North American Free Trade Agreement
Land Transportation Standards Subcommittee
Working Group 2 - Vehicle Weights and Dimensions

Harmonization of Vehicle Weight and Dimension Regulations Within the NAFTA Partnership

Report to the Land Transportation Standards Subcommittee
October 1997

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1. Introduction

The North American Free Trade Agreement is predicated on establishing an economic partnership within which trade can flourish, both between the member countries and from the partnership to the global marketplace. The full economic benefits of this partnership will only be realized if efficient transportation systems exist to support mobility, manufacturing and distribution processes throughout North America.

Over the past twenty-five years highway transportation has emerged as the dominant mode for freight and passenger transportation in North America. While there is growing acceptance of the principle that a truly efficient transportation system must exploit the strengths of all available modes, it has long been recognized by governments at all levels that safe, efficient highway transportation systems are critical to local, regional, state and national economies. With such broadly dispersed jurisdiction, a wide range of policies and a complex web of regulations affecting highway freight transportation have developed within North America.

It is expected that highway transportation will play a major role in support of the growing trade which is occurring within the NAFTA partnership, and the partners committed to work together to find ways to improve the compatibility of policies and regulations which affect the efficiency of international highway transportation.

Highway Freight Transportation Within NAFTA

	Canada	***United States***	***Mexico***
Length of Highway System:			
Paved	254,000 km	3,600,000 km	42,000 km
Unpaved	596,000 km	2,600,000 km	157,000 km
No. of Commercial Vehicles	0.7 million	15.5 million	0.3 million
Annual For-hire Trucking Revenues	$ 15 billion	$345 billion	$ 16 billion
Employment in Trucking Industry	0.6 million	7.8 million	1.2 million

The Land Transportation Standards Subcommittee (LTSS) was established to pursue more compatible standards and regulations for rail and highway transportation within the NAFTA partnership. Under the umbrella of LTSS, a number of specialized working groups were formed to review the state of standards and regulations within the three countries in a range of areas including driver and vehicle licensing, vehicle manufacturing standards, transportation of dangerous goods and safety. The work of Subgroup 2 has focused on the standards and regulations for weight and dimension limits which apply to trucks operating on highway system.

It is likely that there is no other field of public policy which is more complex than truck size and weight limits, and in this context, harmonization of vehicle weights and dimension regulations within the three countries which are partners to the North American Free Trade Agreement presents a major challenge.

It is clear there is no prospect of developing complete consensus within North America on a common set of truck weight and dimension limits. However, there is considerable room for improving the degree of regulatory compatibility, with potential to deliver significant benefits to shippers, carriers and highway agencies throughout North America.

Efficient transportation is an essential component of the economic partnership that NAFTA represents. While the strengths of all modes must be exploited to produce a safe, efficient and environmentally sound transportation system in support of the economic objectives of the partnership, truck transportation will undoubtedly continue to play a major role.

The widely dispersed jurisdiction over the highway system in North America, coupled with the broad base of participation in truck transportation, presents a real challenge for the NAFTA partnership. With growing trade in north-south corridors, conflicts in regulatory policies are becoming more evident, carriers are encountering more problems with compliance, and enforcement is becoming more difficult.

There is little doubt that an agreement between the NAFTA partners on simplified, compatible regulations for the dimensions of vehicle configurations commonly used in long haul transportation would be of significant benefit to highway agencies, carriers, shippers and vehicle manufacturers. The prospect of being able to build, operate and easily check compliance of such vehicles is consistent with the goals of the agreement.

2. The Objectives of LTSS Subgroup 2 - Vehicle Weights and Dimensions

2.1 Working Group Mandate

Within the context of the North American Free Trade Agreement, the range of initiatives and discussions undertaken by the Land Transport Standards Subcommittee were designed to address the objectives of:

- elimination of barriers in trade, and facilitation of cross border movement of goods and services between the territories of the Parties
- promotion of conditions of fair competition in the free trade area
- creation of effective procedures for the implementation and application of the agreement, for its joint resolution and for resolution of disputes

More specifically, the mandate of the LTSS contained in the NAFTA agreement was as follows:

1. The Land Transportation Standards Subcommittee, established under Article 913(5)(a)(i), shall comprise representatives of each Party.

2. The Subcommittee shall implement the following work program for making compatible the Parties' relevant standards-related measures for:

a) bus and truck operations

i) no later than one and one-half years after the date of entry into force of this Agreement, for non-medical standards-related measures respecting drivers, including measures relating to the age of and language used by drivers,

ii) no later than two and one-half years after the date of entry into force of this Agreement, for medical standards-related measures respecting drivers,

iii) ***no later than three years after the date of entry into force of this Agreement, for standards-related measures respecting vehicles, including measures relating to weights and dimensions****, tires, brakes, parts and accessories, securement of cargo, maintenance and repair, inspections, and emissions and environmental pollution levels not covered by the Automotive Standards Council's work program established under Annex 913.5.a-3,*

iv) no later than three years after the date of entry into force of this Agreement, for standards-related measures respecting each Party's supervision of motor carriers' safety compliance, and

v) no later than three years after the date of entry into force of this Agreement, for standards-related measures respecting road signs;

b) rail operations

i) no later than one year after the date of entry into force of this Agreement, for standards-related measures respecting operating personnel that are relevant to cross-border operations, and

ii) no later than one year after the date of entry into force of this Agreement, for standards-related measures respecting locomotives and other rail equipment; and

c) transportation of dangerous goods, no later than six years after the date of entry into force of this Agreement, using as their basis the United Nations Recommendations on the Transport of Dangerous Goods, or such other standards as the Parties may agree.

3. The Subcommittee may address other related standards-related measures as it considers appropriate.

Within this mandate, the working group on vehicle weights and dimensions was formed to address the objective of pursuing compatibility of standards related measures respecting vehicle weights and dimensions.

3. Working Group Review Process

The trilateral working group was formed in early 1994, and has met seven times over the course of its mandate.

Meetings were held as follows:

July 1994	Cancun
April 1995	Toronto
June 1995	Vancouver
Sept 1995	Washington
June 1996	San Diego
December 1996	Mexico City
July 1997	Puerto Vallarta

The initial workplan adopted by the working group focused on exchange of information on the regulations, policies and practices respecting heavy vehicle weights and dimensions within each country. Documentation was exchanged and briefings provided in the following areas:

- jurisdictional responsibilities within the three countries
- weight and dimension limits for regular operations (national and state/provincial)
- highway network designations (truck routes, classification systems)
- special permit policies for oversize and/or overweight loads
- special permit policies in other areas (divisible loads, special commodities)
- enforcement facilities and policies
- fines and penalties for violations of weight and dimension limits
- vehicle configurations prevalent in international operations
- vehicle configurations prevalent in regional operations

In addition, background briefings were also provided on other issues as requested by delegations, including:

- an overview of the U.S. domestic size and weight policy review studies
- an overview of past Canadian research on truck size and weight limits
- an overview of the weight and dimension policy reforms being undertaken in Mexico (limits and route networks)
- planned vehicle certification procedures to be used in Mexico
- a review of the impact of Canada's national agreement on weight and dimension limits
- a review of the operational experience with B and C Train double trailer configurations in Canada
- reviews of the results of western U.S./Canada Cross-border and U.S./Mexico Cross-border studies

The focus on information exchange was completed in June 1996. The working group efforts were then directed toward three key areas:

- preparation of a comprehensive "side-by-side" comparison of vehicle weight and dimension regulatory limits for twelve heavy truck configurations selected from the existing national and/or international fleets

- assessment of the prospects for improving the compatibility of regulations for four vehicle configurations which predominate existing international operations (5 and 6 axle Tractor Semitrailers, and 5 and 6 axle A Train Double Trailer Combinations)

- identification of initial efforts and mechanisms which would support improved policy coordination and regulatory compatibility in the future

4. Truck Weight and Dimension Regulatory Responsibilities

4.1 Canada

In Canada the ten provinces and two territories have authority for establishing weight and dimension limits on all roads within their jurisdiction (except federally owned roads in national parks, national defense installations etc).

Under the umbrella of a national agreement (Memorandum of Understanding or MOU), all provinces have agreed to accept vehicles which comply with a set of national weight and dimension standards for travel on a system of provincial highways designated by each province. In some cases these limits are lower than provincial standards, and in these cases provinces have generally retained the higher limits in regulation.

The provincial and territorial governments also have authority for issuing special permits for oversize and/or overweight loads, movement of selected commodities and other permit provisions which depart from normally regulated limits.

4.2 United States

In the United States the federal government has authority for mandating minimum and/or maximum size and weight limits for vehicles travelling on the Interstate system and minimum size limits on other portions of the state highway systems on the national truck network. Nonetheless, state regulations for weight and dimension limits also apply to this network, provided the federal provisions are respected (eg. maximum width limit of 102”, no overall length limit etc).

The state governments have full responsibility for establishing size and weight limits for highways within their jurisdiction which are not part of the national truck network. In addition, under “grandfather clause” provisions, many states continue to retain authority to allow higher weight limits for the Interstate System.

The fifty state governments also hold responsibility for special permit programs for oversize and/or overweight indivisible loads. In addition many states have special permit programs in other areas such as long combination vehicles, divisible loads and for movement of particular commodities.

There are a number of privately owned highways, generally toll facilities, operated within the United States. The limits on truck size and weight which apply to these routes are under the control of the authority which owns or operates the road (eg. turnpike authorities), subject to Federal provisions if the toll facility is also on an Interstate route.

4.3 Mexico

In Mexico the federal government has authority to set truck size and weight and dimension limits which apply to an extensive system of federal highways. This authority also includes responsibility for issuing special permits for oversize and/or overweight loads or other restricted departures from normally regulated limits.

The thirty one state governments have authority for establishing truck size and weight limits on roads under their jurisdiction, although at the time of writing, no state had exercised this authority.

4.4 Special Permits

Special permit policies are generally used by highway agencies as a means to consider and respond to requests from carriers to depart from the legal limits for weight and/or dimensions. By issuing a one time or fixed period permit, highway agencies can exercise close control over the proposed operation and can chose to impose conditions or restrictions which may be needed to ensure that the proposed operation can be carried out safely. Such conditions may include routing restrictions, limited hours of operation, equipment type and condition, driver training or qualifications etc.

The range of special permit policies used by highway jurisdictions within North America is extremely broad. While it is recognized that a portion of the truck transportation trade that is occurring between the NAFTA partners currently takes place under the authority of special permits, this area of weight and dimension policy has not been a primary focus for review by Subgroup 2.

Special permit authorities generally fall into two categories; divisible loads and indivisible loads.

All jurisdictions in North America have provision to issue permits for indivisible loads. The policy principle is to consider requests to move loads which exceed normal dimension or weight limits, provided they cannot be divided into pieces which do not exceed the normal limits. The specific permit conditions which apply vary from one jurisdiction to another.

A number of regionally based agreements exist or are under development to facilitate more efficient interjurisdictional movement of oversize or overweight loads. Such agreements are usually based on an oversize or overweight “envelope” which is acceptable to all of the participating jurisdictions and for which a special permit will be made available.

The area of divisible load permit policies is much more complex, and the policy principles are not consistent from one jurisdiction to another. Not all jurisdictions within North America are prepared to issue permits for divisible loads, usually on the principle that it is possible to configure the load or vehicle to fit within the normal legal limits.

At the other extreme, a number of jurisdictions have comprehensive permit policies and a wide range of choices for movement of divisible loads. The underlying principle in such cases appears to be reduction of transportation costs by offering the opportunity to carriers and shippers to exceed the normal size or weight limits under controlled conditions.

4.5 Summary - Jurisdiction and Authority

Authority	*Size and Weight Limits*	*Route Restrictions*	*Special Permits*
Federal Government:			
Canada			
United States	**X**	**X**	
Mexico	**X**	**X**	**X**
State/Province Government:			
Canada	**X**	**X**	**X**
United States	**X**	**X**	**X**
Mexico	**X**	**X**	**X**
Private Road Authorities:			
Canada			
United States	**X**	**X**	**X**
Mexico			

5. Highway Networks

5.1 Canada

There are approximately 825,000 kilometers of public roads and 50,000 bridges within Canadian highway transportation system. Approximately 250,000 kilometers of the system are paved. The paved system includes approximately 16,000 kilometers of muli-lane divided expressways.

Constitutionally, the responsibility for, and jurisdiction over the highway system was assigned to the ten provincial governments in 1867. The provinces and territories currently have direct responsibility for approximately 34% of the network, and have assigned responsibility for about 64% to their respective municipal governments. About 2% of the highway system is under federal jurisdiction, primarily within national parks and northern resource roads.

Policies regarding highway design and operational standards are developed and implemented by each of the provincial governments (historically most provincial standards have been similar to those developed by AASHTO in the United States). Consequently it is within the provincial context that regulations respecting the weight and dimensions of heavy trucks have evolved, and decisions on designation of truck routes, route and bridge restrictions are made.

In the late 1950's a federal/provincial cooperative highway program was undertaken to design and construct a high standard (principally two lane, paved) highway system linking most major centers along a east west corridor from coast to coast. This route is known as the Trans-Canada highway, and was completed in the late 1960's.

In the late 1980's, a cooperative study was undertaken by the federal, provincial and territorial governments to update and expand the Trans-Canada Highway concept by considering designation and recognition of the key interprovincial and international highway linkages as the National Highway System.

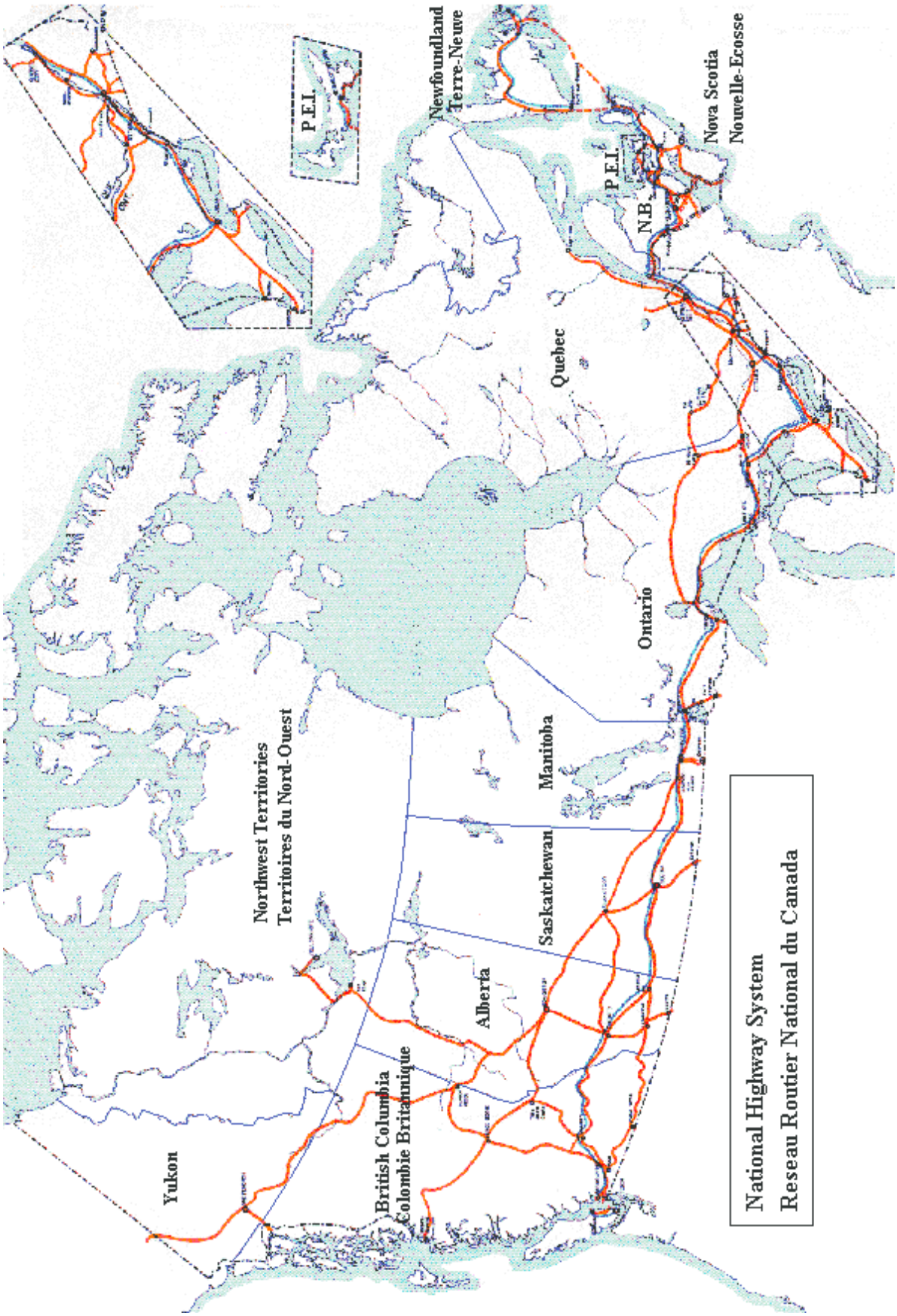
One of the requirements deemed appropriate for routes on the National Highway System was the ability to accept all heavy vehicle configurations which meet the limits contained in the MOU on Vehicle Weights and Dimensions, without seasonal load restrictions.

