs are limited to 2-5 weeks, and most do not teach beyond more general competencies (e.g., filling out log, pre-trip inspections, and mechanical aspects of equipment). There also is no standardized curriculum and in many programs, there is only a limited opportunity for behind the wheel driving practice. Equipment is often outdated resulting in a lack of exposure to new technologies and modern telematics.

#### **Recommendations**

- Encourage and support CDL training programs in community colleges and technical schools to increase their numbers in Michigan. A possible approach would be to promote commercial driver training as part of workforce development programs in Michigan's community colleges.

- Support minimum CDL training standards. This includes adoption of a standardized curriculum that goes beyond preparation for passing the CDL test, but also prepares the student for a career as a commercial vehicle driver.
- Advocate and support increased behind the wheel time for CDL students, as well as training in the use of new technologies and telematics. This could be part of the minimum training standards, or part of a standardized curriculum.

## **10.2 Training of the entry-level driver**

### **Summary of results**

It is widely accepted that the level of driving skill and knowledge required to earn a CDL is well below that required to be a safe and reliable driver in a full-time operational setting. To this end, many carriers put their entry level drivers through an orientation or finishing program in which drivers are given additional training to improve their driving skills and company-specific instruction on non-driving aspects of the job such as managing the carrier's paperwork, working with its dispatchers, and interacting with customers.

While entry-level drivers are not necessarily young, many of them are. The analysis of hazardous actions in truck crashes identified young drivers age 21-25 as having a higher rate of *failure to yield, improper backing and unable to stop in an assured clear distance* actions than older drivers. The over-representation of younger drivers in these specific hazardous actions identifies areas that should receive more attention in the training of young drivers. Thus, the initial training of entry level drivers should emphasize backing maneuvers and stopping and skid control. Finishing programs of entry-level drivers should also orient the drivers to state, federal, and company policies and regulations. Among the current challenges for finishing programs are that they are not standardized across carriers and they are generally not feasible for very small carriers.

### **Recommendations**

- Support standardized training of entry-level drivers during finishing programs and in subsequent safety meetings to include not only driving skills, but also state and federal regulations.
- Emphasize training in backing maneuvers, stopping, and skid control for entry-level drivers.
- Provide more outreach and encouragement to smaller carriers to provide training for their young drivers. Publicize and encourage their participation in MCTS programs and resources.

## **10.3 Continuing training**

### **Summary of results**

Training for truck drivers continues with experience and through various safety programs at work and at finishing and orientation programs when changing jobs. Many carriers have finishing programs for new hires and periodic safety meetings for their drivers. Most new-hire finishing training includes a basic program that lasts from 2 hours to 1 day. This training often consists of a human resources orientation, and a presentation of company policies, procedures, and safety topics. Some programs are longer and

include additional driver training based on an assessment of a driver-trainer. However, smaller carriers are not likely to provide such training.

Ongoing training is provided through safety meetings. These meetings are mandatory at some carriers, and in some cases are influenced by the carrier's insurance providers. Topics covered at such meetings include safety and driver performance records, changes in policy or regulations, review of incidents, areas for improvement, and recognition of good performance. Again, not all carriers have such programs.

The pattern of violations identified in this study points to areas where training of drivers is needed. Brakes and tires accounted for most of the OOS conditions in vehicle violations, with brakes being by far the most significant. Although mechanics are responsible for fixing problems, drivers are responsible for pre- and post-trip inspections and should be able to identify brakes that are out of adjustment. Among driver-related violations, the primary area was hours of service, and that was mainly for exceeding the number of driving hours permitted daily. This suggests that additional emphasis on log book record keeping requirements and on training in the newer technologies of electronic log books could be beneficial to drivers. It is noteworthy that smaller carriers had higher OOS rates than larger ones.

One of the training challenges facing Michigan carriers has to do with new telematics and advanced technology. The survey of truck drivers conducted as part of the present study indicates that a large portion of the drivers who have some of these technologies on their vehicles figured out how to use them by themselves. Clearly, a more systematic and comprehensive approach is required. A possible way to address this program is through MCTS. MCTS could create or coordinate a training program to address new technologies.

