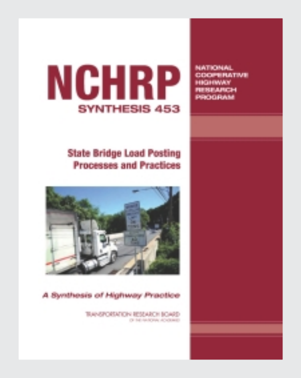

State Bridge Load Posting Processes and Practices

DETAILS

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NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP SYNTHESIS 453

State Bridge Load Posting Processes and Practices

A Synthesis of Highway Practice

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TRANSPORTATION RESEARCH BOARD

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Cover Figure: Baltimore Avenue Bridge over Darby Creek, on the border of Lansdowne and Clifton Heights, in Pennsylvania. (*Courtesy*: Clem Murray/staff photographer, Philly.com.)

FOREWORD

Highway administrators, engineers, and researchers often face problems for which information already exists, either in documented form or as undocumented experience and practice. This information may be fragmented, scattered, and unevaluated. As a consequence, full knowledge of what has been learned about a problem may not be brought to bear on its solution. Costly research findings may go unused, valuable experience may be overlooked, and due consideration may not be given to recommended practices for solving or alleviating the problem.

There is information on nearly every subject of concern to highway administrators and engineers. Much of it derives from research or from the work of practitioners faced with problems in their day-to-day work. To provide a systematic means for assembling and evaluating such useful information and to make it available to the entire highway community, the American Association of State Highway and Transportation Officials—through the mechanism of the National Cooperative Highway Research Program—authorized the Transportation Research Board to undertake a continuing study. This study, NCHRP Project 20-5, “Synthesis of Information Related to Highway Problems,” searches out and synthesizes useful knowledge from all available sources and prepares concise, documented reports on specific topics. Reports from this endeavor constitute an NCHRP report series, *Synthesis of Highway Practice*.

This synthesis series reports on current knowledge and practice, in a compact format, without the detailed directions usually found in handbooks or design manuals. Each report in the series provides a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems.

PREFACE

By Jon M. Williams
Program Director
Transportation
Research Board

U.S. state governments may restrict weights of vehicles that can cross highway bridges and culverts to levels below legal loads. Bridges and culverts restricted for vehicle weights are called load posted structures. Load posting practices of bridge owners include the identification of structures to post for load, the evaluation of safe load capacities of these structures, and the implementation of restrictions on vehicle weights at structures.

Information for this study was acquired through a literature review and a survey of state transportation agencies.

George Hearn, University of Colorado at Boulder, collected and synthesized the information and wrote the report. The members of the topic panel are acknowledged on the preceding page. This synthesis is an immediately useful document that records the practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As progress in research and practice continues, new knowledge will be added to that now at hand.

CONTENTS

Note: Many of the photographs, figures, and tables in this report have been converted from color to grayscale for printing. The electronic version of the report (posted on the Web at www.trb.org) retains the color versions.

STATE BRIDGE LOAD POSTING PROCESSES AND PRACTICES

SUMMARY

This report is a synthesis of the practices of U.S. state governments in restricting weights of vehicles that can cross highway bridges and culverts to levels below legal loads. Bridges and culverts restricted for vehicle weights are called load posted structures. The load posting practices of bridge owners include the identification of structures to post for load, the evaluation of safe load capacities of these structures, and the implementation of restrictions on vehicle weights at structures.

Practices for load posting operate within a system of legal loads established in law and regulation of federal, state, and local governments. Posting for load is one possible outcome of states' larger activities in evaluation of safe load capacities of bridges and culverts. States post for load, but also grant permits that allow overweight vehicles to travel on designated routes. Overall, states identify and regulate routes that can carry overweight vehicles, routes that can carry legal weight vehicles only, and routes or individual structures that must be restricted to less than legal loads.

This synthesis report addresses the practices and the context of load posting of highway bridges and culverts. Practices include methods of load rating, the role of safety inspections, the recognition of deterioration in structures, and the evaluation of safe load capacity for structures. The context includes laws and regulations that limit vehicles loads, exemptions to load limits for some vehicles, permitting for overweight loads, coordination with local governments and, when limits on load are violated, fines that states impose.

The synthesis gathers information on loads and posting for load from the United States Code (USC), U.S.DOT National Bridge Inventory (NBI), states' statutes and administrative codes, state department of transportation (DOT) manuals and published advice to commercial carriers, and a survey of states' representatives to the Subcommittee on Bridges and Structures (SCOBS) of AASHTO.

Load posting is a restriction of the weights of vehicles to values below legal loads and below routine permit loads. It includes the placement of signs at structures stating the limits on vehicle weights. There are several reasons for load posting. Some structures were designed for loads equal to or less than H15, a single-unit truck with gross weight equal to 15 tons, and are posted for load as a result. Other structures carry additional dead weight and are posted for the reduced remaining capacity for live load. Still other structures have deterioration or damage that weakens load-carrying components and are posted for load in consequence. Some low strength structures are closed, rather than posted.

Load posting is an outcome of load rating. Bridge owners determine the safe load capacities of bridges and culverts. For most structures, load capacities are greater than legal loads, and posting for load is not required. Bridge owners must act when load capacity is less than legal loads. Owners can replace, repair, shore (as a temporary fix), close, or post the structures with low capacity. Load posting is a decision in asset management that proceeds from a finding in load rating.

For more than 80% of bridges and culverts, load rating is an exercise in computational structural analysis. For 2% of structures, information on design is missing or incomplete, and

safe load capacities are estimated from observed conditions of structures and known traffic loads in service. For less than 1% of structures, load ratings are determined using load tests. For 16% of structures, no load rating analysis is performed.

Most computational load ratings use approximate structural analysis with live load distribution factors; the same type of analysis used in design. The basis for a structure's design is often the basis for its load rating. Methods for allowable stress design, load factor design, and load and resistance factor design provide corresponding bases in allowable stress rating, load factor rating, and load and resistance factor rating.

The engineering practices for load rating and load posting are similar among U.S. states. AASHTO publishes a *Manual for Bridge Evaluation* (MBE) that provides methods for load rating, live loads for rating computations, and guidance on load posting. States employ AASHTO's manual, sometimes with modifications such as additional state-specific live loads or state-specific policies for weight limits at load posted structures.

Load postings address present-day conditions of structures, and are based on load ratings that are computed for present-day conditions. Conditions that alter strength such as deterioration in components, and conditions that alter loads such as additional dead load on structures, are recognized in load rating computations.

Safety inspections provide information on present-day conditions. Safety inspectors alert load raters about new conditions at structures, and load raters review reports of safety inspections. Safety inspectors and bridge load raters compare observed conditions with current load ratings to determine when to update load ratings.

Bridges and culverts are posted for load when safe load capacity is less than legal loads. Laws of U.S. states set limits on single-axle weight, tandem-axle weight, and gross vehicle weight (GVW). States also limit the combined weight of axle groups based on the count and spacing of axles in a group.

States' legal loads are influenced by limits for loads on interstate highways as set in USC Title 23. The general limits in USC Title 23 are 20,000 lb for single-axle load, 34,000 lb for tandem-axle load, and 80,000 lb for GVW. The majority of U.S. states use these same limits for state legal loads.

Legal loads on non-interstate highways can be higher than loads on interstate highways as set in USC Title 23. In 13 states, the single-axle legal load for non-interstate highways is greater than 20,000 lb; the largest among these is 24,000 lb. In 16 states, the tandem-axle legal load for non-interstate highways is greater than 34,000 lb; the largest is 48,000 lb. In 18 states, GVW for non-interstate highways is greater than 80,000 lb; the largest is 164,000 lb.

States provide exemptions from load limits for some vehicles, which are tied to vehicle use, to the commodity being transported, or to the vehicle owner. States exempt some farm equipment and construction equipment; some raw products from farms, forests, or mines; and some vehicles owned by public utilities, or state or local governments.

No U.S. state government sets legal loads for state highways at values less than the general limits specified in USC Title 23. Some local governments limit loads on their roads to values less than state legal loads.

Vehicles that exceed limits on legal loads routinely travel on U.S. highways, including interstate highways. USC Title 23 includes grandfather protections for state legal loads that were in effect in year 1956. Title 23 lists state-by-state exceptions for loads on designated route segments, and exceptions in 22 states for longer combination vehicles. The gross weights of such vehicles are as great as 164,000 lb.

Overweight permits are issued by states for single trips, multiple trips, or unlimited trips within a fixed period of time, often one year. States issue multi-trip permits for routes that have been evaluated for common configurations of overweight vehicles. The load ratings of bridges and culverts along these routes have been evaluated for overweight vehicles and found to be adequate. States can issue multi-trip permits without further evaluation of structures. This synthesis report includes information on overweight permit loads. Many states issue multi-trip permits for vehicles with GVW equal to or greater than 100,000 lb.

When posting for load is required, signs stating limits on vehicle weights are installed at structures. States set fines for violations of weight limits, with larger violations incurring larger fines. The median fine among U.S. states is $0.20 per pound of excess weight. Some states set additional fines for violation of load limits at posted structures.

Three levels of government, federal, state, and local, have three ranges of responsibility in load posting. The federal government has direct control of few structures, but establishes regulations that affect the eligibility of states for federal aid to highways. Federal regulation addresses execution and reporting of safety inspections, load ratings, and load postings of bridges and culverts.

Under federal regulation, state governments must inspect, rate, and post state-owned structures, and must ensure the inspection, rating, and posting of local government structures. Coordination between state and local governments varies. In many states, local governments inspect, rate, and post structures on their road systems. In addition, in many states, local government bridge owners receive advice and assistance from state governments for local bridge programs. In a few states, the state government inspects, load rates, and posts all structures; both those that are state-owned and those owned by local governments.

Federal regulation requires the reporting of the load posting status of bridges and culverts. The federal NBI has information for bridges and culverts on public roads with a span greater than 20 ft. The NBI includes information on structure type, condition, and year built; on structure owner, route, and average daily traffic; and on load rating values, rating methods, and load posting status. NBI data are examined in this synthesis report to learn the prevalence of load posting and the relation of load posting to structure type, owner, condition, and other attributes of structure.

Using year 2012 NBI data, it was found that 10% of all U.S. bridges and culverts are posted for load. Sixteen percent of local government structures are posted for load. Local governments (cities and counties) own five of every six structures posted for load. Among state-owned bridges and culverts, slightly more than 3% are posted for load. The posted structures are distributed unevenly among states, with 27 U.S. states having less than 1% of state-owned structures posted for load.

Load posting is rare among bridges and culverts on U.S. interstate routes (0.26% are posted for load) and U.S. numbered routes (0.94% are posted for load). On state highways, 5% of structures are posted for load; on county highways, 17% of structures are posted for load. Three of four posted structures have daily traffic of fewer than 400 vehicles per day. Four of five posted structures have fewer than 20 truck crossings per day.

Ninety-five percent of load posted structures are bridges, not culverts. Among bridges, 12% are posted for load; among culverts, 2% are posted for load.

Three of four load posted structures are in fair or good general condition. Seventy-seven percent of load posted structures were designed for unknown loads or for loads less than or equal to H15. More than 50% of timber beam bridges, and more than 50% of steel thru-truss bridges, are posted for load.

CHAPTER ONE

STATUS OF BRIDGE POSTING FOR LOAD IN THE UNITED STATES

This chapter presents information from the National Bridge Inventory (NBI) for reporting year 2012 (*1*) that identifies bridges and culverts that are posted for load, and shows the distributions of load posted structures among attributes such as owner, route system, structures type, and general condition.

Distributions of load posted structures are presented for 24 attributes available in the NBI. Examination of these distributions yields some general findings:

Prevalence — Ten percent of bridges and culverts on U.S. roads are posted for load.

Owner — Eighty percent of load posted bridges and culverts are owned by local governments. In 27 U.S. states, less than 1% of state-owned structures are posted for load.

Route System — Ninety-one percent of load posted bridges and culverts are on rural roads, 76% of posted structures are on low-volume roads, and 79% of load posted structures carry fewer than 20 trucks per day. Less than 1% of structures on interstate routes are posted for load.

Condition — Seventy-five percent of load posted bridges and culverts are in fair or good general condition.

Age — Eighty-eight percent of load posted bridges and culverts were built before 1980.

Design Load — Seventy-seven percent of load posted bridges and culverts have unknown design live load or were designed for live load equal to or less than H15.

Structure Type — Ninety-five percent of load posted structures are bridges, not culverts. Among bridges, 12% are posted for load, and among culverts, 2% are posted for load.

Load Rating Method — Ninety-three percent of load posted bridges and culverts have load ratings determined by computational methods. Seven percent of load posted structures have load rating determined by field evaluation and engineering judgment (FE/EJ), or lack load rating analysis. Load tests are used for less than 1% of load ratings.

U.S. NATIONAL BRIDGE INVENTORY

Every year, U.S.DOT collects data from state governments on their inventories of bridges and culverts. These data, the NBI, are publically available as a set of fixed format text files (*2*). The NBI includes 116 data items that list structure locations, owners, types, conditions, uses, and status as structurally deficient or functionally obsolete (*3*). The NBI identifies bridges and culverts that are posted for load.

Several data items are useful to an examination of load posting among U.S. bridges and culverts (Table 1). One field, NBI item 41, is used in this synthesis report as a dependent variable. Item 41 reports that a structure is open, closed, or posted for load. Coding 'P' for item 41 indicates that a structure is posted for load. The tables in this synthesis list the counts and percentages of 'P' structures within categories defined by structure owner, route, structure type, condition, and status.

LOAD POSTING AND BRIDGE OWNER

There are more than 61,000 bridges and culverts posted for load among the 610,000 structures reported in the NBI (Table 2). NBI records include 50 state governments plus the District of Columbia and Puerto Rico. Among these 52 governments, a median of 7% of bridges and culverts are posted for load; the maximum is 27% percent, and the minimum is slightly more than 1%.

More than 80% of structures posted for load are owned by local governments (Table 3), and are part of local government roads. Posted structures on county highways make up nearly three of four U.S. structures posted for load (Table 4).

LOAD POSTING AND ROUTE SYSTEM

Less than 1% of structures on interstate routes and U.S. numbered routes are posted for load. Five percent of structures on state highways are posted for load. Less than 10% of structures posted for load are on the base network of highways (Table 5), less than 3% are on the designated national highway network for trucks (Table 6), less than 1% are on the

TABLE 1
NBI DATA ITEMS EXAMINED FOR CORRELATION WITH LOAD POSTING

Item	Title	Note
1	State code	Federal Information Processing Standards (FIPS) codes for states
5B	Route signing prefix	Interstate, U.S. highway, state highway, county road, city street, federal lands road, state lands road
5C	Designated level of service	Mainline, alternate, bypass, spur, business, ramp/wye/connector, service/frontage road
12	Base highway network	On/off base highway network
20	Toll	Toll status of the bridge
22	Owner	Owner(s) of the bridge
26	Functional classification of inventory route	Arterial, collector, or local; urban or rural
27	Year built	Year of construction
29	Average daily traffic	Average daily count of vehicles crossing the bridge
31	Design load	Live load for which the bridge was designed
37	Historical significance	Bridge's listing, if any, on a register of historic places
41	Structure open, posted, or closed to traffic	Operational status of a bridge
43	Structure type, main	Kind of material, type of design
58	Deck condition	General condition rating
59	Superstructure condition	General condition rating
60	Substructure condition	General condition rating
62	Culvert condition	General condition rating
63	Method used to determine operating rating	Method of load rating, or absence of analysis
65	Method used to determine inventory rating	Method of load rating, or absence of analysis
70	Bridge posting	Comparison of operating rating to state legal loads
92A	Fracture critical (FC) details	Yes/no for presence of FC details in bridge
100	STRAHNET highway designation	On/off STRAHNET
104	National Highway System	On/off National Highway System
110	Designated national network	On/off national network for trucks
SD	Status	Yes/no structurally deficient, functionally obsolete

Source: *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges* (*3*).
STRAHNET = Strategic Highway Network.

TABLE 2
LOAD POSTING, STATE CODE AND BRIDGE OWNER

	All Structures	State Owned	Locally Owned
	Count		
Structures	609,728	293,870	305,505
Posted for Load	61,038	10,045	50,170
	Percentage		
Posted for Load, FIPS Average	10.0	3.4	16.4
Posted for Load, FIPS Median	6.9	0.91	12.6
Posted for Load, FIPS Maximum	27.2	20.4	34.5
Posted for Load, FIPS Minimum	1.2	0.02	0.00

FIPS = Federal Information Processing Standards.

TABLE 3
LOAD POSTING AND BRIDGE OWNER

Item 22 Owner	Structures	Posted for Load	% of Owner	% of Load Posted
Federal Government	8,890	515	5.8	0.84
State Government	293,870	10,045	3.4	16.5
Local Government	305,505	50,170	16.4	82.2
Other	1,449	306	21.1	0.50

National Highway System (NHS) (Table 7), and less than 1% are on the strategic highway network (STRAHNET) (Table 8). Less than 1% of structures posted for loads carry toll roads (Table 9). [Note: The federal transportation bill Moving Ahead for Progress in the 21st Century Act (MAP-21) (*4*) changed the extent of the NHS. NBI data for year 2012 do not include this change.]

LOAD POSTING AND ROUTE SERVICE

More than 90% of structures posted for load are on rural routes (Table 10). Nearly 90% of structures posted for load are on mainline routes (Table 11), nearly 76% of load posted structures carry low-volume roads (Table 12), and nearly 79% of load posted structures carry fewer than 20 trucks per day (Table 13).

LOAD POSTING, BRIDGE CONDITION, AND AGE

Nearly 40% of bridges and culverts built before year 1900 are posted for load (Table 14). Less than 2% of structures built since 2000 are posted for load. The fraction of structures that are posted for load increases with age. About 30% of structures on national or state registries of historic bridges are posted for load (Table 15). More than 70% of load posted structures are not yet historically significant.

TABLE 4
LOAD POSTING AND ROUTE SIGNING PREFIX

Item 5B Route Signing Prefix	Structures	Posted for Load	% by Route	% of Load Posted
Interstate Highway	55,981	147	0.26	0.24
U.S. Numbered Highway	54,218	510	0.94	0.84
State Highway	147,441	7,392	5.0	12.1
County Highway	259,656	44,884	17.3	73.5
City Street	68,222	6,003	8.8	9.8
Federal Lands Road	7,175	312	4.3	0.51
State Lands Road	1,135	195	17.2	0.32
Other	15,892	1,595	10.0	2.6

TABLE 5
LOAD POSTING AND BASE HIGHWAY NETWORK

Item 12 Base Highway Network	Structures	Posted for Load	% of System	% of Load Posted
Inventory Route Is Not on the Base Network	412,817	55,991	13.6	91.7
Inventory Route Is on the Base Network	150,527	2,967	2.0	4.9

TABLE 6
LOAD POSTING AND DESIGNATED NATIONAL NETWORK

Item 110 Designated National Network	Structures	Posted	% of System	% of Load Posted
Not Part of the National Network for Trucks	513,827	59,531	11.6	97.5
Part of the National Network for Trucks	95,896	1,506	1.6	2.5

TABLE 7
LOAD POSTING AND HIGHWAY SYSTEM

Item 104 Highway System of the Inventory Route	Structures	Posted	% of System	% of Load Posted
Inventory Route Is Not on the NHS	491,984	60,540	12.3	99.2
Inventory Route Is on the NHS	117,743	497	0.4	0.8

TABLE 8
LOAD POSTING AND STRAHNET

Item 100 STRAHNET Highway Designation	Structures	Posted	% of Group	% of Load Posted
Not a STRAHNET Route	541,477	60,854	11.2	99.7
Interstate STRAHNET Route	56,952	155	0.27	0.25
Non-Interstate STRAHNET Route	10,314	24	0.23	0.04
STRAHNET Connector Route	984	4	0.41	0.01

TABLE 9
LOAD POSTING AND TOLL BRIDGES

Item 20 Toll	Structures	Posted for Load	% of Route	% of Load Posted
Toll Routes	7,678	89	1.2	0.1
Free Routes	601,951	60,947	10.1	99.9

TABLE 10
LOAD POSTING AND FUNCTIONAL CLASS

Item 26 Functional Class	Structures	Posted for Load	% of Functional Class	% of Load Posted
Rural				
Arterial	101,083	1,030	1.0	1.7
Collector	141,366	14,269	10.1	23.4
Local	206,364	40,028	19.4	65.6
Urban				
Arterial	107,597	1,700	1.6	2.8
Collector	20,641	1,090	5.3	1.8
Local	32,673	2,921	8.9	4.8
Total				
Arterial	208,680	2,730	1.3	4.5
Collector	162,007	15,359	9.5	25.2
Local	239,037	42,949	18.0	70.4

LOAD POSTING AND GENERAL CONDITION RATINGS

General condition ratings (GCR) in the NBI are reported on a 9 to 0 scale. Rating 9 indicates the best condition. The AASHTO *Manual for Bridge Evaluation* (MBE) (*5*) relates NBI general condition ratings to "good," "fair," and "poor" categories of condition. General condition ratings of 6 and higher reflect good condition, a rating of 5 is considered fair condition, and ratings of 4 and lower are designated poor.

Most bridges posted for load are in good or fair condition. Among load posted structures, 88% have decks in good or fair condition (Table 16), 83% have superstructures in good or fair condition (Table 17), and 75% have substructures in good or fair condition (Table 18). Most culverts posted for load are in good or fair condition (Table 19).

Forty-eight percent of load posted structures are structurally deficient, and 17% are functionally obsolete (Table 20).