Under the terms of the MOU on Vehicle Weights and Dimensions, each jurisdiction has agreed to allow vehicles which comply with the limits contained in the MOU to travel on a designated portion of their highway system. It is the responsibility of each province to identify its respective designated highway system as an integral component of the agreement. As a result of ongoing highway upgrading and bridge rehabilitation programs, the designated highway systems in some provinces have been subject to change and expansion.

Canada's climate has an important influence on the weight limits allowed during the spring when road infrastructure is weakened during the thaw period. Most jurisdictions reduce the maximum allowable axle loads during this period, usually on a route specific or zone basis.

Network Accessibility for Vehicle Configurations which Comply with the National MOU

	MOU Dimensions			MOU Weights		
Jurisdiction	***All Roads***	***All Main Routes***	***Restricted Network***	***All Roads***	***All Main Routes***	***Restricted Network***
British Columbia	**X**			**X**		
Alberta	**X**				**X**	
Saskatchewan	**X**					**X**
Manitoba	**X**					**X**
Ontario	**X**			**X**		
Quebec		**X**			**X**	
New Brunswick	**X**					**X**
Nova Scotia		**X**			**X**	
Prince Edward Island		**X**			**X**	
Newfoundland	**X**			**X**		
Yukon	**X**			**X**		
Northwest Territories	**X**			**X**		


P.E.I.
Newfoundland
Terre-Neuve
Nova Scotia
Nouvelle-Ecosse
P.E.I.
N.B.
Quebec
Ontario
Manitoba
Saskatchewan
Alberta
British Columbia
Colombie Britannique
Yukon
Northwest Territories
Territoires du Nord-Ouest
National Highway System
Reseau Routier National du Canada

5.2 United States

There are over 6.2 million kilometers of highway in the United States, of which 3.6 million kilometers are paved. The highway network includes approximately 85,000 kilometers of multi-lane divided expressways. There are nearly 600,000 bridges included within the highway system inventory (with spans greater than 20 ft).

Responsibility for the design, operation, maintenance and regulation of the highway system is mixed (and complex):

Under federal control	~ 300,000 km
Under state control	~ 1,300,000 km
Under local control	~ 4,600,000 km

The U.S. federal government provides financial assistance to state and local governments in support of planning, design construction and maintenance costs for selected routes from within the highway network. There have been a variety of assistance programs, route designations and obligations implemented since the mid-1950's.

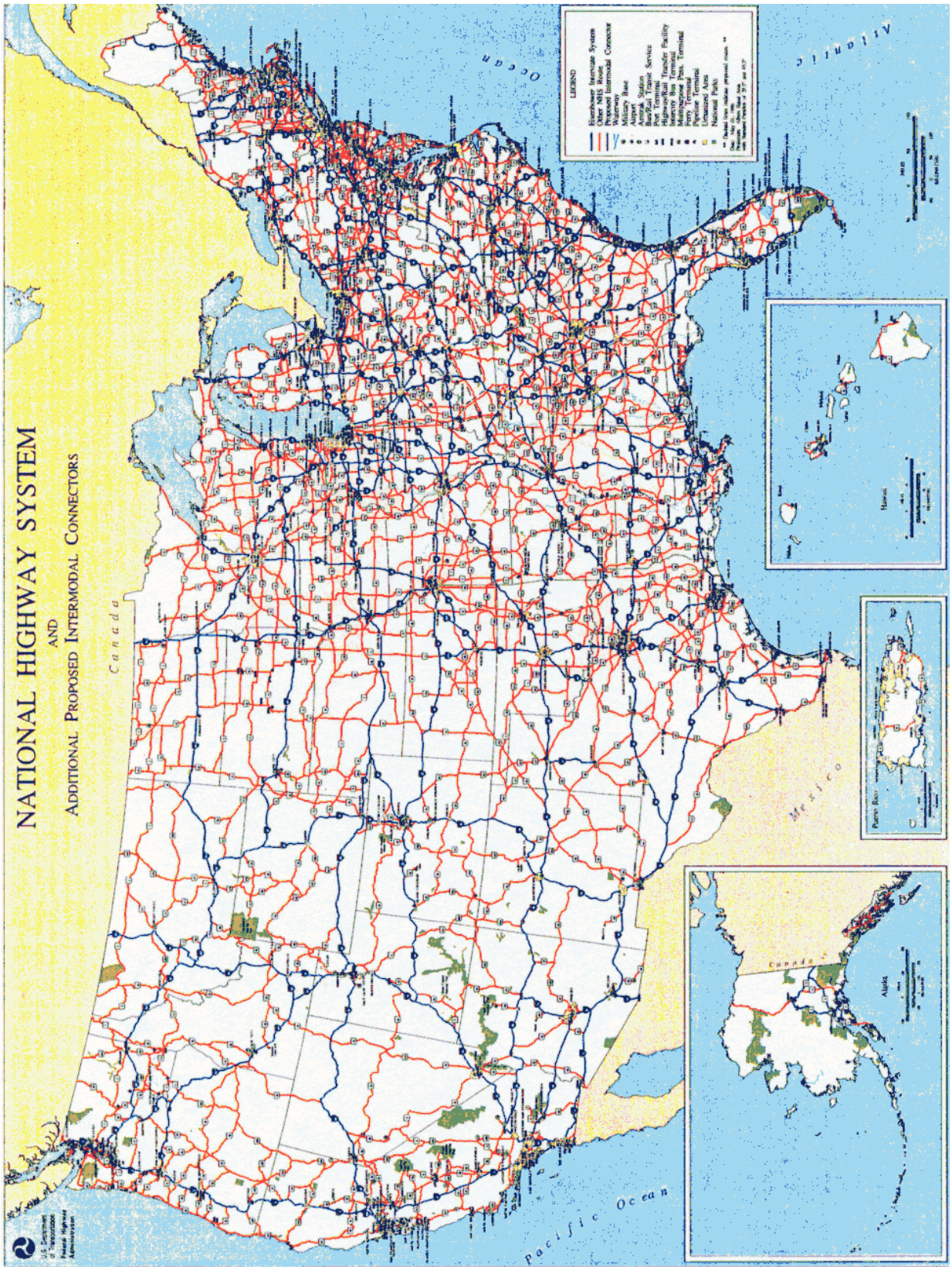
Recommended standards for highway and bridge design are developed and published through the cooperative mechanisms of the American Association of State Highway and Transportation Officials (AASHTO). Recommended standards for traffic control devices are developed by the Institute of Transportation Engineers (ITE) and published as the Manual on Uniform Traffic Control Devices.

Interstate System
The National System of Interstate and Defense Highways was originally established by the Federal-aid Highway Act of 1944. The Federal-aid Highway Act of 1956 and the companion Highway Revenue Act of 1956 further defined the purpose and extent of the system, and as subsequently amended, dedicated a group of Federal excises on motor fuel and automotive products to the support of Federal highway activities. By law, the system is limited to 44,000 miles except that other Federal-aid Primary routes may be incorporated into the system provided they are logical additions or connections to the System and meet all of the standards of highways on the Interstate System as defined in 23 U.S.C 139.

National Network for Trucks
The National Network for Trucks was established by the Surface Transportation Assistance Act of 1982. The network includes the Interstate System (with minor exceptions) plus approximately 50 percent of the non-Interstate portion of the Federal-aid Primary System. The network allows the operation of truck-tractor with 48 foot semitrailers, and twin trailer (28.5 ft) combinations up to 102 inches wide, with no overall length limitations. This network comprises a total length of approximately 300,000 kilometers.

Intermodal Surface Transportation Efficiency Act
This act introduced a freeze on state authority to issue new permits for the operation of Longer Combination Vehicles, allowing only those which had been in operation on or before June 1, 1991 to continue. An LCV was considered to be any combination of truck-tractor and two or more trailers which operate on the Interstate System at gross vehicle weight greater than 80,000 pounds.

In 1995 a National Highway System was designated by the US Congress, comprising nearly 250,000 kilometers of key highways from within the existing network. The National Highway System does not, as yet, have any special provisions respecting truck size and weight limits.


NATIONAL HIGHWAY SYSTEM
AND
ADDITIONAL PROPOSED INTERMODAL CONNECTORS
LEGEND
Eisenhower Interstate System
Other NHS Route
Proposed Intermodal Connector
Strategic Highway
Military Base
Airport
Amtrak Station
Amtrak Transit Service
Port Terminal
Highway/Rail Transfer Facility
Intercity Bus Terminal
Major Intermodal Terminal
Ferry Terminal
Pipeline Terminal
Urbanized Area
National Parks
Canada
Mexico
Pacific Ocean
Atlantic Ocean
Hawaii
Alaska
Puerto Rico

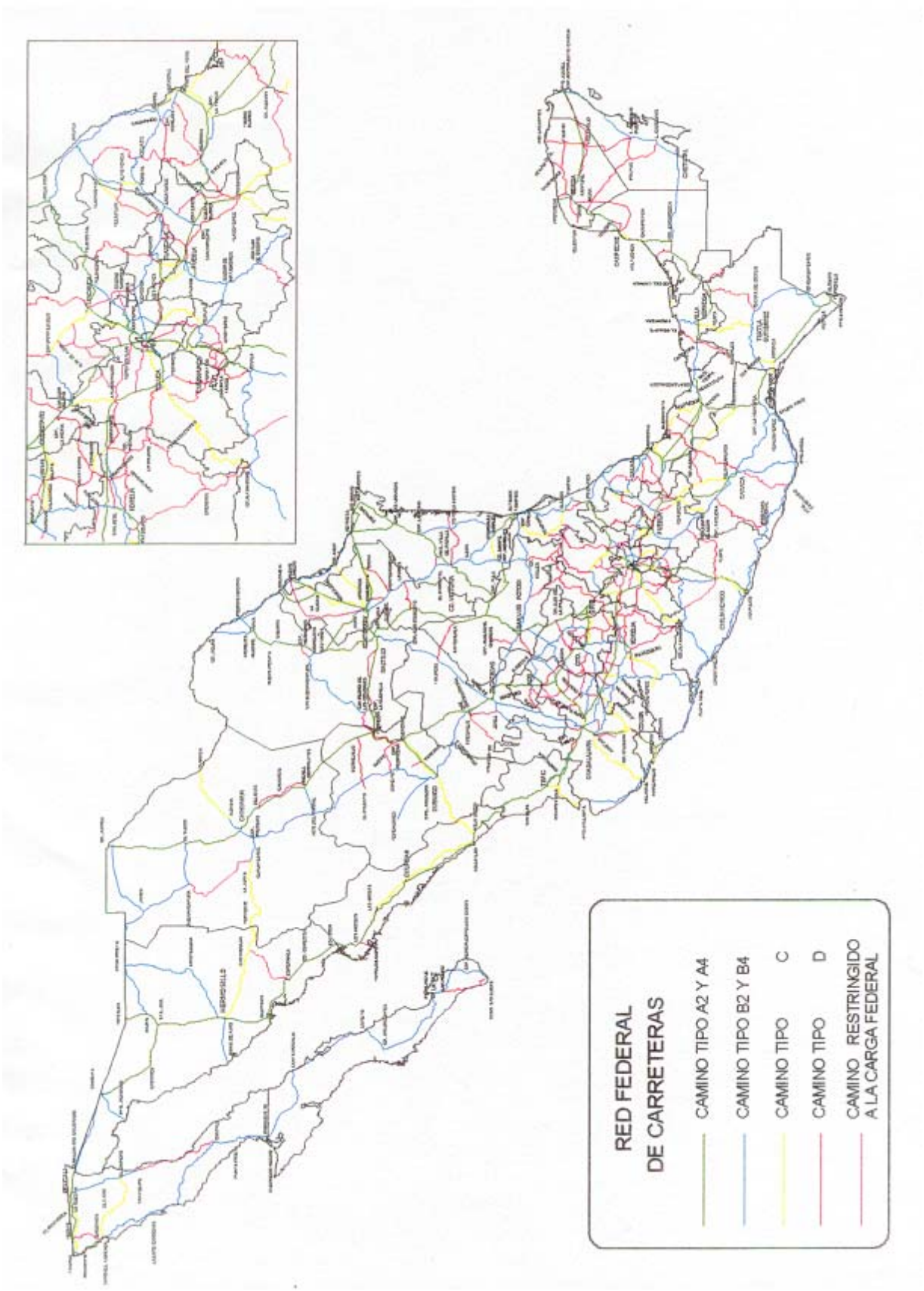
5.3 Mexico

There are 242,000 kilometers of highway in Mexico, of which 84,800 kilometers is paved. The federal government has direct responsibility for a 42,000 kilometer designated National Highway System, which comprises routes in four main classifications:

Type A Highways	highways whose geometric and structural characteristics permit all the vehicles authorized by the regulations to travel with the maximum dimensions, capacity and weights Type A4 - Four Lane Highway Type A2 - Two Lane Highway
Type B Highways (Primary Network)	highways whose geometric and structural characteristics provide interstate linkages and connections to the Type A Highway network Type B4 - Four Lane Highway Type B2 - Two Lane Highway
Type C Highways (Secondary Network)	highways whose geometric and structural characteristics provide service at the state level, and provide connections to the Primary Network Type C - Two Lane Highway
Type D Highways (Feeder Network)	highways whose geometric and structural characteristics provide service at the municipal level, and provide connections to the Secondary Network Type D - Two Lane Highway

National Highway System - Summary	Type	Length
Four Lane Highway - Existing	A4	7,054
- Under design or construction	A4	357
Two Lane Highway – Existing	A2	5,840
- Under design or construction	A2	211
Four Lane Highway, primary network	B4	1,010
Two Lane Highway, primary network	B2	14,366
Two Lane Highway, secondary network	C	6,055
Two Lane Highway, feeder network	D	6,404
Total National Highway System Length -		41,297 km

The size and weight limits vary with both the type of vehicle configuration and the classification of highway.