Some carriers provide additional vehicle-skills training for their drivers as a result of a performance review or only after a problem arises. Others are more proactive and use the training resources of the MCTS to promote and reinforce safe driving practices. Among this group, many have called attention to the value of the *Michigan Decision Driving* course that used a skid pad to help drivers understand proper stopping and skid control techniques on the type of vehicle they drive. Further support for this type of training comes from the aftermath of the approximately 150-vehicle pile-up on I-94 in January, 2015, that involved a large number of trucks on a slippery surface in inclement weather.

While the MCTS has an extensive training program, many carriers do not make use of its resources. The results of the statewide survey of safety managers indicated that most of them are aware of the program and about half of drivers statewide also have heard of MCTS. Reasons given by carriers for not using MCTS programs are that they run lean operations and cannot spare drivers to attend training and that "buy-in" was lacking from their firms' owners.

## Recommendations

- Advocate for finishing programs for new hires at all carriers. These programs should include not only the basic human resource requirements and carrier policies and procedures, but also an assessment of driving and training if needed.
- Advocate for periodic safety meetings at all carriers. A possible approach for small carriers would be to hold joint meetings where common safety topics could be covered.
- Stress brake systems and tires when training on vehicle mechanical parts, so that drivers can identify problems before their vehicle is OOS in an inspection.
- Develop a program for teaching drivers how to use the new telematics and technologies. This program could be developed or coordinated by MCTS and aimed at drivers directly or by training trainers.
- Increase utilization of MCTS by making carriers more aware of the programs, website, and especially the simulator through marketing and publicity. Reaching out to small carriers would be especially important.
- Promote MCTS outreach to small carriers, making sure that they are aware of the resources available to them, as well as through the distribution of the MCTS *Truck Driver's Guidebook*.
- The loss of the skid pad facility for driver training in Michigan is very unfortunate. It was a valuable training resource and there are only a few such facilities available for truck driver training left in the U.S. Because of the high costs involved in running such facilities, other skid pads have been replaced by high-fidelity simulators. The economic feasibility of opening another facility in Michigan should be examined, and options based on the findings should be pursued.

### 10.4 Addressing the driver shortage

Finally, there is a concern in the trucking industry that a career in trucking is not seen as a desirable career path by young people. This is not only a Michigan problem, but a nationwide problem and has led, in part, to the present shortage of drivers. Because an individual has to be at least 21 years old to get a CDL and start a driving career, he or she might not consider it when still in high school and beginning to make career decisions. There is a need to examine the trucking industry in a broader context and identify what can be done to present driving as a positive career option. One approach for encouraging more individuals to consider the trucking industry as a career would be to introduce the trucking industry (driver, dispatcher, maintenance) as a career path option in high school and provide materials for high school counselors. Outreach programs from the industry and apprenticeship programs would also help high school students learn about the industry and consider it as a career choice.

## Recommendations

- Encourage research to examine trucking issues within the broader societal context, and examine attitudes toward the trucking industry and drivers and how they vary by cohort.

- Develop and support approaches to introduce the trucking industry as a career choice in high school and help institute outreach programs and apprenticeships for high school students to learn about the industry and consider it as a career choice.
- Review national efforts of the trucking industry aimed at driver shortage issues and identify and support those that are reasonable and beneficial for Michigan

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## **Appendix A. Certified CDL Training Providers In Michigan- June 2015**

A & B CDL Inc.  
ABC Training and Testing LLC  
All Stars Truck Driving School Inc.  
American Workplace Trucking Centers Inc.  
Baker College  
Berts Testing & Training Services Inc.  
BNM Professional Transportation and  
Warehouse Academy  
CCW Headquarters Inc. doing business as (dba)  
CCW Headquarters School of Law  
Enforcement  
CDL Training Services & Consulting Inc.  
Class A Training Center LLC  
Classic Driving School Inc.  
Coast To Coast Truck Driving Schools Inc.  
Detroit Training Center Inc.  
Driving for America-Saginaw LLC  
E Z Way Driver Training Inc.  
Extra Effort Enterprises LLC dba Driver Training  
Services  
EZ Truck Driving School Inc.  
FCG Truck Driver Training Inc.  
First Class Driving School Inc.  
Gogebic Community College  
Great American Truck Driving School Inc.  
GTR Trucking School Inc.  
Humphrey Enterprises Inc. dba Humphrey's  
Driver Training & Testing  
International Trucking School Inc. dba ITS 1  
Lake Fenton Truck Training Driving School Inc.  
Liberty Truck Driving School  
Maier Driver Education School LLC  
Midwest Truck Driving Schools LLC  
Pinnacle Truck Driver Training Inc.  
Polyservice Inc. dba Polyservice Driving School  
Rassem Trucking Driving School Inc.  
Rivertown CDL Academy LLC  
Road Warrior Truck Driving School Inc.  
Ross Education LLC dba Tri Area Trucking  
School  
Samba Express Inc.  
Sea 2 Sea CDL Training School LLC  
Semi U Inc. dba Semi Academy  
Star Employee Leasing LLC dba Star  
Professional Driving School  
Suburban Career Service Inc. dba Suburban  
Truck Driver Training School  
Trainco Inc.  
US Truck Driver Training School Inc.  
West Michigan CDL Inc.