LOAD POSTING, BRIDGE TYPE, AND DESIGN LOAD

Twenty-nine percent of structures posted for load were designed for AASHTO H15 live load or less (Table 21). The design load is not known for 57% of structures posted for load. The ten most numerous structure types, and load posted counts for

TABLE 11
LOAD POSTING AND LEVEL OF SERVICE

Item 5C Designated Level of Service	Structures	Posted for Load	% of Level of Service	% of Load Posted
None of the Below	60,629	5,164	8.5	8.5
Mainline	517,182	54,114	10.5	88.7
Alternate	7,250	872	12.0	1.4
Bypass	1,204	17	1.4	0.0
Spur	2,414	137	5.7	0.2
Business	2,548	180	7.1	0.3
Ramp, Wye, Connector, etc.	11,878	64	0.5	0.1
Service/Frontage Road	6,622	490	7.4	0.8

TABLE 12
LOAD POSTING AND ADT

Item 29 ADT	Structures	Posted for Load	% of Group	% of Load Posted
Fewer than 400	243,573	46,198	19.0	75.7
400 to 999	71,381	6,656	9.3	10.9
1,000 to 4,999	127,446	5,555	4.4	9.1
5,000 to 9,999	58,345	1,189	2.0	1.9
10,000 to 49,999	88,965	1,106	1.2	1.8
50,000 and Greater	18,319	77	0.4	0.1

ADT = average daily traffic.

TABLE 13
LOAD POSTING AND ADTT

ADTT (count)	Structures	Posted for Load	% of Group	% of Load Posted
0 or Not Reported	159,708	27,968	17.5	45.8
1 to 19	121,652	20,402	16.8	33.4
20 to 99	90,849	7,704	8.5	12.6
100 to 499	104,534	3,474	3.3	5.7
500 to 4,999	112,742	1,380	1.2	2.3
5,000 and More	20,390	110	0.5	0.2

ADTT = average daily truck traffic.

TABLE 14
LOAD POSTING AND YEAR BUILT

Item 27 Year Built	Structures	Posted for Load	% of Group	% of Load Posted
1697 to 1899	1,847	733	39.7	1.2
1900 to 1919	14,418	4,947	34.3	8.1
1920 to 1939	66,406	14,926	22.5	24.5
1940 to 1959	97,398	16,164	16.6	26.5
1960 to 1979	188,847	17,180	9.1	28.1
1980 to 1999	160,742	5,984	3.7	9.8
2000 to 2012	80,061	1,103	1.4	1.8

each, are shown in Table 22. The top ten counts of load posted bridges and culverts by structure type are shown in Table 23. More than 35% of bridges with fracture critical details are posted for load (Table 24).

Structures and load posted structures having design load equal to or less than H15 are listed by structure material in Table 25.

LOAD POSTING AND METHOD OF LOAD RATING

NBI uses 15 codes to identify methods of load rating. Of these, 12 codes indicate methods of computational structural analysis, one indicates load testing, and two indicate neither analysis nor testing. FE/EJ, NBI code 0, is a documented evaluation of safe load capacity (*6*). FE/EJ is used when design plans for structures are not available. No rating analysis, NBI code 5, is the absence of a load rating or of documentation of a load rating. More than 50% of load posted structures are load rated using the allowable stress method (Tables 26 and 27).

LOAD RATING METHOD—DETAILS ON BRIDGES AND CULVERTS

Ninety percent of bridges have load ratings determined by computation. Eighty-nine percent of bridges that are posted for load have load ratings determined by computation (Table 28). Less than 10% of bridges that have load ratings determined by FE/EJ, or by load tests, or that lack load rating analysis, are posted for load.

Fifty-two percent of culverts have load ratings determined by computation (Table 29). Seventy-nine percent of culverts that are posted for load have load ratings determined by computation.

LOAD POSTING AND OPERATING RATING

Fifty-four percent of bridges and culverts that are posted for load have an operating load rating of less than 50 kips, the gross vehicle weight (GVW) of the lightest truck among AASHTO legal load rating vehicles (*5*) (Table 30).

TABLE 15
LOAD POSTING AND HISTORICAL SIGNIFICANCE

Item 37 Historical Significance	Structures	Posted for Load	% of Group	% of Load Posted
On National Register of Historic Places	1,806	593	32.8	0.97
Eligible for National Register of Historic Places	4,258	1,269	29.8	2.1
On a State or Local Historic Register	15,223	5,165	33.9	8.5
Not Determinable	92,344	8,963	9.7	14.7
Not Eligible for National Register of Historic Places	496,075	45,048	9.1	73.8

TABLE 16
LOAD POSTING AND DECK CONDITION

Item 58 Deck Condition	Structures	Posted	% of Group	% of Load Posted
Good	387,001	35,272	9.1	61.0
Fair	59,745	15,736	26.3	27.2
Poor	22,960	6,780	29.5	11.7

TABLE 17
LOAD POSTING AND SUPERSTRUCTURE CONDITION

Item 59 Superstructure Condition	Structures	Posted	% of Group	% of Load Posted
Good	392,827	31,564	8.0	54.1
Fair	57,263	16,762	29.3	28.7
Poor	24,515	9,982	40.7	17.1

TABLE 18
LOAD POSTING AND SUBSTRUCTURE CONDITION

Item 60 Substructure Condition	Structures	Posted	% of Group	% of Load Posted
Good	381,562	26,706	7.0	45.8
Fair	61,217	17,056	27.9	29.3
Poor	31,897	14,537	45.6	24.9

TABLE 19
LOAD POSTING AND CULVERT CONDITION

Item 62 Culvert Condition	Structures	Posted	% of Group	% of Load Posted
Good	120,749	1,865	1.5	3.1
Fair	11,016	463	4.2	0.76
Poor	3,075	368	12.0	0.60

TABLE 20
LOAD POSTING AND STRUCTURE STATUS

Structure Status	Structures	Posted	% of Group	% of Load Posted
Structurally Deficient	65,599	29,005	44.2	47.5
Functionally Obsolete	76,316	10,353	13.6	17.0
Not Deficient, Not Obsolete	465,291	21,475	4.6	35.2
Not Applicable	2,522	205	8.1	0.3

TABLE 21
LOAD POSTING AND DESIGN LOAD

Item 31 Design Load	Structures	Posted for Load	% of Group	% of Load Posted
M9 or H10	12,179	5,740	47.1	9.4
M13.5 or H15	67,888	10,660	15.7	17.5
MS13.5 or HS15	11,175	1,022	9.1	1.7
M18 or H20	51,375	2,899	5.6	4.7
MS18 or HS20	248,108	5,327	2.1	8.7
MS18+Mod or HS20+Mod	69,032	594	0.9	1.0
Pedestrian	68	3	4.4	0.005
Railroad	169	9	5.3	0.015
MS22.5 or HS25	29,666	89	0.3	0.15
Other or Unknown	115,877	34,673	29.9	56.8

SUMMARY ON STATUS OF LOAD POSTING

NBI records were examined for the counts and distributions of load posted bridges and culverts. Ten percent of U.S. bridges and culverts are posted for load. On interstate routes, less than 1% of structures are posted for load. On state highways, 5% of structures are load posted. On roads owned by local governments, 16% of structures are posted for load.

Local governments own 82% of all U.S. structures posted for load, and state governments own 16%. The distribution of load posted structures among states is non-uniform. In 27% states, less than 1% of state-owned structures are posted for load.

Seventy-six percent of bridges and culverts posted for load have average daily traffic (ADT) of fewer than 400 vehicles, and 82% have average daily truck traffic (ADTT) of fewer than 100 trucks.

Thirty-three percent of historic structures are posted for load, and 40% of structures built before 1900 are load posted. Eighty-eight percent of load posted structures were built before 1980.

Load posting is more frequent among structures in poor general condition; however, structures in poor condition are not numerous. As a result, most load posted bridges are in good or fair general condition. Among load posted bridges, general conditions are fair or good for decks (88%), for superstructures (83%), or for substructures (75%).

Ninety-five percent of load posted structures are bridges, not culverts. Fifty-two percent of timber beam bridges are load posted, and timber beam bridges are 15% of all load posted structures.

The design live load is not known for 57% of load posted structures. Fifty-one percent of load posted structures have operating load ratings computed by the allowable stress method.

Ninety-three percent of load posted bridges and culverts have load ratings determined by computational methods.

TABLE 22
TEN MOST NUMEROUS STRUCTURE TYPES AND LOAD POSTING

Item 43 Structure Type, Main		Structures	Posted	% of Group	% of Load Posted
Steel	Stringer/multi-beam or girder	101,454	22,481	22.2	36.8
Concrete	Culvert, includes frame culvert	89,624	2,038	2.3	3.3
Prestressed Concrete	Stringer/multi-beam or girder	54,317	383	0.71	0.63
Steel Continuous	Stringer/multi-beam or girder	47,005	2,710	5.8	4.4
Prestressed Concrete	Box beam or girders—Multiple	40,686	710	1.7	1.2
Concrete	Slab	33,123	3,907	11.8	6.4
Concrete Continuous	Slab	31,940	1,489	4.7	2.4
Concrete Continuous	Culvert, includes frame culvert	27,795	215	0.77	0.35
Concrete	Tee beam	20,295	1,997	9.8	3.3
Wood or Timber	Stringer/multi-beam or girder	18,180	9,373	51.6	15.4

TABLE 23
MOST NUMEROUS POSTED STRUCTURES BY STRUCTURE TYPE

Item 43 Structure Type, Main		Structures	Posted	% of Group	% of Load Posted
Steel	Stringer/multi-beam or girder	101,454	22,481	22.2	36.8
Wood or Timber	Stringer/multi-beam or girder	18,180	9,373	51.6	15.4
Steel	Truss—Thru	9,396	4,927	52.4	8.1
Concrete	Slab	33,123	3,907	11.8	6.4
Steel Continuous	Stringer/multi-beam or girder	47,005	2,710	5.8	4.4
Concrete	Culvert (includes frame culvert)	89,624	2,038	2.3	3.3
Concrete	Tee beam	20,295	1,997	9.8	3.3
Steel	Girder and floor beam system	3,993	1,630	40.8	2.7
Concrete	Channel beam	12,748	1,576	12.4	2.6
Concrete Continuous	Slab	31,940	1,489	4.7	2.4

TABLE 24
LOAD POSTING AND FRACTURE CRITICAL DETAILS

Item 92A Fracture Critical Details	Structures	Posted	% of Group	% of Load Posted
Yes	20,828	7,440	35.7	12.2
No	588,892	53,597	9.1	87.8

TABLE 25
LOAD POSTING AND STRUCTURE MATERIAL FOR DESIGN LOAD H15 OR LOWER

Structure Material	Structures	Posted	% of Group	% of Load Posted
Design Load H15 or Lower				
Concrete	55,057	6,273	11.4	10.3
Prestressed Concrete	6,829	781	11.4	1.3
Steel	23,538	7,392	31.4	12.1
Timber	5,369	2,909	54.2	4.8
Masonry	370	39	10.5	0.1
Aluminum, Iron	56	26	46.4	0.0
Other	22	2	9.1	0.0

TABLE 26
LOAD POSTING AND METHOD USED TO DETERMINE OPERATING RATING

Item 63 Method Used to Determine Operating Rating	NBI Code	Structures	Posted	% of Group	% of Load Posted
Field evaluation and engineering judgment	0	14,294	340	2.4	0.6
Load Factor Rating (LFR)	1	320,833	24,346	7.6	39.9
Allowable Stress Rating (ASR)	2	162,510	31,397	19.3	51.4
Load and Resistance Factor Rating (LRFR)	3	9,934	586	5.9	1.0
Load testing	4	553	37	6.7	0.1
No rating analysis performed	5	95,876	4,109	4.3	6.7
LFR, rating factor, MS18 loading	6	293	1	0.3	0.0
ASR, rating factor, MS18 loading	7	10	0	0.0	0.0
LRFR, rating factor, HL93 loading	8	3,234	221	6.8	0.4
Assigned rating, Load Factor Design in metric tons	A	1,327	1	0.1	0.0
Assigned rating, Allowable Stress Design in metric tons	B	794	0	0.0	0.0
Assigned rating, Load and Resistance Factor Design in metric tons	C	18	0	0.0	0.0
Assigned rating, Load Factor Design, rating factor, MS18 loading	D	0	0	—	0.0
Assigned rating, Allowable Stress Design, rating factor, MS 18 loading	E	5	0	0.0	0.0
Assigned rating, Load and Resistance Factor Design, rating factor, HL93 loading	F	18	0	0.0	0.0

TABLE 27
LOAD POSTING AND METHOD USED TO DETERMINE INVENTORY RATING

Item 65 Method Used to Determine Inventory Rating	NBI Code	Structures	Posted	% of Group	% of Load Posted
Field evaluation and engineering judgment	0	14,250	341	2.4	0.6
Load Factor Rating (LFR)	1	320,969	24,355	7.6	39.9
Allowable Stress Rating (ASR)	2	162,694	31,420	19.3	51.5
Load and Resistance Factor rating (LRFR)	3	9,909	581	5.9	1.0
Load testing	4	555	41	7.4	0.1
No rating analysis performed	5	95,613	4,076	4.3	6.7
LF, rating factor, MS18 loading	6	291	1	0.3	0.0
AS, rating factor, MS18 loading	7	11	0	0.0	0.0
LRFR, rating factor, ML93 loading	8	3,237	222	6.9	0.4
Assigned rating, Load Factor Design in metric tons	A	1,327	1	0.1	0.0
Assigned rating, Allowable Stress Design in metric tons	B	794	0	0.0	0.0
Assigned rating, Load and Resistance Factor Design in metric tons	C	18	0	0.0	0.0
Assigned rating, Load Factor Design, rating factor, MS18 loading	D	0	0	—	0.0
Assigned rating, Allowable Stress Design, rating factor, MS18 loading	E	5	0	0.0	0.0
Assigned rating, Load and Resistance Factor Design, rating factor, HL93 loading	F	18	0	0.0	0.0

TABLE 28
LOAD POSTING AND METHOD USED TO DETERMINE OPERATING RATING—BRIDGES ONLY

Item 63 Method Used to Determine Operating Rating	NBI Code	Bridges	Posted for Load	% of Group	% of Posted Bridges
Load Rating Computation	1, 2, 3, 6, 7, 8, A, B, C, D, E, F	429,460	54,426	12.7	93.3
Field Evaluation and Engineering Judgment	0	3,684	285	7.7	0.5
No Rating Analysis Performed	5	41,254	3,594	8.7	6.2
Load Testing	4	464	34	7.3	0.1

TABLE 29
LOAD POSTING AND METHOD USED TO DETERMINE OPERATING RATING—CULVERTS ONLY

Item 63 Method Used to Determine Operating Rating	NBI Code	Culverts	Posted for Load	% of Group	% of Posted Culverts
Load Rating Computation	1, 2, 3, 6, 7, 8, A, B, C, D, E, F	69,509	2,123	3.1	78.7
Field Evaluation and Engineering Judgment	0	10,610	55	0.5	2.0
No Rating Analysis Performed	5	54,611	515	0.9	19.1
Load Testing	4	89	3	3.4	0.1

TABLE 30
LOAD POSTING AND OPERATING RATING

Operating Rating Minimum, kip	GVW Equivalent	Structures	Posted for Load	% of Group	% of Load Posted
Less than 6		2,668	2,043	76.6	3.3
6		15,314	13,673	89.3	22.4
30	H15	11,901	7,952	66.8	13.0
40	H20	16,304	9,014	55.3	14.8
50	Type 3	77,610	17,295	22.3	28.3
72	Type 3S2	27,641	3,172	11.5	5.2
80	Type 3-3	170,525	4,988	2.9	8.2
100 and Greater		276,570	2,739	1.0	4.5

Among structures with no load rating analysis or load rating by FE/EJ, 4% are posted for load.

ORGANIZATION OF THE SYNTHESIS REPORT

This report is presented as a summary, four chapters and two appendices, as follows:

Chapter One: Status of Bridge Posting for Load in the United States presents information from the NBI for reporting year 2012 (*1*) that identifies bridges and culverts that are posted for load, and shows the distributions of load posted structures among attributes such as owner, route system, structures type, and structure condition.

Chapter Two: Management of Load Posting of Bridges and Culverts reports state government authority to post structures for load, the role of state government in load posting of structures owned by local governments, load rating staff at departments of transportation (DOTs), use of safety inspections and general condition ratings in load posting, time intervals to identify and implement load postings, quality practices in load posting, signs for weight limits at posted structures, and fines for violation of weight limits.

Chapter Three: Methods of Evaluation of Weight Limits for Bridges and Culverts presents details on the legal loads, overweight permit loads, methods of load rating, load rating vehicles, and posting levels used by U.S. states. This chapter reports on research at states related to load posting.

Chapter Four: Conclusions and Needs for Further Research presents a brief summary of the synthesis report, notes the boundaries of information in the report and lists areas for additional work.

Definitions, Abbreviations, and Acronyms provides definitions of terms, and the meanings of abbreviations and acronyms used in this synthesis report.

References: A comprehensive listing of the references cited in the text.

Appendix A: Survey of States on Practices in Load Posting presents the questionnaire distributed to U.S. state DOTs and the responses from the states.

Appendix B: Detailed Information on Fines, Loads, and Vehicles contains tabulations of fines, legal loads, exempt loads, overweight permit loads, and rating vehicles collected from state law and state DOT publications.

CHAPTER TWO

MANAGEMENT OF LOAD POSTING OF BRIDGES AND CULVERTS

Chapter two reports on state government authority to post structures for load, the role of state government in load posting of structures owned by local governments, load rating staff at DOTs, use of safety inspections and general condition ratings in load posting, time intervals to identify and implement load postings, quality practices in load posting, signs for weight limits at posted structures, and fines for violation of weight limits.

The content of this chapter is summarized here:

Authority to Post for Load — State governments have the authority to post state-owned bridges and culverts for load. In general, local governments retain the authority to post their structures for load. In some states, the state DOT inspects, evaluates, and posts local government structures; in others, the state DOT can load post local government structures if the local government fails to implement needed posting.

State governments have the responsibility under federal regulation to ensure that all bridges and culverts, both state structures and local government structures, are inspected, load rated, and, if necessary, load posted. States often assist local governments in safety inspections and load ratings.

Load Rating Staff — Most states complete all or most evaluations of load ratings using DOT staff. States that use engineering consultants for load ratings perform quality reviews of consultants' work

Safety Inspections — Safety inspections can reveal changes to bridges and culverts that affect load capacity. Findings of inspections can prompt re-evaluation of load ratings with load posting among the possible outcomes.

Safety inspectors can recommend re-evaluation of load ratings. DOT load rating engineers can review inspection reports and re-evaluate load ratings as needed. Some DOTs have policies to re-evaluate load ratings when general condition ratings are low or have declined significantly.

Safety inspections provide quantitative data that are used in evaluations of load ratings. Data can include thicknesses of wearing courses on decks and dimensions of remaining sections of deteriorated components of structures.

Time Intervals — Time intervals for tasks in load posting vary from immediate action to restrict live loads when safety is impeached, to several weeks that state DOTs may allow local government bridge owners to implement load posting, to one year or more for verification of weight limit signs as a part of periodic safety inspections.

Statutory and regulatory time limits exist for actions by local governments and for updates to bridge databases when load rating or posting status changes. Policy limits on time exist at some DOTs for various branches to act on inspection findings that affect load ratings. In all states, there is prompt action for events and findings that affect the safety of structures.

Quality Practices — Quality control and assurance for load postings are achieved through quality programs for safety inspections and for load ratings. States use peer review of load rating computations, review of computer models and modeling assumptions, and hand computations to verify outputs of software applications for load rating.

Weight Limit Signs — Most states use U.S.DOT standard signs for weight limits at posted structures. Some states use additional, state-specific signs for weight limits.

Overweight Fines — The median fine for violation of weight limits is $0.20 per pound of excess weight. The range of fines is $0.01 per pound to $0.75 per pound. Most states have schedules of fines that impose greater fines for greater excess weight.

Information presented in chapters two and three was collected from a survey of states on load posting practices, state statutes, state administrative codes, and DOT publications such as bridge rating manuals, bridge inspection manuals, and trucker's handbooks. Where information from the survey is used, this is noted as "response to Survey" or as information from "Survey states."

Forty-three U.S. states responded to the survey. Where counts of states are reported for various aspects of load posting practice, these are the counts from the 43 survey states. In this synthesis report, New York State and its DOT are referred to simply as "New York." No information is presented from the New York City DOT. Washington State and its DOT are referred to as "Washington." This synthesis presents no information from the District of Columbia DOT. This report identifies U.S. government sources as "U.S.," "U.S.DOT," or "federal."

Details on practices from individual U.S. states are based on state publications and on longer responses to the questionnaire provided by some states. The selection of details follows the available information from states.

AUTHORITY TO POST FOR LOAD

Background

For state-owned bridges and culverts, the state DOT evaluates safe load capacities and determines needs to post structures for load. In 36 survey states, authority to post for load is held in the DOT central office by the state bridge load rater, state bridge engineer, DOT chief engineer, or DOT director (Table 31). In seven states, authority is held at the DOT district level or by other state official.

In 14 survey states, the authority of the state DOT extends to load posting of some structures owned by local governments (Table 32).

TABLE 32
SUMMARY—STATE'S SCOPE OF LOAD POSTING

Structures Posted by State DOT	States Count
All Structures	14
State-Owned Structures Only	29

Notes on State Authority in Posting Bridges and Culverts

In Alabama, the authority of the state DOT to post for load extends to any bridge or culvert that is built or maintained with state funds (*7*). In Florida, the state DOT can impose weight limits at local government structures if local governments fail to impose needed limits (*8*). Local governments in Florida have 30 days to act on inspection reports that recommend posting for load. In Illinois, the state DOT, acting at the request of a local authority or acting on its own, can determine and post weight limits on structures that are part of a mainline highway (*9*). The Maryland State Highway Administration is responsible for load posting of all structures (*10*). Missouri law allows cities or counties to delegate authority for load posting to the state (*11*).