RED FEDERAL
DE CARRETERAS
CAMINO TIPO A2 Y A4
CAMINO TIPO B2 Y B4
CAMINO TIPO C
CAMINO TIPO D
CAMINO RESTRINGIDO
A LA CARGA FEDERAL

6. Truck Size and Weight Limits - Highway Infrastructure Issues

6.1 Pavements

While the range of techniques used by highway agencies within North America to design highway pavement structures is quite broad, the key elements of all approaches are essentially the same. The design of the pavement structure, including the thickness requirements of its constituent layers and the design of the asphalt (or concrete) mix are dependent on a number of variables, the most significant being:

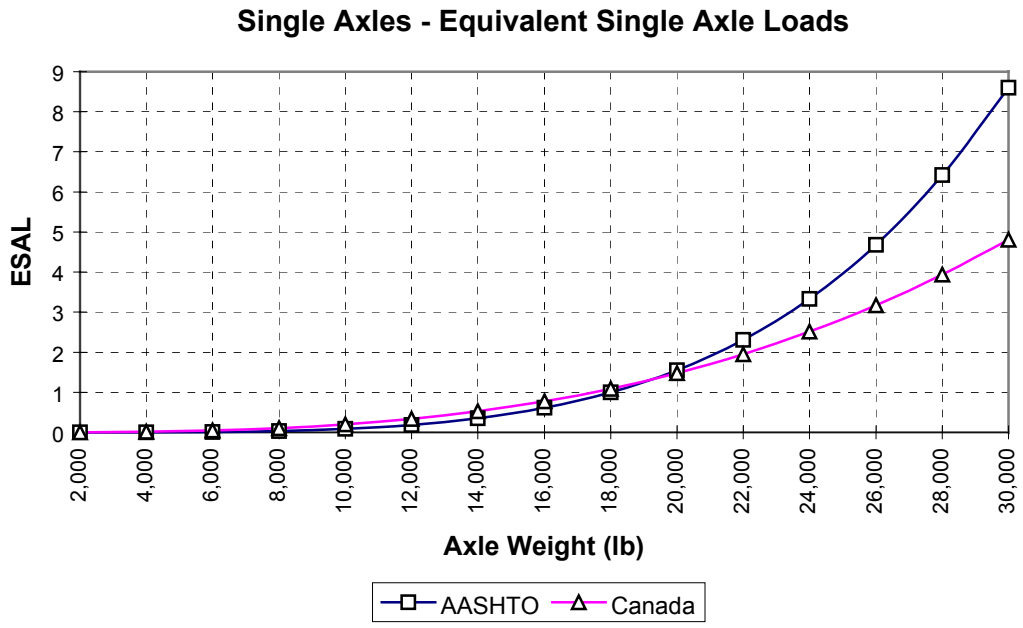
- current and expected traffic loading (traffic volume and growth rates, axle load distribution)
- environmental conditions (precipitation, moisture conditions in pavement layers, temperature ranges, freeze-thaw cycles)
- subgrade soil (type, moisture content, properties)
- available materials, material properties, and costs
- expected quality of construction and maintenance
- funding constraints (both for construction and for future maintenance)

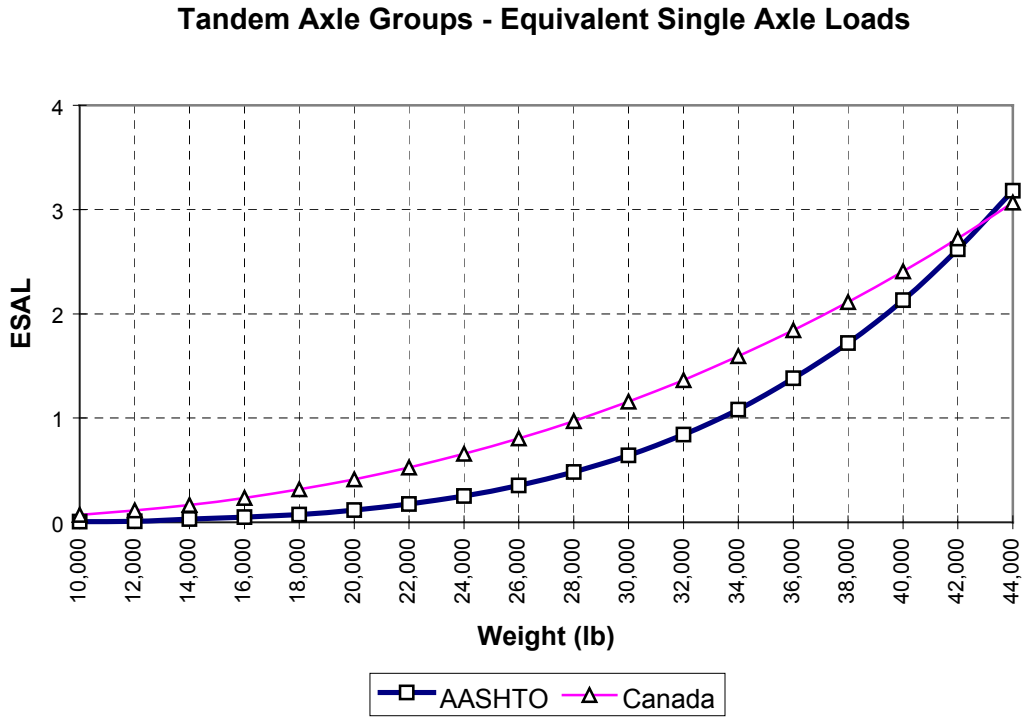
Within the design process, current and expected traffic volumes with the corresponding axle load distribution are considered to be key factors. In most cases, traffic is the most influential variable used by highway agencies in considering the type and thickness of pavement designs, as the environmental factors and soil conditions are often relatively constant within states or provinces.

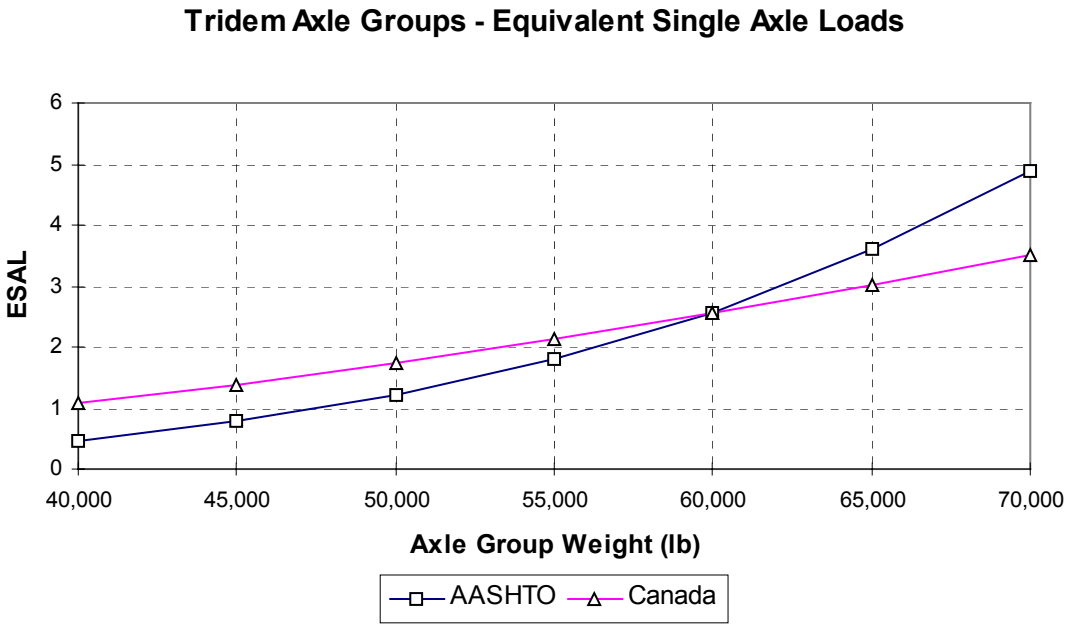
Axle loads are believed to be the principle source of load-related pavement wear. Including traffic as a design factor requires that the load component of the expected volume and mix of cars and trucks to be converted to a common basis, generally known as “Equivalent Single Axle Loads” or ESAL’s. This concept was developed in the 1950's and resulted from a test program carried out by the American Association of State Highway Officials (AASHO). Statistical analysis of test data showed that the relationship between axle loadings and their damaging potential (ie ESAL value) was not linear, but increased exponentially with increasing load at a rate generally believed to correspond to roughly a 4^{th} power relationship.

In essence, this concept assigns an 18,000 pound single axle an ESAL value of 1.0, and would predict that a 30,000 pound single axle would have an ESAL value of $(30{,}000 \text{ lb}/18{,}000 \text{ lb})^4$, or 7.7. Hence, it is believed that the wearing potential of a 30,000 pound single axle is likely to be 7.7 times greater than that of an 18,000 pound single axle.

Similar testing carried out in Canada during the mid-1980’s produced relationships between truck axle loads and pavement stress, which can be compared to the AASHTO equivalencies as depicted in the figures which follow.


Single Axles - Equivalent Single Axle Loads
ESAL
0
1
2
3
4
5
6
7
8
9
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
22,000
24,000
26,000
28,000
30,000
Axle Weight (lb)
AASHTO
Canada


Tandem Axle Groups - Equivalent Single Axle Loads
ESAL
0
1
2
3
4
10,000
12,000
14,000
16,000
18,000
20,000
22,000
24,000
26,000
28,000
30,000
32,000
34,000
36,000
38,000
40,000
42,000
44,000
Weight (lb)
AASHTO
Canada



On the whole, the differences which appear in the ESAL predictions developed by AASHTO and by research in Canada are relatively small.

Nonetheless, there is not clear consensus within the highway engineering community within North America on the impact or cost implications of truck traffic on pavement structures. Such fundamental issues are the subject of ongoing research and debate including:

- the impact that truck traffic has on pavement life and performance, relative to other contributing factors
- the impact that changes in allowable truck weights have on pavement life expectancy and performance
- an acceptable methodology for identifying the pavement life cycle cost implications which should be assigned to truck traffic

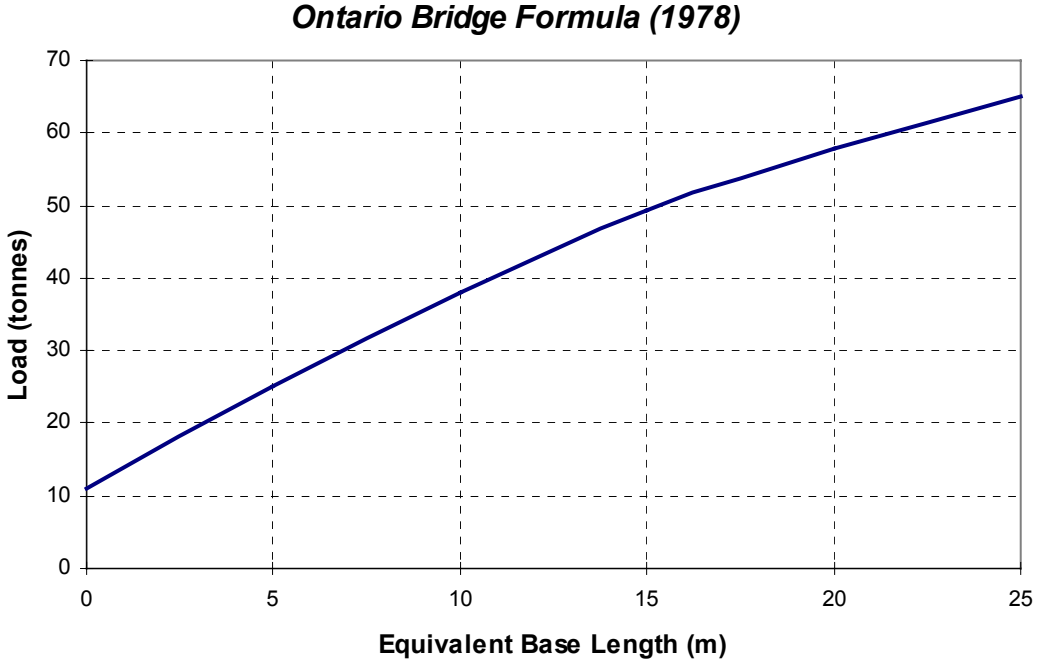
6.2 Bridges

6.2.1 Canada

There is currently no single “bridge formula” in use by all provinces in Canada to establish limits on the weight of trucks and truck axles. The Ontario Bridge Formula developed in the early 1970’s has become the most commonly used basis for assessment of bridge capacity, and is being used as the foundation for developing national consensus for a national bridge code being developed by the Canadian Standards Association (CSA).

The Ontario Bridge Formula is considered to be more liberal, and slightly more complex, than those used in the United States and Mexico, primarily because it introduces the concept

of "Equivalent Base Length". This is a calculated parameter derived from the number of axles on a vehicle and the distance between them.



However, under the provisions of the national MOU on Vehicle Weights and Dimensions, weight limits are not derived directly from a bridge formula constraint, but rather by a simplified approach:

- *Axle weight limits*: The weight limits which apply to single, tandem and tridem axle groups were based, in part, on the constraints imposed by the capacity of bridges. In the interests of simplifying the regulations, the weight limit for tandem axle groups does not vary with axle spacing. However, in the case of tridem axle groups, the weight limit varies with the spacing of axles, reflecting the sensitivity of bridge capacity constraints to relatively small changes in loading pattern.

- *Minimum Interaxle Spacing Requirements*: To simplify both compliance by carriers and enforcement by governments, a table of requirements for the spacing between axle groups within a vehicle is used instead of a formula:

Single Axle to Single, Tandem or Tridem Axle	Minimum 3.0 m
Tandem Axle to Tandem Axle	Minimum 5.0 m
Tandem Axle to Tridem Axle	Minimum 5.5 m
Tridem Axle Group to Tridem Axle Group	Minimum 6.0 m

6.2.2 United States

Since 1974 the limit on vehicle and axle weight limits within the United States has been controlled by the Bridge Formula, as contained in federal law (Section 127 of the United States Code Title 23). Simply stated the Bridge Formula is as follows:

$$W = 500 \times \left[\frac{L \times N}{N - 1} + 12N + 36 \right]$$

Where:

W = the maximum weight, in pounds that can be carried on a group of two or more axles to the nearest 500 pounds.
L = the spacing in feet between the outer axles of any two or more consecutive axles
N = the number of axles being considered

This formula is designed to establish a relationship between the allowable weight of the vehicle and:

- the number of axles on the vehicle
- the distances between the axles and axle groups
- the length of vehicle

Consequently, the gross weight of the vehicle is permitted to increase as the number of axles and overall length increases.

In addition to the weight limits which are derived from the formula itself, there are additional weight limits contained in federal law for operation on the Interstate System:

- 20,000 pounds maximum loading for a single axle
- 34,000 pounds maximum loading for a tandem axle
- 80,000 pounds maximum gross vehicle weight

In order to determine the maximum loading which a vehicle is permitted to carry in accordance with the bridge formula, each axle and axle group on the vehicle must be evaluated against both the provisions of the formula and the single or tandem axle weight limits. The full reference table for Formula B appears in Appendix 2.

6.2.3 Mexico

The federal department of transportation in Mexico (SCT) employs bridge formulas which are similar in structure to the US Bridge Formula, but which are used only to establish gross vehicle weight limits. There are four different formulas in use, depending upon the classification of road under consideration:

Class A4 and A2 Routes:

$$PBV = 930.43 \times \left[\frac{DE * N}{N-1} + (3.66 * N) + 11 \right]$$

Class B4 and B2 Routes:

$$PBV = 899.41 \times \left[\frac{DE * N}{N-1} + (3.66 * N) + 11 \right]$$

Class C Routes:

$$PBV = 854.46 \times \left[\frac{DE * N}{N-1} + (3.66 * N) + 11 \right]$$

Class D Routes:

$$PBV = 845.24 \times \left[\frac{DE * N}{N-1} + (3.66 * N) + 11 \right]$$

Where:

PBV = the maximum gross vehicle weight
DE = the distance between the extreme axles (from the first axle on the vehicle to the last axle on the trailer or semitrailer)
N = the number of axles on the vehicle combination

6.3 Summary – Pavement and Bridge Infrastructure Issues and Constraints

- The engineering standards and practices used to design, build and maintain highway infrastructure within the NAFTA countries are very similar.

- The analysis techniques used to accommodate heavy axle loads in pavement design, and to assign cost responsibility, are essentially the same in all three countries.

- There are fundamental differences in the bridge capacity assessments used in Canada, the United States and Mexico to control the weight of trucks. While the technical bases vary, the most significant differences exist in assessing the probability of failure of a bridge or its structural components, and in establishing a level of risk which can be accepted. The differences in bridge capacity assessment probably constitute the single biggest obstacle to the pursuit of more compatible weight limit regulations within the NAFTA partnership.

7. Truck Size and Weight - Operational and Safety Issues

7.1 Highway Geometric Design

The geometric design standards used within Canada, the United States and Mexico appear to be similar, and on the whole, relatively compatible. However, it is recognized that the highway inventory within North America includes a very wide range of "standards", reflecting the gradual evolution and expansion of the road network over a long period.

For this reason, a significant percentage of the road networks in each of the NAFTA countries would be considered deficient with respect to current geometric design standards. However, such roads usually reflect "best" practices dating back to the time of construction, and in most cases, continue to be operated safely.

In Canada, national guidelines for roadway geometric design are developed by the Transportation Association of Canada and published as the "Geometric Design Guide for Canadian Roads". Highway agencies are not legally required to comply with these guidelines, and some variation in standards and practices exist from one jurisdiction to another.

In the United States, the American Association of State Highway and Transportation Officials (AASHTO) serves as a focus for development of national standards for highway design and engineering practice. AASHTO prepares and publishes a series of standards in this area, most notably "A Policy on Geometric Design of Highways and Streets". This guide is widely used by the state highway departments, although similar to Canada, minor variations in standards and practices do exist from one state to another.

In Mexico the Secretaria de Comunicaciones y Transportes (SCT) has developed geometric design standards for the federal road network, which are comparable to those used in Canada and the United States.

The compatibility of truck turning and operating characteristics with the physical constraints of highway geometry is an important component of vehicle weight and dimension polices and regulations. The issues which must be considered by the NAFTA partners in this area are also currently faced by highway agencies throughout North America:

- the turning characteristics of some types of heavy truck configurations exceed the space available within the geometry of significant portions of the highway network

- roads in urban areas often pose more severe restrictions than rural roads, with reduced room available for manoeuvering, tighter curves, narrower lanes and steeper grades

The policy tools which are often used by jurisdictions in this area include:

- route restrictions
- designation of truck routes

- restrictions on hours of operation

At the extreme, some jurisdictions require longer, multi-trailer combinations to be broken into two vehicles when operating on highways with space restrictions or lower geometric design standards.