**Appendix B. Interview Guide for CDL Training Providers  
Summer/Fall 2015**

**Main Questions**

1. **What CDL classes or training do you offer?**
  - a. *Probe for the number of training hours*
  - b. *Probe for the content covered*
    - c. *Probe for a copy of the curriculum or an overview of the curriculum*
2. **What is the format for each course / How is each course taught?**
  - a. *Probe for classroom*
  - b. *Probe for range and/or year*
  - c. *Probe for on the road*
  - d. *Probe for simulator*
  - e. *Probe for skid pad*
  - f. *Probe for instructor-led, one-on-one, independent study/practice*
    - g. *Is instruction provided in any other format?*
3. **What is the cost of your courses?**
4. **Do you offer any financial assistance?**
  - a. *Probe for types of assistance offered*
    - b. *Probe for how many students use financial assistance*
5. **How many students do you enroll in a typical year?**
  - a. *Probe for each course offered*
    - b. *Probe for basic demographic info*
6. **What pre-requisites do you have to enroll in your courses?**
  - a. *Probe for each course offered*
7. **Do you offer job placement assistance to your students?**
  - a. *Probe for a description of the assistance provided*
  - b. *Probe for requirements to receive assistance*
    - c. *Probe for how long assistance is continued after course completion*
8. **Is there anything else you would like to share with us about your CDL training?**

## Appendix C. Truck Driver Survey Instrument

My name is **(INTERVIEWER'S NAME)** from **(SURVEY COMPANY)**. I'm calling on behalf of the University of Michigan Transportation Research Institute to conduct a survey as part of a truck highway safety study in Michigan. This survey is for research purposes only; we are not trying to sell anything. May I speak with **(NAME ON SAMPLE)**?

This survey will take about **15** minutes of your time.

**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 of age or older and less than 71 years of age. IF NO, TERMINATE (NOT ELIGIBLE)**

**S2. Do you have a Michigan Commercial Driver License (CDL)? IF NO, TERMINATE (NOT ELIGIBLE)**

**S3. Is driving a truck your primary job? By truck, I am referring to a large commercial vehicle such as a single unit truck, tractor trailer, semi-trailer, car-hauler, tanker, dump truck, double-bottom truck, or other large truck with a gross vehicle weight of at least 26,000 lb. I am NOT talking about pickup trucks. IF NO, TERMINATE (NOT ELIGIBLE)**

**“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?”**

**If respondent chooses to continue, “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.”**

**If they are not available at this time, schedule a follow up call. If they refuse to participate, terminate.**

-----  
**The first several questions have to do with the type of CDL you have, the truck you drive, and your trucking firm.**

- 1. How long have you been a truck driver? \_\_\_\_\_ years**
- 2. What type of CDL do you hold?**
  - A
  - B
  - C
- 3. What endorsements do you currently have on your CDL? (CHECK ALL THAT APPLY)**
  - T (double/triple trailers)
  - P (transporting passengers)
  - N (tank vehicle)
  - H (hazardous material)
  - X (combination of tank vehicle and hazardous materials)
  - Other
  - None
- 4. What type of truck do you normally drive?**
  - Straight truck
  - Tractor – 1 trailer
  - Tractor – 2 or 3 trailer
  - Straight truck + trailer
  - Tanker

Other Specify \_\_\_\_\_

**5. Do you work for:**

- Yourself as an independent contractor leased to a motor carrier
- Yourself as an independent contractor with own authority
- Carrier
- Carrier/broker
- Shipper/carrier (also called Private carrier or House carrier)
- Other Specify \_\_\_\_\_