TABLE 31
SUMMARY—STATE AUTHORITY TO POST FOR LOAD

Authority to Post	States Count
DOT Director/Secretary of Transportation	9
DOT Chief Engineer	6
State Bridge Engineer	15
State Bridge Load Rating Engineer	6
DOT District Engineer	5
Other	2

Missouri places the authority to post for load in a state Transportation Commission. Nebraska law designates the DOT director as the custodian of the state highway system, and vests the director with the authority to establish procedures for all design, construction, maintenance, and operation of highways and structures (*12*). State laws in New Hampshire (*13*) and in Nevada (*14*) place the authority to post weight limits with DOT directors.

Survey responses on the authority to post for load appear in Table A2.

LOAD RATING STAFF

Sixteen states use only DOT staff to evaluate load ratings, 18 states complete more than 50% of load ratings using DOT staff, and nine states use engineering consultants for most load ratings (Table 33).

Texas uses consultants for most load ratings, and uses state DOT staff to check all load ratings that result in recommendations to post for load. Idaho is using consultants at present (year 2013) to resolve a backlog of load ratings. By 2014, the Idaho Transportation Department will perform most load ratings with state employees. Idaho makes quality reviews of all load ratings by consultants.

Survey response on staff for load rating is listed in Table A3.

TABLE 33
SUMMARY—EXECUTION OF LOAD RATINGS

Load Rating Execution	States Count
State Performs All Load Ratings	16
State Performs Most Load Ratings	18
Consultants Perform 50% or More Load Ratings	9

USE OF SAFETY INSPECTIONS IN LOAD POSTING

Background

State DOTs review reports of safety inspections for changes at bridges and culverts that may affect load capacity. Changes include additions to dead weight, changes to condition, and critical findings. The use of inspection reports in decisions to re-evaluate load capacity of structures is shown in Table 34. In 28 states inspectors can recommend the re-evaluation of load ratings, in 11 states load rating staff review inspection reports, in 16 states an initial report of low general condi-tion rating can trigger a re-evaluation of load rating, and in 39 states report of a critical finding can trigger a re-evaluation of load rating.

Survey responses on the use of safety inspections in load posting are listed in Table A4. Response on use of critical findings is listed in Table A5.

Notes on States' Use of Bridge Safety Inspection Reports in Load Posting

In Arizona, inspection reports are checked in quality control, and the checker identifies issues in the report that may affect load capacity (*15*). Colorado re-evaluates load ratings for critical findings and uses inspection reports to verify the thickness of hot-mix bituminous pavement wearing surfaces on bridge decks; Colorado's inspection program manager requests re-evaluation of load ratings as needed (*16*). Delaware re-evaluates load ratings when section loss in members is reported (*17*). In Florida, DOT districts review each inspection report and determine whether current load ratings are consistent with newly reported conditions. Florida re-rates on critical findings, if findings affect load capacity (*18*).

Indiana relies on inspection team leaders to decide whether a re-evaluation of load rating is needed. Team leaders also track and verify the completion of computations by bridge load raters (*19*). In Louisiana, the load rating engineer reviews bridge files after every inspection and determines whether a new load rating analysis is required (*20*).

Maryland re-rates for all significant new deterioration and for critical findings in primary structural components. In Montana, bridge inspectors notify DOT district bridge inspection coordinators of damage or safety concerns (*21*). New York re-calculates an H20 operating rating for each bridge as part of biennial inspection. A low operating rating triggers a detailed review for (potential) load posting (*22*). Ohio's district bridge engineers request re-evaluation of load ratings. District engineers use Ohio's general appraisal ratings and reports of structural deficiencies in making requests (*23*).

Oregon reviews inspection reports for conditions of structures and for inspectors' comments that indicate potential changes to load capacity. A drop in condition rating of 2 or more for primary load carrying members triggers re-rating (*24*). Oregon uses queries to its bridge database to find poor conditions or changes to condition, and to alert the load rating staff. In Texas, professional engineers (PEs) review all reports of safety inspections and determine whether to re-evaluate load capacity.

Virginia requires that district bridge engineers determine the need for re-rating as part of routine safety inspections (*25*). The state responds to critical findings to ensure the safety of road users. This response can include re-rating of highway structures. Washington's Bridge Preservation Office examines bridge inspection reports and identifies bridges that must be re-rated for load (*26*). In Wisconsin, bridge inspectors can set a re-rate flag in the DOT's Highway Information System to schedule a load rating of a structure (*27*).

States' comments on use of safety inspection reports and responses to critical findings are noted in Table A5.

TABLE 34
SUMMARY—USE OF SAFETY INSPECTIONS IN LOAD POSTING

Safety Inspections and Load Posting	States Count
Inspectors Recommend Re-Rate	28
Load Raters Review Inspection Reports	11
Low General Condition Rating Triggers Review	16

USE OF GENERAL CONDITION RATINGS IN LOAD POSTING

Background

Low values of GCR indicate deterioration that may affect load capacity. Twenty-two states reported values of GCRs that trigger re-evaluation of load ratings. NBI GCR '4' is the most common value to prompt re-rating (Table 35). Sixteen states re-rate for a low deck condition rating, 21 for a low superstructure condition rating, 17 for a low substructure condition rating, 13 for a low culvert condition rating, and three for a low channel condition rating.

Survey responses on the use of NBI GCRs to re-evaluate load ratings for bridges and culverts are shown in Table A6.

Notes on General Condition Ratings and Re-evaluation of Load Ratings

Florida assumes that decks in poor condition are simple spans between girders and evaluates distribution factors for live load using this assumption (*18*). Illinois re-rates when NBI GCRs drop to 4 or lower (*29*).

Indiana requires that bridge inspectors notify load raters whenever NBI GCRs fall to 5 or below for primary load

TABLE 35
SUMMARY—GENERAL CONDITION RATINGS (GCR) AND RE-EVALUATION OF LOAD RATING

GCR Triggers Load Rating	States, Count					States (any component)
	Deck	Superstructure	Substructure	Channel	Culvert	
5	1	1	1	—	2	2
4	11	17	14	1	9	18
3	3	3	2	2	2	6
2	1	—	—	—	—	1
States (any GCR)	16	21	17	3	13	

carrying members (*19*). Louisiana requires consideration of load posting when the NBI GCR for primary load carrying members is 3 or below (*30*). Louisiana uses GCRs to set intervals for continuing re-evaluation of load ratings (*20*) (Table 36).

Nevada requires load rating of reinforced concrete girders and reinforced concrete pier caps when NBI GCRs are below 6. It uses reduced material properties in load rating computations for components with GCR lower than 6 (*31*).

New York identifies bridges for “R-Posting”; an exclusion of overweight permit loads when a primary member has a New York GCR of less than 4, or a deck has a New York GCR equal to 1. New York uses a 7-valued condition rating scale. Rating 7 is an as-new condition; rating 4 is deficient (*32*).

Oklahoma uses a four-value element-level condition rating scale. Element condition ‘1’ is good; element condition ‘4’ is poor. Load ratings are re-evaluated when condition ratings for deck, superstructure, or substructure drops to ‘4’ or drops by two or more rating points in a single inspection (*33*). Oklahoma’s electronic bridge inspection reports include a field that inspectors use to recommend re-evaluation of load ratings.

Utah re-rates bridges when the superstructure condition rating is 4 or lower, or when the superstructure condition rating drops by 2 or more (*34*). Washington uses a four-value element-level condition reporting scale (*26*). Element condition ‘1’ is good; element condition ‘4’ is poor. Re-rating is advised when conditions of primary load carrying elements drop from condition state 1 or 2 to condition state 3 or 4.

TABLE 36
LOUISIANA GENERAL CONDITION RATINGS AND INTERVALS FOR LOAD RATING

Lowest GCR	Re-Rating Interval, years
0–2	2
3–5	10
6–9	—

TIME INTERVALS FOR LOAD POSTING

Background

The time interval from an initial recommendation to consider load posting to the installation and verification of weight limit signs ranges from less than one week to more than one year (see Table A7). Recommendations for re-rating, and verification of weight limit signs are both part of routine safety inspections, and therefore the time interval for verification of signs can be linked to the interval for inspection. During the time from initial recommendation, to re-evaluation of load capacity, to a decision to post for load, DOTs review options for immediate repair, for exclusion of permit vehicles, or for load posting. States respond quickly to situations of severe damage to structures and to other events that could dangerously decrease load capacity. Responses of survey states on time intervals are noted in Table A8.

When load ratings are changed, federal regulation requires updates to bridge inventory records within 90 days for state-owned structures and within 180 days for local government structures (*35*). These limits appear in states’ policies for completion and reporting of load ratings (Table 37). State policies also set time limits on the state’s response to recommendations to post for load, and time limits on response by local governments to advice from the state to post structures for load.

Time intervals differ for state and locally owned structures. State DOTs act autonomously for load posting of state-owned structures. DOTs, in many states, lack authority to post local government structures. Instead, state DOTs notify local bridge owners of the need to re-evaluate load capacity or need to post for load. State DOTs can act only if, and only after, local owners fail to act.

Notes on Time Intervals

Florida has a statewide bridge database that contains load ratings and other bridge information. District quality control (QC) processes must track the date(s) when re-evaluation of load ratings of structures is (1) recommended and (2) completed.

TABLE 37
POLICIES ON TIME INTERVALS FOR LOAD RATING AND LOAD POSTING

State	Milestones			Bridges	Interval Days
Colorado (*16*)	Safety inspection[1]	to	Updated load rating[2]	State owned	90
Florida (*18*)	Safety inspection	to	Updated load rating	Simple bridges	60
	Safety inspection	to	Updated load rating	Complex bridges	90
	Updated load rating	to	Bridge database[3]	On system	90
	Updated load rating	to	Bridge database	Off system	180
Louisiana (*20*)	Updated load rating	to	Posting implementation[5]	State owned	30
Michigan (*36*)	Updated load rating	to	Posting implementation	State owned	90
	Updated load rating	to	Posting implementation	Locally owned	180
Minnesota (*37*)	Updated load rating	to	Posting implementation	All	30
Ohio (*38*)	Updated load rating	to	Bridge database	State owned	90
	Updated load rating	to	Bridge database	Locally owned	180
Oregon (*24*)	Updated load rating	to	Bridge database	State owned	90
	Updated load rating	to	Bridge database	Locally owned	180
Texas (*39*)	Notification to owner[4]	to	Posting implementation	State owned	90
	Notification to owner	to	Posting implementation	Locally owned	180
Washington (*26*)	Notification to owner	to	Posting implementation	All	60

Milestones:

[1] *Safety inspection*—Submission of signed inspection report containing a recommendation to re-rate or to post for load.

[2] *Updated load rating*—Completion of load rating computation with a finding to post for load.

[3] *Bridge database*—Data entry of new load rating values to bridge inventory file.

[4] *Notification to owner*—State's formal notice to a bridge owner that posting for load is required at a bridge.

[5] *Posting implementation*—Placement and verification of weight limit signs at bridges.

Louisiana's central office bridge design section advises DOT districts of the need to post structures for load. Districts must act on the advice within 30 days, and report on their actions to the bridge design section (*20*). New York reports that bridge condition and load path redundancy affect the urgency of evaluation for load posting. New York acts on posting within one day for the most urgent cases, and within 6 weeks for less urgent cases. Oregon completes implementation of load posting within 6 months of load rating. Virginia applies immediate restrictions on bridge live loads if changes to condition or dead weight are significant. The immediate restrictions can exclude overweight permit vehicles while evaluations for load posting are completed. In Wisconsin, the bridge load rating engineer makes immediate review of recommendations to re-evaluate load capacity, and determines a priority for each recommendation.

QUALITY PRACTICES IN LOAD POSTING

Quality practices in load posting include: (1) Detection of structures that should be re-rated, (2) confirmation of the accuracy of load rating computations, and (3) verification that load posting signs are installed. Quality practices for safety inspection programs address concerns in detection of structures to re-rate. Most states apply peer review for confirmation of load rating computations. Many states collect photographs of weight limit signs at structures as verification of load posting. Signs for weight limits are verified during routine safety inspections of structures.

States' quality practices for load posting were collected from the survey and from state bridge program manuals. The terms quality control (QC) and quality assurance (QA) are used as the individual states apply these terms. This synthesis report does not alter states' use of terms.

Load Rating Quality

Peer review of load ratings addresses the use of reports from safety inspections to determine dead loads and to identify and evaluate deteriorated components; formation of appropriate models for load rating analysis; and application of DOT policy for consideration of condition, load path redundancy, traffic levels and other aspects of structure type, condition or service that affect load ratings, and load postings.

Notes on States' Quality Practices

Arizona requires peer review of load rating computations (*15*). Both the load rater and the reviewer sign the load rating

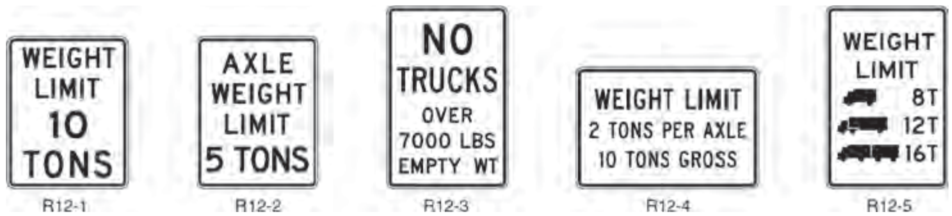


FIGURE 1 U.S.DOT weight limit signs (*47*).

report, which is reviewed by Arizona DOT's QA manager before final acceptance. Arizona uses Virtis (*40*) for most load rating analyses, and conducts independent checks using other rating or analysis software such as GT-Strudl (*41*), MDX (*42*), Simon, Conbox (*43*), or Conspan (*44*). Arizona uses reports from safety inspections in QC for load ratings. The load rater and load rating reviewer must each use the most recent inspection report.

Florida applies peer review to all load rating computations (*18*). Load raters are encouraged to perform hand calculations to verify results of computer programs for load rating. Florida conducts annual QA reviews of the load rating performance of DOT districts. Florida DOT districts implement QC plans that ensure that decisions to re-evaluate load ratings are addressed at every safety inspection. Districts have QC plans to manage load ratings by engineering consultants. QC plans set limits on the times for completion of load rating computations and for updates to Florida's bridge database. Florida's bridge database yields a Comprehensive Inventory Data Report that is used to approve and to route overweight permit loads.

Indiana applies peer review to load rating computations, and makes QA reviews of load ratings of samples of structures (*19*). Iowa makes peer review by PEs of all load ratings, and keeps records of peer review using a Load Rating Evaluation Form (*45*). New Mexico's QC procedure employs two load raters working independently (*46*). The outcomes for load ratings are compared. Load ratings are accepted if the independent evaluations are within 2% of each other. Failing that, details of rating computations and structural models are examined and differences are identified and resolved. The process continues until agreement within 2% is achieved. New Mexico checks samples of load ratings by engineering consultants. Consultants are notified of all errors, and must correct known errors and examine their procedures in the context of such errors.

Utah applies peer review of load rating computations and documents the review as part of the bridge file (*34*). Virginia uses peer review for QC of load ratings (*25*). QA in Virginia is the verification that QC has been performed. Virginia undertakes QA review of all load ratings submitted by local government bridge owners.

The state survey responses on quality practices in load posting are listed in Table A9.

WEIGHT LIMIT SIGNS

The U.S.DOT *Manual of Uniform Traffic Control Devices* includes five standard signs for weight restrictions on highway structures (*47*) (Figure 1): R12-1 GVW limit, R12-2 axle weight limit, R12-3 empty GVW limit, R12-4 axle load limit plus GVW limit, and R12-5 limits on GVW of single vehicles, tractor-semi-trailer combination vehicles, and truck-trailer combination vehicles (the silhouette sign).

Thirty-four survey states use the U.S.DOT R12-1 weight restriction sign and 27 the R12-5 silhouette sign. Several states use both. Fewer states use the U.S.DOT R12-2, R12-3, and R12-4 signs (Table 38). Survey responses on states' use of weight limit signs are listed in Table A10.

Notes on States' Signs for Weight Limits

Some states have signs that are modifications of U.S.DOT signs, as well as signs that are state-specific designs. The Illinois R12-I100 sign shows limits on GVW for single-unit vehicles, and for 4-axle and 5-axle combination vehicles (Figure 2). The Illinois' R12-I105 sign restricts bridge crossings to one truck at a time.

Missouri uses signs to restrict truck speed and travel lane in addition to GVW. New Hampshire's E-1 and E-2 excluded crossing signs prohibit crossing by some single-unit (E-1) and combination (E-2) vehicles. New Hampshire's caution crossing signs limit bridges to use by one truck at a time for single-unit vehicles (C-1), both single-unit and combination vehicles (C-2), and by combination vehicles only (C-3). Single-unit trucks are excluded from bridges restricted as C-3 crossings.

TABLE 38
SUMMARY—USE OF U.S.DOT SIGNS FOR WEIGHT LIMITS

U.S.DOT Standard Sign	States Using U.S.DOT Sign Count
R12-1	34
R12-2	8
R12-3	0
R12-4	1
R12-5	27

FIGURE 2 Illinois weight limit signs (*48*).

FIGURE 3 Nebraska weight limit signs (*49*).

Nebraska's R12-5a and R12-5b signs show limits specifically for loads on interstate highways (Figure 3). Nebraska's signs show limits for loads on single axles and tandem axles together with limits on GVW. Ohio's R12-5 sign shows truck silhouettes, load limits for each, and the distance in miles from the sign to the restricted bridge (*50*). Oregon's R12-4 signs shows limits for axle weights, tandem-axle weights, and GVW (Figure 4).

Texas' R12-2cT and R12-4aT signs include load limits for tandem axles (Figure 5). Texas' R12-6aT, R12-7aT, R12-6bT, and R12-7bT signs show limits for load-zoned routes and advise truckers of available detours. Texas' R12-8aT signs show limits on load for single axles, tandem axles, single-unit vehicles, and combination vehicles. Washington uses a modified version of the U.S.DOT R12-5 sign. Wisconsin's standard weight restriction sign shows a limit on GVW only.

FIGURE 4 Oregon weight limit sign (*51*).

Installation of Weight Limit Signs

In 24 survey states, central office staff of the DOT direct installation of weight limit signs at structures posted for load (Table 39). In 19 states, DOT staff in districts direct installation of signs. The presence and adequacy of weight limit signs are verified by bridge safety inspectors in 41 survey states (Table 40). Seven states use maintenance crews to verify weight limits signs. In five states, both safety inspections and maintenance crews verify weight limit signs. Survey responses on installation and verification of weight limit signs are listed in Tables A15 and A16.

Eight survey states post weight limit signs at weight-restricted bridges (Table 41). Weight-restricted bridges are open to legal loads, but not open to overweight permit loads. Oregon's sign for weight-restricted bridges states that loads are limited to legal loads. New York's sign notes the exclusion of trucks operating with overweight permits. Survey responses on the use of weight limit signs at weight-restricted bridges are listed in Table A17.

FINES FOR VIOLATION OF WEIGHT LIMITS

Fines for violations of weight limits range from $0.01 per pound to $0.75 per pound of excess weight. The median fine is $0.20 per pound. Many states impose increasing fines per pound for larger overweight violations. Some states have separate schedules for violations of limits on axle weights

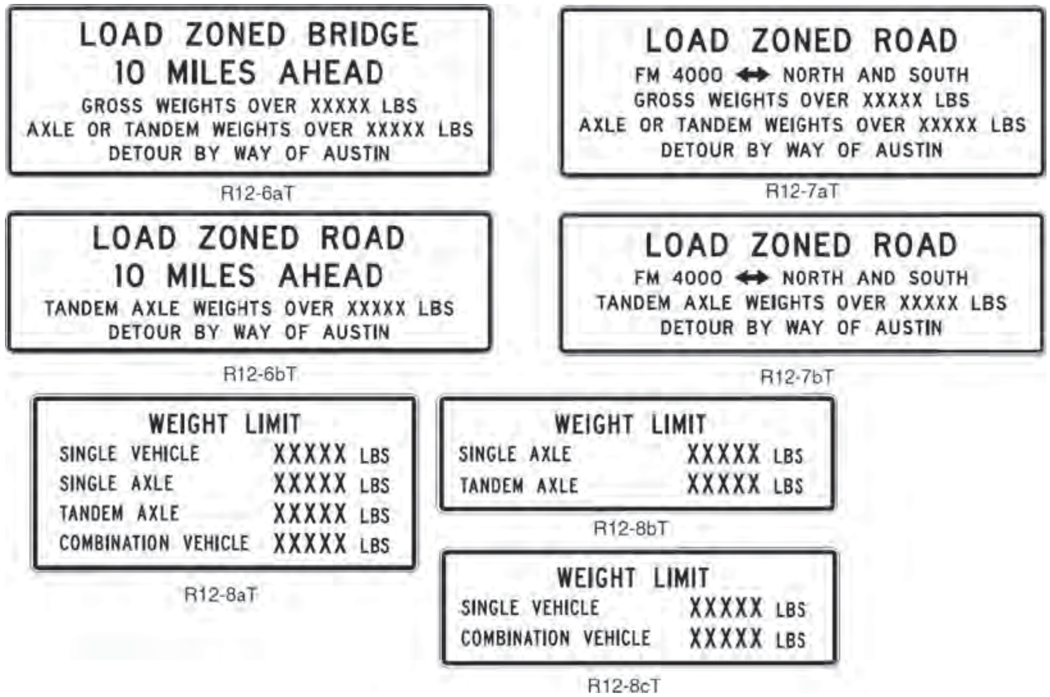


FIGURE 5 Texas weight limit signs (*52*). *Note:* "Load zoned" indicates limits on axle weight and GVW for some routes, usually county roads, to preserve pavements and structures that were designed for loads less than state legal loads.

