

Case Study of Mexico's Third-Party Entry-Level Driver Training for Commercial Vehicle Operators



U.S. Department of Transportation
Federal Motor Carrier Safety Administration

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FOREWORD

This study documents lessons learned from Mexico's experience with a third-party entry-level driver training (ELDT) program. In Mexico, commercial drivers must complete ELDT (which is administered by accredited third parties) in order to obtain a *Licencia Federal de Conductor* (LFC) and operate on Federal highways.

Mexico accredits and monitors third parties that conduct LFC knowledge/skills training and testing. Third parties (i.e., public or private schools or private motor carriers) and their instructors must comply with multiple Mexican agencies' requirements before they can be accredited as ELDT training centers for LFC applicants.

Study results include a description of the ELDT system in Mexico and an analysis highlighting the Mexican training and testing experience and its impacts on the Mexican motor carrier industry.

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16. Abstract The purpose of the study is to document lessons learned from Mexico's experience with its third-party entry-level driver training (ELDT) program. Study results include a description of the ELDT system in Mexico and an analysis highlighting the Mexican experience and its impacts on the Mexican motor carrier industry. Mexico accredits and monitors third parties that conduct <i>Licencia Federal de Conductor (LFC)</i> knowledge/skills training and testing. There is a national standardized minimum curriculum required for each LFC class. For every LFC issued, there is universal and systematic linkage of the following details: driver awarded the LFC; class curriculum certificate; the third party conducting the training and awarding the certificate; and information related to the LFC itself.			
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SI* (MODERN METRIC) CONVERSION FACTORS

Approximate Conversions to SI Units				
Symbol	When You Know	Multiply By	To Find	Symbol
Length				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
Area				
in ²	square inches	645.2	square millimeters	mm ²
ft ²	square feet	0.093	square meters	m ²
yd ²	square yards	0.836	square meters	m ²
ac	Acres	0.405	hectares	ha
mi ²	square miles	2.59	square kilometers	km ²
Volume (volumes greater than 1,000L shall be shown in m³)				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft ³	cubic feet	0.028	cubic meters	m ³
yd ³	cubic yards	0.765	cubic meters	m ³
Mass				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2,000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
Temperature (exact degrees)				
°F	Fahrenheit	5(F-32)/9 or (F-32)/1.8	Celsius	°C
Illumination				
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m ²	cd/m ²
Force and Pressure or Stress				
lbf	poundforce	4.45	newtons	N
lbf/in ²	poundforce per square inch	6.89	kilopascals	kPa
Approximate Conversions from SI Units				
Symbol	When You Know	Multiply By	To Find	Symbol
Length				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
Area				
mm ²	square millimeters	0.0016	square inches	in ²
m ²	square meters	10.764	square feet	ft ²
m ²	square meters	1.195	square yards	yd ²
Ha	hectares	2.47	acres	ac
km ²	square kilometers	0.386	square miles	mi ²
Volume				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m ³	cubic meters	35.314	cubic feet	ft ³
m ³	cubic meters	1.307	cubic yards	yd ³
Mass				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2,000 lb)	T
Temperature (exact degrees)				
°C	Celsius	1.8c+32	Fahrenheit	°F
Illumination				
lx	lux	0.0929	foot-candles	fc
cd/m ²	candela/m ²	0.2919	foot-Lamberts	fl
Force and Pressure or Stress				
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in ²

* SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380. (Revised March 2003, Section 508-accessible version September 2009.)

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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

Acronym	Definition
ANTP	National Association of Private Carriers
ATRI	American Transportation Research Institute
CANACAR	National Chamber of Freight Motor Carriers
CANAPAT	National Chamber of Passenger and Tourism Motor Carriers
CECAF	Centro de Capacitación y Adiestramiento de Conductores del Servicio de Autotransporte Federal y Transporte Privado (LFC driver training and skill-building centers)
CDL	commercial driver's license
CDLIS	Commercial Driver's License Information System
CMV	commercial motor vehicle
CONATRAM	National Confederation of Mexican Motor Carriers
DGAF	Director General of the Federal Motor Carrier Administration
DOF	Diario Oficial de la Federación (Mexican equivalent of the U.S. Federal Register)
DMV	Division of Motor Vehicles
DTCC	Delaware Technical And Community College
ELDT	entry-level driver training
FMCSA	Federal Motor Carrier Safety Administration
ID	Identification
IMT	Mexican Institute of Transportation
ISO	International Standards Organization
LCPAF	Roads, Bridges, and Motor Carrier Transportation Act
LFC	Licencia Federal de Conductor (the Mexican equivalent of a CDL)
MVR	motor vehicle report
NPRM	notice of proposed rulemaking

Acronym	Definition
NTIS	National Technical Information Service
NTL	National Transportation Library
PDO	property damage only
PMC	minimum training curricula
PTDI	Professional Truck Driver Institute
RAFSA	Rules of Federal Motor Carrier Transportation and Related Services
RI	SCT internal rules
RTTMRP	Rules for Land Transportation of Hazardous Materials and Waste
SCT	Secretariat of Communications and Transportation (USDOT's sister agency in Mexico)
SCT Accord	Accord published in the DOF or Federal Register on April 21, 2010
SCT Manual	Technical Specifications Handbook for CECAFs
SEP	Secretariat of Public Education
STPS	Secretariat of Labor and Social Forecasters
TRID	Transport Research International Documentation
USDOT	U.S. Department of Transportation

EXECUTIVE SUMMARY

This study documents lessons learned from Mexico's experience with a third-party entry-level driver training (ELDT) program. In Mexico, commercial drivers must complete ELDT (which is administered by accredited third parties) in order to obtain a *Licencia Federal de Conductor* (LFC) and operate on Federal highways.

BACKGROUND

Motor carriers in Mexico transport large amounts of freight and provide billions of passenger trips each year. Annually, Mexico moves:

- 551 million tons of freight with:
 - 420,000 power units and 365,000 trailers.
 - 20,000 corporations and 140,000 sole proprietors.
- 3 billion passenger trips with:
 - 100,000 buses.
 - 5,500 corporation and 11,700 sole proprietors.

About 500,000 drivers conduct these movements on Federal highways. These drivers are required to have a *Licencia Federal de Conductor* (LFC), which is roughly the Mexican equivalent of a U.S. commercial driver's license (CDL).

Initially, the Mexican Government established and administered a mandatory Federal LFC knowledge and skills test program. In 1999, Mexico began transitioning the program, ultimately creating a minimum LFC training curriculum now administered by Government-accredited third parties. To obtain a LFC, drivers must complete the required training and testing at one of the 230 accredited LFC driver training and skill-building centers, known in Mexico as "Centros de Capacitación y Adiestramiento de Conductores del Servicio de Autotransporte Federal y Transporte Privado," or CECAFs. CECAFs may be operated by publicly or privately funded educational organizations or by motor carriers.

Mexico's Federal commercial transportation system is under the sole authority and administration of the Mexican Federal Government. Commercial motor vehicle (CMV) registration and LFC licensing are controlled by Mexico's Secretariat of Communications and Transportation (SCT). The LFC medical certification (comparable to the U.S. medical certification) is performed by SCT medical offices and SCT-authorized third parties, while the LFC knowledge and skills training and testing is conducted at SCT-authorized CECAFs. The Agency has direct authority over both the LFC minimum curriculum and the accreditation of CECAFs. Mexico began implementing the third-party ELDT program in a phased manner starting in 1999 and has 15 years of experience administering the third-party program.

MEXICO’S CASE STUDY RESULTS

Mexico’s case study results are documented in three main sections, as outlined below:

- System principles.
 - General overview of Mexico’s third-party ELDT program.
 - Licensing system.
 - Implementation.
- Unit attributes.
 - Carriers, drivers, schools, and instructors.
 - Accreditation.
 - Training curriculum (see Appendix B and Appendix C for sample LFC curricula).
- Effectiveness.
 - Safety metrics.
 - Fuel efficiency metrics.

STUDY APPROACH

The research team’s approach for performing this case study is described in Table 1. In some cases, the available literature was limited, so estimations were developed based on stakeholder interviews (e.g., in the effectiveness evaluation). This is discussed in more detail in Section 4.

Table 1. Overview of study approach.

Topic	Approach
System Principles: <ul style="list-style-type: none"> • General overview of Mexico’s third-party ELDT program. • Licensing system. • Implementation. 	Literature review of Mexican regulations and minimum curricula; clarifications during stakeholder interviews/meetings with representatives from SCT/ Director General of the Federal Motor Carrier Administration (DGAF) headquarters.
Unit Attributes: <ul style="list-style-type: none"> • Carriers, drivers, schools, and instructors. • Accreditation. • Training curriculum. 	Development of interview questionnaires and analysis instruments (e.g., evaluation models), followed by onsite stakeholder interviews with: <ul style="list-style-type: none"> • 12 CECAFs (6 internal, 6 external). • SCT-DGAF headquarters and five DGAF field offices. • Policia Federal in Mexico City. • Mexican trucking associations/industry organizations.
Effectiveness: <ul style="list-style-type: none"> • Safety metrics. • Fuel efficiency metrics. 	Literature review; onsite stakeholder interviews and analysis.

MEXICO'S EXPERIENCE

In the United States, individual States test a driver's knowledge and skills before issuing a CDL. States are subject to compliance with Federal CDL regulations and guidance published by the American Association of Motor Vehicle Administrators for conducting those tests. States can conduct the testing themselves, and many have delegated some of the testing to third-party vendors. In contrast, Mexico has delegated all LFC testing as a component of its third-party LFC training and testing program. Mexico's Federal Government accredits and monitors third parties that conduct both the knowledge and skills training and testing.

Mexico's Approach to Training

Mexico's approach to commercial driver training is different from the U.S. approach in several characteristics:

- The Mexican Federal regulations have made driver training in general a driver's right and a motor carrier's obligation through LCPAF requirements.
- The potential conflict of interest in having the same party train and test drivers is addressed by making third parties liable for ensuring drivers have the essential knowledge and skills.
- While Mexico has not evaluated the safety effectiveness of its ELDT system, stakeholder discussions conducted during this study revealed that there is universal industry acceptance that curriculum-based training improves safety.
- The Mexican Federal and State governments and the trucking and bus industries have absorbed most of the driver training costs in exchange for the expected positive safety impact.

Mexico's trade organizations and individual motor carriers have liaisons with ELDT third parties which have led to development of enhancements to the minimum curriculum. Some of these third parties are technical colleges and schools that serve as respected sources for recruiting LFC drivers.

Third-Party Accreditation

Third parties (i.e., public or private schools or private motor carriers) and their instructors must comply with multiple Mexican agencies' requirements before they can be accredited as CECAFs. Within 1 year of starting operations, CECAFs must also obtain International Standards Organization (ISO)-9001-2008 certification. The Mexican Federal Government audits third parties before accreditation and on an ongoing basis to monitor compliance. Driver interviews and testing can easily identify third-party non-compliance or fraud. Mexico has revoked 100 of the 330 third-party accreditations that have been granted since they began transitioning to the third-party ELDT program in 1999. Of the 230 CECAFs that are currently accredited, 190 are external (run by public or private educational institutions), and 40 are internal (run by private motor carriers for hired employees). More than 100 third-party instructors are registered annually. About 105,000 drivers are trained annually (roughly 60 percent for initial LFC issuance and 40 percent for LFC renewal—the renewal training is different from the initial training).

To maintain accreditation, third parties must:

- Maintain the required facilities and equipment.
- Employ Government-certified instructors.
- Become and/or stay ISO-9001-2008 certified.
- Complete online reporting of daily attendance and module grading and all the required documentation.

LFC Training Curricula

Unlike the United States, the Mexican Federal Government established a national, standardized, minimum LFC curriculum that LFC applicants must complete before obtaining a LFC (there is a different curriculum for each LFC class). Each module of the curricula has a set of minimum course hours and objective-based performance measures (see Appendix B and Appendix C). However, the Mexican Federal Government does not develop model didactic materials or standard knowledge and skills tests; third-party trainers must develop their own.

LFC training curricula are specific to the main LFC vehicle classes (pertaining to commercial motor vehicles):

- Class A: Any bus or motor coach.
- Class B: Any truck or combination except hazardous materials (HM).
- Class C: Straight truck, maximum three axles.
- Class E: Any truck or combination, including HM.

For initial LFC issuance, there are specific curricula for drivers with and without experience; similarly, for LFC renewals, there are specific renewal curricula for each LFC class. For each curriculum there are four driver testing components:

- Diagnostic test at the beginning of the course to identify knowledge level and customize the content, techniques, instruction and didactic resources required.
- Diagnostic test at the end of the course to evaluate the level of learning.
- Continuous testing during each module with questionnaires, observations, summaries, and exercises to provide feedback and correct mistakes.
- Module summary to compare the driver's results against module objectives.

In 2015, Mexico published a revised and expanded minimum curricula (see Appendix A and Appendix B for an English translation of the revised Class A and Class B LFC minimum curricula).⁽¹⁾ The new Class B LFC (any truck or combination except HM) curriculum module headings are as follows:

- Diagnostic Evaluation.
- Introduction to Federal Motor Carrier Service.

- Professional Driver Culture.
- Accident Prevention.
- Education and Emotional Health.
- Regulatory Framework.
- Education and Road Safety.
- Comprehensive Knowledge of the Vehicle and Fault Detection.
- Driving and Vehicle Operation.
- Handling Cargo.
- Coupling, Uncoupling, and Articulated Vehicle Driving.
- Drivers' Common Diseases.
- Culture of Service, 14 Environments.
- Intelligent Transportation Systems.
- Basic and Technical English.
- Specialization in New Vehicle Fleets with Advanced Technology.

LFC Information System

The Mexican Federal Government operates an information system that universally links pertinent LFC-related details, including:

- Individual driver information.
- Third-party training center delivering the training.
- LFC class curriculum certificate.
- LFC issuance information.

For each applicable LFC curriculum, CECAFs are required to report drivers' daily attendance and module completion in real-time. All modules must be satisfactorily completed before the CECAF can issue a training certificate number. Daily attendance and module completion information is automatically reported to the LFC issuance system. When the LFC issuance system receives a driver's training certificate number from the CECAF, it issues a LFC. To reduce fraud, the system uses biometrics for daily attendance reporting.

Comparison of Mexican and U.S. Commercial Driver Licensing Practices

Table 2 provides a high-level comparison of Mexican and U.S. commercial driver licensing practices. Mexican practices are discussed in detail throughout this report. For more information on U.S. practices, visit <https://www.fmcsa.dot.gov/registration/commercial-drivers-license>.

Table 2. Comparison of Mexican and U.S. commercial driver licensing practices.