**6. Do you drive long haul, regional or local? (Check all that apply)**

- Long haul
- Regional
- Local

**7. What is the size of the fleet of the trucking firm you work for or with (how many trucks)?**

- 1
- 2-10
- 10-100
- 101 - 500
- Over 500

**8. About how many miles did you drive a truck last year?**

- <25,000 miles
- 25,001-50,000 miles
- 50,001-75,000 miles
- 75,001-100,000 miles
- >100,000 miles

**9. How are you paid?**

- By the hour
- By the mile
- By the load
- Percentage of delivery fee
- Monthly or weekly salary
- Other

**10. In what year did you obtain your CDL? \_\_\_\_\_**

**The next set of questions has to do with training for commercial drivers.**

**11. Did you receive training before getting your CDL?**

Yes                      No    **IF NO, SKIP TO 14**

**11a. Where did you receive your CDL training?**

- Community college                      If yes, what community college was that?
- Commercial Truck Driving School    If yes, which driving school was that?
- Other Specify \_\_\_\_\_

**12. Did you get financial support from the VA, Michigan Works, the Michigan Rural Rehabilitation Corporation, a student loan, a tuition reimbursement or assistance plan or any similar program to get your CDL?**

Yes    No

13. How many total hours or weeks of training was that training? \_\_\_\_\_ hours \_\_\_\_\_ weeks

14. In general, how many hours of on-the-road practice driving did you complete before getting your CDL? \_\_\_\_\_ hours

15. To what extent did you feel prepared for a job as a truck driver when you got your CDL? With 1 being not at all prepared and 5 being completely prepared.

1 2 3 4 5

For the next set of questions, I will ask you how you got your training for specific truck handling maneuvers and other requirements for your job as a truck driver. This includes your training for the CDL, during job orientations, on the job training, or through special programs.

16. For each of the following, please tell me if you've had the training, when you got it, how useful it was, and how it was taught.

16a. Have you had training in stopping and skid control? Yes No **IF NO, GO TO NEXT ITEM**

If yes, where did you get it? (Check all that apply)

Note to interviewers - read this list the first time, for subsequent questions, do not read unless needed as prompt.

During training to get CDL

During orientation training for first job

During orientation training for job other than the first job

During company safety meetings

Previous military training

Training session at Michigan Center for Truck Safety

Other training (Where was it? \_\_\_\_\_)

How was that taught? (Check all that apply)

In a classroom by an instructor

Watching a video

At-home reading or materials

Online or web-based program

In a driving simulator

On a skid pad

On a range or road course – with a formal instructor,

On a range or road course – with peer driver

16b. Have you had training in recognizing and reacting to hazards and emergency situations?

Yes No **IF NO, GO TO NEXT ITEM**

If yes, where did you get it? (Check all that apply)

During training to get CDL

During orientation training for first job

During orientation training for job other than the first job

During company safety meetings

Previous military training

Training session at Michigan Center for Truck Safety

Other training (Where was it? \_\_\_\_\_)

On a scale of 1 to 5, where 1 is not at all useful and 5 is very useful, in general, how useful was that training to you?

1 2 3 4 5

**How was that taught? (Check all that apply)**

- In a classroom by an instructor
- Watching a video
- At-home reading or materials
- Online or web-based program
- In a driving simulator
- On a skid pad
- On a range or road course – with a formal instructor,
- On a range or road course – with peer driver

**16c. Have you had training in defensive driving techniques? Yes No IF NO, GO TO NEXT ITEM**

**If yes, where did you get it? (Check all that apply)**

- During training to get CDL
- During orientation training for first job
- During orientation training for job other than the first job
- During company safety meetings
- Previous military training
- Training session at Michigan Center for Truck Safety
- Other training (Where was it? \_\_\_\_\_)

**How was that taught? (Check all that apply)**

- In a classroom by an instructor
- Watching a video
- At-home reading or materials
- Online or web-based program
- In a driving simulator
- On a skid pad
- On a range or road course – with a formal instructor,
- On a range or road course – with peer driver