The characteristics of truck combinations which are of primary concern in assessing compatibility with highway geometry include:

- low speed offtracking performance
- high speed offtracking performance
- swept path when turning
- swing out of the front and/or rear of the vehicle or load when turning
- clearance on vertical curves

It is also noteworthy that, while the geometric design standards within the NAFTA countries are comparable, the road classification profiles vary widely. While much of the national truck network in the United States is controlled access, multi-lane freeways, the primary systems in Mexico and Canada include higher percentages of two lane rural roads.

7.2 Traffic Safety

The compatibility of heavy truck combinations with other vehicles in the traffic stream, and with the safe operation of the highway system has become an important consideration in deliberations of size and weight policy.

Heavy truck configurations have markedly different characteristics than passenger cars in a number of areas:

- acceleration performance
- braking performance & stopping distance
- rollover threshold
- turning characteristics

In addition, the size disparity between cars and trucks has become an important consideration for traffic safety engineering in a number of areas including:

- positioning and visibility of road signs
- passing zone striping
- traffic signal timing
- intersection and ramp design

Clearly any changes being contemplated in truck size and weight limits which will affect the performance characteristics of the truck fleet must be reviewed from the perspective of traffic

safety. Experience has shown that the relationship between large truck configurations and the highway system often requires compromise:

- changes can be made to the configuration of trucks to render their performance more compatible with the highway and other vehicles in the traffic stream (eg. minimum power to weight requirements, offtracking performance criteria, conspicuity markings etc)

- changes can be made to the highway system to better accommodate the characteristics of large trucks (eg. changes in signal timing, passing and climbing lanes, pavement widening on curves etc)

7.3 Vehicle Stability and Control

Vehicle weight and dimension regulations have their policy origins as measures to protect the structural capacity, geometric limits and vertical clearances of highways and bridges. However, as the size and weight of trucks has been steadily increasing over the past twenty years, closer attention has been paid to the implications of such changes for the stability and control characteristics of the vehicles, and ultimately for the safety of the highway system.

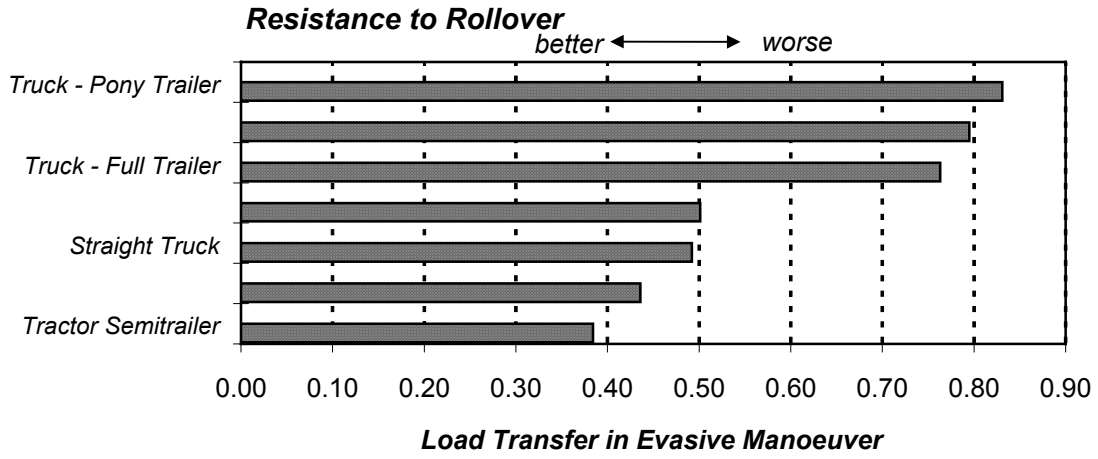
These issues have been the subject of considerable research around the world, and as a result, vehicle designers, carriers and regulatory agencies have developed better assessment tools and a greater appreciation for the sensitivity of vehicle performance to changes in size and weight variables. It is recognized that virtually every control placed on the size or weight of heavy trucks can have an important influence on the stability, handling or turning characteristics of the vehicle.

In Canada the weight and dimension limits described in the national MOU are based, in part, on the objective of promoting the use of vehicle configurations which exhibit the most desirable stability and handling characteristics. The foundation for this approach is based on establishing performance targets in a number of areas including:

- resistance to rollover in turning and in evasive manoeuvres
- braking performance
- space required to make turns
- front and rear swing-out in turning
- trailer sway

The stability and handling characteristics of heavy truck configurations depend upon the actual dimensions of the vehicle, the axle weights and the type of payload. However, for the purposes of comparison, typical performance levels for seven basic configurations of vehicles commonly used within North America are depicted in the charts which follow.

Rollover

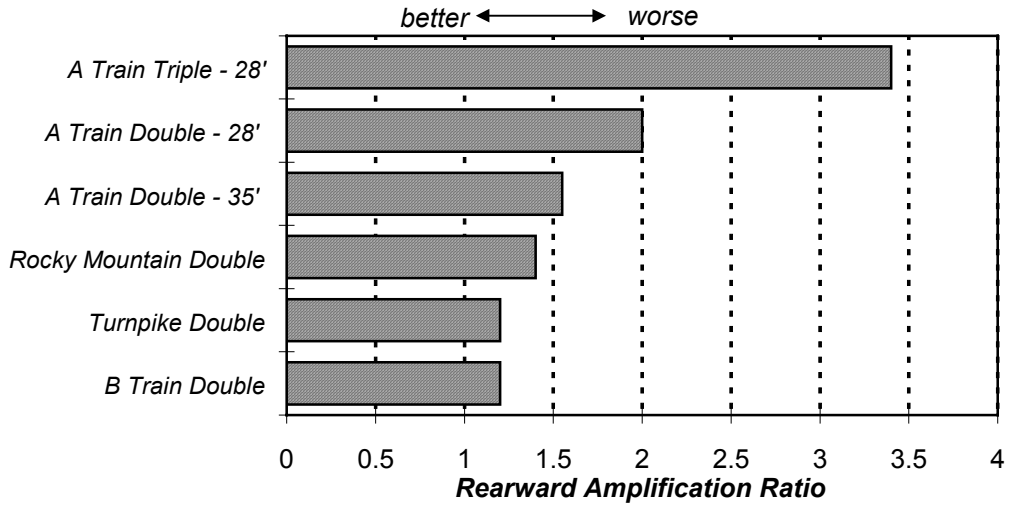


The most influential variable affecting the rollover resistance of heavy trucks is the height of the center of gravity of the payload; the higher the C of G, the lower the rollover threshold will be. Roll stability generally improves as the length (more precisely, the wheelbase) of trailers increases, the width increases, the "hitch offset" dimension decreases, and with fewer trailers and connection points. Conversely, roll stability degrades with higher axle loads, with shorter and/or narrower trailers and with more connection points.

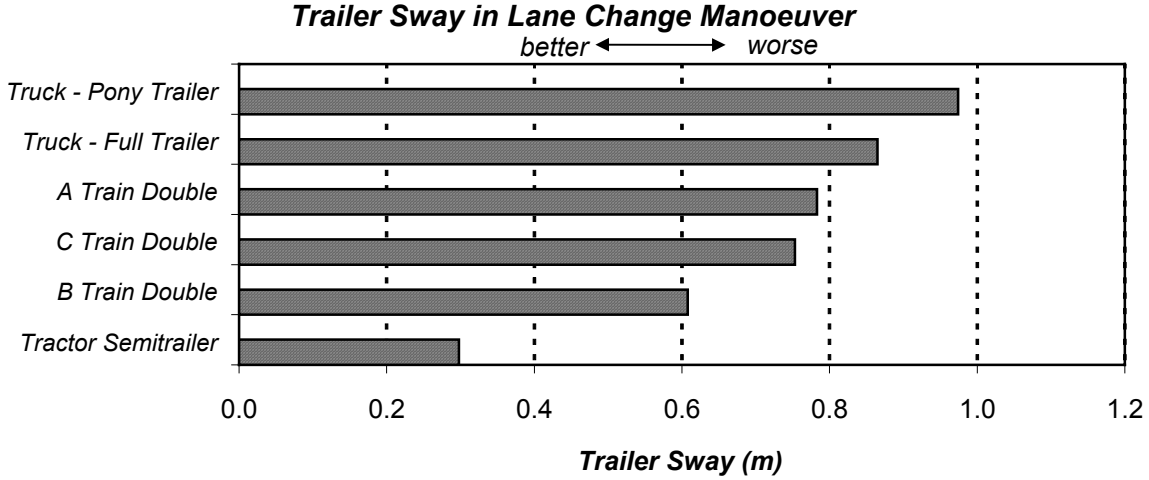
The roll stability and handling characteristics of multi-trailer combinations are subject to a phenomenon called "rearward amplification", where the forces resulting from action taken by the driver are amplified as they move rearward through the vehicle (similar to the "crack the whip" effect). For example, this effect produces higher rollover forces at the rear of the combination than at the tractor.

The amount of amplification increases with increasing numbers of trailers and connection points, and is higher with shorter trailers. For example, the rearward amplification can be as high as 3.5 for a conventional A train triple trailer, while it would be in the order of 1.2 for a double trailer combination with 48 foot long trailers.

Rearward Amplification



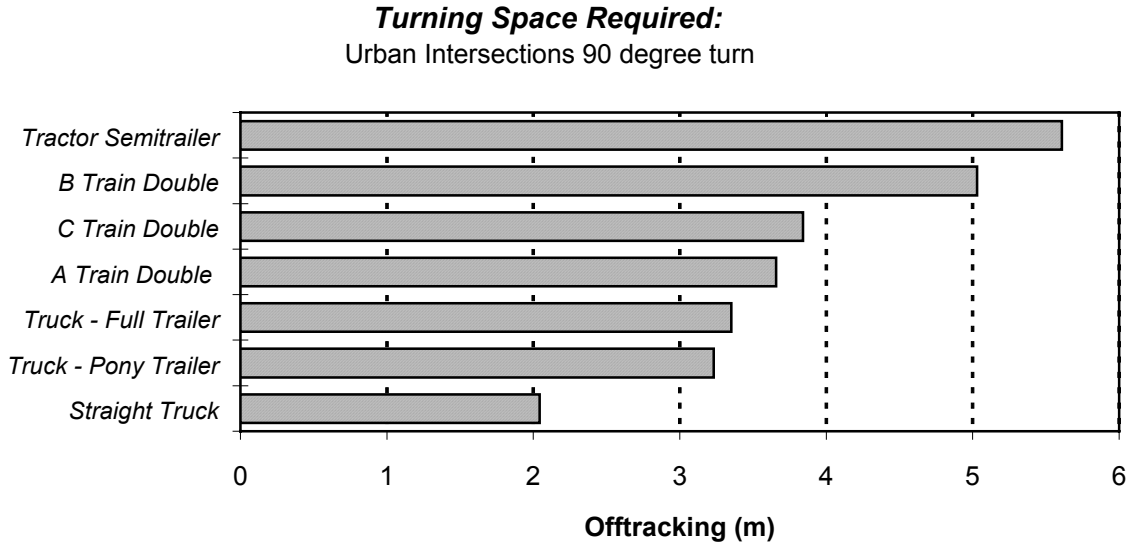
Trailer Sway



The turning space required by truck combinations increases as the wheelbases of tractors and/or trailers increases, and decreases as the number of connection points increases. Turning performance is a function of the length of the wheelbases of tractors, trailers and converter dollies.

The overall length of the vehicle is not directly related to the turning space required. For example a typical triple trailer combination can turn in about the same space as a conventional tractor semitrailer, even through the triple combination may be 10 meters longer.

Turning Space Required at Intersections



The stability and control performance of highway transport vehicles is an important consideration in establishing policies on weight and dimension limits. Consideration of proposals for more compatible weight and dimension limits within the NAFTA partnership will have to include consideration of the potential impacts of changes on the stability characteristics of vehicles currently in, or new configurations introduced to the commercial fleets of the three countries.

7.4 Summary – Operational and Safety Issues

- The geometric design standards currently used in Canada, the United States and Mexico are similar and relatively compatible. However, the profile of road classifications, age of the networks and characteristics of the primary highway systems vary widely.

- All three countries share a concern for ensuring that the performance characteristics of large and heavy truck combinations are compatible with the existing highway geometry.

- While there are differences in the classifications of roads within the primary networks of the NAFTA partners, all share the concern for ensuring that truck size and weight policies result in the use of vehicles whose characteristics can be safely accommodated within the traffic stream.

- Understanding the implications that changes in size and weight limits would have for the stability and control characteristics of large trucks is acknowledged an important policy and safety consideration.

8. Truck Fleet Composition

8.1 Domestic Transportation

The composition of the truck fleets which currently exist within each country is a reflection of a number of factors:

- the economic bases of different regions (ie. shipper requirements)
- trade and commodity flows
- the size and weight regulations which exist within the range of a carrier's operations
- the sphere of carriers operations

With tremendous competitive pressures in a largely deregulated marketplace, trucking companies consider several criteria when making equipment purchases or designing trucks or trailers:

- flexibility - tractors and trailers must be designed to both meet the needs of shippers and fit within the weight and dimension limits of all jurisdictions

- competition - to remain competitive (or gain advantage) in specialized markets carriers can often exploit the payload opportunities available within the size and weight limits of jurisdictions to design specialized equipment suited only to local or regional markets

The predominant truck type found in the commercial fleets of all three NAFTA countries, in terms of percentage of the fleet, is the straight truck (with two or three axles). This reflects the large volume of local or short haul trucking which occurs in and around major urban centres.

The predominant truck configuration in terms of percentage of tonne-km carried is the five-axle tractor-semitrailer (3-S2), reflecting the broad based dependence and acceptability of this configuration by shippers and jurisdictions.

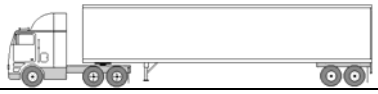
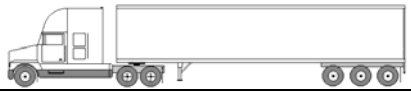
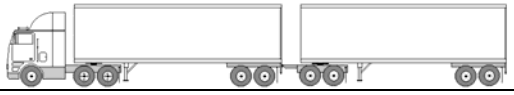
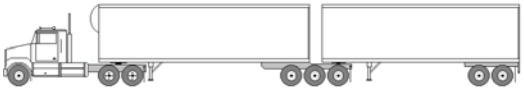
Beyond these two observations, the participation of other configurations varies widely by region and country:

- the acceptance of tridem axle configurations, coupled with higher weight limits, has made the six axle tractor semitrailer (3-S3) attractive to carriers and shippers in Canada and Mexico, and in some of the US states.

- configurations used for heavy commodities or bulk transportation vary by region and country, depending directly on the weight and dimension regulatory environment:
    - the Canadian fleet includes a significant percentage of B Train Doubles (3-S2-S2 and 3-S3-S2)
    - the Mexican fleet includes a significant number of 9 axle A Train Doubles (3-S2-4)

Within the constraints of rather limited data available, a profile of the main configurations participating in trucking fleets within the NAFTA countries is depicted below.

Trucking Fleet Profiles - Estimated Tonne-Km Carried by Configuration Type

Truck Configuraton	*Canada*	*United States*	*Mexico*
Straight Truck - 2 axles 	9.7 %	35.5 %	8.3 %
Straight Truck - 3 axles 	2.3 %	4.9 %	15.3 %
Tractor Semitrailer 2-S1 		1.6 %	
Tractor Semitrailer 2-S2 		5.5 %	
Tractor Semitrailer 3-S2 	51.0 %	42.2 %	35.2 %
Tractor Semitrailer 3-S3 	18.5 %	3.0 %	37.3 %
A Train Double 2-S1-2 		2.7 %	
A Train Double 3-S2-2 	5.2 %	0.3 %	
A Train Double 3-S2-4 		0.4 %	2.5 %
B Train Double 3-S2-S2 	5.3 %		
B Train Double 3-S3-S2 	7.9 %		
Other Configurations	0.1 %	3.9 %	1.4 %

8.2 International Transportation

The vehicle configurations which are commonly used in international transportation vary widely by region.

The predominant configuration crossing the Canada-United States border and the United States-Mexico border is the five axle Tractor Semitrailer (3-S2). Beyond this configuration, the types used vary by trade corridor, and region.

- Straight trucks constitute an important configuration for the US border states and Mexico
- B Trains and multiple axle semitrailers are important configurations in the Quebec-Ontario-Michigan corridor
- heavier A Trains (7+ axles) and B Trains are used in regional operations between western Canada and several northern border states
- the A Train double (5 axles) is an important configuration for many US carriers, and can generally operate freely within both Canada and Mexico. However this configuration is not attractive to Canadian or Mexican carriers because it has limited application for domestic markets.