Category	Mexico: Licencia Federal de Conductor (LFC)	United States: Commercial Driver's License (CDL)
License Classes	<ul style="list-style-type: none"> • Class A: Any bus or motorcoach. • Class B: Any truck/combination except hazardous materials (HM). • Class C: Straight truck, maximum three axles. • Class D: Tourist guide taxi driver. • Class E: Any truck or combination, including HM. • Class F: Taxi driver for Federal ports and airports. 	<ul style="list-style-type: none"> • Class A: Any combination of vehicles with a gross combination weight rating or gross combination weight of $\geq 26,001$ lb, whichever is greater, inclusive of a towed unit(s) with a gross vehicle weight rating (GVWR) or gross vehicle weight of $>10,000$ lb, whichever is greater. • Class B: Any single vehicle with a GVWR or gross vehicle weight of $\geq 26,001$ lb, or any such vehicle towing a vehicle with a GVWR or gross vehicle weight $\leq 10,000$ lb. • Class C: Any single vehicle, or combination of vehicles, that does not meet the definition of Class A or B, but is designed to transport ≥ 16 passengers, including the driver, or is placarded for HM.
Training Requirements	Formal training (completion of minimum standardized curriculum, with specified classroom and behind-the-wheel hours) is required for all LFC classes.	Formal training is not required. There is no standardized curriculum.
Who Conducts Training	Federally accredited third-party LFC training and testing centers.	State-licensed, third-party certified, or accredited CDL training schools (private or vocational); trucking companies that operate their own CDL training schools.
Length of Training	3–5 weeks (average), depending on license class and whether the driver will be operating nationally or internationally.	2–12 weeks (average), depending on the type of school (i.e., private, vocational, or company-run) and the license class being sought.
Testing Requirements	Minimum curricula require four testing components: <ul style="list-style-type: none"> • Diagnostic test at the beginning of the course to identify knowledge level and customize training. • Diagnostic test at the end of the course to evaluate the level of learning. • Continuous testing during each module with questionnaires, observations, summaries, and exercises to provide feedback and correct mistakes. • Module summary to compare the driver's results against module objectives. 	CDL applicants must pass a written highway safety test and a test about the different parts of a large truck. Applicants must also pass a driving skills test (this requirement is waived for military service members/ recently separated veterans with 2 years of safe driving experience in similar vehicles). There are additional testing requirements for certain endorsements (e.g., HM, school bus, etc.). Some States may have additional testing requirements beyond minimum Federal requirements.
Who Conducts Testing	Federally accredited third-party LFC training and testing centers.	States and authorized third-party skills testers.
Who Pays for Training/Testing	The Mexican Federal and State Governments and motor carrier industry have absorbed most of the training costs in exchange for the expected safety benefits. When drivers do have to contribute financially, costs range from \$80 to \$300 (average).	Drivers seeking CDL training typically pay for training out of pocket. Costs can range from \$1,000 to \$7,500 (average), depending on the type of school and license class being sought. Some companies will help cover a driver's training costs, dependent on hiring agreements.
Renewal Requirements	Drivers are required to complete LFC renewal training and testing periodically. The Class E LFC must be renewed every 3 years; all others must be renewed every 5 years.	Renewal requirements differ by State. Renewal does not necessarily require re-testing. Renewal is dependent on a driver's safety record and medical qualification.
Information Systems	Federal information system universally links LFC-related details, including individual driver information, training center delivering the training, LFC class curriculum certificate, and LFC issuance information.	States use the Commercial Driver's License Information System (CDLIS) and the National Driver Register (NDR) to exchange information about CDL drivers, traffic convictions, and disqualifications. States must notify CDLIS of license transactions within 10 days.
Government Role	The Secretariat of Communications and Transportation (SCT) establishes the minimum LFC curricula and regulates, accredits, oversees, audits, imposes sanctions on, and cancels LFC training and testing centers.	The Federal Government does not issue CDLs. States develop their own knowledge and skills tests, which must meet minimum Federal standards. States may authorize entities to administer skills tests, if Federal criteria are met.

Category	Mexico: Licencia Federal de Conductor (LFC)	United States: Commercial Driver's License (CDL)
Successes/Failures	Required completion of standardized minimum curriculum ensures that all LFC drivers understand the regulations and basic principles of safe driving; third-party system with SCT-accredited training facilities and instructors ensures consistency in training and testing methods and reduces fraud.	Lack of standardized curriculum makes it difficult to ensure CDL drivers understand the regulations and basic principles of safe driving; costs of CDL training can be a bar to entry; de-centralized auditing process may not be most effective at preventing/reducing fraud; differences in State regulations can complicate licensing in other States.

1. INTRODUCTION AND ANALYSIS METHODS

Mexico has about 500,000 drivers operating on their Federal highways. These drivers are required to have a *Licencia Federal de Conductor* (LFC), which is roughly the Mexican equivalent of a U.S. commercial driver's license (CDL).

Initially, the Mexican Government established and autonomously operated a mandatory Federal LFC knowledge and skills test program. In 1999, Mexico began transitioning the program, ultimately creating a minimum LFC training curriculum that is now administered by Government-accredited third parties. To obtain a LFC, drivers must complete the required training and testing at one of the 230 accredited CDL driver training and skill-building centers, known in Mexico as "Centros de Capacitación y Adiestramiento de Conductores del Servicio de Autotransporte Federal y Transporte Privado," or CECAFs. CECAFs may be operated by publicly or privately funded educational organizations or by motor carriers.

Mexico's Federal commercial transportation system is under the sole authority and administration of the Mexican Federal Government. Commercial motor vehicle (CMV) registration and LFC licensing are controlled by Mexico's Secretariat of Communications and Transportation (SCT). The LFC medical certification (comparable to the U.S. medical certification) is performed by SCT medical offices and SCT-authorized third parties, while the LFC knowledge and skills training and testing is conducted at SCT-authorized CECAFs. The Agency has direct authority over both the LFC minimum curriculum and the accreditation of CECAFs. Mexico began implementing the third-party entry-level driver training (ELDT) program in a phased manner starting in 1999 and has 15 years of experience administering the third-party program.

1.1 MEXICO'S CASE STUDY RESULTS

Mexico's case study results are documented in three main sections, as outlined below:

- System principles.
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 - Licensing system.
 - Implementation.
- Unit attributes.
 - Carriers, drivers, schools, and instructors.
 - Accreditation.
 - Training curriculum (see Appendix B and Appendix C for sample LFC curricula).
- Effectiveness.
 - Safety metrics.
 - Fuel efficiency metrics.

1.2 ANALYSIS METHODS

The case study analysis methods included the following:

1. Conducting a U.S. literature review to provide the Federal Motor Carrier Safety Administration (FMCSA) an update on the domestic “state of the knowledge” regarding the effectiveness of entry-level commercial driver training.
2. Conducting a literature review of Mexican sources on Mexico’s third-party ELDT program.
3. Conducting onsite visits to interview Mexican Government officials, school/carrier training managers, and drivers and trade association representatives in six Mexican jurisdictions, which were: the States of Guanajuato, Estado de Mexico, Nuevo Leon, Queretaro, Veracruz, and the Federal District of Mexico City. Individual sources were kept anonymous to encourage candid input.

The stakeholder interviews focused on the key issues raised by the 2007 ELDT notice of proposed rulemaking (NPRM), the 2013 Motor Carrier Safety Advisory Committee (MCSAC) Task 13-01 Report on ELDT, and the 2014 Recommendations for a Collaborative Approach to Developing ELDT Regulations.^(2,3,4)

Stakeholder representatives from the following organizations were interviewed:

- The National Chamber of Freight Motor Carriers (CANACAR),ⁱ the National Chamber of Passenger and Tourism Motor Carriers (CANAPAT),ⁱⁱ the National Association of Private Carriers (ANTP),ⁱⁱⁱ and the National Confederation of Mexican Motor Carriers (CONATRAM)^{iv} in Mexico City.
- Policia Federal in Mexico City.
- Mexican Institute of Transportation (IMT) in Sanfandila.
- Five General Directorships of Federal Motor Carriers Transportation (DGAF) field offices in the cities of Celaya, Queretaro, Monterrey-Guadalupe, Veracruz, and Mexico City.
- Secretariat of Communications and Transportation (SCT)-DGAF Headquarters in Mexico City.
- Twelve CECAFs in Leon, Celaya, Silao, Monterrey-San Nicolas de los Garza, Monterrey-Ciénega de Flores, Veracruz, Xalapa, Palo Gacho, Tlalnepantla, and Mexico City.
 - Six internal CECAFs which offer the following courses: three bus passenger LFC courses, two general freight LFC courses, and one general freight/HM LFC course.

ⁱ CANACAR is comparable to the American Trucking Associations (ATA) in the United States.

ⁱⁱ CANAPAT is comparable to the American Bus Association (ABA) in the United States.

ⁱⁱⁱ ANTP is comparable to the National Private Truck Council (NPTC) in the United States.

^{iv} CONATRAM is comparable to the Owner Operator Independent Drivers Association (OOIDA) in the United States.

- Six external CECAFs which offer the following courses: three general freight LFC courses, two HM and bus passenger LFC courses, one general freight and HM LFC course, and two general freight LFC courses. Only one of these CECAFs is privately owned; the other five are all Government-funded with Federal and State Government grants and industry sponsorships.

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2. MEXICO SYSTEM PRINCIPLES

2.1 GENERAL OVERVIEW OF MEXICO'S THIRD-PARTY ENTRY-LEVEL DRIVER TRAINING

Most of the roads connecting cities in Mexico are under Federal jurisdiction. All commercial drivers (including drivers employed by for-hire and private companies) operating on Federal roads^v are required to obtain a LFC^{vi} and are subject to a single Federal LFC system administered by the SCT (the Mexican sister agency to the U.S. Department of Transportation [USDOT]).^{vii}

To obtain and maintain a LFC, drivers must obtain both a medical certificate and a training certificate for the class of license sought (for the vehicle class to be operated). The training certificate is issued upon completion of a training program in an SCT-accredited school (or CECAF). CECAFs conduct the training and the knowledge/skills testing that drivers must complete in order to receive a LFC.

There are internal and external CECAFs. Internal CECAFs are run by motor carriers, and they generally train only their own drivers. External CECAFs are run by both public and private schools, and they offer training to the public and/or enrolled students. CECAFs may be privately or publicly funded. To maintain SCT accreditation, all CECAFs must obtain ISO-9001-2008 certification within 1 year of starting operations. An example of an external CECAF is shown in Figure 1.

^v Drivers who are operating in private transportation for a sole proprietor carrying less than 9,000 pounds or a corporation carrying less than 18,000 pounds, or when privately transporting less than 9 passengers, are exempted from obtaining a LFC.

^{vi} There also are State-issued licenses for passenger vehicles and for local commerce that operates only on non-Federal highways and within the State. These are not acceptable for operation of CDL CMVs in the United States.

^{vii} The SCT operates more like U.S. State driver licensing agencies and vehicle registration agencies for Federal requirements.



Figure 1. Photograph. One of Mexico's top CECAFs, located in Monterrey-Ciénega de Flores.

2.2 LICENSING SYSTEM

2.2.1 Licencia Federal de Conductor Standards

The SCT Accord, published in the *Diario Oficial de la Federación* (or DOF, which is the Mexican equivalent of the U.S. Federal Register) on April 21, 2010, defines the LFC vehicle classes as follows:⁽⁵⁾

- Class A: Any bus or motor coach.
- Class B: Any truck or combination except hazardous materials (HM).
- Class C: Straight truck, maximum three axles.
- Class D: Tourist guide taxi driver.
- Class E: Any truck or combination, including HM.
- Class F: Taxi driver for Federal ports and airports.

The Accord also establishes the requirements to obtain a LFC, which include:

- LFC application.
- Medical certificate.
- Proof of domicile.
- Training certificate.
- Legal document indicating that the applicant is 18 years of age (the age requirement for an international LFC is 21 years of age and proof of English knowledge is required).
- Class E requires previous Class B or Class C licensure or a carrier letter providing proof that the applicant has at least 2 years of experience.
- Class D requires tourist guide identification (ID) issued by the Secretariat of Tourism.
- To change or add a class, only the corresponding training certificate is required.

- A duplicate license may be issued if damaged upon submission of valid damaged license or with police report if stolen or lost.

The Accord establishes that a driver’s LFC must be renewed every 5 years, except for Class E for HM, which must be renewed every 3 years.

To renew any of these classes, applicants must submit a written or electronic application and the following documentation:

- Updated medical certificate.
- Proof of domicile.
- Training certificate (renewal).

Article 36 of the *Ley de Caminos, Puentes y Autotransporte Federal* (LCPAF), or the “Roads, Bridges, and Motor Carrier Transportation Act,” requires that all commercial drivers must obtain/renew LFCs according to the regulations.⁽⁶⁾ Drivers who are operating in private transportation for a sole proprietor carrying less than 9,000 pounds or a corporation carrying less than 18,000 pounds, or when privately transporting less than nine passengers, are exempted from obtaining a LFC and may operate with a State-issued commercial license (on both State and Federal highways). Drivers seeking a LFC must pass knowledge and skills testing and complete courses in vehicles or simulators according to the regulations.

Article 37 of the LCPAF requires motor carriers to assure their drivers have the training and skills necessary to provide an effective, safe, and efficient service.⁽⁷⁾ However, this article does not make it mandatory for carriers to provide the training needed to obtain a LFC.

As in the United States, requirements set forth in the LCPAF are further implemented in regulations issued by the SCT. Article 93-C of the *Reglamento de Autotransporte Federal and Servicios Auxiliares* (RAFSA), or “Rules of Federal Motor Carrier Transportation and Related Services,” establishes that to obtain or renew a LFC, the driver’s training must be performed by an SCT-authorized CECAF.⁽⁸⁾

Article 128 of the *Reglamento para el Transporte Terrestre de Materiales y Residuos Peligrosos* (RTTMRP), or “Rules for Land Transportation of Hazardous Materials and Waste,” indicates that drivers and personnel involved in the transportation of HM and waste must have the specific training and knowledge updates for hazardous materials.⁽⁹⁾ Article 130 of the RTTMRP further states that motor carriers must ensure that vehicles transporting HM and waste are exclusively driven by drivers with the proper LFC class.⁽¹⁰⁾

Article 131 of the RTTMRP requires that drivers transporting HM and waste must pass the Class E (any truck or combination, including HM) LFC training and testing (which must be administered by an SCT-accredited CECAF).⁽¹¹⁾

2.2.2 School Regulation

Article 57 of the LCPAF requires CECAFs to obtain the necessary authorization by the appropriate agencies to operate.⁽¹²⁾

By regulations, Article 93-D of the RAFSA outlines the documentation required for parties interested in seeking SCT accreditation as a CECAF. A CECAF application must be submitted with the following:⁽¹³⁾

- Sole proprietors: birth certificate and Government-issued ID.
- Corporations: Articles of Incorporation.
- If applicable, notarized power of attorney of legal representative.
- Proof of legal domicile for the time period when courses will be provided.
- Training center registration with the *Secretaría del Trabajo y Previsión Social* (STPS, or Secretariat of Labor and Social Forecasting) or labor education studies accreditation by the *Secretaría de Educación Pública* (SEP, or Secretariat of Public Education).
- List of proposed CECAF instructors.
- STPS instructors' registration.
 - Article 93-E of RAFSA requires CECAF instructors to register with the SCT.⁽¹⁴⁾
- Responsibility acceptance letter by proposed CECAF's legal representative.
- Proposed curricula according to the SCT minimum training curricula and the various LFC classes.
- Facilities and hardware technical descriptions and documentation of ownership of vehicles and simulators, in accordance with Article 93-G of the RAFSA.⁽¹⁵⁾ Article 93-G of the RAFSA requires that CECAFs obtain/maintain the following minimum facilities and hardware for training commercial drivers (not all items below apply to HM):
 - Vehicles or simulators according to the LFC class or a minimum 1-year agreement with a company that will provide the vehicles for training (see Figure 2).
 - One or more classrooms for knowledge courses, including a sufficient number of desks to accommodate students (according to legal specifications).
 - A workshop and/or laboratory provisioned with a sufficient amount of required hardware/tools (according to the number of students to be trained and according to the LFC class). The workshop must include a complete diesel engine.
 - Computer equipment for data exchange between the CECAF and the SCT.
 - Legal land possession or an agreement with a company to use such land as a designated space for maneuvers. Land must measure 100 x 200 feet and must be fenced, paved, and free of obstacles/pedestrians.