**16d. Have you had training in vehicle control under various loading conditions? Yes No IF NO, GO TO NEXT ITEM**

**If yes, where did you get it? (Check all that apply)**

- During training to get CDL
- During orientation training for first job
- During orientation training for job other than the first job
- During company safety meetings
- Previous military training
- Training session at Michigan Center for Truck Safety
- Other training (Where was it? \_\_\_\_\_)

**How was that taught? (Check all that apply)**

- In a classroom by an instructor
- Watching a video
- At-home reading or materials
- Online or web-based program
- In a driving simulator
- On a skid pad
- On a range or road course – with a formal instructor,
- On a range or road course – with peer driver

**16e. Have you had training in backing maneuvers? Yes No IF NO, GO TO NEXT ITEM**

**If yes, where did you get it? (Check all that apply)**

During training to get CDL  
During orientation training for first job  
During orientation training for job other than the first job  
During company safety meetings  
Previous military training  
Training session at Michigan Center for Truck Safety  
Other training (Where was it? \_\_\_\_\_)

**How was that taught? (Check all that apply)**

In a classroom by an instructor  
Watching a video  
At-home reading or materials  
Online or web-based program  
In a driving simulator  
On a skid pad  
On a range or road course – with a formal instructor,  
On a range or road course – with peer driver

**16f. Have you had training in fatigue management?** Yes No **IF NO, GO TO NEXT ITEM**

**If yes, where did you get it? (Check all that apply)**

During training to get CDL  
During orientation training for first job  
During orientation training for job other than the first job  
During company safety meetings  
Previous military training  
Training session at Michigan Center for Truck Safety  
Other training (Where was it? \_\_\_\_\_)

**How was that taught? (Check all that apply)**

In a classroom by an instructor  
Watching a video  
At-home reading or materials  
Online or web-based program  
In a driving simulator  
On a skid pad  
On a range or road course – with a formal instructor,  
On a range or road course – with peer driver

**16g. Have you had training in handling hazardous materials?** Yes No **IF NO, GO TO NEXT ITEM**

**If yes, where did you get it? (Check all that apply)**

During training to get CDL  
During orientation training for first job  
During orientation training for job other than the first job  
During company safety meetings  
Previous military training  
Training session at Michigan Center for Truck Safety  
Other training (Where was it? \_\_\_\_\_)

**How was that taught? (Check all that apply)**

In a classroom by an instructor  
Watching a video  
At-home reading or materials  
Online or web-based program  
In a driving simulator  
On a skid pad

On a range or road course – with a formal instructor,  
On a range or road course – with peer driver

**16h. Have you had training in load securement?** Yes No **IF NO, GO TO NEXT ITEM**

**If yes, where did you get it? (Check all that apply)**

During training to get CDL  
During orientation training for first job  
During orientation training for job other than the first job  
During company safety meetings  
Previous military training  
Training session at Michigan Center for Truck Safety  
Other training (Where was it? \_\_\_\_\_)

**How was that taught? (Check all that apply)**

In a classroom by an instructor  
Watching a video  
At-home reading or materials  
Online or web-based program  
In a driving simulator  
On a skid pad  
On a range or road course – with a formal instructor,  
On a range or road course – with peer driver

**16i. Have you had training in hours of service requirements and log book recordkeeping?** Yes No **IF NO, GO TO NEXT ITEM**

**If yes, where did you get it? (Check all that apply)**

During training to get CDL  
During orientation training for first job  
During orientation training for job other than the first job  
During company safety meetings  
Previous military training  
Training session at Michigan Center for Truck Safety  
Other training (Where was it? \_\_\_\_\_)

**How was that taught? (Check all that apply)**

In a classroom by an instructor  
Watching a video  
At-home reading or materials  
Online or web-based program  
In a driving simulator  
On a skid pad  
On a range or road course – with a formal instructor,  
On a range or road course – with peer driver

**16j. Have you had training in route planning?** Yes No **IF NO, GO TO NEXT ITEM**

**If yes, where did you get it? (Check all that apply)**

During training to get CDL  
During orientation training for first job  
During orientation training for job other than the first job  
During company safety meetings  
Previous military training  
Training session at Michigan Center for Truck Safety  
Other training (Where was it? \_\_\_\_\_)

**How was that taught? (Check all that apply)**

In a classroom by an instructor

Watching a video  
At-home reading or materials  
Online or web-based program  
In a driving simulator  
On a skid pad  
On a range or road course – with a formal instructor,  
On a range or road course – with peer driver