9. Compatibility Issues and Conflicts

9.1 Review of Existing Weight and Dimension Limits

For practical purposes, there are 64 jurisdictions with responsibility for setting weight and dimension limits of highway transport vehicles operating on the road network within North America. In addition, there is a range of types of "designated" highway networks which feature specific weight and dimension limit provisions, both nationally and at the state and/or provincial levels. To the extent possible and within this context, Supplement 1 provides comparative summaries of the key limits for each of the vehicle configurations selected by the working group for its initial review.

It is evident that there are numerous and significant differences in these regulations; not only in the actual size and weight limits, but more importantly in the underlying philosophy and rationale behind the limits which have been chosen. Understanding and interpreting the regulations is a formidable task, and depicting the wide spectrum of types of regulations in a consistent format is virtually impossible.

9.2 Types of Regulatory Conflicts and Issues

From the perspective of identifying incompatibilities and potential conflicts for international transportation, the tables reveal three general categories which could be considered:

1. **Controls which exist in all jurisdictions, but for which different limits have been chosen**

    - overall height
    - overall width
    - steering axle weight limit
    - single axle weight limit
    - tandem axle weight limit
    - tridem axle weight limit
    - gross vehicle weight limit

Regulations in this category probably constitute the most obvious "conflicts" faced in interjurisdictional transportation.

2. **Controls which are in place in a majority of jurisdictions**

    - trailer length limits
    - bridge formula weight and axle spacing requirements

Regulations in this category present potential conflicts similar to those above, where limits for the same parameter are different in different jurisdictions. An example of this kind would be the limit on length of semitrailers, which ranges from 14.63 m to 18.3 m.

In addition, compliance problems can also arise when movements originate in a jurisdiction or region which does not have a limit for transportation to a jurisdiction which does. An example of this kind would be movement of double trailer combinations from a jurisdiction which does not limit the length of individual trailers to a jurisdiction which does.

3. Controls which are in place in some jurisdictions

- overall length limit
- minimum interaxle spacing limit
- tractor wheelbase limit
- trailer wheelbase limit
- trailer track width limit
- box length limits for multiple trailer configurations
- limit on tandem and tridem axle group spreads
- limit on trailer kingpin position
- limit on trailer rear overhang
- other internal dimensional controls, such as distance from trailer kingpin to axle group or rear bumper

Regulations in this category present two types of problems; carriers which are not familiar with the requirements of jurisdictions with additional controls may inadvertently face compliance problems, and vehicles configured to meet the requirements of one jurisdiction may not be capable of meeting the requirements of others.

An example of this kind would be the problem which has arisen with tractors designed to remain within the overall length limit of some states which are too short to meet the minimum interaxle spacing requirements of the provinces.

10. The Pursuit of More Compatible Standards within NAFTA

10.1 Context

In reflecting upon the results of the period of information exchange, it is evident that the heavy vehicle size and weight regulatory regime within North America is extremely complex. This is due in large part to the widely dispersed, and often overlapping, jurisdiction for such policies within the national or federal governments, the state and provincial governments and, in a few cases, municipal governments.

While this environment presents significant challenges to the pursuit of regulatory harmonization under NAFTA, it also raises fundamental questions regarding the extent to which harmonization is both necessary and desirable. Central to this dilemma is recognition of the fact that the regulatory environments within both Canada and the United States are far from uniform, and quite likely never will be. In addition, the information exchanged between countries over the past year has also revealed that regulations often vary within a single jurisdiction, depending upon factors such as:

- type of road
- season
- special permit availability and provisions, including both indivisible and divisible loads
- grandfathering provisions and authorities

Historically the natural alliances between jurisdictions on matters of trade enhancement and regulatory harmonization have occurred on a regional basis. This is reflected by the relatively high degree of regulatory harmony within regions of Canada (eg. west vs. east) and within the U.S. (eg. west vs. south-east vs. north-east). In recent years there have been several initiatives aimed at building agreement on common weight and dimension standards for international movements, but principally for specific vehicle types operating within regionally based trade corridor concepts.

While there is a wide range of differences in the weight and dimension regulations within North America, truck transportation has flourished and international truck movements continue to grow at a rapid pace.

However, it should be recognized that the vast majority of international truck transportation movements currently take place with 5 axle tractor-trailer configurations, usually configured to meet US weight and dimensional requirements and operating at gross weights less than 80,000 lb. While the regulations within the NAFTA countries are not uniform for this configuration, they are, on the whole, relatively compatible.

While recent studies have shown that carriers can exploit the compatible features of state and provincial regulations by using other vehicle configurations to engage in international transportation at weights higher than 80,000 lb., such movements represent a small percentage of international traffic. Nonetheless, where infrastructure and traffic conditions are suitable,

significant benefits are realized by shippers (and local/regional economies) through the use of larger or heavier productive trucks.

In this context, while it may be intuitively attractive to pursue fully harmonized regulations on a broad, international scale, the prospects of success could only be considered remote. In addition, the potential economic and transportation efficiency benefits are unclear. The economic bases and transportation needs of different regions within North America are distinctly different, and these differences are, in part, reflected in the current truck weight and dimension limits. There are obvious and inherent difficulties in attempting to make these regulations uniform:

- standardization at limits which are lower or more restrictive than currently allowed in some regions would likely have unacceptable economic consequences for shippers and carriers in these regions

- standardization at limits which are higher than currently permitted may not be politically or practically acceptable in regions which have consciously maintained more restrictive policies

The five-axle tractor semitrailer configuration is the dominant highway freight vehicle for domestic and international movements within North America. Over the past ten years, the defacto standard has evolved to become a tractor coupled to a 16.2 m long (53'), tandem axle trailer, 2.6 m wide and 4.15 m high. However, the regulations governing this configuration are not uniform, and carriers must have a comprehensive understanding of local requirements to avoid encountering compliance problems (eg. width limits, height limits, kingpin restrictions etc). As considerable investment is being made in this configuration by carriers in all three countries, all partners would benefit if uniform regulations could be developed for this vehicle.

At the other extreme, the straight truck configuration plays an important role in transportation between Mexico and the US border states. There may be considerable merit in pursuing compatible weight and dimension regulations for movement of this configuration within this region. There are no doubt other examples where harmonization of regulations for this configuration may be beneficial on a local or regional basis. However, the straight truck configuration is not efficient for long haul shipments, either domestically or internationally. Consequently it would not be productive, and quite possibly counter-productive to attempt to seek uniform standards for this configuration between regions; as a common standard may prove to be sub-optimal in each region.

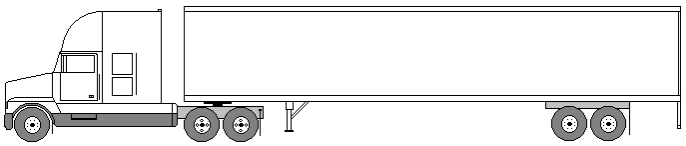
Between these extremes are important regionally-based, international market areas which are served by vehicle configurations which are optimized to meet (or perhaps exploit) the regulations of states and/or provinces within the region. As example, there are a large number of unique heavy truck combinations which operate within the region of Quebec, Ontario, Michigan and Ohio which are vitally important to regional trade. These configurations include semitrailers equipped with four or more axles and double trailer combinations with multiple axle groups, liftable axles and unusual axle spacings. Similar situations exist in other regions, notably along the western Canada-US border, where vehicle configurations have been designed

to maximize payload opportunity within the constraints of specific provincial and state regulations.

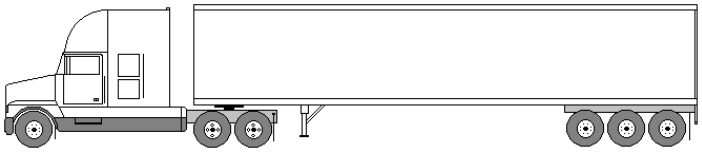
Acknowledging the importance of regional trade and the important vehicle configurations that serve such markets cannot be overlooked within the standards harmonization efforts of NAFTA. However, with possible few exceptions, it is highly unlikely that the vehicle configurations that are uniquely configured to serve regional markets will become candidates for NAFTA-wide usage. Nonetheless, in the interests of improving the efficiency of transportation within North America, it would be desirable to support regionally based harmonization efforts within the umbrella of the NAFTA partnership.

10.2 Initial Observations - NAFTA-Wide Configurations

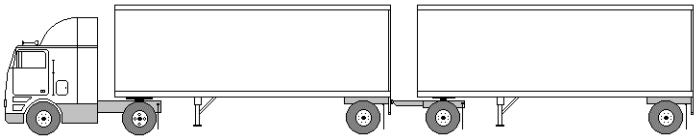
Tractor Semitrailer - Five Axles



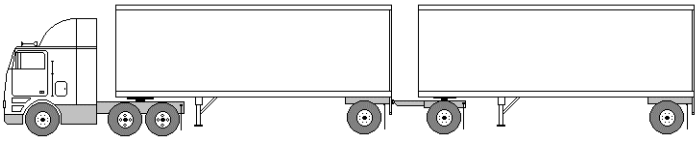
Tractor Semitrailer - Six Axles



A Train Double Trailer Combination - 5 Axles



A Train Double Trailer Combination - 6 Axles



These configurations are currently suited to long haul, efficient operation throughout most of North America within the constraints of existing weight and dimension regimes (in particular the U.S. Gross Weight Limit of 80,000 lb). While the six axle configurations are relatively inefficient within this GCW cap, they are commonly used within the domestic fleets of Canada and Mexico.

10.3 Compatibility Issues – General Observations

The current weight and dimension limits for these configurations are summarized in the sections and tables which follow.

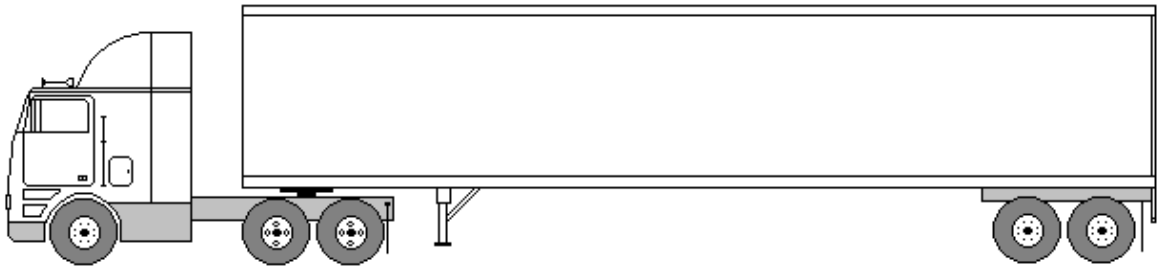
Focussing on the dimensional limits, it is evident that there are two distinct types of regulatory compatibility issues:

- minor compatibility issues exist where all jurisdictions control dimension directly (eg. height, width)

- more complex (or subtle) problems arise when some jurisdictions control and others don't (overall length versus trailer length)

Dimensions	All Jurisdictions Control	Some Jurisdictions Control
Overall Height	**X**	
Overall Width	**X**	
Overall Length		**X**
Tractor Length (wheelbase)		**X**
Trailer Length		**X**
Box Length		**X**
Hitch Offset		**X**
Kingpin Setback		**X**
Effective Rear Overhang		**X**
Trailer Wheelbase		**X**
Tandem Axle Spread		**X**
Tridem Axle Spread		**X**
Track Width		**X**
Interaxle Spacing		**X**
Weights		
Steering Axle	**X**	
Single Axles	**X**	
Tandem Axle Groups	**X**	
Tridem Axle Groups	**X**	
Gross VehicleWeight	**X**	

10.3.1 Tractor Semitrailer - Five Axles



Weight and Dimension Limit Summary:

Dimension Limits

	Interstate			*National Network*		
Summary	***No***	***Lowest Limit***	***Highest Limit***	***No***	***Lowest Limit***	***Highest Limit***
Overall Length	13	20.8	25.0	13	20.8	25.0
Overall Width	63	2.59	2.6	64	2.59	2.74
Overall Height	62	3.96	4.42	64	3.96	4.42
Tractor Wheelbase	12	6.2	6.2	12	6.2	6.2
Trailer Length	60	14.63	18.29	61	14.63	18.29
Trailer Wheelbase (max)	33	11.28	13.11	33	11.28	13.11
Rear Overhang	17	35%	1.83	17	35%	1.83

Weight Limits

	Interstate			*National Network*		
Summary	***No***	***Lowest Limit***	***Highest Limit***	***No***	***Lowest Limit***	***Highest Limit***
Steering Axle	62	4,990	10,206	64	4,990	10,206
Tractor Tandem	63	15,422	19,958	64	14,515	19,958
Trailer Tandem	63	15,422	19,958	64	9,756	19,958
GCW	63	36,288	44,000	64	33,240	44,000

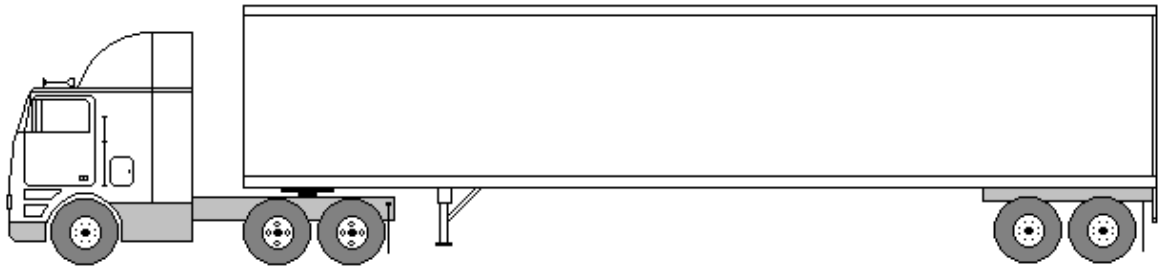
Legend:

No. = Number of jurisdictions which have a limit; maximum possible is 64.

Interstate = Interstate highway system in US, primary system in Canada and Class A & B highways in Mexico

National System = National truck network in US, primary system in Canada and Class A & B highways in Mexico

Observations - Compatibility Issues



Dimension Limits

Overall Length	• *no overall length limit (USA) versus length restriction (Canada & Mexico)* • *different overall length limits (Canada vs Mexico vs US State limits)*
Overall Height	• *three "camps":* *4.15 m (13.5'), 4.25 m (13.9') & 4.27 m (14')*
Trailer Length	• *different trailer length limits; although 53' is widely accepted*
Tractor Wheelbase	• *only Canada controls directly*
Trailer Wheelbase	• *Canada and some US states control*
Trailer Tandem Spread	• *USA encourages wider spread for higher weight* • *Canada limits spread to 1.85 m* • *Mexico neutral*
Other Issues: Additional controls:	• *kingpin setback (Canada)* • *effective rear overhang (Canada)* • *track width (Canada)*

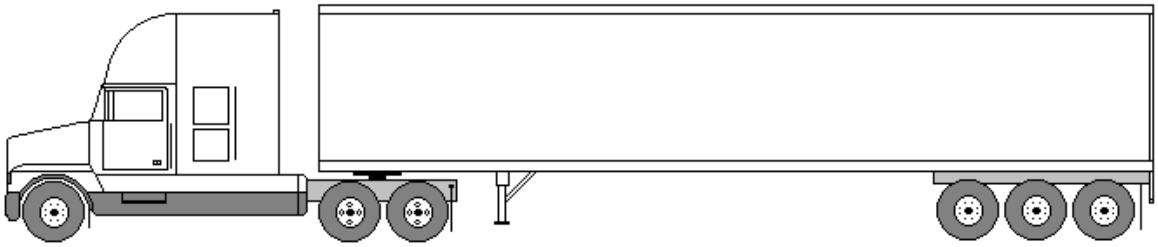
Weight Limits

Steering Axle	• *two camps; 5500 kg versus full single axle weight (9,000 to 10,000 kg)*
Drive Tandem	• *range of limits throughout NAFTA* • *more weight for tractor tandem than trailer* • *extra weight for specific suspension type*
Trailer Tandem	• *range of limits in place* • *greater spread for higher weight vs same weight for any spread*
Gross Vehicle Weight	• *US has bridge formula cap* • *Canada limits GVW based on axle weights* • *Mexico limit by bridge formula; different for different routes*