Figure 2. Photograph. A vehicle used by a CECAF.

Article 93-H of RAFSA requires all CECAFs and their instructors to provide the SCT with any requested information on drivers who pass an LFC course.⁽¹⁶⁾ Article 93-H also establishes that the SCT may visit a CECAF at any time to verify compliance with the minimum curricula and to ensure the CECAF has the required facilities and hardware.

Finally, Article 93-H establishes that the SCT may cancel a CECAF's accreditation if the CECAF or its instructors are proven to be in noncompliance with the curricula or any of the CECAF requirements, as described in more detail below.

In June 2003, in the DOF 13 (Mexico's equivalent of the U.S. Federal Register), the SCT published its *Programas Mínimos de Capacitación (PMC)*, or "minimum training curricula," according to the LFC classes, as follows:⁽¹⁷⁾

- Three Class A curricula:
 - New Entry.
 - Renewal 1.
 - Renewal 2.
- Five Class B/C curricula:
 - Class B New Entry.
 - Class C New Entry.
 - Class B/C New Entry with Experience.
 - Class B/C Renewal 1.
 - Class B/C Renewal 2.
- Three Class E curricula:
 - New Entry with Experience.
 - Renewal 1.

- Renewal 2.
- Two Class D/F curricula:
 - New Entry.
 - Renewal 1.

Table 3 summarizes the current PMC for each LFC class.

Table 3. Current PMC for each LFC class.

LFC Class	New Entry	New Entry with Experience	Renewal 1	Renewal 2
Class A	X	N/A	X	X
Class B	X	N/A	N/A	N/A
Class B/C	N/A	X	X	X
Class C	X	N/A	N/A	N/A
Class E	N/A	X	X	X
Class D/F	X	N/A	X	N/A

The “Class B/C—New Entry with Experience” curriculum requires a minimum of 2 years of experience with a previous LFC. Likewise, the “Class E—New Entry with Experience” curriculum requires a minimum of 2 years of experience with a previous LFC or a carrier letter providing proof that the driver has at least 2 years of experience. The various “Renewal 1” and “Renewal 2” curricula are alternative refresher courses to be taken on every renewal (not just the first two).

Based on the PMC, CECAFs are required to meet the following requirements:

- Conduct and document the following driver tests (documentation must be kept for at least 2 years):
 - Diagnostic test at the beginning of the course to identify knowledge level and customize the content, techniques, instruction, and didactic resources required.
 - Diagnostic test at the end of the course to evaluate the level of learning.
 - Continuous testing during each module with questionnaires, observations, summaries, and exercises to provide feedback and correct mistakes.
 - Module summary to compare the driver’s results against module objectives.
- Provide a descriptive letter—which will be mandatory and subject to audit—specifying courses, instruction techniques, and didactic resources to be used.
- Obtain ISO-9001-2008 certification within 12 months of operation. The certification must include the following:
 - Organization and administration:
 - › Organization with capacity for performing the training effectively.
 - › Defined and documented organization structure including staff responsibilities.
 - › Qualified technical manager with experience on driver training.

- › Job descriptions including education, training, technical knowledge, and experience.
- Quality control system:
 - › Documented commitment to policy on quality objectives and assurance that the policy is understood, implemented, and maintained at all levels of the organization.
 - › Must operate a quality system that is effective and appropriate for the type, scope, and volume of work performed.
 - › Quality system must be documented and there must be a manual containing the following information:
 - Name, address, phone number, and legal status.
 - Management statements on objectives, policies, and quality commitments.
 - Designation of a technical manager.
 - Organizational structure.
 - Relevant position descriptions.
 - Policies on train-the-trainer development.
 - Document control procedures.
 - Internal audit procedures.
 - Comment procedures (feedback and corrective actions).
 - Procedures for quality system review by management.
 - › A complete control system of all documentation on all related activities must be maintained and made readily available. Must have documented procedures to deal with feedback and perform corrective actions every time discrepancies are detected in the quality system or in the training procedure development.
- CECAF staff:
 - › Staff must have the accredited training, experience, and knowledge of the training processes.
 - › Must establish a documented training system that is kept up to date and in agreement with policies to ensure staff is trained in all relevant technical and administrative aspects.
- Facilities and equipment:
 - › Equipment and facilities must be available and in proper operational conditions according to RAFSA articles 93-C, 93-D, 93-F, 93-G, and 93-H.
 - › Must have computer equipment with the latest technology that includes email and a finger scanner, according to SCT specifications.
- CECAF operations:
 - › CECAFs must comply with all SCT directives.
 - › CECAFs must have documented procedures to handle user or other party complaints concerning the services provided.

Table 4 summarizes Mexico’s CECAF regulations and associated organizational and safety impacts.

Table 4. Analysis of Mexico’s CECAF regulations.

Mexico’s Experience	Organizational/Safety Impact
1. Mexico relies on multiple agencies to ensure third parties comply with requirements.	CECAFs must comply with certification and auditing requirements from the Mexican Department of Transportation, Labor, Education, and Commerce, which generates coordination among agencies to ensure a CECAF’s performance meets professional standards.
2. CECAFs are required to obtain ISO-9001-2008 certification within a year of starting operations.	The ISO certification serves to establish a quality management system nationwide for continuous improvement. It also serves to establish channels of communication for irregularities and fraud.
3. Prior to accreditation, CECAFs must be audited by the Government.	With the exception of the ISO certification (which may take up to a year), this audit ensures compliance with requirements before operations begin.
4. A motor carrier may establish an internal CECAF for its own drivers only.	A motor carrier that establishes its own CECAF has control over ensuring its drivers have the knowledge and skills required for safely driving their vehicles.

2.2.3 Government Responsibilities

Article 22 of the SCT Reglamento Interior (RI), or “Internal Rules,” provides the SCT’s DGAF (or “Federal Motor Carrier Transportation Administration”) with the authority to:⁽¹⁸⁾

- Regulate CECAFs.
- Accredite CECAFs.
- Establish the curricula.
- Oversee CECAFs.
- Audit CECAFs.
- Impose sanctions on CECAFs.
- Cancel non-compliant CECAFs.

Article 57 of the LCPAF establishes that the SCT will coordinate with the appropriate agencies to establish requirements and curricula for all CECAFs.⁽¹⁹⁾

Regulatory Article 93-F of RAFSA requires the SCT to respond to all CECAF and instructor applications within 45 working days of the application submission date. If no SCT response is received within the 45-day period, that is a tacit approval.⁽²⁰⁾

Table 5 summarizes the CECAF-related regulatory responsibilities of the Mexican Government, along with associated impacts.

Table 5. Analysis of Mexican Government’s CECAF-related regulatory responsibilities.

Mexico’s Experience	Impact
1. Government needs sufficient personnel to audit applicant CECAFs and ongoing operations.	Integrity of third-party program depends on Government auditors.
2. LFC applicant interviews/testing are necessary to detect noncompliance/fraud.	LFC applicant interviews/testing are more effective at detecting third-party noncompliance and fraud.

Mexico's Experience	Impact
3. Government established an information system to accredit, manage, and interact with CECAFs.	The LFC training information system ensures more transparency for CECAF operations and Government oversight.
4. Some CECAFs require the same biometrics for Government daily online attendance reporting as for license issuance.	Using the same biometrics to identify the driver at both the CECAF location and the licensing agency reduces fraud.

2.3 IMPLEMENTATION

2.3.1 Rule Cost

No Government cost estimate was found, but there are several cost-related factors to consider:

- Establishing an accredited CECAF.
- Government registrations and certificates.
- Facility infrastructure.
- Equipment.
 - Vehicle procurement, maintenance, operation, and renewal can generate higher operating costs for CECAFs (see Figure 3 and Figure 4).
- Personnel.
- Administrative systems.
- ISO-9001-2008 certification.
- Driver travel and time spent on training.
- Course fees.
- Carrier involvement with CECAFs.
- Government subsidies/grants and industry scholarships.
- Vehicle manufacturers' donations.



Figure 3. Photograph. Trailers and cargo tank at one CECAF.



Figure 4. Photograph. An internal CECAF has several buses exclusively dedicated to its CECAF.

A short summary of cost factors related to Mexico’s third-party ELDT program is presented in Table 6.

Table 6. Analysis of cost factors related to Mexico’s third-party ELDT program.

Mexico’s Experience	Impact
1. Cost factors vary greatly for each CECAF because of Government subsidies, pre-existing infrastructure and certifications, vehicle manufacturers’ donations, and course duration and fee structure.	Without a Government estimate and so many variables, estimating a rule cost for Mexico’s system would be too complex and of limited value for this report.
2. CECAFs are not financially sustainable without Government subsidies. LFC applicants and CECAFs depend on either or a combination of Government subsidies and/or Government/ industry scholarships.	The Mexican Government and industry have absorbed most of the driver training costs in exchange for the expected positive safety impact.

2.3.2 Availability By Geographic Area

It took Mexico 4 years (from 1999 to 2003) to establish accredited CECAFs in all 32 Mexican jurisdictions (via phased rollout) and subsequently to require all LFC applicants to complete the training at an accredited CECAF. Until this process was complete, the SCT allowed drivers in areas without an established CECAF to take the SCT-administered knowledge and skills tests in lieu of the third-party LFC training and testing.

Table 7 summarizes Mexico’s approach to implementing the training nationally, along with associated impacts.

Table 7. Analysis of phased implementation approach and geographical impacts.

Mexico’s Experience	Impact
1. Phased implementation permitted the creation of CECAFs in all Mexican jurisdictions over the course of 4 years.	During the phased 4-year implementation period, drivers who had an accredited CECAF in their district were required to complete the third-party-administered training and testing, while drivers who did not have a CECAF in their district completed the SCT-administered knowledge and skills tests.
2. Mexico relied on transportation trade associations, chambers, and other industry organizations to disseminate information on the third-party ELDT program.	Dissemination of information via transportation-only organizations may have limited the reach and may have slowed the establishment of sufficient third parties.

2.3.3 Effect on Supply of New Drivers

According to CANACAR, in 2014 Mexico had a shortage of 70,000 LFC drivers—a shortage that is forcing Mexican motor carriers to keep almost 40 percent of their fleets parked. CANACAR indicates that this shortfall is exacerbated by the commercial driver shortfall in the United States, which is attracting Mexican drivers to the U.S.-Mexico border zones.

Paradoxically, driver training in Mexico is not seen as a barrier to entry into the profession, but the opposite. Driver training is perceived as a mechanism to attract more individuals into the profession and to allow individuals to acquire the necessary skills to operate ever-more-sophisticated vehicles (see Figure 5).



Figure 5. Photograph. Internal CECAF shuttle van with a sign that reads “Professional Drivers Needed.”

Table 8 summarizes the effects of Mexico’s third-party ELDT program on the supply of drivers.

Table 8. Analysis of the effects of Mexico’s third-party ELDT program on the supply of new drivers.

Mexico’s Experience	Impact
1. Technical colleges, universities, and large carriers are best positioned to serve as CECAFs because they already have most of the required infrastructure and certifications.	Technical colleges, universities and large carriers serve a respected source for recruiting commercial driver candidates, which encourages alliances between schools and carriers.
2. Motor carriers collaborate with CECAFs performing driver testing and recruiting candidates.	CECAFs have expanded training curricula (in response to motor carrier feedback regarding desired driver skill sets), and they attract more LFC applicants because of motor carrier job offerings.
3. Making LFC licensing and third-party information readily available reduces barriers to driver entry into the profession.	Field offices observed larger numbers of successful driver applicants when information on requirements and application processes was readily provided to driver candidates.

2.3.4 Intrastate Exclusion

Because most roads connecting cities in Mexico are under Federal jurisdiction, intrastate licensed drivers are basically restricted to inner-city operations or operations on non-Federal highways. State commercial licensing standards have not been reviewed. Except for the curricula specifically designated “without experience,” Most LFC applicants have at least 2 years of experience driving commercially with an intrastate license.

3. SYSTEM UNIT ATTRIBUTES

3.1 CARRIERS, DRIVERS, SCHOOLS, AND INSTRUCTORS

In Mexico there are currently 190 external accredited CECAFs (i.e., open to the public and/or enrolled students) and 40 internal CECAFs (run by individual motor carriers and open only to that company’s own drivers). More than 100 new CECAF instructors are registered annually. About 105,000 drivers are trained annually (roughly 60 percent are new entries and 40 percent are renewals). Table 9 and Table 10 show the breakdown of trained LFC drivers in 2013, by LFC class, for initial LFC training and for renewals.

Table 9. 2013 CECAF new-entry trained drivers, by LFC class.

LFC Class	Drivers Trained
Class B & C	36,628
Class E	11,876
Class A	11,578
Class D & F	788
Total	60,870

Source: 2013 DGAF Basic Statistics.⁽²¹⁾

Table 10. 2013 CECAF renewal trained drivers, by LFC class.

LFC Class	Drivers Trained
Class B & C	12,548
Class E	26,873
Class A	4,921
Class D & F	43
Total	44,385

Source: 2013 DGAF Basic Statistics.

3.2 ACCREDITATION

3.2.1 Instructional Methods

The SCT minimum curriculum establishes which subjects should be covered with classroom instruction and which subjects should be taught behind the wheel of a vehicle or in a vehicle simulator. Vehicle simulators are mostly used for teaching shifting and fuel efficiency (in order to reduce time spent in the limited number of training vehicles, fuel usage, and repairs required because of damage to gears, transmissions, clutches, etc., during the training process—see Figure 6 and Figure 7).

Table 11 summarizes the breakdown of classroom and vehicle/simulator curricula.



Figure 6. Photograph. Example of a vehicle simulator at a CECAF.



Figure 7. Photograph. Example of a vehicle simulator at a CECAF.

Table 11. Analysis of CECAF instructional methods (classroom versus vehicle/simulator).

Mexico's Experience	Impact
1. Some CECAFs use simulators to reduce on-vehicle time and repairs. Observed average cost of simulators was about \$250,000.00.	Simulators are mostly used for teaching basic shifting and fuel economy. More expensive simulators are not used, thus few are suitable to be used for training risky driving scenarios.
2. Some CECAFs have agreements with vehicle manufacturers that donate them new vehicles on a yearly basis (several 2015 models were observed).	Drivers at these CECAFs are learning how to use the latest vehicle technologies.

3.2.2 Fees

There are no guidelines or parameters set by the Mexican Government on the fees charged for LFC training. External CECAFs must make their fees and schedules available to the public. When an external CECAF does charge fees, the fees that drivers are responsible for paying typically range from \$80 to \$300. Table 12 provides an analysis of LFC course fees in Mexico, based on discussions with CECAF representatives and other observations.

Table 12. Analysis of LFC course fees in Mexico.

Mexico's Experience	Impact
1. Several CECAF representatives agreed that the true cost of the new-entry LFC training course in a 10-student group is about \$1,500 for each student. Total fees charged to the driver were observed to range from \$0 to \$300.	The Mexican Government and motor carrier industry have absorbed most of the driver training costs as a safety investment (i.e., there is an expected positive safety impact for Mexican society).
2. Fraudulent training certificates are allegedly available from \$500.	Anecdotal information indicated that fraudulent certificates have been known to be sold by certain accredited third parties.
3. Scholarships, stipends, transportation, food, and other incentives are used to attract LFC candidates to attend CECAF facilities.	Several jurisdictions in Mexico are using these incentives (referenced left) to increase commercial vehicle driver employment rates.