**16k. Have you had training in pre-trip inspection?** Yes No **IF NO, GO TO NEXT ITEM**  
**If yes, where did you get it? (Check all that apply)**

During training to get CDL  
During orientation training for first job  
During orientation training for job other than the first job  
During company safety meetings  
Previous military training  
Training session at Michigan Center for Truck Safety  
Other training (Where was it? \_\_\_\_\_)

**How was that taught? (Check all that apply)**

In a classroom by an instructor  
Watching a video  
At-home reading or materials  
Online or web-based program  
In a driving simulator  
On a skid pad  
On a range or road course – with a formal instructor,  
On a range or road course – with peer driver

**16l. Have you had training in post-trip inspection?** Yes No **IF NO, GO TO NEXT ITEM**  
**If yes, where did you get it? (Check all that apply)**

During training to get CDL  
During orientation training for first job  
During orientation training for job other than the first job  
During company safety meetings  
Previous military training  
Training session at Michigan Center for Truck Safety  
Other training (Where was it? \_\_\_\_\_)

**How was that taught? (Check all that apply)**

In a classroom by an instructor  
Watching a video  
At-home reading or materials  
Online or web-based program  
In a driving simulator  
On a skid pad  
On a range or road course – with a formal instructor,  
On a range or road course – with peer driver

**17. About how many different trucking companies have you worked for? \_\_\_\_\_**

**18. What portion of these companies provided a formal orientation training period? (Do not read)**

None  
About a quarter  
About a third  
About half  
About two-thirds

About three-quarters  
All

**19. On average, how long were the training periods?**

- Less than one day
- One day
- 2-4 days
- 5-7 days
- 1-2 weeks
- More than 2 weeks

**20. Now thinking about your career as a truck driver, how confident do you feel doing each of the following? On a scale of 1 to 5, where 1 is not at all confident and 5 is completely confident:**

- 20a. Stopping and controlling skids 1 2 3 4 5
- 20b. Being able to identify hazards 1 2 3 4 5
- 20c. Reacting in emergency situations 1 2 3 4 5
- 20d. Driving defensively 1 2 3 4 5
- 20e. Avoiding jackknifing 1 2 3 4 5
- 20f. Controlling the vehicle in bad weather 1 2 3 4 5
- 20g. Backing your truck in various conditions 1 2 3 4 5
- 20h. Being able to avoid crashes 1 2 3 4 5
- 20i. Stopping on slippery surfaces 1 2 3 4 5
- 20j. Securing loads 1 2 3 4 5
- 20k. Driving with hazardous materials 1 2 3 4 5
- 20l. Managing fatigue 1 2 3 4 5
- 20m. Recordkeeping in your logbook 1 2 3 4 5
- 20n. Conducting pre and post trip vehicle inspections 1 2 3 4 5

**21. Does the truck you currently drive have any of the following advanced technologies?**

Yes No DK

- 21a. 1 2 3 Collision warning system
- 21b. 1 2 3 Lane departure warning
- 21c. 1 2 3 Blind spot detection
- 21d. 1 2 3 Electronic stability control
- 21e. 1 2 3 Roll stability control
- 21f. 1 2 3 Adaptive cruise control

21g. 1 2 3 GPS navigation

21h. 1 2 3 Communication with dispatch

21i. 1 2 3 Trailer tracking

21j. 1 2 3 Electronic log device

**22. How did you learn how to use this: (ASK AFTER EACH YES IN 21)**

Safety meeting at work

Figured it out myself

Another driver

Vendor demonstration/training

CDL class

Refresher or additional training after CDL

Watched video

Other, Specify \_\_\_\_\_

**23. Would you be interested in more training on any of these?**

Yes      No

23a. IF YES, Which ones? \_\_\_\_\_

**24. Is there any other training that you would be interested in taking?**

Now think about your company's top management. How much do you agree with these statements, where 1 is strongly disagree and 5 is strongly agree?