Summary: Tractor - Semitrailer (5 axles) - National Networks

Jurisdiction	Overall Length (m)	Overall Width (m)	Overall Height (m)	Tractor Wheelbase - max	Trailer Length - max	Trailer Wheelbase (max)	Rear Overhang - max	Tandem Spread - min	Tandem Spread - max	Steering Axle Weight - max	Tractor Tandem Weight - max	Trailer Tandem Weight - max	GCW
United States		2.59								9,072	15,422	15,422	36,288
Alabama		2.59	4.11		17.37	12.50	1.52	1.01	2.44	9,072	15,422	15,422	36,288
Alaska		2.59	4.27		14.63			0.91	3.05	5,443	17,237	17,237	36,288
Arizona		2.59	4.27		17.53			1.01	2.44	9,072	15,422	15,422	36,288
Arkansas		2.59	4.11		16.31			1.01	2.44	5,443	15,422	15,422	36,288
California		2.59	4.27		16.15	12.19		1.01	2.44	5,670	15,422	15,422	36,288
Colorado		2.59	3.96		17.47			1.01	2.44	9,072	18,144	18,144	36,288
Connecticut		2.59	4.11		16.15		1.22	1.01	2.44	5,443	16,330	16,330	36,288
Delaware		2.59	4.11		16.15		1.83	1.01	2.44	9,072	18,144	18,144	36,288
D.C.		2.59	4.11		14.63			1.01	2.44	9,072	15,422	15,422	36,288
Florida		2.59	4.11		16.15	12.50	1.22	1.01	2.44	5,489	19,958	19,958	36,288
Georgia		2.59	4.11		16.15	12.50		1.01	2.44	8,165	15,422	15,422	36,288
Hawaii		2.74	4.27					1.01	2.44	10,206	15,422	15,422	39,917
Idaho		2.59	4.27		16.15			1.01	2.44	5,443	15,422	15,422	36,288
Illinois		2.59	4.11		16.15	12.95		1.01	2.44	8,165	14,515	14,515	33,240
Indiana		2.59	4.11		16.15	12.34		1.01	2.44	7,258	15,422	15,422	36,288
Iowa		2.59	4.11		16.15			1.01	2.44	9,072	15,422	15,422	36,288
Kansas		2.59	4.27		18.14			1.01	2.44	9,072	15,422	15,422	36,288
Kentucky		2.59	4.11		16.15			1.01	2.44	5,443	15,422	15,422	36,288
Louisiana		2.59	4.11		18.14			1.01	2.44	5,897	15,422	15,422	36,288
Maine		2.59	4.11		14.63	13.11		1.22	2.44	5,443	17,237	17,237	36,288
Maryland		2.59	4.11		16.15	12.50		1.01	2.44	5,443	15,422	15,422	36,288
Massachusetts		2.59	4.11		16.15			1.01	2.44	7,258	16,330	16,330	36,288
Michigan		2.59	4.11		16.15	12.50		1.01	2.44	6,350	15,422	15,422	36,288
Minnesota		2.59	4.11		16.15	12.50		1.01	2.44	5,443	15,422	15,422	36,288
Mississippi		2.59	4.11		16.15			1.01	2.44	4,990	14,515	14,515	33,240
Missouri		2.59	4.27		16.15			1.01	2.44	8,165	15,422	15,422	36,288
Montana		2.59	4.27		16.15			1.01	2.44	5,443	15,422	15,422	39,917
Nebraska		2.59	4.42		16.15			1.01	2.44	9,072	15,422	15,422	36,288
Nevada		2.59	4.27		16.15			1.01	2.44	5,443	15,422	15,422	36,288
New Hampshire		2.59	4.11		16.15	12.50		1.01	2.44	10,161	16,330	16,330	36,288
New Jersey		2.59	4.11		16.15	12.50		1.01	2.44	7,258	15,422	15,422	36,288
New Mexico		2.59	4.27		17.53			1.01	2.74	5,443	15,568	15,568	39,191
New York		2.59	4.11		17.53	12.50		1.01	2.44	10,161	16,330	16,330	36,288
North Carolina		2.59	4.11		16.15	12.50		1.01	2.44	9,072	17,237	17,237	36,288
North Dakota		2.59	4.27		16.15			1.01	2.44	4,990	15,422	15,422	38,556
Ohio		2.59	4.11		16.15			1.01	2.44	5,897	15,422	15,422	36,288
Oklahoma		2.59	4.11		18.14			1.01	2.44	5,897	15,422	15,422	36,288
Oregon		2.59	4.27		16.15			1.01	2.44	5,443	15,422	15,422	36,288
Pennsylvania		2.59	4.11		16.15			1.01	2.44	7,258	16,330	16,330	36,288
Rhode Island		2.59	4.11		16.15		1.83	1.01	2.44	10,161	16,330	16,330	36,288
South Carolina		2.59	4.11		16.15	12.50		1.01	2.44	9,979	17,963	17,963	36,560
South Dakota		2.59	4.27		16.15			1.01	2.44	5,443	15,422	15,422	36,288
Tennessee		2.59	4.11		15.24	12.50		1.01	2.44	9,072	15,422	15,422	36,288
Texas		2.59	4.27		17.98			1.01	2.44	5,897	15,422	15,422	36,288
Utah		2.59	4.27		16.15	12.34		1.01	2.44	5,443	15,422	15,422	36,288
Vermont		2.59	4.11		16.15	12.50		1.07	2.44	5,443	16,330	16,330	36,288
Virginia		2.59	4.11		16.15	12.50		1.01	2.44	5,897	15,422	15,422	36,288
Washington		2.59	4.27		16.15			1.01	2.44	5,443	15,422	15,422	36,288
West Virginia		2.59	4.11		16.15	11.28		1.01	2.44	9,072	15,422	15,422	36,288
Wisconsin		2.59	4.11		16.15	12.50		1.01	2.44	5,897	15,422	15,422	36,288
Wyoming		2.59	4.27		18.29			1.01	2.44	6,804	16,330	16,330	39,463

10.3.2 Tractor Semitrailer Configuration - Six Axles



Current Weight and Dimension Limit Summary:

Dimension Limits

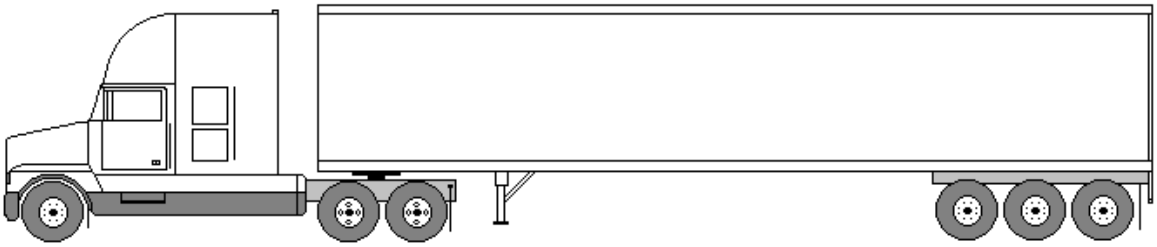
	Interstate			*National Network*		
Summary	***No***	***Lowest Limit***	***Highest Limit***	***No***	***Lowest Limit***	***Highest Limit***
Overall Length	13	20.8	25	32	16.8	25
Overall Width	63	2.4	2.7	64	2.4	2.7
Overall Height	63	4	4.4	64	4	4.4
Tractor Wheelbase	13	6.2	16.8	13	6.2	16.8
Trailer Length	60	13.7	18.3	53	13.7	18.3
Trailer Wheelbase (max)	12	12.5	12.5	12	12.5	12.5
Rear Overhang	17	35%	1.8	17	35%	1.8

Weight Limits

	Interstate			*National Network*		
Summary	***No***	***Lowest Limit***	***Highest Limit***	***No***	***Lowest Limit***	***Highest Limit***
Steering Axle	63	4,995	10,218	64	4,995	10,218
Tractor Tandem	63	14,532	19,982	64	14,532	19,982
Tridem 2.4 - 3.0 m	63	15,441	24,000	64	15,077	24,000
Tridem 3.1 - 3.6 m	63	17,711	24,000	64	16,167	24,000
Tridem - 3.6 m	63	17,711	28,500	64	17,257	28,500
GCW with 2.4 m Tridem	63	35,876	48,500	64	33,279	48,500
GCW with 3.0 m Tridem	63	35,876	48,500	64	33,279	48,500
GCW with 3.6 m Tridem	63	35,876	48,500	64	33,279	48,500

Legend:
No. = Number of jurisdictions which have a limit; maximum possible is 64.
Interstate = Interstate highway system in US, primary system in Canada and Class A & B highways in Mexico
National System = National truck network in US, primary system in Canada and Class A & B highways in Mexico

Observations - Compatibility Issues



Dimension Limits

Overall Length	• *no overall length limit (USA) versus length restriction (Canada & Mexico)* • *different overall length limits (Canada vs Mexico vs US State limits)*
Overall Height	• *three"camps":* *4.15 m (13.5'), 4.25 m (13.9') & 4.27 m (14')*
Trailer Length	• *different trailer length limits; although 53' is widely accepted*
Tractor Wheelbase	• *only Canada controls directly*
Trailer Wheelbase	• *Canada and some US states control*
Trailer Tridem Spread	• *Not an issue for USA* • *Canada limits spread to 3.7 m* • *Mexico neutral on spread*
Other Issues: Additional controls:	• *kingpin setback (Canada)* • *effective rear overhang (Canada)* • *track width (Canada)*

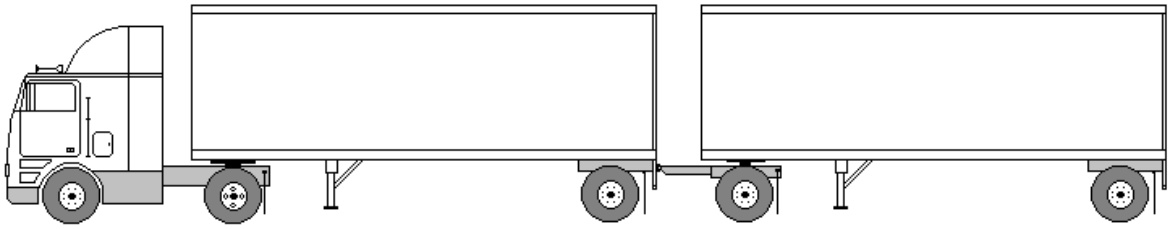
Weight Limits

Steering Axle	• *two camps; 5500 kg versus full single axle weight (9,000 to 10,000 kg)*
Drive Tandem	• *range of limits throughout NAFTA* • *more weight for tractor tandem than trailer* • *extra weight for specific suspension type*
Trailer Tridem	• *greater spread for higher weight vs same weight for any spread*
Gross Vehicle Weight	• *US has bridge formula cap* • *Canada limits GVW based on axle weights* • *Mexico limit by bridge formula; different for different routes*

Summary: Tractor - Semitrailer (6 axles) - National Networks

Jurisdiction	Overall Length (m)	Overall Width (m)	Overall Height (m)	Tractor Wheelbase - max	Trailer Length - max	Trailer Wheelbase (max)	Rear Overhang - max	Tridem Spread - min	Tridem Spread - max	Steering Axle Weight - max	Drive Tandem Weight - max	Trailer Tridem - 3m	Trailer Tridem 2.4 - 3.6m	Trailer Tridem 3.0 - 3.7m	GCW with Tridem - 3m	GCW with Tridem 2.4 - 3.6m	GCW with Tridem 3.0 - 3.7m
Mexico	20.8	2.60	4.25							6,500	19,500	22,500	22,500	22,500	48,500	48,500	48,500
Canada																	
British Columbia	23.0	2.60	4.15	6.20	16.20	12.50	35%	2.40	3.70	5,500	17,000	24,000	24,000	24,000	46,500	46,500	46,500
Alberta	25.0	2.60	4.15	6.20	16.20	12.50	35%	2.40	3.70	5,500	17,000	21,000	23,000	24,000	43,500	45,500	46,500
Saskatchewan	23.0	2.60	4.15	6.20	16.20	12.50	35%	2.40	3.70	5,500	17,000	21,000	23,000	24,000	43,500	45,500	46,500
Manitoba	23.0	2.60	4.15	6.20	16.20	12.50	35%	2.40	3.70	5,500	17,000	21,000	23,000	24,000	43,500	45,500	46,500
Ontario	23.0	2.60	4.15	6.20	16.20	12.50	35%	2.40	3.70	9,000	18,000	21,300	23,000	24,400	48,300	50,000	51,400
Quebec	23.0	2.60	4.15	6.20	16.20	12.50	35%	2.40	3.70	5,500	18,000	21,000	23,000	25,000	44,500	46,500	50,500
New Brunswick	23.0	2.60	4.15	6.20	16.20	12.50	35%	2.40	3.70	5,500	18,000	21,000	23,000	26,000	44,500	46,500	49,500
Nova Scotia	23.0	2.60	4.15	6.20	16.20	12.50	35%	2.40	3.70	9,500	17,000	22,000	23,000	28,500	48,500	49,500	53,000
Prince Edward Island	23.0	2.60	4.15	6.20	16.20	12.50	35%	2.40	3.70	5,500	18,000	21,000	23,000	27,000	44,500	46,500	49,500
Newfoundland	23.0	2.60	4.15	6.20	16.20	12.50	35%	2.40	3.70	5,500	18,000	21,000	23,000	27,000	44,500	46,500	49,500
Yukon	23.0	2.60	4.20	6.20	16.20	12.50	35%	2.40	3.70	5,500	17,000	21,300	23,000	24,400	43,800	45,500	46,900
Northwest Terr.	23.0	2.60	4.20	6.20	16.20	12.50	35%	2.40	3.70	5,500	17,000	21,000	23,000	24,000	43,500	45,500	46,500
United States		2.59								9,072	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Alabama		2.59	4.11		17.37	12.50	1.52	2.44		9,072	16,330	19,051	19,732	20,412	38,102	38,102	38,102
Alaska		2.59	4.27		14.63			3.05		5,443	17,237	19,051	19,051	19,051	39,917	40,597	41,278
Arizona		2.59	4.27		17.53			2.44		9,072	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Arkansas		2.59	4.11		16.31			2.44		5,443	15,422	19,051	19,732	20,412	36,288	36,288	36,288
California		2.59	4.27		16.15	12.19		2.44		5,670	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Colorado		2.59	3.96		17.47			2.44		9,072	16,330	19,051	19,732	20,412	36,288	36,288	36,288
Connecticut		2.59	4.11		16.15		1.22	2.44		5,443	16,330	19,051	19,732	20,412	36,288	36,288	36,288
Delaware		2.59	4.11		16.15		1.83	2.44		9,072	18,144	19,051	19,732	20,412	36,288	36,288	36,288
D.C.		2.59	4.11		14.63			2.44		9,072	15,422	17,237	19,278	19,958	36,288	36,288	36,288
Florida		2.59	4.11		16.15	12.50	1.22	2.44		5,489	19,958	19,958	19,958	20,412	36,288	36,288	36,288
Georgia		2.59	4.11		16.15	12.50		2.44		8,165	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Hawaii		2.74	4.27					2.44		10,206	15,422	19,596	20,412	20,866	39,917	39,917	39,917
Idaho		2.59	4.27		16.15			2.44		5,443	15,422	19,051	19,732	20,412	36,288	40,597	41,278
Illinois		2.59	4.11		16.15	12.95		2.44		8,165	14,515	19,051	19,732	20,412	33,240	33,240	33,240
Indiana		2.59	4.11		16.15	12.34		2.44		7,258	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Iowa		2.59	4.11		16.15			2.44		9,072	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Kansas		2.59	4.27		18.14			2.44		9,072	15,422	19,051	19,732	20,412	38,783	38,783	38,783
Kentucky		2.59	4.11		16.15			2.44		5,443	15,422	21,773	21,773	21,773	36,288	36,288	36,288
Louisiana		2.59	4.11		18.14			2.44		5,897	16,783	20,412	20,412	20,412	39,917	39,917	39,917
Maine		2.59	4.11		14.63	13.11		2.44		5,443	17,237	21,773	21,773	21,773	45,360	45,360	45,360
Maryland		2.59	4.11		16.15	12.50		2.44		5,443	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Massachusetts		2.59	4.11		16.15			2.44		7,258	16,330	19,051	19,732	20,412	36,288	36,288	36,288
Michigan		2.59	4.11		16.15	12.50		2.13	5.49	6,350	15,422	17,690	17,690	17,690	38,556	38,556	38,556
Minnesota		2.59	4.11		16.15	12.50		2.44		5,443	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Mississippi		2.59	4.11		16.15			2.44		4,990	14,515	19,051	19,732	20,412	36,288	36,288	36,288
Missouri		2.59	4.27		16.15			2.44		9,072	14,515	15,060	16,148	17,237	33,240	33,240	33,240
Montana		2.59	4.27		16.15			2.44		5,443	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Nebraska		2.59	4.42		16.15			2.44		9,072	15,422	19,051	19,732	20,412	43,092	43,092	43,092
Nevada		2.59	4.27		16.15			2.44		5,443	15,422	19,051	19,732	20,412	39,917	40,597	41,278
New Hampshire		2.59	4.11		16.15	12.50		2.44		9,072	15,422	19,051	19,732	20,412	36,288	36,288	36,288
New Jersey		2.59	4.11		16.15	12.50		2.44		7,258	15,422	19,051	19,732	20,412	36,288	36,288	36,288
New Mexico	19.8	2.59	4.27		17.53			3.05		5,443	15,568	15,568	17,690	18,398	39,191	39,191	39,191
New York		2.59	4.11		17.53	12.50		2.44		10,161	16,330	19,051	19,732	20,412	36,288	36,288	36,288
North Carolina		2.59	4.11		16.15	12.50		2.44		9,072	17,237	19,051	19,732	20,412	36,288	36,288	36,288
North Dakota		2.59	4.27		16.15			2.44		4,990	15,422	19,051	19,732	20,412	39,463	40,144	40,824
Ohio		2.59	4.11		16.15			2.44		5,897	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Oklahoma		2.59	4.11		18.14			2.44		5,897	15,422	19,051	19,732	20,412	40,370	40,824	40,824
Oregon		2.59	4.27		16.15			2.44		5,443	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Pennsylvania		2.59	4.11		16.15			2.44	4.88	7,258	16,330	19,051	19,732	20,412	36,288	36,288	36,288
Rhode Island		2.59	4.11		16.15		1.83	2.44		10,161	16,330	16,330	20,321	20,412	36,288	36,288	36,288
South Carolina		2.59	4.11		16.15	12.50		2.44		9,979	17,963	19,051	19,732	20,412	40,643	40,643	40,643
South Dakota		2.59	4.27		16.15			2.44		5,443	15,422	19,051	19,732	20,412	39,917	40,597	41,278
Tennessee		2.59	4.11		15.24	12.50		2.44		9,072	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Texas		2.59	4.27		17.98			2.44		5,897	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Utah		2.59	4.27		16.15	12.34		2.44		5,443	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Vermont		2.59	4.11		16.15	12.50		2.44		5,443	16,330	19,051	19,732	20,412	36,288	36,288	36,288
Virginia		2.59	4.11		16.15	11.28		2.44		5,897	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Washington		2.59	4.27		16.15			2.44		5,443	15,422	19,051	19,732	20,412	39,917	40,597	41,278
West Virginia		2.59	4.11		16.15	11.28		2.44		9,072	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Wisconsin		2.59	4.11		16.15	12.50		2.44		5,897	15,422	19,051	19,732	20,412	36,288	36,288	36,288
Wyoming		2.59	4.27		18.29			1.01		6,804	16,330	19,278	19,732	16,330	42,638	42,638	42,638