3.2.3 Train-the-Trainers

CECAF instructors must meet a number of requirements. In addition to registering with the SCT and STPS, CECAF instructors must also meet the obligations outlined in the SCT Manual of Technical Specifications for CECAFs (SCT Manual), as follows:⁽²²⁾

- Conduct the training according to SCT-established curricula and other SCT guidelines.
- The CECAF and the instructor must provide the SCT with any requested information on the training.
- Submit students' daily attendance reports to the appropriate CECAF manager.
- Pass any instructor development course established by the SCT.
- May conduct training in more than one CECAF as long as the instructor is properly registered as such with the SCT and STPS and demonstrates schedule compatibility (i.e.,

that the instructor is not “double booked” or overscheduled and can be present at each CECAF location at the required times).

- Meet the SCT instructor model profile, as described below:
 - **Driving Skills Instructors:**
 - › Must be 28 years of age or older.
 - › Must have 10 years of LFC experience.
 - › Must have completed middle school (secondary school) at a minimum.
 - › Must pass the SCT instructor development course and instructor evaluation (10-minute instructor presentation).
 - › Must exhibit knowledge of the curriculum being taught.
 - › Must have communication skills.
 - › Must have competency in teaching.
 - **Driving Knowledge Instructors:**
 - › Must be 20 years of age or older.
 - › Must have 2 years of LFC experience in the LFC curriculum being taught.
 - › Must have completed high school at a minimum.
 - › Must pass the SCT instructor development course and instructor evaluation (10-minute instructor presentation).
 - › Must exhibit knowledge of the curriculum being taught.
 - › Must have communication skills.
 - › Must have competency in teaching.

Note that most CECAFs have different instructors for classroom (see Figure 8 and Figure 9) and behind-the-wheel training (see Figure 10).



Figure 8. Photograph. An example of a CECAF classroom/workshop.



Figure 9. Photograph. Sample brake components in a CECAF classroom/workshop.



Figure 10. Photograph. A CECAF instructor and an instructor-in-training prepare a driver for a skills test.

The SCT Manual establishes the following Instructor Code of Conduct:

- Perform according to the SCT requirements.
- Perform in a professional, trustworthy, and quality manner.
- Maintain proper behavior and communication during the training.
- Maintain an attitude of commitment to innovation and continuous improvement in the teaching-learning process.

- Avoid (and penalize) intolerance and any form of racial, gender, handicap, or political discrimination.
- Generate the conditions that strengthen the development of commercial drivers through specialized training.
- Apply one’s own knowledge and experience in the development of commercial drivers.
- Commitment to the role of instructor and knowledge facilitator.
- Be honest at all times and do not accept, offer, or provide—under any direct or indirect circumstances—money, gifts, favors, or advantages that may constitute bribery.
- Table 13 summarizes Mexico’s “train-the-trainer” approach for third-party LFC instructors.

Table 13. Analysis of Mexico’s “train-the-trainers” approach for third-party LFC instructors.

Mexico’s Experience	Impact
1. Mexican instructors must comply with the instructor competencies requirements of the Departments of Transportation, Labor, and Education.	Accredited third-party instructors meet instructor competencies standards established by the Departments of Transportation, Labor, and Education.
2. Instructor performance is evaluated and monitored as part of required processes for ISO-9001-2008 certification maintenance.	Instructors are subject to the consequences of feedback from students and managers as part of the required CECAF quality system.
3. Industry organizations such as CANACAR, CANAPAT and ANTP organize train-the-trainer courses and standards in coordination with the Mexican Department of Labor and Transportation.	Third parties have access to quality instructor training.
4. CECAFs emphasize years of experience as an LFC driver as a key requirement for instructors.	Most skills instructors interviewed were veteran drivers. All of them displayed a wealth of knowledge and a long history from which to draw examples for their lessons.

3.2.4 Training Certificate

The SCT Manual dictates that CECAFs may only issue an SCT official training certificate when the driver has covered 100 percent of the curriculum and associated activities, including testing (i.e., has competed the training and testing and passed).

The SCT Manual also describes the process for requesting, processing, issuing, and canceling the SCT official training certificate:

- Requests for SCT official training certificates must be made via email by the CECAF legal representative at least 3 days prior to issuance, specifying the number of certificates required by each LFC class course.
- The SCT-DGAF will assign the certificates to CECAFs as long as the CECAF has properly issued, in accord with the requirements, at least 80 percent of previously-assigned certificates.

- Once the CECAF has utilized 90 percent of its assigned certificates, the CECAF may request an additional batch from the SCT-DGAF. The DGAF determines the new batch quantity based on the quantity requested and the CECAF’s capacity (i.e., the number requested is not greater than the CECAF’s training capacity).
- Certificates issued must include a recent driver photograph as well as the system-assigned control number and date.
- There is an original official certificate and two official copies:
 - The driver keeps the original.
 - The SCT-DGAF LFC Issuing Office keeps the first official copy.
 - The CECAF keeps the second official copy in the driver’s file, along with the driver’s test results and original application.
- Canceled certificates, due to clerical or technical errors, must be kept on the CECAF files for at least 2 years after reporting them as canceled in the SCT-DGAF information system.
- Lost or stolen certificates must also be reported, along with a police report.
- Official training certificates are issued by the SCT-DGAF upon receipt of the corresponding fee payment (the party responsible for paying this fee varies—sometimes the company will pay the fee; other times the driver will cover it).

Table 14 summarizes Mexico’s approach to issuing official LFC training certificates.

Table 14. Analysis of Mexico’s official LFC training certificate issuance processes.

Mexico’s Experience	Impact
1. CECAFs must report LFC trainee attendance online on a daily basis to the SCT during the course of the training. Some use biometrics (e.g., photograph and fingerprint) for daily attendance reporting.	Without real-time attendance reporting, a training certificate cannot be issued. This is intended to reduce fraud.
2. Training certificates are centrally issued by the SCT to the CECAF, which awards to the student.	The SCT has an audit trail on each certificate provided to a CECAF.

3.2.5 Process for Decertifying Poorly-Performing CECAFs

A CECAF certification may be revoked if the CECAF:

- Is found to be noncompliant with any requirements established in the regulatory framework.
- Has been issuing training certificates to drivers without covering the established curriculum.
- Has been offering LFC classes that are not authorized and included in its SCT certification.
- Is found to be noncompliant with any of its established CECAF requirements.
- Has had its STPS certification revoked.

- Has suspended activities for more than a year without justified cause.

Table 15 summarizes Mexico’s processes for decertifying/canceling poorly-performing CECAFs.

Table 15. Analysis of Mexico’s process for decertifying poorly-performing CECAFs.

Mexico’s Experience	Impact
1. SCT has legal authority to audit and cancel CECAFs.	Out of 330 CECAFs, 100 have been canceled.
2. CECAFs pending ISO certification or those requesting a number of training certificates beyond its past average are targeted for audits.	Failure to maintain the ISO certification and fraud are the top reasons for canceling CECAFs.
3. In addition to CECAF applicant audits, the SCT audits 50 CECAFs per year. There are currently 230 CECAFs in operation.	With existing resources, it takes the SCT 5 years to audit all currently-certified third parties.
4. SCT uses an information system to target noncompliant CECAFs.	SCT system controls and keeps an audit trail for certificates assigned to each CECAF, driver daily attendance, and authorization to issue each certificate.

3.3 TRAINING CURRICULUM

Mexico established both minimum time (classroom hours) and performance standards (testing to confirm achievement of module objectives) for its existing LFC curricula. The Mexican SCT is responsible for developing and updating the LFC minimum curricula. While this central control allows the Government to ensure that there are standardized national curricula, it can also hamper the updating process. For instance, Mexico recently updated its LFC minimum curricula for the first time in 15 years with a new set of “comprehensive” LFC curricula.

The previous minimum curriculum for the Class B LFC (new entrant without experience) required 155 hours (41 classroom hours and 114 practice hours). The new comprehensive curriculum requires 196 hours (70 classroom hours and 126 practice hours). The previous minimum curriculum for the Class A LFC (new entrant) required 120 hours (44 classroom hours and 76 practice hours). The new comprehensive curriculum requires 142 hours (54 classroom hours and 88 practice hours).

The current curricula require four driver testing components:

- Diagnostic test at the beginning of the course to identify knowledge level and customize the content, techniques, instruction, and didactic resources required.
- Diagnostic test at the end of the course to evaluate the level of learning.
- Continuous testing during each module with questionnaires, observations, summaries, and exercises to provide feedback and correct mistakes.
- Module summary to compare the driver’s results against module objectives.

LFC drivers must also complete renewal training periodically in order to maintain their license. The Class E (HM) LFC must be renewed every 3 years; all others must be renewed every 5 years.

Table 16 summarizes Mexico’s experience with the development, length, updating, testing and renewal components of the LFC curricula. Appendix B and Appendix C provide translations of the proposed curriculum outlines for Mexico’s Class A and Class B LFC training and testing.

Table 16. Analysis of Mexico’s experience with the LFC curricula.

Mexico’s Experience	Impact
1. The Mexican Government established the minimum curricula length after reaching consensus with major industry organizations.	Nationwide acceptance of minimum curriculum length.
2. CECAFs that work in conjunction with motor carriers have expanded the length of the curricula as a way to supplement the carrier’s finishing training.	Mexican motor carriers do not allow drivers to drive solo if they have only passed the minimum training and have no further experience. Just as in the United States, carriers routinely conduct finishing training for inexperienced drivers.
3. There are plenty of CECAFs that stick to the exact minimum training curricula.	The driver market for the minimum training curricula is strong.
4. Top CECAFs have expanded the curricula topics in collaboration with motor carriers, to include more requirements from finishing training.	Top CECAFs provide enhanced curricula.
5. A disadvantage of a Government-established curriculum is the long process for updates.	In 15 years, Mexico updated its LFC curricula one time.
6. SCT relies on CECAFs to develop didactic materials.	Didactic materials, content, and topic elaboration vary from one CECAF to another.
7. With diagnostic, modular, and final testing, CECAFs extensively evaluate candidate LFC drivers’ knowledge and skills.	Drivers go through extensive evaluations that reinforce knowledge and skills.
8. Top CECAFs have extensive tests and checklists to evaluate driver performance.	Top CECAFs can serve as good examples of how to evaluate driver performance.
9. Diagnostic testing allows CECAFs to tailor training for completely inexperienced, intermediately experienced, and very experienced drivers who have been driving commercial vehicles for years with a State license.	Training is tailored to drivers’ skills.
10. Top CECAFs with extended curricula have high enrollment rates for new-entry courses and little-to-no enrollment for renewal courses.	Drivers take LFC renewal training at CECAFs where the minimum curriculum is offered. Drivers perceive the renewal training as more of a burden than an opportunity to refresh their knowledge. Drivers completing the renewal training are largely already employed, so they have difficulty seeing the benefits of completing the training.
11. Internal CECAFs all agree that experienced drivers become overconfident and have higher crash rates than recently-licensed drivers.	Motor carriers conduct yearly refresher courses to ensure a safety culture.

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4. SYSTEM EFFECTIVENESS

4.1 SAFETY METRICS

Mexico has not evaluated the safety effectiveness of either their original SCT-administered testing program or the third-party ELDT and testing program. While the Mexican Federal Police does maintain a database of crashes that occur on Federal highways, event-based safety performance metrics were not available for “before-after” comparisons to 1) test for significant differences in observed versus expected event frequencies using nonparametric analyses, and 2) to apply survival analyses to test for differences in the time between completion of training and the first such event on record. While such global or macro analysis was not possible, a few micro analyses were reported during the onsite interviews. A summary of the micro-analysis results is shown in Table 17.

Table 17. Summary of micro-analysis of safety metrics in Mexico.

Mexico’s Experience	Impact
<p>1. From January 2005 to December 2006, the top CECAF in Monterrey used the SCT minimum training curriculum to train close to 10,000 inner-city bus drivers who drove an average of 200 miles per day. The training was credited with a 44 percent crash reduction.</p>	<p>Transportation officials credited the training with 44 percent crash reduction (when bus driver was found at fault). Crashes decreased from 4,020 in 2004 to 2,255 in 2007. Two of every three crashes resulted from lane-change or were “fender-bender” crashes.⁽²³⁾</p>
<p>2. An internal CECAF for training bus drivers uses a three-tier structure to evaluate crashes and determine proper future actions to reduce such crashes:</p> <ul style="list-style-type: none"> – The “Support Team” goes to the crash site to collect evidence. – The “Incident Commission” analyzes the evidence and the driver’s role. – An interdisciplinary “Safety Committee” synthesizes background information from management/drivers on training, medical data, driver audits, and vehicle maintenance for making decisions to prevent crashes. 	<p>This company (referenced left) has found that the single most important factor for preventing crashes is a driver’s attitude. This company offers financial incentives for driver performance; if crashes occur, drivers lose these financial incentives. Crashes are categorized by severity from 1 to 5 (1 is a broken light, 5 is total loss) and color coded for damages only, injuries, and/or fatalities. Drivers participate in workshops on crash causation, speed awareness, and highway crashes to identify causes and solutions.</p>
<p>3. An internal freight CECAF (a training school within an individual company) has identified higher crash risks associated with the following:</p> <ul style="list-style-type: none"> – Drivers younger than 24 years of age. – The first 2 years of driving (for new drivers). – Driving between the hours of 7–9 a.m. and 1–2 p.m. (when traffic peaks). 	<p>After conducting crash prevention awareness training for drivers following drivers’ involvement in a crash, the company (referenced left) has observed a crash recidivism of 2 percent (98 percent of drivers trained do not crash again). They have also opted for hiring drivers who are at least 24 years old.</p>

4.2 FUEL EFFICIENCY METRICS

One of the objectives of the SCT curricula is to improve fuel efficiency and the corresponding environmental impact. No impact reports were found during the research project. Table 18 summarizes fuel efficiency metrics based on CECAF reporting.

Table 18. Analysis of CECAF-reported fuel efficiency metrics.

Mexico's Experience	Impact
CECAFs reported that after training, drivers' fuel efficiency improved between 10–20 percent.	Before taking the training, drivers had 5.7 miles per gallon fuel efficiency. After the training it is 7 miles per gallon. As an incentive, a top internal freight CECAF pays 50 percent of fuel savings to its drivers.

APPENDIX A: U.S. ELDT STATE-OF-THE-KNOWLEDGE UPDATE

U.S. LITERATURE SEARCH STRATEGY

The research team searched the following databases for relevant literature: the Transport Research International Documentation (TRID), the National Technical Information Service (NTIS), and the National Transportation Library (NTL). A parallel search was conducted using Google Scholar and the European Transport Safety Council publications. The search strategy focused on the effectiveness of CDL ELDT programs in the United States and internationally.

The search terms and strategy used for the search supporting this literature review are indicated in the list below. All searches were limited to the years 2004–15.