**25. Management considers training to be important.**

1 2 3 4 5

**26. Safety is given a high priority by management.**

1 2 3 4 5

**27a. Do you know about the skid pad training offered to truck drivers in Michigan?**

- Yes
- No
- Not Sure

**27b. Have you heard of the Michigan Center for Truck Safety?**

- Yes
- No
- Not Sure    **IF NO OR NOT SURE, SKIP TO 28**

**27c. Do you know about the programs and courses offered by the Michigan Center for Truck Safety?**

- Yes
- No
- Not Sure

The final set of questions is for statistical purposes only.

28. What is your age? \_\_\_\_\_

**IF RESPONDENT REFUSES, ASK IF THEY ARE WITHIN THE FOLLOWING AGE GROUPS:**

- 18-20
- 21-25
- 26-40
- 41-55
- 56-70

**29. Record gender (Do not ask)**

- Male
- Female

**30. What is your race? (Check all that apply)**

- White
- Black/African American
- American Indian/Alaska Native
- Asian
- Native Hawaiian or Other Pacific Islander
- Other

## **Appendix D. Discussion Guide for West and East MTA Safety Councils**

In this project, we are interested in identifying and exploring training needs for truck drivers in Michigan. To this end, we will be talking to safety managers from a sample of trucking firms in the state, and conducting a telephone survey of truck drivers. We want to make sure that we are asking the right questions and using the right language. We also want your opinions on the topics we have listed below. Your input will help us not only in developing the sets of specific questions that we will ask safety managers and truck drivers, but also will help us to interpret the answers that we get.

1. The first topic has to do with individual characteristics of truck drivers that might affect their needs for training. Among these characteristics are: 1) their level of experience and amount of training coming in; 2) where they received their training prior to obtaining their CDL (e.g., are there differences in the quality of classes and training across sites offering CDL training that might have implications for future training needs; 3) their age and years of driving, etc.
2. The second topic has to do with the characteristics of trucking firms that might affect future training needs. These include: how management of trucking firms view training; patterns of established policies about training at various types of trucking firms (for example, by size, by inter/intra state); incentives to drivers, are drivers with certain training given preferences in schedules or assignments; procedures for how to decide who goes for training.
3. The third topic relates to perceptions among the group about what is the greatest need for training – topic areas, type of training, for whom, frequency (one-time, periodic).
4. Related to this topic is the status of training available to truckers in Michigan. Are there unmet needs and if so, are they due to a lack of training opportunities for post CDL training in Michigan or are there sufficient opportunities but barriers for drivers to take the training that is available. Are training needs being met but is there room for more training opportunities.
5. As a safety manager do you see differences in driver outcomes from classroom training, on-line training, simulator training, hands-on (skid pad), and on-the-road training.
6. How do you determine success for a particular training? How do you determine that it was useful?

## Appendix E. Interview Questions for Survey Safety Managers

### Ice-breaker Questions

*How many drivers are in the fleet?*

*Are any of your drivers owner-operators?*

*Do your drivers do long haul, regional, and/or local?*

*What percent of each make up most of your drivers' runs/trips?*

*What types of trucks do your drivers use?*

*How many new hires do you typically have in a year?*

*How many terminals do you have?*

### Main Questions

1. **In general, what kinds of training do new hires come in with?**
2. **How adequately does this training prepare them for their job responsibilities?**
3. **Can you describe the orientation/finishing program that you provide to new hires?**
  - a. *Probe for who gets it*
  - b. *Probe for use of volunteer driver trainers*
  - c. *Probe for compensation to volunteer driver trainers*
  - d. *Probe for compensation to trainees*
  - e. *Miscellaneous comments*
4. **Do you find differences in training needs between young new drivers, middle-age new drivers coming from other occupations, new drivers coming in from the military and more experienced career drivers?**
5. **Do you have follow-up training that you refer drivers to or offer yourselves?**
  - a. *Probe for who gets it*
  - b. *Probe for format (safety meetings, vendor presentations, etc.)*
  - c. *Probe for how often, etc.*
  - d. *Probe for awareness of Michigan Center for Truck Safety*
  - e. *Probe for skid pad training*
6. **What are the barriers to getting training for your drivers?**
7. **Where do you see gaps in training that is available? What other training opportunities would you like to see?**
8. **How are you addressing training needs with regard to emerging vehicle technologies? Such as crash avoidance warning systems, stability control, adaptive cruise control, GPS navigation, communication with dispatch, trailer tracking, and electronic log devices.**
9. **Is there anything else we should be talking about or be aware of?**