TABLE 39
SUMMARY—INSTALLATION OF WEIGHT LIMIT SIGNS

DOT Staff Responsible for Installation of Weight Limit Signs	States Count
Central Office	24
District Office	19

TABLE 40
SUMMARY—VERIFICATION OF WEIGHT LIMIT SIGNS

Staff Verifying Weight Limit Signs	States Count
Safety Inspectors Only	36
Maintenance Crews Only	2
Both Safety Inspectors and Maintenance Crews	5

TABLE 41
SUMMARY—WEIGHT LIMIT SIGNS FOR PERMIT LOADS

Weight Limit Signs at Restricted Bridges	States Count
Yes	8
No	35

and for violation of limits on gross weights. Some states have separate schedules for specific commodities or for repeat offenses. Table 42 summarizes overweight fines among U.S. states. A detailed listing of fines for overweight violations can be found in Table B1.

Schedules for overweight fines run from 1,000 lb to as much as 50,000 lb. Schedules that run to 5,000 or to 10,000 lb are more common. Maine and New York have schedules of fines that express overweight violations as percentages of permissible weight.

STATE ROLE IN LOAD POSTING OF LOCAL GOVERNMENT STRUCTURES

Authority to Post Local Structures

Twenty-three survey states reported that authority to load post structures that are owned by local governments is shared between local governments and the state governments (Table 43). Twenty states reported that local governments alone hold load posting authority on local roads.

States have responsibility under federal regulation to report load ratings and load postings for bridges and culverts on public roads within their boundaries, excluding structures owned by the federal government (*35*). In consequence, state DOTs are informed on the conditions, load ratings, and load

TABLE 42
RANGE OF OVERWEIGHT FINES

State	Overweight Range, lb	Overweight Fine, $/lb	Note
Arizona (*53*)	1,000–5,000	0.10–0.29	
Colorado (*54*)	1,000–10,000	0.038–0.294	Fine + surcharge
Delaware (*55*)	to 5,000	0.023–0.0575	First offense
	over 5,000	0.0575–0.115	Second offense
Florida (*56*)	—	0.05	
Georgia (*57*)	—	0.05	
		0.0625	Overweight permit
Idaho (*58*)	1,000–20,000	0.005–0.03	
Illinois (*9*)	1,000–5,000	0.05–0.30	
	1,000–3,000	0.02–0.20	Axle, overweight permit
Indiana (*59*)	1,000–5,000	0.02–0.10	Typical, not mandated
Iowa (*60*)	1,000–20,000	0.012–0.10	Axle, tandem axle, axle group
Kansas (*61*)	1,000–7,500	0.04–0.10	GVW
Louisiana (*62*)	1,000–11,000	0.01–0.11	GVW
Maine (*63*)	1% to 40%	0.02–0.175	GVW, six axle combinations
	1% to 50%	0.0125–0.225	Axle, axle group, GVW
Maryland (*64*)	1,000–20,000	0.01–0.40	GVW
Massachusetts (*65*)	to 10,000	0.03	Massachusetts Turnpike
	over 10,000	0.06	
Michigan (*66*)	2,500–5,000	0.04–0.10	GVW
Minnesota (*67*)	1,000–7,000	0.01–0.20	GVW
Montana (*68*)	2,000–25,000	0.015–0.08	Axle, axle group
Nevada (*69*)	1,500–10,000	0.01–0.08	
New York (*70*)	2% to 40%		GVW
North Carolina (*71*)	1,000–5,000	0.06–0.10	Axle or tandem axle
	2,000–5,000	0.02–0.10	Axle group
North Dakota (*72*)	1,000–30,000	0.02–0.20	
Ohio (*73*)	2,000–10,000	0.04–0.16	
Oregon (*74*)	1,000–12,500	0.10–0.24	Schedule I
	100–10,000	0.10–0.30	Schedule II–Overweight permit
	5,000–10,000	0.20	Schedule III–Posted weight limit >10,000 lb is Class C misdemeanor

(*continued on next page*)

TABLE 42
(*continued*)

State	Overweight Range, lb	Overweight Fine, $/lb	Note
South Dakota (*75*)	1,000–10,000	0.05–0.75	
Texas (*76*)	5,000–10,000	0.03–0.10	Axle, tandem axle or GVW
		0.06–0.20	Second conviction in 12 months
Utah (*77*)	2,000–25,000	0.04–0.13	Axle
		0.02	GVW
Virginia (*78*)	2,000–12,000	0.01–0.35	Axle
		0.01–0.20	GVW
	4,000–12,000	0.01–0.30	Axle, forest or farm products
		0.05–0.15	GVW, forest or farm products
Washington (*79*)	4,000–20,000	0.03–0.30	
West Virginia (*80*)	1–50,000	0.006–0.04	
Wisconsin (*81*)	2,000–5,000	0.01–0.07	First conviction
		0.02–0.10	Second conviction in 12 months
		0.08–0.11	Raw forest products
	3,000–5,000	0.20–0.23	Third conviction in 12 months. Raw forest products

postings of locally owned structures. In many states, DOTs are involved in safety inspection programs for locally owned structures. Some states perform load rating computations for locally owned structures, which are shared with local governments. When actions such as load posting are needed, state governments advise and, if necessary, act in place of local governments.

Overall, there is a practice of deference by state government to local government bridge owners and, if response by local government is lacking, action by state government to post structures for load, to issue overweight permits, and generally to promote mobility and ensure safety on public roads in the state. Comments of survey states on the state role in lost posting of local government structures are listed in Table A19.

TABLE 43
SUMMARY—STATE ROLE IN LOAD POSTING OF LOCAL GOVERNMENT STRUCTURES

State DOT Posts Local Government Structures	States Count
State Computes All Load Ratings	3
By Route System	6
Local Government Delegates to State	3
Case-by-Case	11
No State Role	20

Notes on State Government Role in Load Posting for Locally Owned Bridges

Florida advises local owners of the need to post structures for load. If the owner does not respond within 30 days, the state of Florida will post structures for load (*18*). Georgia DOT undertakes safety inspections of all structures on public roads that are owned by state or local government. Georgia DOT does not inspect structures on privately owned roads (*82*). Georgia DOT advises local governments of the need to post structures for load, and provides local governments with findings of inspections and recommendations for maintenance.

Indiana requires local governments to perform load ratings, and QC of load ratings, and to post for load, if necessary. Local government owners must re-rate their structures when modification or deterioration requires (*19*). Louisiana requires that local governments set and enforce weight limits at their structures. The Louisiana State Maintenance Engineer audits performance of local governments in load rating and posting (*20*). Maine DOT inspects all structures on public roads, and maintains most structures in the state, including many structures on town ways. Towns maintain low-use bridges and redundant bridges (*83*). Maine DOT advises towns of the need to post town-maintained structures, when necessary.

Michigan allows local governments to post their structures for loads that are less than loads indicated by rating analysis. Michigan notes that lower postings can extend the service life of bridges (*84*). Minnesota places responsibility for load rating with local government bridge owners, and requires immediate posting for load, when needed, unless bridge owners undertake expedited repairs (*37*). Montana DOT inspects local government structures. Inspectors coordinate their visits with local bridge owners, so that local owners can participate. Montana notifies local bridge owners of problems found during inspection (*21*).

Ohio DOT inspects and evaluates structures having spans of 10 to 20 ft using the same methods required under U.S. national bridge inspection standards (NBIS) for structures with spans greater than 20 ft (*23*). Ohio law extends the requirement for inspection of short spans to local government bridge owners. State requirements for quality practices extend to load rating by local governments.

In Texas, counties can assign load limits to their structures only with the consent of the state DOT (*39*). The state DOT advises local governments of necessary postings for load and furnishes the weight limit signs.

In Utah, the State Bridge Operations Engineer advises local governments of necessary posting for load (*34*). Local governments must implement postings within 180 days. Posting for load may be rescinded if (1) repairs are made, (2) the local government submits updated load rating calculations to the State Bridge Operations Engineer, and (3) the State Bridge Operations Engineer approves the change. Virginia DOT maintains all interstate and primary routes in Virginia, as well as secondary roads in 90 of 92 counties (*85*).

Legal Loads for Local Government Structures

Thirty-one survey states reported that local governments can set limits for legal loads on their structures that are less than legal loads cited in state law. In five states, other coordination of legal loads exists between state and local governments (Table 44). States establish corridors for truck routes and allow trucks to travel short distances, often one mile or less, to access services on local roads. Local governments must allow trucks to use local roads to reach final points of the delivery of goods. States enjoin local governments from establishing load limits affecting roads that serve warehousing or manufacturing facilities, especially for facilities that are adjacent to truck routes (see Table A18).

Iowa DOT issues system-wide overweight permits that allow loads to travel on roads under state or local government jurisdiction (*86*).

TABLE 44
LOAD LEVELS SET BY LOCAL GOVERNMENTS FOR THEIR STRUCTURES

State	Local Post Lower?
Alabama	Yes
Alaska	No
Arizona	Yes
California	Yes
Colorado	Yes
Delaware	Other
Florida	Other
Georgia	
Hawaii	Yes
Idaho	
Illinois	Yes
Indiana	No
Iowa	No
Kansas	Yes
Kentucky	Yes
Louisiana	Yes
Maine	
Maryland	Yes
Massachusetts	Yes
Michigan	Yes
Minnesota	Yes
Mississippi	Yes

State	Local Post Lower?
Missouri	Yes
Montana	Yes
Nebraska	Yes
Nevada	Other
New Hampshire	Yes
New Mexico	Yes
New York	Yes
North Carolina	No
North Dakota	Yes
Ohio	Yes
Oklahoma	Yes
Oregon	Yes
South Dakota	Yes
Tennessee	Yes
Texas	Other
Utah	Other
Virginia	Yes
Washington	Yes
West Virginia	Yes
Wisconsin	Yes
Wyoming	Yes

SUMMARY

State DOTs can post state-owned bridges and culverts for load. In 36 survey states, load posting decisions are made in the DOT central office. In most states, local governments have the authority to post the structures owned by local governments. In all states, state governments have the responsibility to ensure that all structures, state-owned and local government owned, are inspected, evaluated, and posted in conformance with federal regulation.

Among survey states, Georgia, Maine, Maryland, Montana, and Virginia inspect all or most bridges and culverts owned by local governments, and advise local governments on maintenance and load posting. Twenty-three survey states reported some extent of authority or participation by state DOTs in load posting of local government structures.

Thirty-four survey states perform all or most load rating evaluations using DOT staff. In 28 states, load ratings are re-evaluated on the recommendation of safety inspectors. Sixteen survey states re-evaluate load ratings when low GCRs are reported.

Time intervals for tasks in load posting vary. Actions are taken immediately to ensure the safety of structures. Federal regulation, state statutes, and DOT policies set limits on time intervals for updating load ratings in bridge databases, for coordination among DOT branches in the course of load rating and posting, for response by local governments to states' advice to post for load, and for verification of weight limit signs at structures.

QC and QA practices for safety inspections and for load rating support the quality needs in load posting. States use reviews of safety inspections, peer review of load rating models and computations, and field verification of weight limit signs to ensure that load postings are properly evaluated and implemented.

Thirty-four survey states use the U.S.DOT standard R12-1 sign to post GVW limits at load posted structures. Twenty-seven survey states use the U.S.DOT standard R12-5 sign to post GVW limits at posted structures for single-unit vehicles, tractor plus semi-trailer combination vehicles, and truck-trailer combination vehicles. States also use state-specific signs for weight limits. Eight survey states post weight limit signs to exclude overweight permit vehicles at structures that have adequate strength for legal loads.

Fines for violations of weight limits range from $0.01 per pound to $0.75 per pound of excess weight. The median fine is $0.20 per pound. Many states impose increasing fines per pound for larger overweight violations.

CHAPTER THREE

METHODS OF EVALUATION OF WEIGHT LIMITS FOR BRIDGES AND CULVERTS

Chapter three presents details on the legal loads, overweight permit loads, methods of load rating, load rating vehicles, and posting levels used by U.S. states. It reports on research in states related to load posting.

There are limits in law and in regulation on the weights of vehicles that can cross highway bridges and culverts. Bridges and culverts are posted for load when safe load capacity is less than legal loads and routine permit loads.

Legal Loads Legal loads are established in federal regulation, in state law, and in local law. Federal regulation of loads applies to interstate highways, state law to other highways generally, and local law to roads owned by local government. Load limits for highway bridges and culverts are expressed as limits on axle loads, on tandem-axle loads, and vehicle gross weights. Federal limits, apart from exclusions and exemptions, are 20,000 lb for single axles, 34,000 for tandem axles, and 80,000 for GVW. Legal loads in 32 states exceed one or more of the limits set in federal regulation. Information on legal loads is presented for 50 U.S. states.

Overweight Permit Loads Vehicles that exceed load limits in federal regulation or in state law routinely travel on highways. This includes vehicles protected by grandfather provisions in federal regulation, longer combination vehicles named as exceptions in federal regulation, vehicles exempt from state law for specific commodities or specific uses, and vehicles that qualify for overweight permits. Information on overweight permit loads is presented for 43 survey states.

Load Rating Methods States evaluate their bridges and culverts for capacity to carry legal vehicles, exempt vehicles, and overweight permit vehicles. Load ratings, the numerical outcomes of evaluations, indicate whether posting for load are needed. All states apply computational structural analysis in load ratings. Approximate structural analysis using live load distribution factors is the most common approach. Refined methods of structural analysis using three-dimensional models of structures are used for complex bridges and for structures that might be posted for load if approximate analysis alone is used.

Load ratings are set using allowable stress basis, load factor basis, or load and resistance factor basis. These bases follow from methods for design of bridges and culverts.

Weight Limits for Load Posting Weight limits for load posted structures are set at or below operating ratings; the estimates of maximum single vehicle loads that structures can carry without damage. Some states post structures at loads less than operating ratings if structural condition is poor. Specific weight limits for posted structures can depend on structure condition, ADT, detour length, load path redundancy, and the level of enforcement of weight limits.

Components to Rate for Load Evaluations of safe load capacity of structure always include superstructure components, and may include bridge decks and substructures depending on conditions of decks and substructures, and on the consequence that could follow from overload of these components.

Load Rating Vehicles Computational methods for load rating use numerical descriptions of vehicles. These rating vehicles are expressed as counts, spacings, and weights of axles. Thirty-three survey states use AASHTO vehicles in load rating. Thirty-two survey states define additional rating vehicles for legal loads.

Condition of Components Deterioration in components of structures is included in computations for load rating through field measurement of remaining sections (41 survey states), and through AASHTO's condition factor, φ_C (18 survey states).

Research in Load Posting Current research related to load posting includes use of weigh-in-motion (WIM) data to characterize truck loads and to evaluate multiple presence factors, calibration of refined models for structural analysis, development of load rating methods for complex bridges, and evaluation of load effects of special vehicles on bridges.

LEGAL LOADS

For interstate routes, U.S. Code Title 23 (*87*) sets limits on axle load, tandem-axle load, and GVW. The general limits in Title 23 are 20,000 lb for single-axle load, 34,000 lb for tandem-axle load, and 80,000 lb for GVW. In addition, combined weight W of axle groups must not exceed limits in pounds related to the number of axles N and the wheelbase of the outermost axles L in feet. This is the federal bridge gross weight formula.

$$W = 500\left(\frac{LN}{N-1} + 12N + 36\right) \quad (1)$$

Title 23 admits exceptions to the general limits on load. States' legal loads that were in effect on July 1, 1956, remain legal today under a grandfathering provision. Other exceptions have been written into Title 23. Among these are exceptions for loads traveling on designated route segments, and exceptions for longer combination vehicles (LCVs). Title 23 lists LCV exceptions for 22 states. Weights of LCVs range from 86,400 lb to 164,000 lb (Table 45). LCV exceptions are: (1) legal under federal regulation for operation on interstate highways; (2) state-specific; and (3) subject to state law on vehicle weight and dimensions. In 18 of 22 states, the LCVs listed in Title 23 require state-issued overweight or over-dimension permits.

States establish load limits for single axles, tandem axles, and GVW. States generally adopt the limits set in USC Title 23 for interstate highways, including grandfathered provisions and exceptions for weight limits for some vehicles or route segments. Some states set other, higher limits for non-interstate highways such as U.S.-numbered routes and state highways. Separate still are roads owned and maintained by counties, cities, and other local governments. These governments can set their own limits on load.

States' legal axle loads, tandem-axle loads, and GVW are collected from state statutes, state administrative codes, and from a U.S.DOT study of truck size and weight (*88*). These are the legal loads for non-interstate highways. Bridges and culverts are posted when load capacity is not adequate for these legal loads.

States' Legal Single-Axle Loads

Thirty-six of 50 states set limits for axle load at 20,000 lb, the limit set in USC Title 23 (Table 46). Fourteen states set higher limits on axle load, with the highest being 24,000 lb. No state sets the limit on single-axle load less than 20,000 lb.

States' Legal Tandem-Axle Loads

Thirty-three of 50 states set limits for load on tandem axles equal to 34,000 lb, the limit set in USC Title 23 (Table 47). Seventeen states set higher limits for tandem-axle load. The highest limit is 48,000 lb. No state sets limits below 34,000 lb for tandem axles.

TABLE 45
USC TITLE 23 WEIGHT EXCEPTIONS FOR LCVs

State	GVW, lb	Permit Required	State	GVW, lb	Permit Required
Arizona	129,000	Y	Nevada	129,000	Y
Colorado	110,000	Y	New Mexico	86,400	N
Idaho	105,500	Y	New York	143,000	Y
Indiana	127,400	Y[1]	North Dakota	105,500	Y
Iowa[2]	129,000	N	Ohio	127,400	Y
Kansas	120,000	N[3]	Oklahoma	90,000	Y
Massachusetts	127,400	Y	Oregon	105,500	Y
Michigan	164,000	N	South Dakota	129,000	Y
Missouri	120,000	Y	Utah	129,000	Y
Montana	137,800	Y	Washington	105,500	Y
Nebraska	95,000	Y	Wyoming	117,000	N

[1]Indiana DOT furnishes free annual tandem-trailer permits.

[2]Restricted to portions of I-29 and I-129 within corporate limits of Sioux City, Iowa.

[3]Permit not required for travel on Kansas Turnpike. Permit is needed to reach some motor freight terminals in Kansas.

TABLE 46
LEGAL SINGLE AXLE LOADS, NON-INTERSTATE HIGHWAYS

State	Axle Load, k		State	Axle Load, k		State	Axle Load, k	
Alabama	20	(*7*)	Louisiana	20	(*96*)	Ohio	20	(*73*)
Alaska	20	(*89*)	Maine	22.4	(*63*)	Oklahoma	20	(*107*)
Arizona	20	(*53*)	Maryland	22.4	(*10*)	Oregon	20	(*74*)
Arkansas	20	(*88*)	Massachusetts	24	(*97*)	Pennsylvania	22.4	(*108*)
California	20	(*90*)	Michigan	20	(*98*)	Rhode Island	22.4	(*88*)
Colorado	20	(*54*)	Minnesota	20	(*99*)	South Carolina	20	(*88*)
Connecticut	22.4	(*88*)	Mississippi	20	(*100*)	South Dakota	20	(*75*)
Delaware	22.4	(*55*)	Missouri	20	(*101*)	Tennessee	20	(*109*)
Florida	20	(*91*)	Montana	20	(*102*)	Texas	20	(*76*)
Georgia	18	(*57*)	Nebraska	20	(*103*)	Utah	20	(*77*)
Hawaii	22.5	(*92*)	Nevada	20	(*104*)	Vermont	22.4	(*88*)
Idaho	20	(*58*)	New Hampshire	20	(*13*)	Virginia	20	(*78*)
Illinois	20	(*9*)	New Jersey	22.4	(*88*)	Washington	20	(*79*)
Indiana	20	(*93*)	New Mexico	21.6	(*105*)	West Virginia	20	(*110*)
Iowa	20	(*60*)	New York	22.4	(*70*)	Wisconsin	20	(*81*)
Kansas	20	(*94*)	North Carolina	21	(*106*)	Wyoming	20	(*111*)
Kentucky	20	(*95*)	North Dakota	20	(*72*)			

TABLE 47
LEGAL TANDEM AXLE LOADS, NON-INTERSTATE HIGHWAYS

State	Tandem Axle, k		State	Tandem Axle, k		State	Tandem Axle, k	
Alabama	34	(*7*)	Louisiana	34	(*96*)	Ohio	34	(*73*)
Alaska	38[d]	(*89*)	Maine	41[b]	(*63*)	Oklahoma	40	(*107*)
Arizona	34	(*53*)	Maryland	34	(*10*)	Oregon	34	(*74*)
Arkansas	34	(*88*)	Massachusetts	34	(*97*)	Pennsylvania	40.4[e]	(*108*)
California	34	(*90*)	Michigan	34	(*98*)	Rhode Island	36[b]	(*114*)
Colorado	40[a]	(*54*)	Minnesota	34	(*99*)	South Carolina	36[b]	(*115*)
Connecticut	36[e]	(*88*)	Mississippi	34	(*100*)	South Dakota	34	(*75*)
Delaware	40[b]	(*55*)	Missouri	34	(*101*)	Tennessee	34	(*109*)
Florida	34	(*91*)	Montana	34	(*102*)	Texas	34	(*76*)
Georgia	40.68[b]	(*57*)	Nebraska	34	(*103*)	Utah	34	(*77*)
Hawaii	34	(*92*)	Nevada	34	(*113*)	Vermont	36[a]	(*116*)
Idaho	34	(*58*)	New Hampshire	36[b]	(*13*)	Virginia	34	(*78*)
Illinois	34	(*9*)	New Jersey	34	(*88*)	Washington	34	(*79*)
Indiana	34	(*93*)	New Mexico	37.44[f]	(*105*)	West Virginia	34	(*117*)
Iowa	34	(*112*)	New York	34	(*70*)	Wisconsin	34	(*81*)
Kansas	34	(*94*)	North Carolina	38[b]	(*106*)	Wyoming	36[c]	(*111*)
Kentucky	34	(*95*)	North Dakota	48[c]	(*72*)			

[a]Axle spacing not specified.