- Commercial AND driver AND entry level AND training
- Commercial AND driver AND training
- Third-party AND commercial AND driver

In addition to reports already obtained for a related literature review, 22 reports were acquired as candidates most relevant to this review. Of these, four contained pertinent information (i.e., within the parameters outlined above and with a focus on entry-level CDL drivers). An additional 32 reports were identified but rejected for review because they pertained to topics such as legislation and industry practice, legislation on licensing standards, safety interventions, and technology. One report focusing on a training intervention for new entrant owners/managers of small fleets was also included, with the encouragement of FMCSA.

U.S. LESSONS LEARNED

Several studies have found that when CMVs are coded with the critical event in a crash, reasons for the crash are often attributed to commercial vehicle driver behavior. Driver errors—especially those that occur early in a CDL driver’s career—have long been assumed to reflect, at least in part, a deficiency in the operator’s preparation for the demands of the profession. It is within this context that Section 32304 of the Moving Ahead for Progress in the 21st Century Act (MAP-21) requires that FMCSA must issue a minimum standard for commercial vehicle driver training. The premise of this congressional requirement is that standardized minimum CDL entry-level driver training may be an effective safety intervention. Currently there is no standardization of such training; therefore, there is much variance in programs and methods used. Methods range from in-depth on-road and simulator training through third-party certified programs and institutions (e.g., the PTDI certification) to courses designed specifically to enable entry-level CDL drivers to pass the CDL exam with little or no coursework devoted to safe driving strategies or tactics. There is very little research that evaluates the effectiveness of these training methods, especially with regard to safety outcomes.

This literature review identified just one study that investigated the relationship between CDL entry-level commercial driver training and safety. This study, conducted in 2008 by the

American Transportation Research Institute (ATRI), collected detailed information on training programs and data on driver safety metrics for approximately 17,000 entry-level CDL drivers from 6 different motor carriers.⁽²⁴⁾ Safety metrics included: USDOT-reportable crashes, traffic violation convictions, and property-damage-only (PDO) crashes. For analysis purposes, training methods were categorized as the following: company-owned or sponsored programs; private training programs; and training programs with public education institutions. The researchers found that there was no significant correlation between length of entry-level training and safety events until age and days of employment were controlled for.

It is worth noting that 80 percent of the safety events in the analysis were PDO crashes, i.e., those that occur most often on private roads, yards, and in parking lots (and not crashes reported to FMCSA). There is no standardization in the employer recording of such PDO events, or how they were reported for the ATRI analysis). Such low-speed crashes generally do not produce either injuries or fatalities (and the purpose of the proposed mandated minimum training is to reduce injuries and fatalities caused by large truck crashes). Additionally, as identified in the ATRI review, there are methodological reservations to be considered when interpreting the results of this ATRI study.

The research team identified a more recent ATRI study (2014) that investigates the safety impacts of simulator training on CDL drivers.⁽²⁵⁾ The participants in the 2014 ATRI study were new hires at the participating carriers; at the beginning of the study, 45.6 percent of the 168 participants had their CDL for less than 6 months, 5.0 percent had their CDL for 6 months to 1 year, 20.6 percent had their CDL for 1–5 years, and 28.1 percent had their CDL for 5 years or more. Motor vehicle records (MVRs) including detailed reports of violations, convictions, and crashes, were collected at baseline (prior to training), at 6 months post-training, and at 12 months post-training. Participants were randomly assigned to receive either the ATRI-designed simulator training program or a company-designed conventional simulator training program. The ATRI-designed program, which was developed in conjunction with the University of Central Florida, included four specific driving scenarios that directly aligned with driving behaviors identified as important crash predictors. The ATRI-targeted driving simulator training scenarios are described in Table 19.

Table 19. ATRI driving simulator training scenarios.

Scenario	Description	Distance	Example Obstacles
Suburban	Driver is hauling a heavy load with a traditional tractor-trailer, with a rest area as the destination.	8.2 miles	Pot-hole in road Residential fire on driver's route Animals and pedestrians venturing onto road Vehicles pulling out in front of driver
Rural	Driver is hauling a heavy load with a traditional tractor-trailer to a residential home under construction.	5.3 miles	Sharp curve on road Streets that require wide turns Assess one-lane bridge clearance Railroad crossing
Freeway	Driver is hauling a heavy load with a traditional tractor-trailer, with a rest area as the destination.	8.2 miles	Enter construction zone with obstructed view Merge onto freeway with proper distance between vehicles Accident causing congestion
City	Driver is hauling a heavy load with a traditional tractor-trailer to a mall.	4.0 miles	Inattentive pedestrians and drivers Turning from a boulevard onto a narrower street Assess bridge height clearance Obstructed vision

Due to relatively high participant attrition (n=175 at baseline, n=160 at 6 months post-training, and n=54 at 12 months post-training), statistical analyses were conducted separately for the 6-month and 12-month intervals. CDL drivers with less than 1 year of experience operating a CMV were coded as “entry-level” drivers and the remaining participants were coded as “experienced” drivers. For analyses comparing entry-level and experienced drivers, pre-training MVRs and simulator groups (ATRI-designed or standard company-designed program) were controlled for. Negative binomial regression showed no significant group differences in 6-month post-training MVRs, but there was an indication that on average, the experienced drivers had approximately 0.35 times fewer incidents than entry-level drivers ($B = -1.055$, $x^2 = 3.211$, $p = 0.73$). There were no significant findings for the 12-month follow up, but at this time the results indicated that *experienced* drivers had, on average, 1.437 times *more* post-training MVR incidents than the entry-level drivers. Notably, at the 6-month interval, 14 of the 160 (8.8 percent) had MVR incidents when just 5 of these 160 had incidents prior to training, and at the 12-month interval, 9 of the 54 remaining participants (16.7 percent) had MVR incidents (just 2 had incidents prior to training).

These findings led the researchers to note that perhaps the training was “already diminished by the 6-month post-training period and decreased even more so by the 12-month post-training period,” and support the notion that retention of training over time may be a central concern in the effectiveness of any entry-level driver training program, particularly with regard to safety outcomes (p 24).

In the multi-phase, FMCSA-sponsored *Commercial Motor Vehicle Driving Simulator Validation Study: Phase II*, researchers examined how various training methods influence CDL test performance.⁽²⁶⁾ As presented by Robin, et al., this study compared a conventional, PTDI-certified behind-the-wheel training program, a PTDI-certified simulator training program, informal training (training from friends, family, or on-the-job), and CDL-test-focused training (i.e., short courses oriented toward the CDL test) among 107 entry-level CDL drivers.⁽²⁷⁾

Effectiveness of training was measured via Division of Motor Vehicles (DMV) and Delaware Technical and Community College (DTCC) behind-the-wheel and simulator road and range test scores. The study found that there were no significant group differences on DMV road test scores and that overall, there were no significant differences between the (PTDI-certified) conventional and simulator-trained groups. However, statistical significance was seen for both the DMV and DTCC range test. Results showed that those in the conventional and simulator-trained groups had significantly higher scores than the CDL-test-focused group for the DMV range test and the DTCC behind-the-wheel range test, and that the simulator-trained group scored significantly better on the simulator range test than did the conventional and CDL-test-focused training groups. Findings indicated that, on average, the conventional and simulator training groups scored significantly better than the informal training and CDL-test-focused training groups.

It should be noted, though, that *all* participants in this study, across all training methods, passed the DMV road and range tests.

In order to evaluate the longitudinal effects of the various training methods, researchers re-tested participants (DTCC tests only) and contacted their supervisors for an employee evaluation 4–5 months after being hired; researchers also collected participants' driving records after 4 and 12 months on the job. Due to an economic downturn that resulted in many of the initial participants being unable to find employment as a CDL driver, the number of participants in the longitudinal portion of this study was relatively small, so only descriptive statistics were available.

A total of 22 participants completed the 4–5 month re-testing. While there was wide variation in performance among initial training group participants, neither of the two individuals from the informal training group passed the simulator and DTCC road tests; however, both did pass the DTCC and simulator range exams. Participants from the conventional and simulator groups also showed a pattern of scoring lower on the tests at the 4–5-month follow-up than at post-training entry-level testing. However, those from the conventional and simulator training groups tended to perform better on the follow-up road test than those from the informal training and CDL-test-focused groups.

For the evaluation of on-the-job performance, researchers contacted participants' supervisors and safety managers (at the 4–5-month period after being hired) and asked them to complete a brief questionnaire on the participant. Responses for 10 participants from 3 of the 4 training groups (2 from the conventional group, 6 from the simulator group, and 2 from the CDL-test-focused group) were obtained. Supervisors commented on USDOT-reportable collisions, non-USDOT-reportable collisions, moving violations, miles driven, and supervisor-rated control and safety (defensive driving) skills. No USDOT-reportable collisions were noted, but three non-USDOT-reportable collisions (PDO) were identified and all three were among simulator training group participants; two of these three collisions were deemed "preventable" by the supervisor. Three moving violations were reported as well, one for the simulator group and two for the CDL-test-focused group. Estimated miles driven varied widely among participants, ranging from 1,200 to 120,000.

With regard to job performance, overall, participants were rated between average and above average. Notably, the CDL-test-focused group (n=2) had the highest average rating for control skills, but the lowest average rating for safety skills; the conventional (n=2) and simulator (n=5)

trained groups each had similar ratings for control and safety skills, falling slightly above average.

Next, Delaware DMV and Commercial Driver's License Information System (CDLIS) data were examined for all participants. Of the 44 participants who were employed at the 4-month follow-up period, 7 had a reported violation, representing 11–20 percent of each training group. Only three of these violations were obtained while driving a CMV, however, and all three were from the simulator group; two of these violations were related to speeding and one was failure to obey a traffic sign. There were four crashes identified by the research team that did not appear in CDLIS records—two from the conventional group and two from the simulator group. The researchers acknowledged the limitations related to small sample size and other data limitations; the findings may therefore be regarded as anecdotal, and conclusions regarding safety may not be reliable.

Finally, in a recent FMCSA-sponsored study conducted in Montana, researchers evaluated the effect of fostering safety culture among small, new entrant motor carriers on driver and carrier safety performance and crash instances.⁽²⁸⁾ In this study, a first-generation voluntary training was conducted in Montana, during the years 2005–06. This training included a half-day of one-on-one training for the owner or manager at each carrier's location; recommended "homework," which consisted of preparing the FMCSA-required recordkeeping files; an offer for a mock audit; and telephone technical support in preparing or correcting the recordkeeping files. Training was completed for 221 new entrant motor carriers, and participants were grouped based on whether or not they completed the "homework" assignment. A control group that did not receive any training was selected from the same time period for comparison among new entrants from States geographically similar to Montana. Data on safety performance were extracted from the Motor Carrier Management Information System (MCMIS) in 2009 to provide several years of post-intervention safety data that included crashes, violations (driver and vehicle), out-of-service (OOS) violations (driver and vehicle), and inspection violations. In addition, safety audit pass rates and compliance review (CR) analyses were included as proxies for risk of poor safety performance. Seasonal and structural differences were controlled for. The researchers found that the new entrant carriers that completed the homework (indicating that they adopted a safety culture) had significantly better ($p = .001$) inspection and driver crash performance than the control group.

Researchers then conducted a second-generation training during the years 2010–12 among small new entrant carriers in Montana. This training, designed to increase the homework-completion and mock-audit participation rates, was conducted in peer groups rather than one-on-one training; the curriculum was made more detailed; all attendees were given hard copies of required files; and pre-, post-, and 1-year post-intervention tests were conducted to measure retention. For this second-generation training, safety and MCMIS safety performance data were evaluated from July 1, 2010, to August 25, 2012, a much shorter post-intervention period than for the first-generation training data collection. Also, there were several conditions that led to substantial changes in environmental and enforcement activities during the 2010–12 training, and it was not possible for the researchers to determine the impact of each of these changes.

Similar to the first-generation training analysis, seasonal and structural differences were controlled for. The only measure that showed statistical significance ($p = .05$) was the percent of

inspections resulting in driver OOS orders, where the trained carriers performed better than the control group. Due to the shorter data collection period and the low occurrence of crashes, significance testing was not performed for crash rates.

A clear conclusion was from the analysis was that new entrant motor carriers that adopt a safety culture can effectively improve both the safety performance behavior of their drivers and driver retention by adopting a safety culture. However, the considerable data limitations acknowledged in this report suggest that the findings may be regarded as preliminary.^{viii}

KEY QUESTIONS, PROBLEMS, AND FACTORS ADDRESSED IN U.S. LITERATURE

It has been established that the lack of standardized training is associated with a great deal of variance in training methods. At the same time, there is a dearth of data to support analyses of the relative effectiveness of different training methods. Currently, a passing score on the CDL exam is the only standardized measure of a CDL driver's ability to operate functionally and safely on public roadways. However, the results of that test may not be an accurate measure of safety performance capabilities, and as one researcher notes, "in reality, CDL requirements represent a licensing standard, not a training standard."⁽²⁹⁾

A central tenet throughout the limited U.S. literature is the questionable retention of skills acquired during entry-level CDL driving training. As noted by the *Commercial Motor Vehicle Driving Simulator Validation Study: Phase II* researchers, certain maneuvers present in training and testing may not often be required on the job for many CDL drivers. For example, some drivers may not use a manual-shift vehicle following training and testing. Perhaps more significant, those who drive alone receive no feedback for unsafe driving behaviors. Unfortunately, just as there is scant research on the effectiveness of entry-level CDL driver training measured by safety outcomes, neither is there a body of evidence addressing transfer of entry-level training to real-world tasks, nor long-term skill retention.⁽³⁰⁾

Another important issue identified in the limited U.S. literature on entry-level CDL driver training involves methodological considerations and availability of data. As noted in the *Commercial Motor Vehicle Driving Simulator Validation Study: Phase II*, and supported by the experience of the present research team, not only are public CDL datasets incomplete, but carriers are often very reluctant to share information about their drivers. In the *Commercial Motor Vehicle Driving Simulator Validation Study: Phase II*, for example, all participants provided authorization allowing the release of their records in the form of a supervisor evaluation. However, employers refused to provide information for over half of the participants available for this phase of the study, with three carriers accounting for many of the refusals; notably, each employer cited liability concerns as their reason for refusal.

^{viii} Final report is published and available at: <https://rosap.ntl.bts.gov/view/dot/208>

Also worth noting, the effectiveness of a training program may rely heavily on the commitment and experience of the trainer and there are currently no standards for the qualifications of CDL driving instructors, aside from those at PTDI-certified institutions.⁽³¹⁾

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APPENDIX B: SAMPLE CLASS B LFC NEW CURRICULUM MODULE OUTLINE

I, ADRIAN DEL MAZO MAZA, Director General of the Federal Motor Carrier Administration (DGAF) –which belongs to the Ministry of Communications and Transportation (SCT) –, and based on the provisions of Articles 1 and 36, fractions IX, XXVI and XXVII of the Organic Act of the Federal Public Administration; 1, 36 and 57 of the Roads, Bridges and Federal Motor Carrier Act; 4 of the Federal Administrative Procedure Act; 88, 89, 93C to 93H of the Federal Motor Carrier and Auxiliary Service Regulations; 10, fractions I, IV, XVII, and 22, fractions IV, VI, XI, XII and XIII of the Ministry of Communications and Transportation Procedure Regulations, and in order to achieve a safe and efficient traffic on national roads, and based on the coordination established between the Ministries of Communications and Transportation, Public Education and Labor and Social Welfare, hereby inform stakeholders about the following:

COMPREHENSIVE TRAINING PROGRAM FOR THE TYPE B FEDERAL LICENSE OF MOTOR CARRIER FREIGHT TRANSPORTATION FOR ELIGIBLE DRIVERS WITHOUT EXPERIENCE ON TRUCK-TRACTORS AND FIFTH WHEELS

Area:	Federal Motor Carrier Transportation of Freight.
Addressed to:	Candidate for drivers of motor carrier transportation and private transportation of freight, without experience on articulated vehicles.
Timeframe:	National Curriculum: 180 hours (62 in-the-classroom hours and 118 behind-the-wheel hours). International Curriculum: 196 hours (70 in-the-classroom hours and 126 behind-the-wheel hours).
Overall Training Objective:	Provide and develop the knowledge and skills in driving techniques and vehicle operation, through training in regulatory, technical and operational subjects, to foster driver expertise, improve road safety, care for the environment, and industry competitiveness for eligible Federal commercial drivers.