10.3.3 A Train Double Trailer Configuration - Five Axles



Current Weight and Dimension Limit Summary:

Dimension Limits

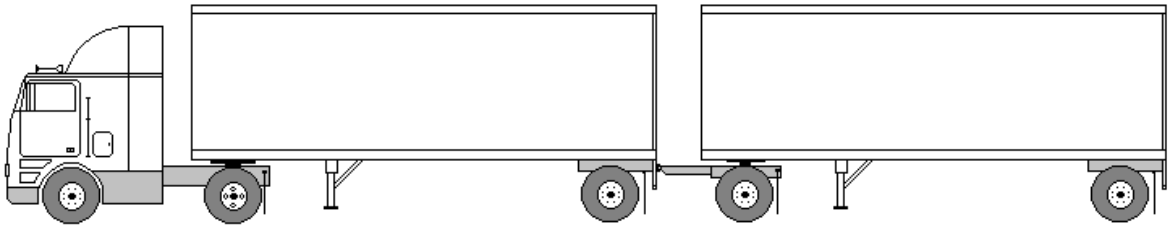
	Interstate			*National Network*		
Summary	***No***	***Lowest Limit***	***Highest Limit***	***No***	***Lowest Limit***	***Highest Limit***
Overall Length	13	25	31.0	13	18	28.5
Overall Width	63	2.59	2.74	64	2.59	2.74
Overall Height	63	3.96	4.42	64	3.96	4.42
First Trailer Length	44	8.53	16.15	44	8.53	16.15
Second Trailer Length	44	8.53	16.15	44	8.53	16.15
Box Length	20	18.5	33.53	21	18.5	33.53

Weight Limits

	Interstate			*National Network*		
Summary	***No***	***Lowest Limit***	***Highest Limit***	***No***	***Lowest Limit***	***Highest Limit***
Steering Axle	62	4,990	10,206	63	4,990	10,206
Tractor Drive Axle	63	9,072	11,000	64	9,072	11,000
Trailer Axle	63	9,072	10,206	64	9,072	10,000
2nd Trailer Weight	12	16,000	16,000	14	16,000	18,144
GCW	63	36,288	47,500	63	36,288	47,500

Legend:
No. = Number of jurisdictions which have a limit; maximum possible is 64.
Interstate = Interstate highway system in US, primary system in Canada and Class A & B highways in Mexico
National System = National truck network in US, primary system in Canada and Class A & B highways in Mexico

Observations - Compatibility Issues



Dimension Limits

Overall Length	• *no overall length limit (USA) versus length restriction (Canada & Mexico)* • *different overall length limits (Canada vs Mexico vs US State limits)*
Overall Height	• *three"camps":* *4.15 m (13.5'), 4.25 m (13.9') & 4.27 m (14')*
Trailer Length(s) **Box Length** **Tractor Wheelbase** **Trailer Wheelbase**	• *independent controls but closely linked* • *primary source of interjurisdictional conflicts/operational complications*
Interaxle Spacing	• *bridge formula (USA & Mexico) versus fixed limits (Canada)*
Other Issues: Additional controls:	• *kingpin setback (Canada)* • *hitch offset (Canada)* • *track width (Canada)*

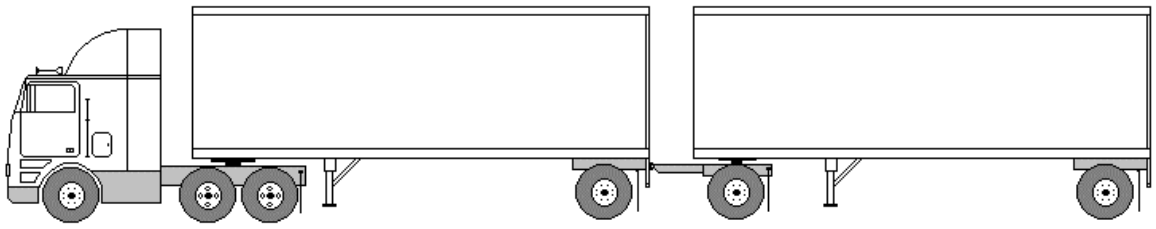
Weight Limits

Steering Axle	• *two camps; 5500 kg versus full single axle weight (9,000 to 10,000 kg)*
Drive Axle	• *range of limits throughout NAFTA* • *more weight for tractor tandem than trailer* • *extra weight for specific suspension type*
Trailer Axles	• *range (narrow) of limits throughout NAFTA* • *cap on second trailer weight*
Gross Vehicle Weight	• *US has cap based on bridge formula* • *Canada has cap based on stability* • *Mexico limit by bridge formula*

Summary: A Train Double (5 axles) - National Networks

Jurisdiction	Overall Length (m)	Overall Width (m)	Overall Height (m)	Tractor Wheelbase - max	First Trailer Length - max	Second Trailer Length - max	Box Length - max	Steering Axle Weight - max	Tractor Axle Weight - max	Trailer Axle Weight - max	Sum of Second Trailer wts - max	GCW
Mexico	28.5	2.60	4.25					6,500	11,000	10,000		47,500
Canada												
British Columbia	25.0	2.60	4.15	6.20			18.50	5,500	9,100	9,100	16,000	38,000
Alberta	25.0	2.60	4.15	6.20			18.50	5,500	9,100	9,100	16,000	39,700
Saskatchewan	25.0	2.60	4.15	6.20			18.50	5,500	9,100	9,100	16,000	39,700
Manitoba	25.0	2.60	4.15	6.20			18.50	5,500	9,100	9,100	16,000	39,700
Ontario	25.0	2.60	4.15	6.20			18.50	5,500	10,000	10,000	16,000	39,700
Quebec	25.0	2.60	4.15	6.20			18.50	5,500	10,000	10,000		39,700
New Brunswick	25.0	2.60	4.15	6.20			18.50	5,500	9,100	9,100	16,000	39,700
Nova Scotia	25.0	2.60	4.15	6.20			18.50	5,500	9,100	9,100	16,000	43,500
Prince Edward Island	25.0	2.60	4.15	6.20			18.50	5,500	9,100	9,100	16,000	39,700
Newfoundland	25.0	2.60	4.15	6.20			18.50	5,500	9,100	9,100	16,000	39,700
Yukon	25.0	2.60	4.20	6.20			18.50	5,500	9,100	9,100		39,700
Northwest Terr.	25.0	2.60	4.20	6.20			18.50	5,500	9,100	9,100	16,000	37,500
United States		2.59						9,072	9,072	9,072		36,288
Alabama		2.59	4.11		8.69	8.69		9,072	9,072	9,072		36,288
Alaska		2.59	4.27				28.96	5,443	9,072	9,072	18,144	39,463
Arizona		2.59	4.27		8.69	8.69		9,072	9,072	9,072		36,288
Arkansas		2.59	4.11		8.53	8.53		5,443	9,072	9,072		36,288
California		2.59	4.27		8.69	8.69		5,670	9,072	9,072		36,288
Colorado		2.59	3.96		8.69	8.69		9,072	9,072	9,072		36,288
Connecticut		2.59	4.11		8.53	8.53		5,443	10,161	10,161		36,288
Delaware		2.59	4.11		8.84	8.84		9,072	9,072	9,072		36,288
D.C.		2.59	4.11		8.53	8.53		9,979	9,979	9,979		36,288
Florida		2.59	4.11		8.53	8.53		5,489	9,979	9,979		36,288
Georgia		2.59	4.11		8.53	8.53		8,165	9,072	9,072		36,288
Hawaii		2.74	4.27					10,206	10,206	10,206		36,288
Idaho		2.59	4.27				20.73	5,443	9,072	9,072		36,288
Illinois		2.59	4.11		8.69	8.69		9,072	9,072	9,072		36,288
Indiana		2.59	4.11		8.69	8.69		7,258	9,072	9,072		36,288
Iowa		2.59	4.11		8.69	8.69		9,072	9,072	9,072		36,288
Kansas		2.59	4.27		8.69	8.69		9,072	9,072	9,072		36,288
Kentucky		2.59	4.11		8.53	8.53		5,443	9,072	9,072		36,288
Louisiana		2.59	4.11		9.14	9.14		5,897	9,072	9,072		36,288
Maine		2.59	4.11		8.69	8.69		5,443	9,979	9,979		36,288
Maryland		2.59	4.11		8.53	8.53		5,443	10,161	10,161		36,288
Massachusetts		2.59	4.11		8.53	8.53		7,258	10,161	10,161		36,288
Michigan		2.59	4.11		8.69	8.69		6,350	9,072	9,072		36,288
Minnesota		2.59	4.11		8.69	8.69		5,443	9,072	9,072		36,288
Mississippi		2.59	4.11		9.14	9.14		4,990	9,072	9,072		36,288
Missouri		2.59	4.27		8.53	8.53		9,072	9,072	9,072		36,288
Montana		2.59	4.27		8.69	8.69		5,443	9,072	9,072		36,288
Nebraska		2.59	4.42				19.81	9,072	9,072	9,072		36,288
Nevada		2.59	4.27		8.69	8.69		5,443	9,072	9,072		36,288
New Hampshire		2.59	4.11		8.53	8.53		9,072	9,072	9,072		36,288
New Jersey		2.59	4.11		8.53	8.53		7,258	10,161	10,161		36,288
New Mexico		2.59	4.27		8.69	8.69		5,443	9,798	9,798		39,191
New York		2.59	4.11		8.69	8.69			10,161	10,161		36,288
North Carolina		2.59	4.11		8.53	8.53		9,072	9,072	9,072		36,288
North Dakota		2.59	4.27		16.15	16.15	31.39	4,990	9,072	9,072		41,278
Ohio		2.59	4.11		8.69	8.69		5,897	9,072	9,072		36,288
Oklahoma		2.59	4.11		16.15	16.15	33.53	5,897	9,072	9,072		36,288
Oregon		2.59	4.27		12.19	12.19	20.73	5,443	9,072	9,072		40,824
Pennsylvania		2.59	4.11		8.69	8.69		7,258	10,161	10,161		36,288
Rhode Island		2.59	4.11		8.69	8.69		10,161	10,161	10,161		36,288
South Carolina		2.59	4.11		8.69	8.69		9,072	9,072	9,072		36,288
South Dakota		2.59	4.27		8.69	8.69		5,443	9,072	9,072		36,288
Tennessee		2.59	4.11		8.69	8.69		9,072	9,072	9,072		36,288
Texas		2.59	4.27		8.69	8.69		5,897	9,072	9,072		36,288
Utah		2.59	4.27				18.59	5,443	9,072	9,072		36,288
Vermont		2.59	4.11		8.53	8.53		5,443	9,072	9,072		36,288
Virginia		2.59	4.11		8.69	8.69		5,897	9,072	9,072		36,288
Washington		2.59	4.27				18.59	5,443	9,072	9,072		39,463
West Virginia		2.59	4.11		8.69	8.69		9,072	9,072	9,072		36,288
Wisconsin		2.59	4.11		8.69	8.69		5,897	9,072	9,072		36,288
Wyoming		2.59	4.27		14.63	12.19	24.69	6,804	9,072	9,072		43,092

10.3.4 A Train Double Trailer Configuration - Six Axles



Current Weight and Dimension Limit Summary:

Dimension Limits

	Interstate			*National Network*		
Summary	***No***	***Lowest Limit***	***Highest Limit***	***No***	***Lowest Limit***	***Highest Limit***
Overall Length	13	25	31	13	25	28.5
Overall Width	63	2.59	2.74	63	2.59	2.74
Overall Height	63	3.96	4.42	63	3.96	4.42
First Trailer Length	45	8.53	16.15	44	8.53	16.15
Second Trailer Length	45	8.53	16.15	44	8.53	16.15
Box Length	20	17.7	29	19	17.7	24.7

Weight Limits

	Interstate			*National Network*		
Summary	***No***	***Lowest Limit***	***Highest Limit***	***No***	***Lowest Limit***	***Highest Limit***
Steering Axle	63	4,990	10,206	64	4,990	10,206
Tractor Drive Axle	63	14,515	19,958	64	14,515	19,958
Trailer Axle	63	8,165	10,206	64	8,165	10,206
2nd Trailer Weight	10	16,000	16,000	10	16,000	16,000
GCW	64	33,240	56,000	64	33,240	56,000

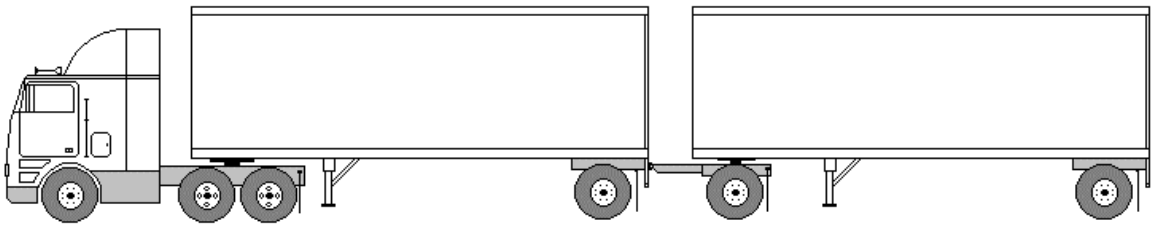
Legend:

No. = Number of jurisdictions which have a limit; maximum possible is 64.