[b]Axle spacing 3’-4” minimum.

[c]Axle spacing greater than 3’-4”.

[d]Axle spacing 3’-6” minimum.

[e]Axle spacing 6’ minimum.

[f]Axle spacing 8’ minimum.

TABLE 48
LEGAL GVW LOADS, NON-INTERSTATE HIGHWAYS

State	GVW, kips		State	GVW, kips		State	GVW, kips	
Alabama	80	(*7*)	Louisiana	88	(*96*)	Ohio	80	(*73*)
Alaska	90	(*88*)	Maine	100	(*63*)	Oklahoma	90	(*121*)
Arizona	80	(*53*)	Maryland	80	(*10*)	Oregon	80	(*74*)
Arkansas	80	(*88*)	Massachusetts	80	(*97*)	Pennsylvania	80	(*108*)
California	80	(*90*)	Michigan	164	(*119*)	Rhode Island	80	(*88*)
Colorado	85	(*54*)	Minnesota	80	(*99*)	South Carolina	80	(*88*)
Connecticut	80	(*88*)	Mississippi	80	(*100*)	South Dakota	155.5	(*122*)
Delaware	80	(*55*)	Missouri	80	(*101*)	Tennessee	80	(*109*)
Florida	80	(*91*)	Montana	137.8	(*120*)	Texas	80	(*76*)
Georgia	80	(*57*)	Nebraska	95	(*103*)	Utah	80	(*77*)
Hawaii	88	(*92*)	Nevada	129	(*113*)	Vermont	80	(*88*)
Idaho	129	(*118*)	New Hampshire	80	(*13*)	Virginia	80	(*78*)
Illinois	80	(*9*)	New Jersey	80	(*88*)	Washington	115	(*79*)
Indiana	80	(*93*)	New Mexico	86.4	(*105*)	West Virginia	80	(*110*)
Iowa	96	(*112*)	New York	80	(*70*)	Wisconsin	80	(*81*)
Kansas	85.5	(*94*)	North Carolina	80	(*106*)	Wyoming	117	(*111*)
Kentucky	80	(*95*)	North Dakota	105.5	(*72*)			

States' Legal Gross Vehicles Weights

Thirty-two states set limits for GVW equal to 80,000 lb, the limit set in USC Title 23 (Table 48). Nine states set GVW limits greater than 100,000 lb. The greatest limit is 164,000 lb. No state set a limit for GVW of less than 80,000 lb.

States' Legal Loads—Bridge Formulas

States set limits on GVW in relation to axle count and wheelbase using the federal bridge formula or using state-specific bridge formulas (Table 49). State-specific formulas are compared with the federal formula in Table 50. All state-specific bridge formulas allow greater GVW than the federal bridge formula.

Exempt Vehicles

States exempt specific vehicles from some limits on load. Vehicles are exempt for specific uses, specific commodities, or specific owners. Exempt uses include off-road equipment for construction or for husbandry. Exempt commodities include agricultural products, raw forest products, refuse, construction materials, and products used for manufacture such as steel coil or ingot. Also exempt are manufactured items such as machinery, equipment, boats, and prefabricated homes that, as part of

TABLE 49
STATES' BRIDGE FORMULAS

State	GVW Formula	Note	
California (*123*)	$W = 1.5(700)(L + 40) + 7000$	Truck cranes, Purple route	
	$W = 1.3(700)(L + 40) + 6000$	Truck cranes, Green route	
Colorado (*54*)	$W = 1000\,(L + 40)$	85,000 lb max.	
Hawaii (*92*)	$W = 900(L + 40)$	non-interstate, 88,000 lb max.	
New York (*70*)	$W = 34{,}000 + (1000\,L)$	71,000 lb max.	
Washington (*79*)	$W = 6500 \times L$	7 ft ≤ wheelbase < 10 ft	105,500 lb max.
	$W = 2200 \times (20 + L)$	10 ft ≤ wheelbase < 30 ft	105,500 lb max.
	$W = 1600\,lbs \times (40 + L)$	wheelbase ≥ 30 ft	105,500 lb max.

W = Gross vehicle weight in pounds.
L = Wheelbase in feet.
N = Count of axles.

TABLE 50
COMPARISON OF BRIDGE FORMULAS

Formula	Axles	Wheelbase, ft	GVW, LB
USC Title 23	4	57	80,000
California Purple Route			108,850
California Green Route			94,270
Colorado			97,000
Hawaii			87,300
New York			91,000
Washington			105,500

their production, must be moved among sites. Exempt owners are public utilities and government agencies such as fire departments. Table 51 lists categories of exempt vehicles and loads. The terms used in "Examples" are taken from state statutes. Many terms overlap. Similar but non-identical terms are kept to show the variations among statutes.

Table 52 lists exemptions for axle load greater than 20,000 lb. The greatest exempt axle load is 32,000 lb. Table 53 lists exemptions for tandem-axle load greater than 34,000 lb. The greatest exempt tandem-axle load is 50,000 lb. Table 54 lists exemptions for GVW greater than 80,000 lb. The greatest exempt GVW is 99,000 lb.

A detailed list of exempt vehicles and loads is in Table B3.

TABLE 51
SUMMARY—EXEMPT VEHICLES

Exempt Vehicles		States
Group	Examples	
Agriculture	Agricultural equipment, agricultural products, animal waste, bulk milk, chile pepper modules, cotton harvest, cotton modules, cotton seed or equipment, crops, dairy products/supplies, farm implements, fertilizer, fuel, live poultry, livestock, meats, pesticides, rendering materials, seeds, water	Alabama, California, Delaware, Georgia, Idaho, Illinois, Indiana, Iowa, Louisiana, Maine, Minnesota, Mississippi, Montana, North Carolina, North Dakota, Oklahoma, Oregon, South Dakota, Tennessee, Texas, Utah, Washington, Wisconsin, Wyoming
Construction	Cranes, concrete, concrete pump truck, concrete products, concrete ready-mix truck, dump trucks, unhardened ready-mix concrete, highway construction and maintenance equipment, highway improvement vehicles	Alabama, California, Florida, Georgia, Illinois, Iowa, Louisiana, Maine, Maryland, Mississippi, North Carolina, Texas, Utah, Washington
Fire Fighting	Fire department vehicle, firefighting apparatus	Delaware, Iowa, Maine, North Carolina, Texas, Utah, Washington
Forest Products	Bark, Christmas trees, knuckle boom log loaders, logs, log haulers, lumber, piling, poles, pulpwood, sawdust, sawn logs, stull, timber, tree-length poles, vehicles transporting logs or poles from forest to sawmill, wood chips, wood residuals	California, Georgia, Idaho, Indiana, Louisiana, Maine, Michigan, Minnesota, Mississippi, Montana, North Carolina, Oklahoma, South Dakota, Tennessee, Texas, Utah, Wisconsin, Wyoming
Materials	Aggregates, asphalt millings, bulk liquid commodities, bulk rock, bulk soil, concentrates (ores), ores, sand, scrap metal	Georgia, Idaho, Louisiana, Maine, North Carolina, Oklahoma, Tennessee, Wisconsin, Wyoming
Misc.	Bus, public utility truck, seagoing container, state- or municipally owned vehicle, utility truck	California, Colorado, Illinois, Iowa, Maine, Maryland, Minnesota, New York, Oklahoma
Refuse	Garbage hauler, garbage operations, garbage trucks, recyclable materials, recycling operations, refuse operations, septage, solid waste	California, Georgia, Illinois, Indiana, Maine, Mississippi, North Carolina, Oklahoma, Oregon, Tennessee, Texas, Washington, Wisconsin
Towing	Towing, tow trucks, towing vehicles under emergency conditions	Illinois, Utah, Washington

TABLE 52
EXEMPT VEHICLES—AXLE LOAD GREATER THAN 20,000 POUNDS

State	Configuration	Load (lb)
Colorado (*54*)	Utility truck	21,000
Georgia (*57*)	Live poultry, cotton, feed, poultry waste, construction aggregates, unhardened concrete, forest products, granite, raw ore or mineral, solid waste or recovered materials	23,000
Illinois (*9*)	Rendering materials, garbage, refuse, or recycling operations	22,000
Indiana (*93*)	Garbage truck	24,000
Iowa (*60*)	Fence-line feeder, grain cart, or tank wagon,	28,000
Maine (*63*)	Dump trucks, concrete ready-mix trucks, raw ore, refrigerated products	24,200
Maryland (*10*)	Seagoing container	22,400
Nevada (*104*)	Mass transit	25,000
New York (*70*)	State- or municipally owned vehicle	32,000
North Carolina (*106*)	Agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock or live poultry, unhardened ready-mixed concrete, forest products, wood residuals, raw logs, Christmas trees, firefighting apparatus, bulk soil, bulk rock, sand, sand rock, or asphalt millings	22,000
	Garbage hauler	23,500
	5+ axles, agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock or live poultry, forest products, wood residuals, raw logs, Christmas trees	26,000
North Dakota (*72*)	Agricultural equipment	22,000
Oregon (*74*)	Garbage or refuse operations	22,000
Tennessee (*109*)	Farm trucks and machinery, logging, sand, coal, clay, shale, phosphate, solid waste, recovered materials	22,000
Texas (*76*)	Transporting recyclable materials	21,000
	Concrete ready-mix truck, concrete pump truck	23,000
Washington (*79*)	Firefighting apparatus	24,000
Wisconsin (*81*)	Dairy products/supplies	21,000

OVERWEIGHT PERMIT LOADS

States issue overweight permits for some vehicles that exceed legal limits on axle load, tandem-axle load, or GVW. USC Title 23 restricts states' issuance of overweight permits for travel on interstate highways. States can issue overweight permits for non-divisible loads and for specific LCVs named in Title 23. Title 23 does not constrain issuance of overweight permits for travel on non-interstate highways.

For truckers, states publish guidance on the overweight permits that are available. State publications show loads and vehicle configurations as the counts, weights, and spacings of axles that qualify for permits. States have evaluated their bridges and culverts for these published configurations of overweight vehicles. This is an application of load rating. States identify routes that are able to carry overweight vehicles, and direct permit holders to use these routes. State inventories of bridges and culverts are seen to have three classes of structures; structures that can carry permitted overweight vehicles, structures that can carry legal loads only, and structures, posted for load, that cannot carry full legal loads.

Overweight permits can allow single trips or multiple trips by overweight vehicles. Routine permits are multi-trip permits. Routine permits are also called annual permits, blanket permits, extended trip permits, and continuous trip permits. Routine permits allow overweight vehicles to mix in normal traffic and travel at normal speeds. Permits are limited to designated routes, and may be restricted in their hours of operation or excluded from travel on certain days (e.g., federal holidays).

Overweight permits and the permitting procedures of states provide higher levels of scrutiny and control of overweight

TABLE 53
EXEMPT VEHICLES—TANDEM AXLE LOAD GREATER THAN 34,000 POUNDS

State	Configuration	Load (lb)
Georgia (*57*)	Live poultry, cotton, feed, poultry waste, unhardened concrete, construction aggregates, forest, granite, raw ore or mineral products, solid waste or recovered materials	46,000
Idaho (*58*)	Unprocessed agricultural products including livestock, logs, pulpwood, stull, poles or piling, ores, concentrates, sand and gravel, aggregates	37,800
Illinois (*9*)	Collection of rendering materials	40,000
Indiana (*93*)	Garbage truck	42,000
Maine (*63*)	Dump trucks, concrete ready-mix trucks, raw ore, refrigerated products	46,000
Maryland (*10*)	Seagoing container	44,000
Nevada (*104*)	Refuse	40,000
New York (*70*)	State- or municipally owned vehicle	42,000
North Carolina (*106*)	Agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock or live poultry, firefighting apparatus, forest products, wood residuals, raw logs, Christmas trees, bulk soil, bulk rock, sand, sand rock, or asphalt millings	42,000
	5+ axles, agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock, or live poultry, forest products, wood residuals, raw logs, Christmas trees	44,000
	Unhardened ready-mixed concrete	46,000
	Cotton seed	50,000
Oregon (*74*)	Farm vehicle, 10-ft wheelbase	37,800
Tennessee (*109*)	Farm trucks and machinery, logging, sand, coal, clay, shale, phosphate, solid waste, recovered materials	37,400
Texas (*76*)	Transporting recyclable materials	44,000
	Concrete ready-mix truck, concrete pump truck	46,000
Utah (*124*)	Hauling livestock or grain, GVW ≤ 80,000 lb	36,000
Washington (*79*)	Firefighting apparatus	43,000
Wisconsin (*81*)	Dairy products/supplies, forest products, scrap metal, septage	37,000

TABLE 54
EXEMPT VEHICLES—GVW GREATER THAN 80,000 POUNDS

State	Configuration	Load (lb)
Iowa (*60*)	Implement of husbandry	96,000
Maine (*149*)	Unprocessed milk, farm produce, dump trucks, ready-mix trucks, concrete products, building materials, forest products, raw ore, rock, soil, road salt, refrigerated products, incinerator ash, solid waste	100,000
Maryland (*10*)	6 axle, Garrett County	87,000
	Seagoing container	90,000
Minnesota (*99*)	Hauling livestock	88,000
	Forest products	99,000
North Carolina (*106*)	5+ axles, agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock or live poultry, firefighting apparatus, forest products, wood residuals, raw logs, Christmas trees	90,000
Oklahoma (*121*)	Utility vehicle, 5 axles	85,500
	Agricultural commodities, utility vehicle—6 axles, refuse—6 axles	90,000
Tennessee (*109*)	Farm trucks and machinery logging, sand, coal, clay, shale, phosphate, solid waste, recovered materials	88,000

vehicles as compared with legal loads. The state, through its DOT, examines load capacities of structures, and relates structures and routes to configurations of overweight vehicles.

Information on axle loads, tandem-axle loads, and GVW of overweight permit vehicles is collected from state statutes, states' published policies on overweight permits, and published advice to truckers. These sources yield limits on loads, load tables showing GVW for various counts and spacings of axles, and configurations of overweight vehicles. Most, but not all, of these loads are allowed under routine permits. All of these loads are permitted without review of structures; states have already rated bridges and culverts for these loads, and can issue overweight permits without further analysis. These loads are "routine" from the perspective of the state bridge load rater.

Overweight Permit Axle Loads

Twenty-five survey states permit axle load for overweight vehicles in excess of 20,000 lb (Table 55). Six states permit overweight axle load at 40,000 lb or greater. The greatest overweight permit axle load is 65,000 lb. Some overweight permits for axles are restricted to specific commodities or for designated vehicles.

TABLE 55
OVERWEIGHT PERMIT LOADS—AXLE LOADS

State	Configuration	Load (lb)
Alabama (*7*)		22,000
	Mining equipment, refractory grade bauxite	27,000
California (*123*)	Orange route	21,000
	Green route	26,000
	Purple route	30,000
Florida (*125*)	Map 3, blanket permit, truck cranes	22,000
	Map 1 or 2, blanket permit, wreckers	25,000
	Map 1 or 2, truck cranes	27,500
	Map 2, wreckers	45,000
Georgia (*126*, *127*)	Wrecker emergency tow	21,000
	Annual permit	25,000
Idaho (*118*)	Yellow routes, single axle	22,500
	Orange routes, single axle	24,000
	Green routes, single axle	25,500
	Blue routes, single axle	27,000
	Purple routes, single axle	30,000
	Black routes, single axle	33,000
Illinois (*128*)	In tandem, limited continuous operations	26,000
	Off-road equipment, 25 mile travel limit	30,000
Indiana (*129*)	Extra heavy duty highway	65,000
Iowa (*60*)	Crane	24,000
	Implement of husbandry	25,000
Kansas (*94*)	Annual permit	24,000
Kentucky (*130*)	Self-propelled truck crane	23,000
		24,000
Louisiana (*131*)	Off-road equipment	30,000
Maryland (*132*)	International freight	22,400
Michigan (*133*)	Construction equipment	24,000
Minnesota (*134*)	Refuse-compactor vehicles	22,000
Montana (*122*)		21,500
North Carolina (*135*)	Annual permit	25,000
	Self-propelled off-highway construction equipment	37,000

TABLE 55
(*continued*)

North Dakota (*72*)	Trucks, combination vehicles	24,000
	Cranes, truck-mounted equipment	30,000
	Self-propelled workover rigs	30,000
	Self-propelled workover rigs “SE”	31,200
	Earthmoving equipment	52,000
Ohio (*136*)	Permit vehicle	29,000
Oregon (*137*)	Heavy haul weight	21,500
Utah (*77*)	Annual permit, GVW < 125,000	29,500
	Single trip, farm tractors, off-road construction equipment	40,000
	Annual permit, trunnion, GVW < 125,000	60,000
Virginia (*138*)	Permit vehicle	24,000
Washington (*79*)	State highway	22,000
Washington (*139*)	8 tires, 8-ft axle width	24,725
	8 tires, 10-ft axle width	26,875
	8 tires, 12-ft axle width	29,025
	8 tires, 16-ft axle width	43,000
West Virginia (*80*)	Single trip permit	28,000
Wisconsin (*27*)	Garbage, refuse, or scrap hauling	25,000
	Annual permit	30,000
	Rear axle, transporting an earthmover	35,000
Wyoming (*111*)	Permit	25,000

Overweight Permit Tandem Axles

Twenty-three survey states permit tandem-axle load in excess of 34,000 lb for overweight vehicles (Table 56). Five states permit overweight tandem-axle load of 60,000 lb or greater. The greatest overweight permit tandem-axle load is 90,000 lb. Similar to overweight single-axle load, some overweight tandem-axle loads are restricted to specific commodities or for designated vehicles.

Overweight Permit GVW

Thirty-six survey states permit GVW for overweight vehicles in excess of 80,000 lb (Table 57). Nine states permit GVW for overweight vehicles at 200,000 lb or higher. The greatest GVW for overweight permit vehicles is 304,000 lb. Overweight vehicles at greater GVW might receive permits after analysis of bridges and culverts along proposed routes.

LOAD RATING

Load rating is the evaluation of safe load capacity of highway structures. Two levels of load rating are reported to NBI: inventory rating and operating rating. The inventory rating is a lower bound on the safe load capacity of a structure. The operating rating is a maximum tolerable load for a structure. Load ratings are also computed as design load ratings, legal load ratings, and overweight permit vehicle ratings. Load ratings are computed for rating vehicles. A rating vehicle is a defined set of axle weights and axle spacings. Rating vehicles correspond variously to design loads, to legal loads, and to overweight permit vehicle loads.

Load posting may be set at a structures’ operating rating, its inventory rating, or at an intermediate level between the inventory and operating ratings.

Load Rating Methods

Load rating methods include load rating by computation, by load test, or by field evaluation and engineering judgment. Load rating by computation uses a basis in Allowable Stress Rating (ASR), Load Factor Rating (LFR), or Load and Resistance Factor Rating (LRFR).

A load rating for a structure can be expressed as a rating factor, *RF*. A rating factor is a scaling factor. *RF* is greater than 1 when a structure has capacity for load greater than a rating vehicle. *RF* is less than 1 when a structure has capacity for load less than a rating vehicle. AASHTO (*5*) provides equations for *RF* for use in computational load rating.