Table 20. Outline of Class B LFC minimum national curriculum.

Module No.	Name	Timeframe (Hours)
1	Diagnostic Evaluation	2 in-the-classroom 2 behind-the-wheel
2	Introduction to the Federal Motor Carrier Service	4 in-the-classroom
3	Professional Driver Culture	4 in-the-classroom
4	Accident Prevention	4 in-the-classroom
5	Education and Emotional Health	4 in-the-classroom
6	Regulatory Framework	8 in-the-classroom
7	Education and Road Safety	8 in-the-classroom
8	Comprehensive Knowledge of the Vehicle and Fault Detection	8 in-the-classroom
9	Driving and Vehicle Operation	104 behind-the-wheel
10	Handling Freight	4 in-the-classroom
11	Coupling, Uncoupling, and Articulated Vehicle Driving	4 in-the-classroom 12 behind-the-wheel
12	Drivers' Common Diseases	4 in-the-classroom
13	Culture of Service	4 in-the-classroom
14	Environment	2 in-the-classroom
15	Intelligent Transport Systems	2 in-the-classroom
Total Hours		180 hours

Table 21. Outline of Class B LFC minimum international curriculum.

Module No.	Name	Timeframe (Hours)
1	Diagnostic Evaluation	2 in-the-classroom 2 behind-the-wheel
2	Introduction to the Federal Motor Carrier Service	4 in-the-classroom
3	Professional Driver Culture	4 in-the-classroom
4	Accident Prevention	4 in-the-classroom
5	Education and Emotional Health	4 in-the-classroom
6	Regulatory Framework	8 in-the-classroom
7	Education and Road Safety	8 in-the-classroom
8	Comprehensive Knowledge of the Vehicle and Fault Detection	8 in-the-classroom
9	Driving and Vehicle Operation	104 behind-the-wheel
10	Handling Freight	4 in-the-classroom
11	Coupling, Uncoupling, and Articulated Vehicle Driving	4 in-the-classroom 12 behind-the-wheel
12	Drivers' Common Diseases	4 in-the-classroom
13	Culture of Service	4 in-the-classroom
14	Environment	2 in-the-classroom
15	Intelligent Transport Systems	2 in-the-classroom
16	Basic and Technical English Language	8 theory 8 practice
Total Hours		196 hours

MODULE 1: DIAGNOSTIC EVALUATION

Timeframe

- 2 in-the-classroom hours
- 2 behind-the-wheel hours

Objective

The driver shall learn the technical basics and the requirements of the training.

Specific Objective

Upon completion of the module, the driver shall have:

- In-the-classroom and behind-the-wheel knowledge on this type of vehicle.

Subjects

- 1.1. Diagnostic evaluation according to profile.
- 1.2. Diagnostic evaluation on road education, regulations and vehicle effective operation.
 - 1.2.1. Road education.
 - 1.2.2. Regulations and signs.
 - 1.2.3. Effective operation.
- 1.3. Diagnostic evaluation of driving skills in the maneuver yard.
 - 1.3.1. Straight ahead.
 - 1.3.2. Serpentine driving
- 1.4. Parking.
 - 1.4.1. Right.
 - 1.4.2. Left.

MODULE 2: INTRODUCTION TO THE FEDERAL MOTOR CARRIER SERVICE

Timeframe

4 in-the-classroom hours

Objective

Identifying ways and means of motor carrier transportation and their importance in the social, economic and international environment, through the basics of federal and private motor carrier transportation, linked to the economic activities of the country, in order to raise awareness on the participation and importance of professional driving in the industry.

Specific Objectives

Upon completion of the module, the driver shall:

- Know the importance of motor carrier transportation and its impact on social and economic issues.
- Assimilate the concept of motor carrier transportation.
- Identify the characteristics of federal motor carrier transportation.
- Acknowledge the characteristics of the private service of motor carrier transportation.
- Learn basic concepts on international good traffic.
- Know the basic concepts of logistics, terminology, productivity lines and their place in the economy.
- Learn about the different means of transportation and their interaction in the supply chain.

Subjects

- 2.1. Motor carrier transportation in the social and economic environment.
 - 2.1.1. Transport definition.
 - 2.1.2. Federal motor carrier transportation of freight.
 - 2.1.3. Private service of motor carrier transportation.
- 2.2. Importance of motor carrier transportation on the national territory.
 - 2.2.1. Figures of motor carrier transportation
 - 2.2.2. Main industries that use and depend on motor carrier transportation of freight.
- 2.3. International goods traffic.
 - 2.3.1. Transport logistics.
 - › 2.3.1.1. What are logistics?
 - › 2.3.1.2. Production line.
 - › 2.3.1.3. Logistics in motor carrier transportation.
- 2.4. Multimodal transport.

- 2.4.1. Concept.
- 2.4.2. Transportation modes.
- 2.4.3. Multimodal and intermodal.
- 2.5. Geography and road network.
 - 2.5.1. Road and crossing classification and types.

MODULE 3: PROFESSIONAL DRIVER CULTURE

Timeframe

4 in-the-classroom hours

Objective

The driver shall learn the vision, mission, principles, values, objectives and quality policy in order to perform a professional driving.

Specific Objectives

Upon completion of this module, the driver shall:

- Know the driver's functions.
- Learn why driving is a professional job.
- Be conscious about the importance and transcendence of his job.
- Know the vision, mission, principles, values, objectives and quality policy of the job.

Subjects

- 3.1. The professional driver.
 - 3.1.1. Why a driver?
 - 3.1.2. Driver functions.
 - 3.1.3. Why professional?
- 3.2. Driver's professional culture.
- 3.3. Job importance.
 - 3.3.1. Vision.
 - 3.3.2. Mission.
- 3.4. Professional principles.
 - 3.4.1. Safety.
 - 3.4.2. Service.
 - 3.4.3. Transcendence.
- 3.5. Professional values.
 - 3.5.1. Responsibility.
 - 3.5.2. Politeness.
- 3.6. Quality objectives.
- 3.7. Quality policy.

MODULE 4: ACCIDENT PREVENTION

Timeframe

4 in-the-classroom hours

Objective

Raising awareness on the importance of motor carrier transportation as a fundamental activity in country development, and the safety risks involved.

Specific Objectives

Upon completion of this module, the driver shall:

- Learn what an accident is and the factors involved.
- Learn the key statistics of death, injuries and costs due to accidents.
- Analyze the causes of accidents and their effects on personal lives.
- Be aware that the main cause of accidents is behavior (emotions).

Subjects

- 4.1. Accidents.
 - 4.1.1. What is an accident?
 - 4.1.2. Accident factors.
 - 4.1.3. Accident statistics.
 - 4.1.4. Accident causes.
 - 4.1.5. Accident cause analysis.
 - 4.1.6. Emotional and behavioral factors in accidents.
- 4.2. The driver and the accidents.
 - 4.2.1. Driver's responsibility in accidents.
 - 4.2.2. How to prevent accidents?
 - 4.2.3. Driving without errors.
 - 4.2.4. Thinking and being intelligent in different situations.

MODULE 5: EDUCATION AND EMOTIONAL HEALTH

Timeframe

4 in-the-classroom hours

Objective

The driver shall acknowledge the value of self-esteem, anger management and the development of emotional intelligence to do a professional job.

Specific Objectives

Upon completion of this module, the driver shall:

- Learn that self-esteem is knowing, being aware of, and practicing all personal potential abilities.
- Know how to develop an emotional intelligence to positively influence on work quality and personal life.
- Learn the basic techniques for controlling and managing emotions.

Subjects

- 5.1. The power of self-esteem.
 - 5.1.1. What is self-esteem?
 - 5.1.2. Self-esteem elements
 - › 5.1.2.1. Life value.
 - › 5.1.2.2. A positive mind attitude.
 - › 5.1.2.3. Self-image.
- 5.2. Emotion control.
 - 5.2.1. Good mood.
 - 5.2.2. Anger management.
- 5.3. Intelligence and emotional health development.
 - 5.3.1. What is emotional intelligence?
 - 5.3.2. Skills developed.
 - 5.3.3. Influence of emotional intelligence.
 - 5.3.4. Understanding, feeling, controlling and/or modifying the mood.

MODULE 6: REGULATORY FRAMEWORK

Timeframe

8 in-the-classroom hours

Objective

Knowing the legal framework of Federal motor carrier transportation, through the study of its main laws, regulations and standards, with the objective of increasing road safety.

Specific Objectives

Upon completion of this module, the driver shall:

- Identify the main provisions that freight transportation must meet, and the applicable penalties.
- Implement the safety criteria cited in the laws and rules of Federal Motor Carrier Transportation.
- Get the general knowledge of applicable rules and regulations in the United States. (Applies only to the international curriculum.)

Subjects

- 6.1. Federal Roads and Bridges Act.
- 6.2. Regulations on Federal Motor Carrier and Auxiliary Services.
 - 6.2.1. Federal Motor Carrier.
 - 6.2.2. Auxiliary Services.
 - 6.2.3. Comparing U.S. and Mexican regulations (applies only to the international curriculum).
- 6.3. Traffic Regulations on Federal Roads and Bridges.
 - 6.3.1. Basic concepts.
 - 6.3.2. Federal public vehicles and drivers.
 - 6.3.3. Road rules.
 - 6.3.4. Authorities and penalties.
- 6.4. Transportation Regulations on Preventive Medicine.
- 6.5. Mexican Official Standard 012 on Weight and Dimensions.
 - 6.5.1. Definitions.
 - 6.5.2. Vehicle classification.
 - › 6.5.2.1. Class, classification, axle and tire number.
 - 6.5.3. Maximum weight.
 - › 6.5.3.1. Maximum weight per axle.
 - › 6.5.3.2. Maximum authorized gross weight.

- 6.5.4. Dimensions.
 - › 6.5.4.1. Maximum authorized dimensions.
- 6.5.5. Alternative technologies.
- 6.5.6. Connectivity cases.
 - › 6.5.6.1. Freight vehicles.
- 6.5.7. Special vehicles and configurations.
- 6.5.8. Penalties.
- 6.6. Mexican Official Standard 068 on Physical and Mechanical Conditions.
 - 6.6.1. Definitions.
 - 6.6.2. Safety physical and mechanical conditions for motor carrier vehicles on the road.
 - 6.6.3. Procedures for compliance assessment.
 - › 6.6.3.1. Vehicle warranty.
 - › 6.6.3.2. Inspection.
 - › 6.6.3.3. Approval report and inspection decals after the physical and mechanical inspection.
 - 6.6.4. Penalties.

MODULE 7: EDUCATION AND ROAD SAFETY

Timeframe

8 in-the-classroom hours

Objective

Identifying the principles of education and road safety by studying the main elements that affect safety, providing concepts and examples applicable to the daily development of driver's duties, in order to prevent accidents on Federal highways.

Specific Objectives

Upon completion of this module, the student shall:

- Identify the types of devices for traffic control.
- Know the factors and causes of accidents.
- Know the aspects involved in preventing accidents.
- Know the defensive driving techniques.
- List some of the recommendations for dealing with accidents and incidents during the trip.
- Recognize the conditions affecting the driver and influencing on a safe journey.

Subjects

- 7.1. Basic concepts on road safety education.
- 7.2. Accident causes: risk factors.
 - 7.2.1 The vehicle as a risk factor.
 - 7.2.2. Driver-vehicle interaction.
 - 7.2.3. Environment factors.
- 7.3. Main causes of accidents: the human factor.
 - 7.3.1. Identifying risk factors.
 - 7.3.2. Risk perception and decision making.
 - 7.3.3. Mastering emotions.
- 7.4. Accident prevention.
 - 7.4.1. Speed and driving.
 - › 7.4.1.1. The principles of preventive driving.
 - › 7.4.1.2. Safety belt.
 - › 7.4.1.3. Assured clear distance ahead
 - › 7.4.1.4. Total stopping distance.
 - 7.4.2. Defensive driving and its characteristics.
 - 7.4.3. Effects of drugs and alcohol while driving.

- 7.4.4. Driving under the influence.
- 7.4.5. Effects of stress, sleep, and fatigue on driving.
- 7.4.6. Accident prevention rules: watching, thinking and acting.
- 7.5. Signals.
 - 7.5.1. Definition of traffic control devices.
 - 7.5.2. International agreements on signals.
 - 7.5.3. Vertical traffic devices.
 - 7.5.4. Horizontal traffic devices.
 - 7.5.5. Lighting device.
 - 7.5.6. Manual signals.
 - 7.5.7. Sound signals.
 - 7.5.8. Risk identification on signs.
- 7.6. Planning trips and routes.
 - 7.6.1. Importance and requirement of route and trip planning.
 - 7.6.2. Connectivity permits, road classification.
 - 7.6.3. Entering States, counties, and rest areas.

MODULE 8: COMPREHENSIVE KNOWLEDGE OF THE VEHICLE AND FAULT DETECTION

Timeframe

8 in-the-classroom hours

Objective

Learning how freight vehicle systems work through the implementation of preventive maintenance and mechanical emergency, in order to save fuel, protect the vehicle's life and promote environmental ethics.

Specific Objectives

Upon completion of this module, the student shall:

- Identify freight vehicle configurations and technologies.
- Know the best operation of diesel engines.
- Know the main components while inspecting the physical and mechanical conditions of vehicles.
- Observe preventive maintenance techniques.

Subjects

- 8.1. Different configurations of transport vehicles.
- 8.2. Basic operation principles of the main systems and components on transport vehicles.
 - 8.2.1. Basic mechanical concepts.
 - 8.2.2. Physical and mechanical vehicle inspection.
- 8.3. Preventive maintenance.
 - 8.3.1. Overview.
 - 8.3.2. Technical specifications.
 - 8.3.3. Basic service.
 - 8.3.4. Additional time based on time.
 - 8.3.5. Additional maintenance based on mileage.
- 8.4. Emergencies.
 - 8.4.1. Emergency mechanics.
 - 8.4.2. Firefighting.

MODULE 9: DRIVER AND VEHICLE OPERATION

Timeframe

104 behind-the-wheel hours

Objective

The driver shall apply appropriately the in-the-classroom and behind-the-wheel knowledge, taking into account the different components involved in a proper operation, complying with applicable regulations, in order to decrease road accidents that are caused by the human factor.

Specific Objectives

Upon completion of this module, the driver shall:

- Know the safety principles that should be considered before driving.
- Identify the steps involved on a vehicle physical and mechanical inspection.
- Know the different ways of braking and maneuvering for parking.
- Apply the appropriate procedures for the "L" maneuvers to the left and to the right.
- Know how to make a "U" turn and turning to the left and to the right.
- Acknowledge the driving techniques.