Interstate = Interstate highway system in US, primary system in Canada and Class A & B highways in Mexico

National System = National truck network in US, primary system in Canada and Class A & B highways in Mexico

Observations - Compatibility Issues



Dimension Limits

Overall Length	• *no overall length limit (USA) versus length restriction (Canada & Mexico)* • *different overall length limits (Canada vs Mexico vs US State limits)*
Overall Height	• *three"camps":* *4.15 m (13.5'), 4.25 m (13.9') & 4.27 m (14')*
Trailer Length(s) **Box Length** **Tractor Wheelbase** **Trailer Wheelbase**	• *independent controls but closely linked* • *primary source of interjurisdictional conflicts/operational complications*
Interaxle Spacing	• *bridge formula (USA & Mexico) versus fixed limits (Canada)*
Other Issues: Additional controls:	• *kingpin setback (Canada)* • *hitch offset (Canada)* • *track width (Canada)*

Weight Limits

Steering Axle	• *two camps; 5500 kg versus full single axle weight (9,000 to 10,000 kg)*
Drive Tandem	• *range of limits throughout NAFTA* • *extra weight for specific suspension type*
Trailer Axles	• *range (narrow) of limits throughout NAFTA* • *cap on second trailer weight (Canada)*
Gross Vehicle Weight	• *US has cap based on bridge formula* • *Canada has cap based on stability* • *Mexico limit by bridge formula*

Summary: A Train Double (6 axles) - National Networks

Jurisdiction	Overall Length (m)	Overall Width (m)	Overall Height (m)	Tractor Wheelbase - max	First Trailer Length - max	Second Trailer Length - max	Box Length - max	Steering Axle Weight - max	Tractor Tandem Weight - max	Trailer Axle Weight - max	Sum of Second Trailer wts - max	GCW
Mexico	28.5	2.60	4.25					6,500	19,500	10,000		56,000
Canada												
British Columbia	25.0	2.60	4.15	6.20			18.50	5,500	17,000	9,100	16,000	47,600
Alberta	25.0	2.60	4.15	6.20			18.50	5,500	17,000	9,100	16,000	47,600
Saskatchewan	25.0	2.60	4.15	6.20			18.50	5,500	17,000	9,100	16,000	47,600
Manitoba	25.0	2.60	4.15	6.20			18.50	5,500	17,000	9,100	16,000	47,600
Ontario	25.0	2.60	4.15	6.20			18.50	5,500	17,900	10,000	16,000	47,600
Quebec	25.0	2.60	4.15	6.20			18.50	5,500	18,000	10,000		47,600
New Brunswick	25.0	2.60	4.15	6.20			18.50	5,500	18,000	9,100	16,000	48,000
Nova Scotia	25.0	2.60	4.15	6.20			18.50	5,500	18,000	9,500	16,000	47,600
Prince Edward Island	25.0	2.60	4.15	6.20			18.50	5,500	17,000	9,100	16,000	47,600
Newfoundland	25.0	2.60	4.15	6.20			18.50	5,500	17,000	9,100	16,000	47,600
Yukon	25.0	2.60	4.20	6.20			18.50	5,500	17,000	9,100		47,600
Northwest Terr.	25.0	2.60	4.20	6.20			18.50	5,500	17,000	9,100	16,000	47,600
United States		2.59						9,072	15,422	9,072		36,288
Alabama		2.59	4.11		8.69	8.69		9,072	16,330	9,072		38,102
Alaska		2.59	4.27				28.96	5,443	17,237	9,072		41,278
Arizona		2.59	4.27		8.69	8.69		9,072	15,422	9,072		36,288
Arkansas		2.59	4.11		8.53	8.53		5,443	15,422	9,072		36,288
California		2.59	4.27		8.69	8.69		5,670	15,422	9,072		36,288
Colorado		2.59	3.96		8.69	8.69		9,072	18,144	9,072		38,556
Connecticut		2.59	4.11		8.53	8.53		5,443	16,330	10,161		36,288
Delaware		2.59	4.11		8.84	8.84		9,072	18,144	9,072		36,288
D.C.		2.59	4.11		8.53	8.53		9,979	15,422	9,072		36,288
Florida		2.59	4.11		8.53	8.53		5,489	19,958	9,979		36,288
Georgia		2.59	4.11		8.53	8.53		8,165	15,422	9,226		36,288
Hawaii		2.74	4.27					10,206	15,422	10,206		39,917
Idaho		2.59	4.27				20.73	5,443	15,422	9,072		41,278
Illinois		2.59	4.11		8.69	8.69		8,165	14,515	9,072		33,240
Indiana		2.59	4.11		8.69	8.69		7,258	15,422	9,072		36,288
Iowa		2.59	4.11		8.69	8.69		9,072	15,422	9,072		36,288
Kansas		2.59	4.27		8.69	8.69		9,072	15,422	9,072		38,783
Kentucky		2.59	4.11		8.53	8.53		5,443	15,422	9,072		36,288
Louisiana		2.59	4.11		9.14	9.14		5,897	16,783	9,979		36,288
Maine		2.59	4.11		8.69	8.69		5,443	17,237	10,161		36,288
Maryland		2.59	4.11		8.53	8.53		5,443	15,422	9,072		36,288
Massachusetts		2.59	4.11		8.53	8.53		7,258	16,330	10,161		36,288
Michigan		2.59	4.11		8.69	8.69		6,350	14,515	8,165		40,824
Minnesota		2.59	4.11		8.69	8.69		5,443	15,422	9,072		36,288
Mississippi		2.59	4.11		9.14	9.14		4,990	15,422	9,072		36,288
Missouri		2.59	4.27		8.53	8.53		8,165	14,515	9,072		33,240
Montana		2.59	4.27		8.69	8.69		5,443	15,422	9,072		36,288
Nebraska		2.59	4.42				19.81	9,072	15,422	9,072		41,278
Nevada		2.59	4.27		8.69	8.69		5,443	15,422	9,072		41,278
New Hampshire		2.59	4.11		8.53	8.53		10,161	16,330	10,161		36,288
New Jersey		2.59	4.11		8.53	8.53		7,258	15,422	10,161		36,288
New Mexico		2.59	4.27		8.69	8.69		5,443	15,568	9,798		39,191
New York		2.59	4.11		8.69	8.69		7,258	16,330	10,161		36,288
North Carolina		2.59	4.11		8.53	8.53		9,072	15,422	9,072		36,288
North Dakota		2.59	4.27		16.15	16.15	31.39	4,990	15,422	9,072		47,628
Ohio		2.59	4.11		8.69	8.69		5,897	15,422	9,072		36,288
Oklahoma		2.59	4.11		16.15	16.15	33.53	5,897	15,422	9,072		40,824
Oregon		2.59	4.27		12.19	12.19	20.73	5,443	15,422	9,072		43,772
Pennsylvania		2.59	4.11		8.69	8.69		7,258	16,330	10,161		36,288
Rhode Island		2.59	4.11		8.69	8.69		10,161	16,330	10,161		36,288
South Carolina		2.59	4.11		8.69	8.69		9,979	17,963	9,979		36,560
South Dakota		2.59	4.27		8.69	8.69		5,443	15,422	9,072		41,278
Tennessee		2.59	4.11		8.69	8.69		9,072	15,422	9,072		36,288
Texas		2.59	4.27		8.69	8.69		5,897	15,422	9,072		36,288
Utah		2.59	4.27				18.59	5,443	15,422	9,072		36,288
Vermont		2.59	4.11		8.53	8.53		5,443	16,330	10,161		36,288
Virginia		2.59	4.11		8.69	8.69		5,897	15,422	9,072		36,288
Washington		2.59	4.27				18.59	5,443	15,422	9,072		41,278
West Virginia		2.59	4.11		8.69	8.69		9,072	15,422	9,072		36,288
Wisconsin		2.59	4.11		8.69	8.69		5,897	15,422	9,072		36,288
Wyoming		2.59	4.27		14.63	12.19	24.69	6,804	16,330	9,072		48,082

11. Appendix 1: US Bridge Formula B

Table 1: U.S. Federal Bridge Formula Loading Tables

Formula B - Maximum Gross Loads (lb x 1000)

Distance	No of Axles							
ft	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
4	34.0							
5	34.0							
6	34.0							
7	34.0							
8 & less	34.0	34.0						
> 8	38.0	42.0						
9	39.0	42.5						
10	40.0	43.5						
11	40.0	44.0						
12	40.0	45.0	50.0					
13	40.0	45.5	50.5					
14	40.0	46.5	51.0					
15	40.0	47.0	52.0					
16	40.0	48.0	52.5	58.0				
17	40.0	48.5	53.0	58.5				
18	40.0	49.5	54.0	59.0				
19	40.0	50.0	54.5	60.0				
20	40.0	51.0	55.0	60.5	66.0			
21	40.0	51.5	56.0	61.0	66.5			
22	40.0	52.5	56.5	61.5	67.0			
23	40.0	53.0	57.0	62.5	68.0			
24	40.0	54.0	58.0	63.0	68.5	74.0		
25	40.0	54.5	58.5	63.5	69.0	74.5		
26	40.0	55.5	59.0	64.0	69.5	75.0		
27	40.0	56.0	60.0	65.0	70.0	76.0		
28	40.0	57.0	60.5	65.5	71.0	76.5	82.0	
29	40.0	57.5	61.0	66.0	71.5	77.0	82.5	
30	40.0	58.5	62.0	66.5	72.0	77.5	83.0	
31	40.0	59.0	62.5	67.5	72.5	78.0	83.5	
32	40.0	60.0	63.0	68.0	73.0	78.5	84.5	90.0
33	40.0	60.0	64.0	68.5	74.0	79.5	85.0	90.5
34	40.0	60.0	64.5	69.0	74.5	80.0	85.5	91.0
35	40.0	60.0	65.0	70.0	75.0	80.5	86.0	91.5
36	40.0	60.0	66.0	70.5	75.5	81.0	86.5	92.5
37	40.0	60.0	66.5	71.0	76.0	81.5	87.0	93.0
38	40.0	60.0	67.5	71.5	77.0	82.0	87.5	93.5
39	40.0	60.0	68.0	72.5	77.5	83.0	88.5	94.0
40	40.0	60.0	68.5	73.0	78.0	83.5	89.0	94.5
41	40.0	60.0	69.5	73.5	78.5	84.0	89.5	95.0
42	40.0	60.0	70.0	74.0	79.0	84.5	90.0	95.5
43	40.0	60.0	70.5	75.0	80.0	85.0	90.5	96.0
44	40.0	60.0	71.5	75.5	80.5	85.5	91.0	97.0
45	40.0	60.0	72.0	76.0	81.0	86.5	91.5	97.5
46	40.0	60.0	72.5	76.5	81.5	87.0	92.5	98.0
47	40.0	60.0	73.5	77.5	82.0	87.5	93.0	98.5
48	40.0	60.0	74.0	78.0	83.0	88.0	93.5	99.0
49	40.0	60.0	74.5	78.5	83.5	88.5	94.0	99.5
50	40.0	60.0	75.5	79.5	84.0	89.0	94.5	100.0
51	40.0	60.0	76.0	80.0	84.5	90.0	95.0	100.5
52	40.0	60.0	76.5	80.5	85.0	90.5	95.5	101.5
53	40.0	60.0	77.5	81.0	86.0	91.0	96.5	102.0
54	40.0	60.0	78.0	82.0	86.5	91.5	97.0	102.5
55	40.0	60.0	78.5	82.5	87.0	92.0	97.5	103.0
56	40.0	60.0	79.5	83.0	87.5	92.5	98.0	103.5
57	40.0	60.0	80.0	83.5	88.0	93.5	98.5	104.0
58	40.0	60.0	80.0	84.5	89.0	94.0	99.0	104.5
59	40.0	60.0	80.0	85.0	89.5	94.5	99.5	105.0
60	40.0	60.0	80.0	85.5	90.0	95.0	100.5	106.0
61	40.0	60.0	80.0	86.0	90.5	95.5	101.0	106.5
62	40.0	60.0	80.0	87.0	91.0	96.0	101.5	107.0

Formula B - Maximum Gross Loads (lb x 1000) (continued)

Distance	No of Axles							
ft	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
63	40.0	60.0	80.0	87.5	92.0	97.0	102.0	107.5
64	40.0	60.0	80.0	88.0	92.5	97.5	102.5	108.0
65	40.0	60.0	80.0	88.5	93.0	98.0	103.0	108.5
66	40.0	60.0	80.0	89.5	93.5	98.5	103.5	109.0
67	40.0	60.0	80.0	90.0	94.0	99.0	104.5	109.5
68	40.0	60.0	80.0	90.5	95.0	99.5	105.0	110.5
69	40.0	60.0	80.0	91.0	95.5	100.5	105.5	111.0
70	40.0	60.0	80.0	92.0	96.0	101.0	106.0	111.5
71	40.0	60.0	80.0	92.5	96.5	101.5	106.5	112.0
72	40.0	60.0	80.0	93.0	97.0	102.0	107.0	112.5
73	40.0	60.0	80.0	93.5	98.0	102.5	107.5	113.0
74	40.0	60.0	80.0	94.5	98.5	103.0	108.5	113.5
75	40.0	60.0	80.0	95.0	99.0	104.0	109.0	114.0
76	40.0	60.0	80.0	95.5	99.5	104.5	109.5	115.0
77	40.0	60.0	80.0	96.0	100.0	105.0	110.0	115.5
78	40.0	60.0	80.0	97.0	101.0	105.5	110.5	116.0
79	40.0	60.0	80.0	97.5	101.5	106.0	111.0	116.5
80	40.0	60.0	80.0	98.0	102.0	106.5	111.5	117.0
81	40.0	60.0	80.0	98.5	102.5	107.5	112.5	117.5
82	40.0	60.0	80.0	99.5	103.0	108.0	113.0	118.0
83	40.0	60.0	80.0	100.0	104.0	108.5	113.5	118.5
84	40.0	60.0	80.0	100.0	104.5	109.0	114.0	119.5
85	40.0	60.0	80.0	100.0	105.0	109.5	114.5	120.0
86	40.0	60.0	80.0	100.0	105.5	110.0	115.0	120.5
87	40.0	60.0	80.0	100.0	106.0	111.0	115.5	121.0
88	40.0	60.0	80.0	100.0	107.0	111.5	116.5	121.5
89	40.0	60.0	80.0	100.0	107.5	112.0	117.0	122.0
90	40.0	60.0	80.0	100.0	108.0	112.5	117.5	122.5
91	40.0	60.0	80.0	100.0	108.5	113.0	118.0	123.0
92	40.0	60.0	80.0	100.0	109.0	113.5	118.5	124.0
93	40.0	60.0	80.0	100.0	110.0	114.5	119.0	124.5
94	40.0	60.0	80.0	100.0	110.5	115.0	119.5	125.0
95	40.0	60.0	80.0	100.0	111.0	115.5	120.5	125.5
96	40.0	60.0	80.0	100.0	111.5	116.0	121.0	126.0
97	40.0	60.0	80.0	100.0	112.0	116.5	121.5	126.5
98	40.0	60.0	80.0	100.0	113.0	117.0	122.0	127.0
99	40.0	60.0	80.0	100.0	113.5	118.0	122.5	127.5
100	40.0	60.0	80.0	100.0	114.0	118.5	123.0	128.5
101	40.0	60.0	80.0	100.0	114.5	119.0	123.5	129.0
102	40.0	60.0	80.0	100.0	115.0	119.5	124.5	129.5
103	40.0	60.0	80.0	100.0	116.0	120.0	125.0	130.0
104	40.0	60.0	80.0	100.0	116.5	120.5	125.5	130.5
105	40.0	60.0	80.0	100.0	117.0	121.5	126.0	131.0
106	40.0	60.0	80.0	100.0	117.5	122.0	126.5	131.5
107	40.0	60.0	80.0	100.0	118.0	122.5	127.0	132.0
108	40.0	60.0	80.0	100.0	119.0	123.0	127.5	133.0
109	40.0	60.0	80.0	100.0	119.5	123.5	128.5	133.5
110	40.0	60.0	80.0	100.0	120.0	124.0	129.0	134.0
111	40.0	60.0	80.0	100.0	120.0	125.0	129.5	134.5
112	40.0	60.0	80.0	100.0	120.0	125.5	130.0	135.0
113	40.0	60.0	80.0	100.0	120.0	126.0	130.5	135.5
114	40.0	60.0	80.0	100.0	120.0	126.5	131.0	136.0
115	40.0	60.0	80.0	100.0	120.0	127.0	131.5	136.5
116	40.0	60.0	80.0	100.0	120.0	127.5	132.5	137.5
117	40.0	60.0	80.0	100.0	120.0	128.5	133.0	138.0
118	40.0	60.0	80.0	100.0	120.0	129.0	133.5	138.5
119	40.0	60.0	80.0	100.0	120.0	129.5	134.0	139.0
120	40.0	60.0	80.0	100.0	120.0	130.0	134.5	139.5
121	40.0	60.0	80.0	100.0	120.0	130.5	135.0	140.0
122	40.0	60.0	80.0	100.0	120.0	131.0	135.5	140.5
123	40.0	60.0	80.0	100.0	120.0	132.0	136.5	141.0
124	40.0	60.0	80.0	100.0	120.0	132.5	137.0	142.0