TABLE 56
ROUTINE PERMIT LOADS—TANDEM AXLE LOADS

State	Configuration	Load (lb)
California (*123*)	Purple route	42,000
	Green route	52,000
	4 axle crane, Purple route	54,300
	Orange route	60,000
Florida (*125*)	Map 2 & Map 3 blanket permit, Map 3 truck cranes	44,000
	Map 1 blanket permit, Map 1 wreckers	50,000
	Map 1 truck cranes, Map 2 truck cranes	55,000
	Map 2 wreckers	90,000
Georgia (*127*)	Wrecker emergency tow	40,000
Idaho (*58*)	Yellow routes	38,000
	Orange routes	41,000
	Green routes	43,500
	Blue routes	46,000
	Purple routes	51,500
	Black routes	56,000
Illinois (*9*)	4 or more axles	44,000
	5 or more axles	48,000
	6 or more axles	60,000
Illinois (*128*)	3 axle, tractor	48,000
	Truck crane or drill rig, 3 axle, 18-ft wheelbase	48,000
	In tandem, limited continuous operations	50,000
	3 axle, semi-trailer	60,000
Kansas (*94*)	Annual permit	45,000
	Special mobile equipment	49,000
	Cotton modules	50,000
Kentucky (*130*)	5 axle vehicle	45,000
	Self-propelled truck crane	46,000
	6+ axle vehicle	48,000
Louisiana (*131*)	Bagged rice	34,000
	Bagged rice	37,000
	Cotton modules	48,000
	Off-road equipment	54,000
Maryland (*10*)	International freight	44,000
	Milk tank, forestry products	52,000
Minnesota (*99*)	Refuse-compactor vehicles	38,000
Mississippi (*100*)	Harvest permit, pre-package products	40,000
Missouri (*101*)	Blanket permit, well drill rig, concrete pump truck	40,000
North Carolina (*135*)	Annual permit	50,000
	Self-propelled off-highway construction equipment	50,000
North Dakota (*140*)	Trucks, combination vehicles	45,000
	Cranes, truck-mounted equipment	50,000
	Self-propelled workover rigs	50,000
	Self-propelled workover rigs “SE”	52,000

TABLE 56
(*continued*)

State	Configuration	Load (lb)
Ohio (*73*)	Spacing ≤ 4 ft	36,000
	Spacing ≤ 16 ft	50,000
Oklahoma (*141*)	Annual envelope permit	40,000
Oregon (*137*)	Heavy haul weight	43,000
Washington (*79*)	Permit vehicle	43,000
West Virginia (*80*)	Single trip permit	45,000
Wisconsin (*142*)	Garbage, refuse, or scrap hauling permits	42,000
	Annual permit	60,000
Wyoming (*111*)	Class B or C Permit	55,000

TABLE 57
ROUTINE OVERWEIGHT PERMIT LOADS—GVW

State	Configuration	Load (lb)
Alabama (*7*)	Permit vehicle	150,000
Arizona (*143, 144*)	Within 20 miles of state border	111,000
	9 axles	121,000
	10 axles	123,500
	Vehicle hauling a houseboat	150,000
	Envelope permit, non-reducible load	250,000
California (*123*)	Conforms to federal bridge formula	131,600
Colorado (*54*)	Permit	85,000
	2+ axles	97,000
	4 axles	110,000
Delaware (*17*)	Permit vehicle	120,000
Florida (*125*)	4 axles, 17-ft wheelbase, Map 1, truck cranes	88,000
	4 axles, 22-ft wheelbase, Map 2, truck cranes	97,000
	9 axles, 51-ft wheelbase, Map 3, truck cranes	125,000
	7 axles, 65-ft wheelbase, Map 1, wreckers	140,000
	7 axles, 61-ft wheelbase, Map 2, wreckers	140,000
	8 axles, 75-ft wheelbase, Map 2, blanket permit	160,000
	10 axles, 90-ft wheelbase, Map 1, blanket permit	162,000
	11 axles, 100-ft wheelbase, Map 3, blanket permit	199,000
Idaho (*58*)	Interstate routes	105,000
	Yellow routes, $W = 560\left(\frac{L\,N}{N-1} + 12N + 36\right)$	200,000 max.
	Orange routes, $W = 600\left(\frac{L\,N}{N-1} + 12N + 36\right)$	
	Green routes, $W = 640\left(\frac{L\,N}{N-1} + 12N + 36\right)$	
	Blue routes, $W = 675\left(\frac{L\,N}{N-1} + 12N + 36\right)$	
	Purple routes, $W = 755\left(\frac{L\,N}{N-1} + 12N + 36\right)$	
	Black routes, $W = 825\left(\frac{L\,N}{N-1} + 12N + 36\right)$	

(*continued on next page*)

TABLE 57
(*continued*)

State	Configuration	Load (lb)
Illinois (*9*, *128*)	Tractor, semi-trailer	88,000
	5 or more axles	100,000
	6 or more axles	120,000
	Combination, 2 axle semi-trailer	100,000
	3 axle semi-trailer	120,000
Indiana (*145*)	Extra heavy duty highway	264,000
Indiana (*129*, *146*)	Ocean-going container	95,000
	Tractor-trailer-trailer	127,000
	Tractor-trailer-trailer-trailer	127,400
	Extra heavy duty highway	134,000
	Extra heavy duty highway	264,000
Iowa (*60*, *147*, *148*)	Annual permit	156,000
	Tracked implement of husbandry	96,000
	Alternative energy construction	256,000
Kansas (*94*)	Special vehicle combination	110,000
	Annual permit	120,000
	Standard permit, 91-ft wheelbase	150,000
	Special mobile equipment, 64-ft wheelbase	150,000
Kentucky (*130*)	Self-propelled truck crane, 4 axles	92,000
	5 axles	96,000
	Self-propelled truck crane, 5 axles	115,000
	6 axles	120,000
	7 axles	160,000
Louisiana (*131*)	Sealed containerized cargo	90,000
	Bagged rice	95,000
	Sugarcane, agronomic, or horticultural crops	100,000
	Timber equipment	105,000
Maine (*63*, *149*)	Pilot project, 3 axle tractor + 3 axle semi-trailer	108,900
	6+ axles, multi-state permit	120,000
	Pilot project, 8 axle combination	137,700
Maryland (*150*)	Book permit	90,000
Massachusetts (*151*)	Tractor-trailer	99,000
	5+ axles, non-reducible	130,000
Michigan (*84*, *133*)	Raw forest products	90,000
	Construction equipment	150,000
Minnesota (*99*)	Pole-length pulpwood, 6-axle	82,000
	Hauling livestock	88,000
	Livestock	88,000
	Paper products, 2-unit	99,000
	Farm products, 6 axles	99,000
	Sealed intermodal container	99,000
	Canola hauling, 3-unit	105,500
	Paper products, 3-unit	108,000
	Construction equipment, boat hauler, farm machinery	145,000
	Mobile cranes; construction equipment, machinery, and supplies; implements of husbandry; commercial boat hauling	155,000

TABLE 57
(*continued*)

State	Configuration	Load (lb)
Mississippi (*100*)	Harvest permit	84,000
Missouri (*101*)	5 axles	105,000
	6 axles	120,000
	7 axles	150,000
	8+ axles	160,000
Montana (*134, 152*)	Eureka Mt. to British Columbia	137,500
		160,000
New Mexico (*105*)	Interstate routes	86,400
	Port of entry + 6 miles, reducible load OK	96,000
	Annual permit	140,000
New York (*153, 154*)	Type 4 (F5), 5 axles, 30-ft wheelbase	93,000
	Type 1 (F1), 3 axles, 16-ft wheelbase	97,400
	Divisible load	102,000
	Type 1A (F1), 5 axles, 16-ft wheelbase	102,000
	Type 7 (F2), 6 axles, 35.5-ft wheelbase	107,000
	Type 9 (F2), 7 axles, 43-ft wheelbase	117,000
	Type 6A (F5), 6 axles, 36.5-ft wheelbase	120,000
	Type 6B (F5), 7 axles, 43-ft wheelbase	120,000
North Carolina (*135*)	Annual permit	90,000
	4 axles single vehicle	90,000
	4 axles single vehicle, self-propelled off-highway construction equipment	90,000
	5 axles single vehicle	94,500
	6 axles single vehicle	108,000
	5 axles combination vehicle	112,000
	6 axles combination vehicle	120,000
	7 axles single vehicle	122,000
	7 axles vehicle combination	132,000
North Dakota (*72*)	4 axles, special mobile equipment	96,800
	4 axles, self-propelled workover rigs	100,700
	5 axles, special mobile equipment	106,800
	5 axles, self-propelled workover rigs	111,100
	6 axles, special mobile equipment	114,800
	6+ axles, self-propelled workover rigs	114,800
	Identification supplement, workover service rig	119,500
	Identification supplement	150,000
Ohio (*136*)	Toledo, Ohio to Delta, Ohio	154,000
Oklahoma (*141*)	5 axles	95,000
	6 axles	115,000
	Annual envelope permit	120,000
	7 axles	135,000
	8 axles, Standard Overweight Permit Trucks	155,000
	9 axles, Standard Overweight Permit Trucks	172,000
	10 axles, Standard Overweight Permit Trucks	189,000
	11 axles, Standard Overweight Permit Trucks	195,000
	14 axles, Standard Overweight Permit Trucks	202,000
	13 axles, Standard Overweight Permit Trucks	209,000
	12 axles, Standard Overweight Permit Trucks	211,000

(*continued on next page*)

TABLE 57
(*continued*)

State	Configuration	Load (lb)
Oregon (*74, 137*)	7 axle, 78-ft wheelbase, Permit Weight Table 2	105,500
	Non-divisible	200,000
	11+ axles, 150-ft wheelbase, Permit Weight Table 3	228,000
	15+ axles, 150-ft wheelbase, Permit Weight Table 4	304,000
Tennessee (*109*)	Permit without evaluation of structures	200,000
Texas (*76*)	Annual permit, overweight or oversize equipment	120,000
	Permit by Port Authority	125,000
	Victoria County Navigation District permits	140,000
	Permit limit without evaluation of structures	200,000
Utah (*77*)	Annual permit, non-divisible load	125,000
	Annual permit, divisible load	129,000
	6 axles, 10-ft width, 60-ft wheelbase	152,000
Utah (*124*)	Non-divisible loads, $W = 1.47 \times 500 \; \frac{LN}{N-1} + 12N + 36$	125,000 min
Virginia (*78, 138*)	Annual permit, non-interstate routes	84,000
	4 axles, 61-t wheelbase	96,000
	5 axles, 64-t wheelbase	102,500
	6 axles, 64-ft wheelbase	108,500
	7 axles, 64-ft wheelbase	115,000
Washington (*79*)	Heavy haul industrial corridor	105,500
	To/from Oroville railhead	139,994
West Virginia (*80*)	Routine permit	90,000
	Routine permit	110,000
Wisconsin (*81, 142*)	Moving farm machinery, sealed loads for international trade	90,000
	6 axles, 60-ft wheelbase	90,000
	7 axles, 52-ft wheelbase	90,000
	8 axles, 42-ft wheelbase	90,000
	Among manufacturing plants along SH 31; raw forest or agricultural products	98,000
	Annual permit, 2 + 2 axles, 18 ft interior spacing	115,000
	Annual permit, 4 + 4 axles, 18 ft interior spacing	150,000
	Pole, pulpwood or coal hauling	154,000
	Within 11 miles of the Wisconsin−Michigan border	154,000
Wyoming (*111*)	Self-issuing permit	117,000
	Permit	150,000

For ASR and LFR methods

$$RF = \frac{C - A_1 D}{A_2 L (1 + I)} \qquad (2)$$

where

C = Load capacity,
A_1 = Load factor for dead load,
D = Dead load,
A_2 = Load factor for live load,
L = Live load, and
I = Impact factor.

For the LRFR method

$$RF = \frac{C - \gamma_{DC} DC - \gamma_{DW} DW \pm \gamma_P P}{\gamma_{LL} (LL + IM)} \qquad (3)$$

where

C = Load capacity adjusted for deterioration and load path redundancy;
γ_{DC} = Load factor for dead load of structural components;
DC = Dead load of structural components;
γ_{DW} = Load factor for load of wearing surface and utilities;
DW = Load of wearing surface and utilities;

γ_P = Load factor for other permanent loads;
P = Other permanent loads;
γ_{LL} = Load factor for live loads;
LL = Live loads; and
IM = Dynamic effect of live loads.

Assigned Load Ratings

Load ratings can be assigned to structures based on their design loads. Design calculations must correspond to structures in service. Structures must be built as designs intended, must not be modified in ways that affect strength, and must not have deterioration that affects strength. FHWA sets limits on the use of assigned load ratings for reporting under NBIS (*155*). Structures must be designed by load factor design or load and resistance factor design methods, design loads must be HS20 or HL93 or greater, and design loads must produce load effects in structure members that are at least as great as states' legal loads and states' routine permit loads.

Load Rating by Load Testing

Load tests are used in structure load rating. There are two types of load tests: diagnostic load tests and proof load tests. Diagnostic load tests establish structure-specific live load distribution factors and reveal the inherent extra load capacity owing to the unintended composite action of beams with decks and the participation of nonstructural elements in load paths. Proof load tests make direct demonstrations of load capacity. Proof load tests apply known live loads to structures. Safe load capacity is set at a value less than the proof load. The difference between proof load and safe load provides a margin of safety for traffic on the structure.

Load Rating by Field Evaluation and Engineering Judgment

Load rating by FE/EJ is the presumptive assignment of a safe load capacity when load rating by computation is not possible, usually because of a lack of as-built plans (*156*). AASHTO advises that if structures are in service and show no distress it is not necessary to post for restricted loadings (*5*). FE/EJ is suitable for structures that are already in service, and show no significant distress.

STATES' USE OF LOAD RATING METHODS

All survey states use computational methods for load rating. Nineteen states use load tests, and 27 states use FE/EJ load rating (Table 58). Survey responses on methods of load rating are listed in Table A20.

TABLE 58
SUMMARY—METHODS OF LOAD RATING

Method of Load Rating	States Count
Computational Load Rating	43
Load Test	19
FE/EJ	27

Load Rating by Computation

Thirty-nine survey states use the LFR basis for computational load rating, 29 use LRFR, and 27 use ASR (Table 59). Thirty-four states use more than one basis, with 18 using all three bases. Several states retain LFR and ASR load ratings for existing structures, and apply LRFR to newly designed structures. Several states use ASR specifically for timber bridges.

TABLE 59
SUMMARY—BASIS FOR LOAD RATING

Basis for Load Rating	States Count
ASR	27
LFR	39
LRFR	29

U.S.DOT policy requires states to report load ratings using the LRFR basis for structures designed or replaced after October 1, 2010 (*155*). For other structures, load ratings may be reported using the LRFR or LFR basis. Load ratings for timber bridges and masonry bridges may be reported using ASR basis. Details of the state responses in the survey on methods of load rating are listed in Table 21.

Computational load rating uses computational methods of structural analysis. Methods of structural analysis include two-dimensional analysis using live load distribution factors and three-dimensional analysis using grillage models or finite-element models. Two-dimensional analysis, called beam line analysis, follows common design practice for bridges. Three-dimensional analysis methods are refined (better than two-dimensional) methods. All survey states use beam line analysis in load rating computations (Table 60). Twenty-four states use refined analysis methods for some load rating computations. Survey responses on the uses of refined analysis are listed in Table A24.

TABLE 60
SUMMARY—METHODS OF STRUCTURAL ANALYSIS

Method of Analysis	States Count
Beam Line	43
Refined	24

TABLE 61
SUMMARY—USE OF REFINED ANALYSIS

Reason for Refined Analysis	States Count
Avoid Posting	18
Complex Bridge	14
Both	6
Not Used	17

Refined methods of structural analysis are applied to complex bridges, to bridges that should not be analyzed using AASHTO live load distribution factors, and to other bridges as needed to evaluate overweight permit loads or to avoid load posting (Table 61). AASHTO recommends the use of refined analysis in place of beam line analysis when beam line analysis yields a low load rating (*5*).

Notes on States' Use of Refined Methods of Structural Analysis

Colorado applies the same method for design analysis and for rating analysis to each bridge (*16*). In Louisiana, prior approval from the state bridge rating engineer is needed for the use of refined analysis (*20*). Massachusetts uses Virtis software for most load ratings (*157*), and STAAD (*158*) or GT-STRUDL (*41*) for refined analysis of arch bridges.

Load rating analysis can be refined by the use of specialized live load distribution factors. Michigan DOT (*84*) publishes a list of live load distribution factors for sawn timber bridges, glued-laminated timber bridges, and bridges with steel grid decks. Minnesota (*37*) uses refined analysis for curved girder bridges, segmental concrete bridges, and cable-stayed bridges. Washington requires refined analysis for steel truss bridges (*159*). Washington uses two-dimensional models for each parallel truss, as well as three-dimensional models of entire, multi-truss bridges.

Workload is a concern. Minnesota cautions load raters to consider the additional work for refined analysis in relation to the potential benefit (*37*). When West Virginia uses refined analysis in the design of new bridges, conversion factors are computed that relate results of refined analysis to results of beam line analysis (*160*). With conversion factors, West Virginia can apply beam line analysis in subsequent evaluations of bridges. Survey responses on the use of refined methods of analysis are listed in Table A24.

Notes on States' Use of Load Testing for Load Rating

Michigan uses both diagnostic load tests and proof load tests. Diagnostic load tests are used to obtain accurate live load distribution in the structure; proof load tests are applied to reach load effects at the level of the operating rating (*84*). Missouri applies proof load tests to reinforced concrete bridges with unknown details for steel reinforcement. Missouri sets bridge load capacity at 75% of the proof load (*161*). Wisconsin does not use load test to determine load ratings (*27*). Survey responses on the use of load testing in load rating are listed in Table A26.

Notes on States' Use of Field Evaluation and Engineering Judgment in Load Rating

For FE/EJ load ratings, Indiana advises load raters to assume that concrete beams have flexural steel reinforcement equal to 75% of balanced flexural reinforcement, if reinforcement is not otherwise known (*19*). Massachusetts does not allow FE/EJ load rating (*157*). Michigan cautions load raters that FE/EJ load ratings are appropriate only with a clear knowledge of expected traffic on the bridge (*84*).

Minnesota defines Physical Inspection Ratings (PIR), a type of FE/EJ load rating (*37*). PIRs are assigned where design plans are not available, or effects of deterioration on load capacity cannot be modeled adequately. Minnesota requires safety inspection every 12 months or less for bridges with PIR load ratings. Minnesota excludes overweight permit loads from these bridges. New York State DOT uses FE/EJ as a temporary measure until further analysis is performed. A typical case would be damage resulting from impact.

Texas sets FE/EJ operating ratings equal to HS20 if bridges have been carrying unrestricted traffic for many years and there are no signs of distress. For FE/EJ load ratings, Texas requires that span/depth ratios not exceed 20, that dimensions of beams and slabs be consistent with adequate cover for steel reinforcement, and that the general appearance of bridges be consistent with construction by a competent builder (*39*). Utah sets FE/EJ load ratings equal to Utah legal loads (*34*). Virginia sets FE/EJ operating ratings equal to the design load used at the time of bridge construction (*25*). Washington sets FE/EJ inventory ratings equal to the design truck at the time of bridge construction, provided that current values of NBI GCRs for superstructure and substructure are 5 or higher (*159*) (Table 62). Wisconsin requires inspections at six-month intervals for reinforced concrete bridges that have FE/EJ load ratings and were built before 1974 (*27*). Survey responses on the use of FE/EJ load rating are listed in Table A25.

Weight Limits for Load Posting

Weight limits for load posted structures may be set at operating ratings, at inventory ratings, or at intermediate levels. AASHTO (*5*) provides a load posting equation for use with LRFR that yields intermediate levels that are proportional to structures' rating factor.

TABLE 62
WASHINGTON STATE DOT GUIDANCE ON LOAD RATING BY FE/EJ

Inventory Rating	Equal to Design Truck at Time of Construction
Operating Rating	$1.667 \times Inventory\ Rating$
Load Posting	None if general condition rating ≥ 5 for superstructure and substructure Post for load if general condition rating ≤ 4 for superstructure or substructure
Overweight Permit Loads	Overweight permit loads excluded if general condition rating ≤ 4 for superstructure or substructure

Source: Washington State DOT (*159*).

$$Safe\ Posting\ Load = \frac{W}{0.7}[RF - 0.3] \qquad (4)$$

where W is the gross weight of a rating vehicle, and RF is the rating factor for the same vehicle.

Twenty-two survey states post structures at the operating rating (Table 63). Twelve states post at intermediate levels between inventory rating and operating rating. Intermediate levels are set in relation to structure condition and load path redundancy. Five states post at the inventory rating, and four use AASHTO's posting equation (Eq. 4).

TABLE 63
SUMMARY—LOAD POSTING LEVEL

Posting Level	States Count
Inventory Rating	5
Operating Rating	22
LRFR Posting Equation	4
Other/Intermediate	12

Delaware posts at four levels in the range of the inventory rating to the operating rating (*17*) (Table 64). Structures in poor condition are posted at the inventory rating, while structures in good condition with load path redundancy are posted at the operating level. Detour length, ADTT, and enforcement of weight limits affect posting level.

Massachusetts posts at inventory rating, but will not post at all if a bridge has an inventory rating that is not more than 5% below the weights of Massachusetts posting trucks (*157*). Missouri posts for load at the operating rating and at intermediates levels. Posting level depends on the method of load rating, fatigue vulnerability, and bridge location (Table 65) (*161*). Montana DOT posts bridges that have an operating rating less than 40 tons for an AASHTO Type 3-3 vehicle (*21*). Montana posts bridges at their inventory ratings.

New York posts at the operating rating for bridges in good condition that are load path redundant (*22*) (Table 66). Bridges

TABLE 64
DELAWARE LOAD POSTING LEVELS

<table>
<tr><th>NBI General Condition (deck, super or sub)</th><th>Load Path Redundant</th><th>Detour (km)</th><th>Fatigue Sensitive Details</th><th>ADTT</th><th>Enforcement Level</th><th>Posting Level</th></tr>
<tr><td rowspan="8">≥ 6</td><td rowspan="7">Y</td><td rowspan="3">>16.1</td><td colspan="3">N</td><td rowspan="3">OR</td></tr>
<tr><td rowspan="2">Y</td><td colspan="2">≤40</td></tr>
<tr><td>>40</td><td>Vigorous</td></tr>
<tr><td rowspan="4">≤16</td><td colspan="3">N</td><td rowspan="3">$IR + \frac{2}{3}(OR - IR)$</td></tr>
<tr><td rowspan="3">Y</td><td colspan="2">≤40</td></tr>
<tr><td rowspan="2">>40</td><td>Moderate</td></tr>
<tr><td>Minimal</td><td rowspan="3">$IR + \frac{1}{3}(OR - IR)$</td></tr>
<tr><td colspan="5">N</td></tr>
<tr><td colspan="6">4 *or* 5</td></tr>
<tr><td colspan="6"><4</td><td>IR</td></tr>
</table>

OR = Operating Rating.
IR = Inventory Rating.
Source: *Bridge Design Manual* (*17*).