Subjects

- 9.1. Driving principles (safety before starting the engine).
 - 9.1.1. Checking the brakes.
 - 9.1.2. Tires.
 - 9.1.3. Lamps.
 - 9.1.4. Safety while driving (safety belt, rear-view mirrors, etc.)
- 9.2. Driver's hours of service logbook.
- 9.3. Vehicle physical and mechanical inspections, before, during and after the trip.
- 9.4. Driving on different weather conditions.
- 9.5. Driving strategies.
 - 9.5.1. Blind spots.
 - 9.5.2. Assured clear distance ahead (four steps rule).
 - 9.5.3. Total stopping distance.
 - 9.5.4. The ABC of driving.
- 9.6. Backing up and forward driving.
- 9.7. Parking between two vehicles.
- 9.8. Perpendicular parking.

- 9.9. “L” to the left.
- 9.10. “L” to the right.
- 9.11. Before turning off the engine.
 - 9.11.1. Clutch usage.
 - 9.11.2. Motor brake usage.
 - 9.11.3. Service brake usage.
- 9.12. Parking brake usage.
- 9.13. Speed control.
- 9.14. U-turns.
- 9.15. Turning to the right or left.
- 9.16. Technical issues.
 - 9.16.1. Driving techniques on normal weather conditions.
 - › 9.16.1.1. In the yard.
 - › 9.16.1.2. In the city.
 - › 9.16.1.3. On the road.
- 9.17. Fuel efficiency.
 - 9.17.1. Introduction.
 - 9.17.2. Forces involved in the movement of a vehicle
 - › 9.17.2.1. Aerodynamic resistance.
 - › 9.17.2.2. Rolling resistance.
 - › 9.17.2.3. Slope resistance.
 - › 9.17.2.4. Inertial resistance.
 - › 9.17.2.5. Centrifugal force.
 - 9.17.3. Engine curves.
 - › 9.17.3.1. Curves (characteristics).
 - › 9.17.3.2. Engine efficiency.
 - 9.17.4. Speed diagram.
 - › 9.17.4.1. Speed control diagram methodology
 - › 9.17.4.2. Selecting depending on operation type.
 - 9.17.5. Fuel efficiency driving.
 - › 9.17.5.1. Basic principles.
 - › 9.17.5.2. Crane mast.
 - › 9.17.5.3. Keeping up momentum.
 - › 9.17.5.4. Green area.

MODULE 10: HANDLING CARGO

Timeframe

4 in-the-classroom hours

Objective

Applying techniques and securement procedures for the transportation and handling of different types of cargo, complying with regulations and standards for maximum vehicle weight and dimensions, in order to provide a quality service that offers safety to both the driver and the others.

Specific Objectives

Upon completion of this module, the driver shall:

- Know the different freight types.
- Know cargo securement and distribution techniques.
- Apply cargo techniques, signaling and distribution, complying with weight and dimension provisions.

Subjects

- 10.1. Center of gravity types.
 - 10.1.1. Identifying and handling the center of gravity.
- 10.2. Cargo types.
 - 10.2.1. General cargo.
 - 10.2.2. Bulk cargo.
 - 10.2.3. Special cargo.
 - › 10.2.3.1. Over-sized cargo.
 - › 10.2.3.2. Refrigerated cargo.
 - › 10.2.3.3. Hazardous material cargo.
 - › 10.2.3.4. Valuable transportation.
- 10.3. Loading and unloading procedures.
 - 10.3.1. Container types.
 - 10.3.2. Securement techniques.
 - 10.3.3. Cargo markings.
 - 10.3.4. Weight distribution of cargo.

MODULE 11: COUPLING, UNCOUPLING, AND ARTICULATED VEHICLE DRIVING

Timeframe

- 4 in-the-classroom hours.
- 12 behind-the-wheel hours.

Objective

The driver shall learn how to appropriately and safely operate, couple and uncouple articulated vehicles.

Specific Objectives

Upon completion of the module, the driver shall:

- Know how to couple and uncouple a truck-tractor and a trailer.
- Know the maneuvers and how to drive an articulated vehicle.

Subjects

- 11.1. Coupling and uncoupling.
 - 11.1.1. Coupling procedure.
 - 11.1.2. Uncoupling procedure.
- 11.2. Driving an articulated vehicle.
 - 11.2.1. Driving and maneuvering procedures.
 - 11.2.2. Behind-the-wheel practice.

MODULE 12: DRIVERS' COMMON DISEASES

Timeframe

4 in-the-classroom hours

Objective

Raising driver awareness about the importance of health and hygiene, learning about different factors that endanger health and work, in order to prevent occupational diseases and reduce the risk of road accidents.

Specific Objectives

Upon completion of this module, the driver shall:

- Identify the factors that endanger the driver's safety while driving.
- Know the importance of a comprehensive medical examination.

Subjects

- 12.1. Critical health and hygiene factors affecting driver safety (sleepiness, fatigue, hours of service).
- 12.2. Heart diseases and risk factors.
- 12.3 Advantages of a comprehensive medical examination.
- 12.4. Drugs and addictions.
- 12.5. Alcohol dependence.
- 12.6. Sexual education.
- 12.7. Obesity.
 - 12.7.1. Eating habits.

MODULE 13: SERVICE CULTURE

Timeframe

4 in-the-classroom hours

Objective

Knowing the importance of good customer service, through assertive communication that will improve the quality.

Specific Objectives

Upon completion of this module, the driver shall:

- Articulate the importance of an appropriate relationship with the customers and the general public.
- Know the advantages of keeping a professional and polite relationship with his colleagues.
- Identify the factors involved in the corporate image.
- Study the basics of interpersonal and work relationships, and their importance on the quality of the service.

Subjects

- 13.1. Quality.
 - 13.1.1. Customer service.
 - 13.1.2. Good customer service as a competition strategy.
 - 13.1.3. Corporate image.
- 13.2. Human development.
 - 13.2.1. Driver's morality.
 - 13.2.2. Interpersonal relationship elements.
 - 13.2.3. In search of personal excellence.
- 13.3. Ethics of care.
 - 13.3.1. Assertive communication.
- 13.4. Total quality.
- 13.5. Productivity.

MODULE 14: THE ENVIRONMENT

Timeframe

2 in-the-classroom hours

Objective

Learning about the effect of ones duties, the standards, regulations, terminology and international concepts, and adopting green technologies.

Specific Objectives

Upon completion of this module, the driver shall:

- Identify environmental concepts and international language.
- Know the importance of international standards and regulations on the environment.
- Study the basics and benefits of adopting green technologies.

Subjects

- 14.1. The environment.
 - 14.1.1. Concepts and definitions.
 - 14.1.2. The carbon footprint.
- 14.2. International standards.
 - 14.2.1. International regulations on the environment.
 - 14.2.2. The Ministry of the Environment and Natural Resources (SEMARNAT)
- 14.3. Green technologies
 - 14.3.1. What are they?
 - 14.3.2. Who uses them?
 - 14.3.3. Benefits of green technologies.

MODULE 15: INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

Timeframe

2 in-the-classroom hours

Objective

Identifying new telecommunication technologies, their benefits and strategic importance, as well as safety issues due to the tracking and monitoring of cargo transportation.

Specific Objectives

Upon completion of the module, the driver shall:

- Know the application fields for ITS.
- Identify the relevance of ITS, in order to “save lives, time, and money.”
- Handle transportation networks and operations.

Subjects

- 15.1. Telematics.
 - 15.1.1. Telecommunications.
 - 15.1.2. Computer science.
- 15.2. Intelligent Transportation Systems.
 - 15.2.1. Scope of application.
 - 15.2.2. Saving lives, time and money.
 - 15.2.3. In the world.
- 15.3. ITS Types and Technology.
 - 15.3.1 Global Positioning System (GPS).
 - 15.3.2. Mobile telephones.
 - 15.3.3. Tracking.
 - 15.3.4. Prepaid cards (toll and fuel).
 - 15.3.5. Traffic monitoring.
 - 15.3.6. Other.

MODULE 16: BASIC AND TECHNICAL ENGLISH LANGUAGE (APPLIES ONLY TO THE INTERNATIONAL CURRICULUM)

Timeframe

- 8 in-the-classroom hours
- 8 hours of practice

Objective

Getting the basic knowledge to communicate in an international environment and the basis for further development or language acquisition.

Specific Objectives

Upon completion of this module, the driver shall:

- Help or ask for help and instructions during cross-border cargo operations.
- Know the importance of developing language skills to maintain a better customer relationship.
- Study the technical concepts of his job in the English language.
- Appropriately identify and complete applications and records (mechanical reports, cargo inspection and entry forms).

Subjects

- 16.1. Introduction and questions.
 - 16.1.1. Questions and answers.
 - 16.1.2. Addresses and emergencies.
- 16.2. Breakdowns.
 - 16.2.1. Truck parts.
 - 16.2.2. Engine parts.
 - 16.2.3. Lubrication system.
 - 16.2.4. Cooling system.
 - 16.2.5. Transmission.
 - 16.2.6. Fuel system.
 - 16.2.7. Start-up system.
 - 16.2.8. Gearbox.
 - 16.2.9. Braking system.
- 16.3. Most usual vocabulary in the driver's work environment.

APPENDIX C: SAMPLE CLASS A LFC NEW CURRICULUM MODULE OUTLINE

I, ADRIAN DEL MAZO MAZA, Director General of the Federal Motor Carrier Administration (DGAF) –which belongs to the Ministry of Communications and Transportation (SCT) –, and based on the provisions of Articles 1 and 36, fractions IX, XXVI and XXVII of the Organic Act of the Federal Public Administration; 1, 36 and 57 of the Roads, Bridges and Federal Motor Carrier Act; 4 of the Federal Administrative Procedure Act; 88, 89, 93C to 93H of the Federal Motor Carrier and Auxiliary Service Regulations; 10, fractions I, IV, XVII, and 22, fractions IV, VI, XI, XII and XIII of the Ministry of Communications and Transportation Procedure Regulations, and in order to achieve a safe and efficient traffic on national roads, and based on the coordination established between the Ministries of Communications and Transportation, Public Education and Labor and Social Welfare, hereby inform stakeholders about the following:

COMPREHENSIVE TRAINING PROGRAM FOR THE TYPE A FEDERAL LICENSE OF MOTOR CARRIER TRANSPORTATION AND PRIVATE TRANSPORTATION OF PASSENGERS AND TOURISM

Area:	Federal Motor Carrier Transportation of Passengers and Tourism.
Addressed to:	Candidates for drivers of Motor Carrier Transportation and Private Transportation of Passengers and Tourism
Timeframe:	National Curriculum: 126 hours (46 in-the-classroom hours and 80 behind-the-wheel hours) International Curriculum: 142 hours (54 in-the-classroom hours and 88 behind-the-wheel hours)
Overall Training Objective:	Providing and developing of candidates for commercial drivers the knowledge and skills in driving techniques and vehicle operation, through training in regulatory, technical and operational issues, in order to foster driver expertise, improve road safety, environmental care and industry competitiveness.

Table 22. Outline of Class A LFC minimum national curriculum.

Module No.	Name	Timeframe (Hours)
1	Introduction to Federal Motor Carrier Transportation and Private Transportation of Passengers and Tourism	2 in-the-classroom
2	Road Training and Defensive Driving	12 in-the-classroom 40 behind-the-wheel
3	Operation	10 in-the-classroom 34 behind-the-wheel
4	Maintenance	4 in-the-classroom 6 behind-the-wheel
5	Customer Service	12 in-the-classroom
6	Drivers' Most Common Diseases	4 in-the-classroom
7	Intelligent Transport Systems	2 in-the-classroom
Total Hours		126 hours

Table 23. Outline of Class A LFC minimum international curriculum.

Module No.	Name	Timeframe (Hours)
1	Introduction to Federal Motor Carrier Transportation and Private Transportation of Passengers and Tourism	2 in-the-classroom
2	Road Training and Defensive Driving	12 in-the-classroom 40 behind-the-wheel
3	Operation	10 in-the-classroom 34 behind-the-wheel
4	Maintenance	4 in-the-classroom 6 behind-the-wheel
5	Customer Service	12 in-the-classroom
6	Drivers' Most Common Diseases	4 in-the-classroom
7	Intelligent Transport Systems	2 in-the-classroom
8	Basic and Technical English Language	8 in-the-classroom 8 practice
Total Hours		142 hours

MODULE 1: INTRODUCTION TO FEDERAL MOTOR CARRIER TRANSPORTATION AND PRIVATE TRANSPORTATION OF PASSENGERS AND TOURISM

Timeframe

2 in-the-classroom hours

Objective

Learning the history and background of the federal motor carrier transportation of passengers and tourism, the technological development and innovation, and their importance in Mexico.

Specific Objective

Upon completion of the module, the driver shall have the knowledge of the transportation industry that will enable him to find a job in one of the transportation modes.

Subjects

- 1.1. Historical backgrounds of transportation in Mexico.
- 1.2. Basic concepts of passenger and tourism motor carrier transportation.
- 1.3. Service modes.
- 1.4. Economical and social share in the development of the country.
- 1.5. Geography and road networks.

MODULE 2: ROAD TRAINING AND DEFENSIVE DRIVING

Timeframe

- 12 in-the-classroom hours
- 40 behind-the-wheel hours

Objective

The driver shall analyze the principles of road safety, describing the importance of their application in professional driving, using defensive driving techniques and identifying the factors involved in accident prevention.

Specific Objectives

Upon completion of the module, the driver shall:

- Know the rules of safe driving, comply with road signs, be responsible, and avoid accidents.
- Drive the vehicle aware of any errors and dangerous maneuvers of other users that may cause accidents on public roads under Federal jurisdiction.

Subjects

- 2.1. Road Education.
 - 2.1.1. Rules and regulations.
 - › 2.1.1.1. Federal Roads, Bridges and Motor Carrier Act.
 - › 2.1.1.2. Federal Motor Carrier and Auxiliary Service Regulations.
 - 2.1.1.2.1. Federal Motor Carrier.
 - 2.1.1.2.2. Auxiliary Services.
 - 2.1.1.2.3. Education and Training.
 - › 2.1.1.3. Traffic Regulations on Federal Jurisdiction Roads and Bridges.
 - 2.1.1.3.1. Basic concepts in these regulations.
 - 2.1.1.3.2. Federal Public Service Vehicles and Drivers.
 - 2.1.1.3.3. Traffic rules.
 - 2.1.1.3.4. Authorities and penalties.
 - › 2.1.1.4. Preventive Medicine Regulations in Transportation.
 - 2.1.2. Road signs.
 - › 2.1.2.1. Preventive road signs.
 - › 2.1.2.2. Restrictive road signs.
 - › 2.1.2.3. Information road signs.
 - 2.1.2.3.1. Destination signs.
 - 2.1.2.3.2. Service signs.
 - 2.1.2.3.3. General.
 - 2.1.3. Markings, traffic islands and various works.
 - › 2.1.3.1. Different kinds of markings.
 - › 2.1.3.2. Traffic island classification.

- 2.2. Defensive driving.
 - 2.2.1. Accident overview.
 - 2.2.2. Practical driving (road, urban street, parking, curve, upward and downward slopes).
 - 2.2.3. Accident types.
 - › 2.2.3.1. Road accidents and their causes.
 - 2.2.4. Adverse driving conditions.
 - › 2.2.4.1. Lighting conditions.
 - › 2.2.4.2. Weather conditions.
 - › 2.2.4.3. Road conditions.
 - › 2.2.4.4. Traffic conditions.
 - › 2.2.4.5. Vehicle conditions.
 - › 2.2.4.6. Driver conditions.
 - 2.2.5. Bus braking systems.
 - 2.2.6. Two vehicle crashes.
 - › 2.2.6.1. Crashing against a vehicle ahead.
 - › 2.2.6.2. Crashing against a vehicle behind.
 - › 2.2.6.3. Crashing against a vehicle in front.
 - › 2.2.6.4. Crashing against a vehicle on a crossroads.
 - › 2.2.6.5. Crashing against a vehicle that is overtaking you.
 - › 2.2.6.6. Crashing against a vehicle that you are overtaking.
 - 2.2.7. Safe overtaking rules.
 - 2.2.8. Other common accidents.
 - › 2.2.8.1. Running over pedestrians.
 - › 2.2.8.2. Crashing against a cyclist.
 - › 2.2.8.3. Crashing against a motorcyclist.
 - › 2.2.8.4. Crashing when backing up.
 - › 2.2.8.5. Mysterious crash.
 - › 2.2.8.6. Crashing against a train.
 - 2.2.9. The ABC of accident prevention.
 - › 2.2.9.1. a) To see.
 - › 2.2.9.2. b) To think.
 - › 2.2.9.3. c) To do.
 - 2.2.10. Night driving techniques.
 - 2.2.11. Rain and fog driving techniques.
 - 2.2.12. The driver and the driving.

MODULE 3: OPERATION

Timeframe

- 10 in-the-classroom hours
- 34 behind-the-wheel hours

Objective

Analyzing the importance of applying in-the-classroom and behind-the-wheel knowledge about the vehicle composition and operation for an appropriate operation.

Specific Objectives

Upon completion of the module, the driver shall:

- Explain the characteristics of the various vehicles used in the passenger and tourism motor carrier transportation service.
- Identify the operating ranges of different types of engines.
- Perform the appropriate inspection steps before, during and at the end of the trip.

Subjects

- 3.1. Bus characteristics.
 - 3.1.1. Bus structure and building technology.
 - 3.1.2. Technical sheet.
 - 3.1.3. Different parts.
 - 3.1.4. What is a powertrain?
- 3.2. Main vehicle systems.
 - 3.2.1. Lubrication systems.
 - 3.2.2. Cooling systems.
 - 3.2.3. Air system.
 - 3.2.4. Fuel system.
 - 3.2.5. Electric system.
 - 3.2.6. Valve train system.
 - 3.2.7. Clutch.
 - 3.2.8. Gearboxes.
 - 3.2.9. Universal joint axle.
 - 3.2.10. Operation ranges.
 - 3.2.11. Safety systems.
 - 3.2.12. Steering.
 - 3.2.13. Activating.

- 3.2.14. Tires.
- 3.3. Electric system.
 - 3.3.1. Alternator.
 - 3.3.2. Regulator.
 - 3.3.3. Battery.
 - 3.3.4. Fuse.
 - 3.3.5. Diode.
- 3.4. Pre-inspection.
 - 3.4.1. Pre-trip inspection.
 - 3.4.2. On-trip inspection.
 - 3.4.3. End-trip inspection.
- 3.5. Safety auxiliary systems.
 - 3.5.1. Operation.
 - 3.5.2. Care.
 - 3.5.3. Failure detection.
 - 3.5.4. Speed retarders.

MODULE 4: MAINTENANCE

Timeframe

- 4 in-the-classroom hours
- 6 behind-the-wheel hours

Objective

Upon completion of the training, the driver shall describe possible vehicle failures, and know how to prevent and correct these.

Specific Objectives

Upon completion of the module, the driver shall:

- Describe engine, electric and auxiliary parts.
- Identify common vehicle failures and how to fix them.

Subjects

- 4.1. Breakdown analysis.
 - 4.1.1. Dirty air filter.
 - 4.1.2. Dirty fuel filters.
 - 4.1.3. Purging the engine because it was out of fuel.
 - 4.1.4. Rotochamber failure.
 - 4.1.5. Changing the bands.
 - 4.1.6. Injector failure.
 - 4.1.7. Electric system fuses and sensors.
- 4.2. Fume analysis.
 - 4.2.1. Types of fumes and causes.
- 4.3. Failures
 - 4.3.1. Start-up system irregularities.
 - 4.3.2. Charging system irregularities.
 - 4.3.3. Fuel system irregularities.
 - 4.3.4. Engine lubrication system failures.
 - 4.3.5. Cooling system irregularities.
 - 4.3.6. Power steering system irregularities.
 - 4.3.7. Locating basic failures.
- 4.4 Maintenance logbook.

MODULE 5: CUSTOMER SERVICE

Timeframe

12 in-the-classroom hours

Objective

The student shall analyze the importance of performing his duties on an appropriate way, committing to provide an excellent service to users, through a genuine service attitude that shall reflect on the corporate image and customer preference and satisfaction, based on a comprehensive training.

Specific Objectives

Upon completion of the module, the driver shall:

- Renew his way of thinking and acting to provide comprehensive advice and customer service.
- Commit to his personal development and to improving his customer service.

Subjects

- 5.1. Human relationships, work and family.
 - 5.1.1. Concept.
 - 5.1.2. Classification.
 - 5.1.3. Communication.
 - 5.1.4. Team work.
 - 5.1.5. Assertiveness.
 - 5.1.6. Speaking and writing.
- 5.2. Revitalizing and change.
 - 5.2.1. Revitalizing oneself.
 - 5.2.2. Renewing the organization.
- 5.3. Quality.
 - 5.3.1. Concept.
 - 5.3.2. Forming teams to solve problems.
 - 5.3.3. Setting key processes and service standards.
 - 5.3.4. Service consistency.
 - 5.3.5. Service ongoing improvement, competitiveness and innovation.
- 5.4. The customer.
 - 5.4.1. Basic needs.
 - 5.4.2. Customer characteristics.
 - 5.4.3. Customer types.

- 5.4.4. Empathy towards the customer.
 - 5.4.5. Implications of service.
- 5.5. Customer Service
 - 5.5.1. Customer service characteristics.
 - 5.5.2. Moments of truth.
- 5.6. Customer Service Attitude.
 - 5.6.1. Our function.
 - 5.6.2. Preference factors.
 - 5.6.3. Recommending because of the service.
- 5.7. Competition.
 - 5.7.1. Who is our competition?
 - 5.7.2. Competition classification.
 - 5.7.3. Competition image concepts.
 - 5.7.4. The challenge of competition.
- 5.8. Personal fulfillment.

MODULE 6: DRIVERS' COMMON DISEASES

Timeframe

4 in-the-classroom hours

Objective

Raising driver awareness about the importance of health and hygiene, through knowledge of the different factors that endanger health and work, in order to prevent occupational diseases and reduce the risk of road accidents.

Specific Objectives

Upon completion of this module, the driver shall:

- Identify the factors that endanger his safety while driving.
- Know the importance of the periodic medical examination.

Subjects

- 6.1. Critical health and hygiene factors affecting driver safety (sleepiness, fatigue, hours of service).
- 6.2. Heart diseases and risk factors.
- 6.3 Advantages of a comprehensive medical examination.
- 6.4. Drugs and addictions.
- 6.5. Alcohol dependence.
- 6.6. Sexual education.
- 6.7. Obesity.
 - 6.7.1. Eating habits.

MODULE 7: INTELLIGENT TRANSPORT SYSTEMS (ITS)

Timeframe

2 in-the-classroom hours

Objective

Identifying new telecommunication technologies, their benefits and strategic importance, as well as safety issues through tracking and monitoring of passenger and tourism transportation.

Specific Objectives

Upon completion of the module, the driver shall:

- Know the application fields for ITS.
- Identify the relevance of ITS, in order to save lives, time and money.
- Handle transportation networks and operation.

Subjects

- 7.1. Telematics.
 - 7.1.1. Telecommunications.
 - 7.1.2. Computer science.
- 7.2. Intelligent Transportation Systems.
 - 7.2.1. Scope of application.
 - 7.2.2. Saving lives, time and money.
 - 7.2.3. In the world.
- 7.3. ITS Types and Technology.
 - 7.3.1 Global Positioning System (GPS).
 - 7.3.2. Mobile telephones.
 - 7.3.3. Tracking.
 - 7.3.4. Prepaid cards (toll and fuel).
 - 7.3.5. Traffic monitoring.
 - 7.3.6. Other.

MODULE 8: BASIC AND TECHNICAL ENGLISH LANGUAGE (ONLY APPLIES TO INTERNATIONAL CURRICULUM)

Timeframe

- 8 in-the-classroom hours
- 8 hours of practice

Objective

Getting the basic knowledge that shall enable communication in an international environment and the basis for further development or language acquisition.

Specific Objectives

Upon completion of this module, the driver shall:

- Help or ask for help and instructions during passenger and tourism transportation.
- Know the importance of developing language skills to maintain a better customer relationship.
- Study the technical concepts of his job in the English language.
- Appropriately identify and complete applications and records (mechanic report).

Subjects

- 8.1. Introduction and questions.
 - 8.1.1. Questions and answers.
 - 8.1.2. Addresses and emergencies.
- 8.2. Breakdowns.
 - 8.2.1. Truck parts.
 - 8.2.2. Engines parts.
 - 8.2.3. Lubrication system.
 - 8.2.4. Cooling system.
 - 8.2.5. Transmission.
 - 8.2.6. Fuel system.
 - 8.2.7. Start-up system.
 - 8.2.8. Gearbox.
 - 8.2.9. Braking system.
- 8.3. Most usual vocabulary in the driver's work environment.

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REFERENCES

- ¹ Secretaría de Comunicaciones y Transportes (2015), Programas Integrales de Capacitación 2015, available at: <http://www.sct.gob.mx/transporte-y-medicina-preventiva/autotransporte-federal/centros-de-capacitacion/capacitacion-2015/>.
- ² Federal Motor Carrier Safety Administration (2007), Minimum Training Requirements for Entry-Level Commercial Motor Vehicle Operators, *Federal Register* 72, no. 246 (December 26, 2007).
- ³ Motor Carrier Safety Advisory Committee (2013), *Recommendations on Minimum Training Requirements for Entry-Level Commercial Motor Vehicle (CMV) Operators*, (MCSAC Task 13-01) Washington, DC: Federal Motor Carrier Safety Administration.
- ⁴ Richard W. Parker (2014), *Recommendations for a Collaborative Approach to Developing Entry-Level Driver Training Regulations*. Washington, DC: Federal Motor Carrier Safety Administration.
- ⁵ Secretaría de Comunicaciones y Transportes (1999), Acuerdo por el que se establecen las categorías de licencia federal de conductor, atendiendo al tipo de vehículo y clase de servicio que se presta. *Diario Oficial de la Federación* (15 de septiembre de 1999) México.
- ⁶ Secretaría de Comunicaciones y Transportes (2005), Ley de Caminos, Puentes y Autotransporte Federal. *Diario Oficial de la Federación*. (22 de diciembre de 1993. Última reforma publicada en el Diario Oficial de la Federación 25 de octubre de 2005) México.
- ⁷ Ibid.
- ⁸ Secretaría de Comunicaciones y Transportes (2000), Reglamento de Autotransporte Federal y Servicios Auxiliares. *Diario Oficial de la Federación* (22 de noviembre de 1994. Última reforma publicada en el Diario Oficial de la Federación, 28 de noviembre de 2000) México.
- ⁹ Secretaría de Comunicaciones y Transportes (2003), Reglamento para el Transporte Terrestre de Materiales y Residuos Peligrosos. *Diario Oficial de la Federación* (28 de noviembre de 2003) México.
- ¹⁰ Ibid.
- ¹¹ Ibid.
- ¹² SCT, Ley de Caminos, Puentes y Autotransporte Federal.
- ¹³ SCT, Reglamento de Autotransporte Federal y Servicios Auxiliares.
- ¹⁴ Ibid.
- ¹⁵ Ibid.
- ¹⁶ Ibid.
- ¹⁷ Secretaría de Comunicaciones y Transportes (2003), Programas Mínimos de Capacitación para conductores de vehículos de los servicios de autotransporte federal. *Diario Oficial de la Federación*. (04 de junio de 2003, 05 de junio de 2003, 06 de junio de 2003, 10 de junio de 2003, 11 de junio de 2003, 12 de junio de 2003) México.
- ¹⁸ Secretaría de Comunicaciones y Transportes (2009), Reglamento Interior de la Secretaría de Comunicaciones y Transportes. *Diario Oficial de la Federación* (21 de junio de 1995. Última reforma publicada en el Diario Oficial de la Federación, 31 de julio de 2009) México.
- ¹⁹ SCT, Ley de Caminos, Puentes y Autotransporte Federal.
- ²⁰ SCT, Reglamento de Autotransporte Federal y Servicios Auxiliares.
- ²¹ Secretaría de Comunicaciones y Transportes (2001-2013), *Estadística Básica del Autotransporte Federal*. México: Dirección General de Autotransporte Federal.

- ²² Secretaría de Comunicaciones y Transportes, Manual de Especificaciones Técnicas y de Operación de los Centros de Capacitación y Adiestramiento de Conductores del Servicio de Autotransporte Federal y Transporte Privado: <http://www.sct.gob.mx/fileadmin/DireccionesGrales/DGAF/ccap/manual/Indice.htm>.
- ²³ Source: Departments of Transportation of the municipalities of Monterrey, Guadalupe, San Pedro and San Nicolas in Nuevo Leon State.
- ²⁴ American Transportation Research Institute (2008). *A Technical Analysis of Driver Training Impacts on Safety*. Arlington, VA: American Transportation Research Institute.
- ²⁵ American Transportation Research Institute (2014). *WHITE PAPER: Safety Impacts of Truck Driving Simulator Training* [White Paper].
- ²⁶ Morgan, J.F., Tidwell, S.A., Medina, A., Blanco, M., Hickman, J.S., and Hanowski, R.,J. (2011). *Commercial motor vehicle driving simulator validation study: Phase II*. (Report No. FMCSA-RRR-11-014). Washington, DC: Federal Motor Carrier Safety Administration.
- ²⁷ Robin, J.L., Knipling, R.R., Tidwell, S.A., Derrickson, L., Antonik, C., & McFann, J. (2005). Truck simulator validation (SimVal) training effectiveness study. *International Truck and Bus Safety and Security Symposium*. Alexandria, Virginia.
- ²⁸ Goettee, David, et al. *Overview of the Federal Motor Carrier Safety Administration Safety Training Research for New Entrant Motor Carriers*. (Report No: FMCSA-RRR-13-015) Washington, DC: Federal Motor Carrier Safety Administration, 2015.
- ²⁹ Sink, H.L. (2007). Entry-level heavy truck drivers and highway safety: Is it finally time for federally mandated training? *Journal of Transportation Management*, 18(1), 33-49.
- ³⁰ Mitsopoulos-Rubens, E., Lenne, M., & Salmon, P. M. (2013). Effectiveness of simulator-based training for heavy vehicle operators: What do we know and what do we still need to know? In *Australasian Road Safety Research Policing Education Conference, August 2013, Brisbane, Queensland, Australia*.
- ³¹ Staplin, L., Lococo, K., Decina, L., & Bergoffen, G. (2004). *CTBSSP Synthesis 5: Training of Commercial Motor Vehicle Drivers*. TRB, The National Academies, Washington, D.C.