TABLE 65
MISSOURI LOAD POSTING LEVEL

Structures	Rating Method	Posting Level
Bridges, Generally	ASR	Using allowable stress = 0.68Fy
	LFR	0.86 OR
Bridges in commercial zones		OR
Load path redundant & ADT < 1000 & no fatigue sensitive details		
Load path redundant & ADT < 200		

Source: Load Rating of Non-State System Bridges (*161*).
Fy = Material yield stress.
OR = Operating Rating.

are posted below operating rating if primary members are in poor condition or bridges are not load path redundant. New York excludes permit loads on bridges that have a primary member with a condition rating below 4 or structural decks with a condition rating below 2. In New York's condition rating scale, ratings below 4 indicate extensive, serious deterioration.

Oklahoma posts its on-system bridges when operating ratings are below 23 tons for an AASHTO H truck, below 36 tons for an AASHTO HS truck, or below 45 tons for an AASHTO Type 3-3 combination vehicle (*33*).

Texas' level for posting depends on structure condition, load path redundancy, and traffic volume. Texas publishes guidance for posting levels for structures on the state system and for structures not on the state system (*39*) (Tables 67 and 68). Virginia posts concrete bridges at operating rating, and posts steel bridges at the average of inventory rating and operating rating (*25*). Survey responses on level for load posting are in Tables A22 and A23.

Load Rating of Decks and Substructures

Load rating computations evaluate structure components that can control load capacity. These always include superstructure components and, less often, deck slabs and substructure components. AASHTO (*5*) notes that reinforced concrete deck slabs supported on stringers usually do not need to be evaluated for load capacity if slabs are performing satisfactorily. Timber decks may control load ratings, especially if decks show excessive deflection under load.

Substructures, similar to deck slabs, usually do not need to be evaluated for load capacity. Substructures are rated for load capacity if substructure condition is poor, if substructures have distress that affects strength, or if substructures are essential to load paths.

Twenty-one survey states evaluate the load capacity of decks. States evaluate load capacity of decks in poor condition. States identify timber decks and metal decks particularly for load rating (Table 69). Twenty-seven survey states evaluate

TABLE 66
NEW YORK SAFE LOAD CAPACITY DETERMINATION GUIDELINES

Bridge Type and Characteristics	Primary Member Condition Rating[1]	Safe Load Capacity
Posting for steel primary members are load path non-redundant, or for primary members with extensive section loss	≤3	0.60 OR
	≥4	0.70 OR
Posting for primary members that are load path redundant, or for floor system members, or for concrete beams or slabs	≤3	0.80 OR
	≥4	0.85 OR
Posting for load path redundant members and floor system with known excess capacity, or for compression chords of trusses with adequate lateral support no signs of lateral movement		OR

Source: *Load Rating Posting Guidelines for State-Owned Highway Bridges* (*22*).
[1]In New York State's condition rating scale, rating "3" indicates severe deterioration that may affect strength.
OR = Operating Rating.

TABLE 67
TEXAS LOAD POSTING LEVEL, ON-SYSTEM STRUCTURES

Load Rating	General Condition Ratings	Inspection Interval, mos	Load Posting
IR ≥ HS20	—	24	None required
OR ≥ HS20	Item 58 ≥ 4 Item 59 ≥ 5 Item 60 ≥ 5 or Item 62 ≥ 5	24	None required
HS10 ≤ OR < HS20	Item 58 ≥ 4 Item 59 ≥ 5 Item 60 ≥ 5 or Item 62 ≥ 5	24	Post at operating level
HS10 ≤ OR < HS20	Item 58 < 4 or Item 59 < 5 or Item 60 < 5 or Item 62 < 5	≤24	Post at inventory level
IR ≥ HS3 and OR < HS10	—	≤24	Post at inventory level
IR < HS3 and OR ≥ HS3	Bridge programmed for rehabilitation or replacement	6[1]	Post at operating level or close bridge
IR < HS3 and OR ≥ HS3	Bridge not programmed for rehabilitation or replacement	—	Close bridge
OR < HS3	—	—	Close bridge

Source: *Bridge Inspection Manual* (*39*).
IR = Inventory rating.
OR = Operating rating.
Item 58 = Deck general condition rating.
Item 59 = Superstructure general condition rating.
Item 60 = Substructure general condition rating.
Item 62 = Culvert general condition rating.
[1]If bridge is not rehabilitated or replaced within 24 months the bridge shall be closed.

the load capacity of substructures. Substructures in poor condition, timber or steel bents, and substructures that, if failed, could cause bridge collapse are rated for load (Table 70).

Notes on States' Practices for Load Rating of Structural Decks

Colorado identifies software packages for the load rating of decks (*16*). Florida load rates deck slabs in poor condition (*18*). For deck panel systems, poor condition entails load rating of the decks, plus modification of live load distribution factors for girders. Live load distribution factors are evaluated as if deck panels are simple spans.

Indiana load rates deck slabs in poor condition, and instructs load raters to use field-determined sacrificial wear in the top surface of slabs for the evaluation of load capacity (*19*). Indiana rates timber decks on truss bridges. Michigan evaluates load capacity of decks in poor condition and decks of older bridges originally designed for H15 loading (*84*).

TABLE 68
TEXAS LOAD POSTING LEVEL, OFF-SYSTEM STRUCTURES

Load Rating	General Condition Ratings	Inspection Interval, mos	Load Posting
IR ≥ HS20	—	24	None required
OR ≥ HS20	Item 58 ≥ 5 Item 59 ≥ 6 Item 60 ≥ 6 or Item 62 ≥ 6	24	None required
HS10 ≤ OR < HS20	Item 58 ≥ 5 Item 59 ≥ 6 Item 60 ≥ 6 or Item 62 ≥ 6	24	Post at operating level
HS10 ≤ OR < HS20	Item 58 < 5 or Item 59 < 6 or Item 60 < 6 or Item 62 < 6	≤24	Post at inventory level
IR ≥ HS3 and OR < HS10	—	≤24	Post at inventory level
IR < HS3 and OR ≥ HS3	Bridge programmed for rehabilitation or replacement	6[1]	Post at operating level or close bridge
IR < HS3 and OR ≥ HS3	Bridge *not* programmed for rehabilitation or replacement	—	Close bridge
OR < HS3	—	—	Close bridge

Source: *Bridge Inspection Manual* (*39*).
IR = Inventory rating.
OR = Operating rating.
Item 58 = Deck general condition rating.
Item 59 = Superstructure general condition rating.
Item 60 = Substructure general condition rating.
Item 62 = Culvert general condition rating.
[1]If bridge is not rehabilitated or replaced within 24 months the bridge shall be closed.

TABLE 69
SUMMARY—LOAD RATING OF DECKS

Load Rating for Deck	States Count
Yes	21

Reason to Load Rate Decks	States Count
Deck Condition	6
Deck Material	4
Other	3

TABLE 70
SUMMARY—LOAD RATING OF SUBSTRUCTURES

Load Rating for Substructure	States Count
Yes	27

Reason to Load Rate Substructure	States Count
Substructure Condition	11
Substructure Material	5
Other	10

Minnesota evaluates load capacity of decks in poor condition and evaluates decks for overweight permit loads (*37*).

Nevada evaluates the load capacity of decks in poor condition (*31*). New Mexico routinely includes timber decks in load rating computations (*46*) and includes concrete deck slabs and metal decks in load rating if their condition is poor. New York evaluates the load capacity of timber and metal decks (*22*). Washington evaluates load capacity of bridge decks that have NBI GCR below 5 (*159*). Wisconsin rates bridge decks in poor condition (*27*). Virginia load rates decks if the deck span between girders is unusually large (*25*). Survey responses on load rating of decks are listed in Table A27.

Notes on States' Practices for Load Rating of Substructures

Arizona rates substructure in poor condition (*15*). Delaware's policy for most bridges is to rate superstructure components only (*17*). Delaware will rate decks or substructures if their condition is poor. Florida directs load raters to consider substructures in the context of load rating obtained for superstructures (*18*). Evaluation of load capacity is not needed for substructures that are judged to have load capacity at least as great as that of the superstructure.

Indiana directs load raters to evaluate substructures that have GCR of less than 4 (*19*). Massachusetts rates steel, timber, and pile bent substructures, and other substructures if their condition is poor (*157*). Minnesota rates substructures for overweight permit loads as needed and rates substructures that are in poor condition (*37*).

Nevada evaluates the load capacity of reinforced concrete pier caps that have a GCR below 6 (*31*). New York evaluates load capacity of timber and metal piers (*22*). Utah evaluates the load capacity of steel or timber bents, and any substructure components with a GCR below 5 (*34*). Virginia evaluates load capacity of substructures in poor condition, substructures that have settled, and substructures that have collision damage (*25*). Wisconsin rates substructures components in poor condition (*27*). Survey responses on load rating substructures appear in Table A28.

LOAD RATING VEHICLES

Load rating computations use load rating vehicles; configurations of axle loads, axle counts, and axle spacings that produce stresses in structures similar to stress under actual traffic. Rating vehicles are defined by AASHTO (*5*) and by states. Rating vehicles come in three classes: (1) design load vehicles, (2) legal load vehicles, and (3) overweight load vehicles. Load postings are determined by load rating using a subset of rating vehicles. In many states, this is the set of rating vehicles for legal loads.

Table 71 lists axle counts, wheelbase, and GVW for AASHTO legal load rating vehicles and for AASHTO HS20 design vehicles. Table 71 lists the ratio of GVW for rating vehicles to the limit on GVW obtained from the federal bridge gross weight formula (see Eq. 1).

$$GVW \text{ Ratio} = \frac{GVW}{W} \qquad (5)$$

where GVW is the gross weight of the rating vehicle, and W is the limit from the federal bridge gross weight formula for the same rating vehicle.

Twenty-five survey states use AASHTO's HS20 design vehicle in load rating (Table 72). Twenty-three states use AASHTO vehicles Type 3, Type 3S2, and Type 3-3. At the time of the survey in 2013, nine states were using one or more special hauling vehicles, SU4 to SU7. Thirty-two states use state-specific rating vehicles. Basic information on state rating vehicles is summarized in Table 73. Load rating vehicles used by states have GVW from 23,900 lb to 404,000 lb. GVW ratios for rating vehicles range from 1.00 to 2.93. Most of the heavy rating vehicles in Table 73 represent overweight permit vehicles. State policies on load rating require evaluation of the load capacity of bridges and culverts for these vehicles.

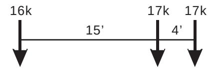
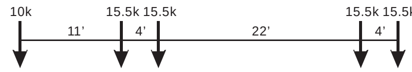
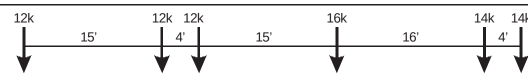
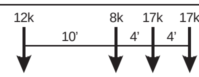
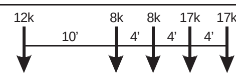
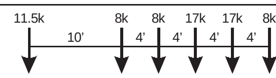
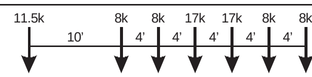
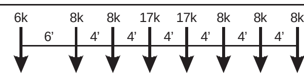
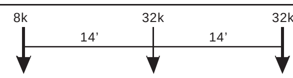
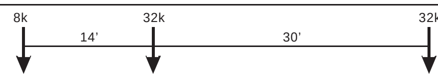
Posting vehicles, the rating vehicles used in the evaluation of weight limits for load posted structures are a subset of load rating vehicles. AASHTO recommends the use of Type 3, Type 3S2, and Type 3-3 vehicles together with one special hauling vehicle in evaluation of posted structures (*5*). A summary of state posting vehicles is shown in Table 74. Posting vehicles range in weight from 33,600 lb to 164,000 lb. GVW ratios range from 1.00 to 1.44. A detailed list of states' posting vehicles appears in Table B6.

OVERWEIGHT RATING VEHICLES

Evaluation of a structures' load capacity for overweight permit loads is, like load posting, an application of computational load rating. Evaluation for permit loads uses a set of overweight rating vehicles; configurations of axle weights, counts, and spacings that are similar to actual overweight vehicles. The axle weights and spacings of actual vehicles are used in the evaluation of load capacity for special overweight permit vehicles.

States' overweight rating vehicles are summarized in Table 75. A detailed list of states' overweight rating vehicles can be found in Table B7. Both tables include all overweight vehicles found in the state DOT publications reviewed in the preparation of this synthesis report. Some of the overweight vehicles listed in these tables are routine overweight permit vehicles and some are single-trip overweight permit vehicles. Most permit rating vehicles have GVW greater than 80,000 lb,

TABLE 71
AASHTO LOAD RATING VEHICLES

Vehicle	Wheelbase, ft	GVW, kip	GVW Ratio	Rating Vehicle
Type 3	19	50	1.00	
Type 3S2	41	72	0.98	
Type 3-3	54	80	0.93	
SU4	18	54	1.00	
SU5	22	62	1.00	
SU6	26	69.5	1.00	
SU7	30	77.5	1.00	
Notional Load	30	80	0.96	
HS20	28	72	1.26	
HS20 Long	44	72	1.04	

with one as great as 480,000 lb. States' permit vehicles have GVW ratios greater than 1.0 and as great as 2.93.

CONDITION AND DETERIORATION IN LOAD RATING COMPUTATIONS

Background

Load ratings and load postings are based on existing conditions of structures. Deterioration in components of structures can reduce the load capacity of components and must be recognized in the evaluation of load posting. For LRFR, AASHTO provides a condition factor, φ_c, as one way to include deterioration in load rating computations. Condition factor, φ_c, is related approximately to NBI GCRs. The factor is lower for lower condition ratings.

TABLE 72
SUMMARY—STATES' USE OF RATING VEHICLES

Rating Vehicle	States Count
HS20	25
Type 3, Type 3S2, Type 3-3	23
SHV (SU4 to SU7)	9
State Legal Load	32

SHV = special hauling vehicle.

Load rating computations can include explicit evaluations of the remaining strength of structure components. Remaining strength of components may be based on field-measured (remaining) dimensions of components or on tests of material coupons collected from structures.

Forty-one survey states use field-measured dimensions to evaluate the remaining sections of structure components (Table 76). Fifteen states use material tests to obtain material strengths. Eighteen states use the AASHTO condition factor.

Notes on States' Use of Structure Condition in Load Rating

California uses field measurement for deteriorated steel members, and reduced material stresses for deteriorated tim-

TABLE 73
SUMMARY—STATE RATING VEHICLES

State/Org.	GVW, k Min.	GVW, k Max.	GVW Ratio Min.	GVW Ratio Max.
AASHTO	50	80	0.93	1.26
Alaska	50	80	0.93	1.04
Arizona	72	72	1.04	1.04
California	122	404	2.18	2.93
Colorado	48	192	0.98	1.81
Delaware	40	80	0.81	1.44
Florida	34	120	0.89	2.11
Georgia	50	80	0.93	1.04
Hawaii	54	80	0.93	1.00
Idaho	80	129	1.00	1.00
Illinois	80	80	1.00	1.00
Indiana	23.9	480	0.65	2.12
Iowa	54.5	96	1.00	1.00
Kansas	50	80	0.93	1.04
Kentucky	72	72	1.04	1.04
Louisiana	40	88	0.91	2.22
Maine	34	100	1.00	1.00
Maryland	72	80	1.00	1.04
Massachusetts	40	72	0.98	1.26
Michigan	33.4	164	0.93	1.40
Minnesota	48	80	0.97	1.00
Mississippi	72	80	1.00	1.04
Missouri	40	92	0.98	1.26
Montana	50	138	0.93	1.04
Nebraska	50	86	1.00	1.01
New Hampshire	33.4	73	0.88	1.27
New Mexico	33.6	86.4	0.76	1.26
New York	50	80	0.93	1.00
North Carolina	50	80	0.93	1.04
North Dakota	50	80	0.93	1.04
Ohio	30	80	0.75	1.00
Oklahoma	50	90	0.93	1.05
Oregon	50	258	0.93	1.60
South Dakota	50	80	0.93	1.04
Tennessee	50	80	0.93	1.04
Texas	72	80	1.00	1.04
Utah	96	132	0.98	1.10
Virginia	54	115	1.00	1.19
Washington	50	207	0.93	1.77
West Virginia	50	80	0.93	1.04
Wisconsin	52	190	0.93	1.86
Wyoming	50	80	0.93	1.04

TABLE 74
SUMMARY—STATE POSTING VEHICLES

State	GVW, k Min.	GVW, k Max.	GVW Ratio Min.	GVW Ratio Max.
Alaska	38	50	1.00	1.03
Colorado	48	85	0.98	1.12
Delaware	40	80	0.81	1.44
Florida	70	80	0.89	1.30
Iowa	90	96	1.00	1.00
Louisiana	41	88	0.91	1.16
Michigan	33.4	164	0.86	1.40
Minnesota	48	80	0.97	1.00
Missouri	40	92	0.83	1.23
Nebraska	50	86	1.00	1.01
New Mexico	33.6	86.4	0.76	1.05
Virginia	54	80	1.00	1.00
Wisconsin	54	98	1.00	1.16

TABLE 75
SUMMARY—STATE OVERWEIGHT RATING VEHICLES

State	GVW, k Min.	GVW, k Max.	GVW Ratio Min.	GVW Ratio Max.
California	122	404	1.94	2.93
Colorado	100	192	1.75	1.81
Florida	55	199	1.24	2.11
Indiana	89.6	480	1.16	2.12
Iowa	90	156	1.06	1.63
Louisiana	133	260	1.47	2.22
Maryland	52	150	1.40	1.52
Michigan	120	283	2.06	2.93
Minnesota	104	256	1.20	1.68
Nevada	314	314	2.55	2.55
New Hampshire	69	99	1.27	1.31
New York	27	120	0.46	2.03
Oklahoma	93	211	1.11	1.50
Oregon	43	304	0.93	1.73
Utah	96	132	0.98	1.10
Virginia	90	115	1.18	1.19
Washington	66	207	1.44	1.77
Wisconsin	190	190	1.86	1.86

TABLE 76
SUMMARY—USE OF CONDITION OF STRUCTURE COMPONENTS IN LOAD POSTING

Use of Condition Data	States Count
Condition Factor	18
Section Properties from Field Measurement	41
Material Coupons	15

ber components. Florida prefers to use field measurement for deterioration in components, but allows use of the condition factor φ_c if measurements are not available (*18*).

Kansas uses the health index of superstructure elements as a condition factor. If the load rating computation indicates a need for posting, explicit evaluations with field measurements are made. Massachusetts requires field measures to quantify deterioration and applies field material sampling and testing if material properties are unknown (*157*). Maryland includes section losses in load ratings when loses are significant. Michigan includes section losses when loses are greater than 25% of the original values of section properties (*84*).

Nebraska uses field measurements for structures with low NBI GCRs (*162*). Nevada uses reduced material properties in load computations for components with deterioration, and applies field measurements to define section properties of components (*31*). New Mexico requires field measurements of structure components for load rating of structurally deficient structures (*46*). New York recognizes deterioration by a reduction to structure operating rating (*22*).

Oregon applies both field measurements for deteriorated sections and a condition factor, φ_c (*163*). Tennessee reduces section properties and material stress limits for known deterioration. Virginia defines its own condition factor, φ_c, and relates the factor to NBI GCRs (*25*). Washington uses field measurements of remaining sections when available. When deterioration is described in general terms only, Washington uses lower values of resistance factors, ϕ in load rating. Resistance factors are reduced by 0.10 for components with element-level condition equal to 3 (fair condition) and reduced by 0.20 for components with element-level condition equal to 4 (poor condition) (*26*).

Wisconsin uses field measurement of sections and makes further reduction to capacity if deterioration includes features that could be stress concentrations (*27*).

RESEARCH RELATED TO LOAD POSTING

Background

Information on current research related to load posting was collected from the survey distributed to U.S. states and from the TRB database on research in progress (*164*). Research projects included the use of field-measured responses of bridges to calibrate refined models for structural analysis and to obtain structure-specific distribution factors for live load, use of WIM data to characterize traffic on rural roads, evaluation of load effects of special vehicles such as implements of husbandry, development of load rating methods for complex bridges such as tied arches and segmental box girder bridges, and evaluation of multiple presence factors.

Notes on States' Research Related to Load Posting

From Survey

Alaska is applying structural health monitoring as part of the load rating for its Chulitna River Bridge. Delaware is studying effective widths of concrete slab bridges for load rating. Florida has developed a short special hauling vehicle for use in load rating (*18*). Iowa, Illinois, and Wisconsin are participating in a pooled fund study of load rating methods adapted for implements of husbandry (*165*). Louisiana is developing rating vehicles using WIM data.

Michigan has examined the probability of side-by-side occurrences of vehicles on bridges (*166*). Missouri is studying the relation of fill heights to load ratings of box culverts. New Mexico is studying methods for load rating of bridges that lack as-built plans. New York has evaluated LRFR methods for load rating and posting (*167*). North Dakota is re-evaluating its existing allowance of 10% greater loading for agricultural hauling during harvest season.

Oregon is using WIM data to generate site-specific live load factors for use in LRFR. Virginia used load testing of a continuous slab bridge to validate the load ratings (*168*). Wisconsin is studying the effects of oversize, overweight vehicles on complex bridges, and has studied the effects of overweight permit vehicle loads on bridges (*169*).

Survey responses on research activities are listed in Tables A31–A34.

From TRB—Research in Progress

The University Transportation Center at the University of Alabama funded a study on the use of field data acquired during bridge WIM tests for re-evaluation of bridge load ratings and load postings (*170*). Florida DOT is funding work by Florida State University to evaluate safe load capacity of prestressed segmental concrete box beam bridges carrying overweight permit vehicles (*171*).

Iowa DOT funded work at the Iowa State University to determine the safe load capacity of bridges carrying farm wagons, carts, applicators, and tractors (*172*). The study included load tests at ten bridges in the state. Kansas DOT is funding work by the University of Kansas to evaluate load capacity of single-cell box structures beneath shallow low fill (*173*). The study includes load tests at two structures and three-dimensional finite-element analysis.

Nebraska Department of Roads funded a study by the University of Nebraska for load rating of two tied-arch bridges using three-dimensional finite-element models (*174*). Nebraska Department of Roads is also funding work by the University of Nebraska to determine appropriate truck loads and multiple presence factors for rural, county-owned bridges (*175*). The study is using WIM data to quantify truck loads.

New York State DOT funded work by the City College of New York to develop load factors for use in LRFR load rating and load posting (*176*). Load factors are calibrated to data on truck weights collected at New York DOT's WIM sites.

Ohio DOT is funding a study by Youngstown State University in the use of field-measured accelerations under load to track deterioration in prestressed concrete box beam bridges (*177*). Field accelerations are used with finite-element models to quantify deterioration and to yield bridge load ratings.

Vermont DOT is funding work by the University of Vermont to compare load effects of the AASHTO HL93 loading with load effects of actual truck traffic (*178*). Quantitative information on truck traffic is developed from data collected at WIM sites in Vermont.

U.S.DOT funded work by the University of Delaware to establish the effects of deterioration in reinforced concrete bridge decks on load path redundancy in multi-beam steel bridges (*179*). The study developed a procedure to identify the bridges that have the greatest need for rehabilitation or replacement.

SUMMARY

Legal loads for motor vehicles on highways are established in state law. USC Title 23 sets limits on loads for interstate highways. Federal regulation sets limits for single-axle load, tandem-axle load, and GVW for interstate highways. Most states set their legal loads equal to the limits in federal regulation; however, some set higher limits for one or more among single-axle loads (13 states), tandem-axle loads (17 states), or GVW (18 states).

State laws provide exemptions from load limits for some vehicles. Exemptions are tied to vehicle use, to the commodity being transported, or to the vehicle owner. States exempt some farm equipment and construction equipment; some raw products from farms, forests, or mines; and some vehicles owned by public utilities or state or local governments.

Vehicles that exceed limits on legal loads routinely travel on U.S. highways, including interstate highways, using overweight permits issued by states. Most survey states issue overweight, multi-trip permits for vehicles with GVW equal to or greater than 100,000 lb.

All survey states use computational methods for load rating. All survey states apply approximate structural analysis using live load distribution factors for load rating. Twenty-four survey states also use refined, three-dimensional methods for structural analysis. Thirty-nine survey states use the LFR basis for computational load rating, 29 use LRFR, and 27 use ASR.

Nineteen survey states use load tests. Less than 0.01% of U.S. bridges and culverts have load ratings determined by load tests. Twenty-seven survey states use FE/EJ load rating. Two percent of U.S. bridges and culverts have load ratings determined by FE/EJ.

Twenty-two survey states use operating load ratings to set weight limits at posted structures. Twelve survey states set weight limits between inventory and operating load ratings. The particular selection of weight limit at posted structures can depend on GCRs, load path redundancy, detour length, and average daily traffic.

Most survey states include bridge decks and substructures in load rating computations if their condition is poor.

Vehicles used in load rating computations determine numerical specifications of counts, spacings, and weights of axles. AASHTO's load rating vehicles, shown in the *Manual for Bridge Evaluation* (*5*), are used by 33 survey states. Thirty-two survey states define additional rating vehicles for legal loads. Nineteen survey states define overweight vehicles for load rating.

Forty-one survey states use field-measured dimensions of components to account for deterioration when performing load rating computations. Eighteen survey states use AASHTO's condition factor, φ_c.

Current research related to load posting includes use of WIM data to characterize truck loads and to evaluate live load distribution factors and multiple presence factors, calibration of refined models for structural analysis, development of load rating methods for complex bridges, and evaluation of effects of special vehicles on bridges.

CHAPTER FOUR

CONCLUSIONS AND NEEDS FOR FURTHER RESEARCH

CONCLUSIONS

This synthesis report collects information on practices of U.S. states in load posting of highway bridges and culverts. Information in this report is collected from federal regulation and publications, state statutes and administrative codes, state department of transportation (DOT) publications, publications of AASHTO and TRB, and from a survey distributed to state DOTs. Forty-three states responded to the survey.

This synthesis report examines the prevalence of load posting among U.S. bridges and culverts; tabulates the distribution of load posted structures among owners, route systems, structure ages and conditions; lists the legal loads and permittable overweight loads; and cites the methods of load rating. Implementation of posting through signs for weight limits and fines for violations of weight limits is included in the report.

Posting for load is an outcome. Decisions to post for load are made in a context of legal limits on vehicle weights and engineering methods for evaluation of safe load capacity.

Legal limits on axle weight, tandem-axle weight, and gross vehicle weight are set in federal regulation, state law, and local law. States exempt some vehicles from load limits. Exemptions are based on vehicle use, the commodity carried, or vehicle owner. States allow overweight vehicles, by permit, to exceed legal loads. This synthesis collects 286 provisions in state law for legal loads, identifies 122 exemptions to state legal loads, and lists 418 examples of overweight permit loads.

Structures are posted for load when their safe load capacity is not adequate for legal loads or for routine overweight permit loads. Safe load capacity is determined, for most structures, by computational load rating. This synthesis report presents methods and bases for load rating, and tabulates the use of load rating methods by states. The synthesis report presents states' policies on selection of weight limits for load posted structures. Most survey states use operating-level load ratings to set weight limits for load posted structures.

Load ratings are computed for present-day conditions of structures; conditions that can include deterioration in components of structures and additions to dead load on structures. For deterioration in components, most states use field measurements to establish remaining sections. States also use AASHTO's condition factor to account for general deterioration in structures.

Load ratings for structures are evaluated using rating vehicles; numerical specification of counts, spacings, and weights of axle groups. Various rating vehicles impose load effects similar to legal loads or to overweight permit loads. States use rating vehicles defined by AASHTO, and also use state-specific rating vehicles.

Load postings are implemented with weight limit signs and enforced with fines. Most states use U.S.DOT standard weight limit signs at load posted structures. The median fine for violation of weight limits is $0.20 per pound of excess weight.

States have the authority to post state-owned structures for load. Under federal regulation, states have the responsibility to ensure the inspection, load rating, and load posting of most bridges and culverts on public roads within state boundaries. States are not responsible for structures owned by the federal government. A few states can load post structures owned by local governments. More often, state governments advise local governments on required load posting of local government structures.

From the perspective of bridge owners, and especially state DOTs as custodians of state-owned structures, load posting is one aspect of the management of mobility. DOTs maintain mobility in highway networks, evaluate structures for overweight loads, and identify routes for overweight permit vehicles. State DOTs evaluate structures for legal loads, and restrict loads on structures that do not have adequate capacity. State DOTs identify the capacities of structures over a wide range, and permit or restrict loads on structures appropriately.

Ten percent of U.S. bridges and culverts are posted for load. More than 80% of load posted structures are owned by local governments. Seventy-six percent of bridges and culverts posted for load have average daily traffic of fewer than 400 vehicles. Ninety-two percent of posted structures have average daily truck traffic of less than 100 trucks. In contrast, less than 1% of structures on interstate highways are posted for load.

GAPS IN KNOWLEDGE AND NEEDS FOR FURTHER RESEARCH

This synthesis report presents information on the practices in load posting of bridges and culverts, but does not provide information on the effectiveness of these practices. It presents information on practices of state governments; however, local governments own most of the load posted structures. There are several areas that need further research as described here.

- **Effectiveness of Decisions in Load Posting**

Report on the number of structures that have inaccurate posting status or incorrectly implemented weight limits. Status issues can include lack of weight restriction where restriction is needed, incorrect load limit implemented, or load limit implemented but not correctly documented. Inaccurate weight limits can be quantified in magnitude and in direction.

- **Effectiveness of Quality Control of Load Rating in Load Posting**

Report on the quality control procedures of load ratings and the effectiveness of quality control procedures when posting is needed.

- **Effectiveness of Implementation of Load Postings**

Report on the number of structures that remain without posted weight limits, although bridge owners are aware that posting is required. Report on the reasons for failure to post for load and on impediments to coordination between state and local governments for load posting of structures.

- **Effectiveness of Load Rating in Load Posting**

Report on the number and magnitude of errors in load rating and on the number of errors in load rating that alter decisions in load posting.

- **Hazard at Un-Rated Structures**

More than 95,000 National Bridge Inspection Standards structures lack load rating analysis (NBI Code 5 for NBI Items 63 and 65). Questions here include: How do bridge owners manage the load ratings and load postings for these structures? What urgency do bridge owners attach to load rating of these structures? Should techniques be developed to assist load raters in rating these structures?

- **Effectiveness of Weight Limit Signs in Restricting Use of Structures**

Report on the rate of misinterpretation of weight limit signs by road users, on the rate of road users' incognizance of weight limit signs, and on sources of misinterpretation and incognizance.

- **Effectiveness of Communication of Weight Restrictions**

Report on communications, other than weight limit signs, that provide road users with information on the presence of load posted structures and the availability of other routes.

- **Effectiveness of Maintenance of Weight Limit Signs**

Report on the absentee rate for weight limit signs at load posted structures. Report on the number of missing signs in relation to the number of load posted structures, on the number of signs replaced annually, and on the average duration of absence of signs at structure sites.

- **Effectiveness of Enforcement**

Report on the frequency and magnitude of illicit crossings of load posted structures. Report on the relation of illicit crossings to the level of enforcement by state police and to the value of overweight fines imposed on violators.

- **Practices of Local Governments in Load Posting**

Report on local government practices for load posting focusing on a sample of municipal and county governments.

- **Transience of Load Posting**

Report on the annual rate of structures joining and leaving the population of load posted structures. Report on the average time duration of structures in load posted status.

DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

DEFINITIONS

Allowable Stress Rating (*ASR*) [from (*5*)]—"A traditional specification to provide structural safety (in which) actual loadings are combined to produce a maximum stress in a member, which is not to exceed the allowable or working stress. The latter is found by taking the limiting stress of the material and applying an appropriate factor of safety."

Annual permit (*overweight*)—A routine overweight permit that is valid for a period of one year.

Axle group—A set of consecutive axles that are compared with limits on load to determine whether vehicles conform to legal loads or to permittable overweight loads.

Axle load—The total load on one axle.

Base highway network [from (*3*)]—"The base highway network includes the through lane (mainline) portions of the NHS, rural/urban principal arterial system, and rural minor arterial system."

Blanket permit (*overweight*)—A routine overweight permit.

Bridge [from (*87*)]—"A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening." Note that this definition admits culverts.

Complex bridge [from (*87*)]—"Movable, suspension, cable stayed, and other bridges with unusual characteristics."

Continuous trip permit (*overweight*)—A routine overweight permit.

Critical finding [from (*87*)]—"A structural or safety related deficiency that requires immediate follow-up inspection or action."

Culvert [from (*201*)]—"A culvert is a structure designed hydraulically to take advantage of submergence to increase hydraulic capacity. Culverts, as distinguished from bridges, are usually covered with embankment and are composed of structural material around the entire perimeter, although some are supported on spread footings with the streambed serving as the bottom of the culvert. Culverts may qualify to be considered "bridge" length."

Deck [from (*201*)]—"The deck is that component of a bridge to which the live load is directly applied."

Design load rating vehicle—A numerical specification of a group of axles intended to produce load effects similar to actual traffic that is used in design of bridges and culverts.

Designated national network for trucks—A network of routes for large vehicles that includes interstate highways plus U.S. routes and state routes designated in USC Title 23 (*35*).

Diagnostic load test—A controlled-load test of a structure to "confirm the precise nature of load distribution to the main load carrying members of a bridge and to the individual components of a multi-component member" (*5*).

Exempt load—A class of vehicles defined by owner, use, or load, that is not subject to one or more statutory limits on weight.

Exempt vehicle—see *Exempt load*.

Extended permit (*overweight*)—A routine overweight permit.

Federal Information Processing Standards (*FIPS*)—Standards for federal computer systems to support data security and system interoperability. FIPS codes that identify U.S. states are used in the national bridge inventory.

Field Evaluation and Engineering Judgment (*FE/EJ*)—A method of load rating that combines field observed conditions of in-service bridges with knowledge of the traffic carried by bridges to determine whether bridges have adequate safe load capacity. FE/EJ is used for bridges that lack as-built plans and cannot be load rated by a computational method.

Fracture critical member (*FCM*) [from (*87*)]—"A steel member in tension, or with a tension element, whose failure would probably cause a portion of or the entire bridge to collapse."

Functionally obsolete [from (*20*)]—"Functional obsolescence is a function of the geometrics of the bridge in relation to the geometrics required by current design standards."

Gross vehicle weight (*GVW*)—The total weight of a vehicle plus its load.

H15—A single-unit truck with GVW equal to 15 tons defined by AASHTO as a design live load for load factor design and allowable stress design of highway bridges (*5*).

H20—A single-unit truck with GVW equal to 20 tons defined by AASHTO as a design live load for load factor design and allowable stress design of highway bridges (*5*).

HS20—A tractor plus semi-trailer combination vehicle with GVW equal to 36 tons defined by AASHTO as a design live load for load factor design and allowable stress design of highway bridges (*5*).

HL93—A design live load having simultaneous uniform lane load and loads from axle groups. The design live load defined by AASHTO for use in load and resistance factor design of bridges.

Load and resistance factor rating (*LRFR*)—A basis for load rating that compares effects of factored loads to reduced failure capacities of bridge components. The basis provides "a methodology for load rating a bridge consistent with the load and resistance factor design philosophy of the AASHTO LRFD Bridge Design Specifications" (*5*).

Load zoned (Texas)—Limits on axle weight and GVW for some routes, usually county roads, to preserve pavements and structures that were designed for loads less than state legal loads (*52*).

Legal load [from (*87*)] "The maximum legal load for each vehicle configuration permitted by law for the state in which the bridge is located."

Legal load rating vehicle—A rating vehicle intended to impose load effects similar to actual traffic on bridges and culverts. AASHTO legal load rating vehicles include Type 3, Type 3S2, Type 3-3, a notional rating load and the single-unit special hauling vehicles SU4, SU5, SU6, and SU7.

Load factor rating (*LFD*) [from (*5*)]—(a load rating method) "based on analyzing a structure subject to multiples of the actual loads (factored loads). Different factors are applied to each type of load, which reflect the uncertainty inherent in the load calculations. The rating is determined such that the effect of the factored loads does not exceed the strength of the member."

Load rating [from (*87*)]—"The determination of the live load carrying capacity of a bridge using bridge plans and supplemented by information gathered from a field inspection."

Low volume road—Roads with average daily traffic fewer than 400 vehicles.

National Bridge Inspection Standards—United States Code Title 23 Part 650 Subpart C (*35*)—Federal regulation for the execution and reporting of periodic safety inspections of bridges and culverts on public roads in the United States.

National Highway System [from (*4*)]—"The National Highway System shall consist of interconnected urban and rural principal arterials and highways (including toll facilities) which serve major population centers, international border crossings, ports, airports, public transportation facilities, other intermodal transportation facilities, and other major travel destinations; meet national defense requirements; and serve interstate and interregional travel. All routes on the Interstate System are a part of the National Highway System."

Notional rating load—A legal load rating vehicle, defined by AASHTO, having eight axles and GVW equal to 80,000 pounds.

Off-system bridges—Bridges carrying routes that are not part of the National Highway System (*3*).

On-system bridges—Bridges carrying routes that are part of the National Highway System (*3*).

Operating rating [from (*87*)]—"The maximum permissible live load to which the structure may be subjected for the load configuration used in the rating."

Overweight load rating vehicle—A rating vehicle having GVW, axle weights, and axle spacings that produce load effects similar to an overweight permit vehicle.

Proof load test—A direct demonstration of load capacity of a structure for a maximum "proof" level. When used in load rating, the safe load capacity is set to a value less than the proof load.

Rating vehicle—A numerical specification of an axle group defined by axle count, axle spacings, and axle weights used in load rating computations for bridges and culverts. Rating vehicles are specified for design live loads, legal live loads, and overweight live loads.

Redundant bridge—In Maine statute, a bridge is redundant if the product of average daily traffic and detour length is less than 200 (*83*).

Route segment—A portion of highway route designated by route number, starting milepost, and ending milepost.

Routine inspection [from (*87*)]—"Regularly scheduled inspection consisting of observations and/or measurements needed to determine the physical and functional condition of the bridge, to identify any changes from initial or previously recorded conditions, and to ensure that the structure continues to satisfy present service requirements." Also called safety inspection.

Routine permit load [from (*87*)]—"A live load, which has a gross weight, axle weight, or distance between axles not conforming with state statutes for legally configured vehicles, authorized for unlimited trips over an extended period of time to move alongside other heavy vehicles on a regular basis."

Strategic Highway Network (*STRAHNET*)—A designated network of highways that link domestic U.S. military installations and ports.

Structurally deficient (*SD*)—[from (*202*)]—"Bridges are considered structurally deficient if significant load-carrying elements are found to be in poor or worse condition due to deterioration and/or damage, or the adequacy of the waterway opening provided by the bridge is determined to be extremely insufficient to the point of causing intolerable traffic interruptions."

Substructure [from (*202*)]—"The substructure is that component of a bridge which includes all the elements which support the superstructure."

Superstructure [from (*202*)]—"The superstructure is that component of the bridge which supports the deck or riding surface of the bridge, as well as the loads applied to the deck."

Survey—When capitalized, refers to the Survey used for NCHRP Project 20-05/Topic 44-15—*State Bridge Load Posting Processes and Practices*, distributed to U.S. state DOTs in year 2013.

SU4—A legal load rating vehicle defined by AASHTO having four axles and GVW equal to 54 kips (*5*).

SU5—A legal load rating vehicle defined by AASHTO having five axles and GVW equal to 62 kips (*5*).

SU6—A legal load rating vehicle defined by AASHTO having six axles and GVW equal to 69.5 kips (*5*).

SU7—A legal load rating vehicle defined by AASHTO having seven axles and GVW equal to 77.5 kips (*5*).

Tandem axle—A pair of single axles with center-to-center spacing not more than 96 inches.

Type 3—A legal load rating vehicle defined by AASHTO having three axles and GVW equal to 50 kips (*5*).

Type 3S2—A legal load rating vehicle defined by AASHTO having five axles and GVW equal to 72 kips (*5*).

Type 3-3—A legal load rating vehicle defined by AASHTO having six axles and GVW equal to 80 kips (*5*).

Weight-restricted bridge—A bridge that is open to legal loads, but not open to overweight permit loads.

ABBREVIATIONS AND ACRONYMS

ASD	Allowable stress design
ASR	Allowable stress rating
C-1	Caution crossing sign type 1 (New Hampshire)
C-2	Caution crossing sign type 2 (New Hampshire)
C-3	Caution crossing sign type 3 (New Hampshire)
DOT	Department of transportation
E-1	Excluded crossing sign type 1 (New Hampshire)
E-2	Excluded crossing sign type 2 (New Hampshire)
FE/EJ	Field evaluation and engineering judgment
FIPS	Federal information processing standards
GCR	General condition rating
GVW	Gross vehicle weight
HIS	Highway information system (Wisconsin)
L	The length in feet between the first axle and last axle of a vehicle or group of consecutive axles, used in a bridge formula to compute limits on loads
LCV	Longer combination vehicle
LFD	Load factor design
LFR	Load factor rating
LRFD	Load and resistance factor design
LRFR	Load and resistance factor rating
MAP-21	Informal name for *Moving Ahead for Progress in the 21st Century Act*, Public Law 112–141 112th Congress
MBE	*Manual of Bridge Evaluation*
N	The count of axles for a vehicle or group of consecutive axles, usually used in a bridge formula to compute limits on loads
NBI	National bridge inventory
NBIS	National Bridge Inspection Standards
NHS	National Highway System
PIR	Physical inspection rating (Minnesota)
RF	Rating factor
QA	Quality assurance
QC	Quality control
SCOBS	AASHTO's Subcommittee on Bridges and Structures
STRAHNET	Strategic highway network
U.S.DOT	United States Department of Transportation
W	Limit on gross weight of a vehicle or group of consecutive axles from a bridge formula
WIM	Weigh-in-motion

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APPENDIX A

Survey of States on Practices in Load Posting

NCHRP Project 20-05 Topic 44-15 distributed a survey in 2013 to state transportation officials who are members of the AASHTO SCOBS. The survey was developed and distributed electronically using SurveyGizmo (surveygizmo.com). This appendix to the synthesis report reproduces the question of the electronic survey and tabulates the responses from states below each question. Forty-three states responded to the survey. These are the survey states referred to at many points in the synthesis report. Survey states are listed in Table A1.

TABLE A1
SURVEY STATES, NCHRP PROJECT 20-05
TOPIC 44-15

Alabama	Indiana	Missouri	Oregon
Alaska	Iowa	Montana	South Dakota
Arizona	Kansas	Nebraska	Tennessee
California	Kentucky	Nevada	Texas
Colorado	Louisiana	New Hampshire	Utah
Delaware	Maine	New Mexico	Virginia
Florida	Maryland	New York	Washington
Georgia	Massachusetts	North Carolina	West Virginia
Hawaii	Michigan	North Dakota	Wisconsin
Idaho	Minnesota	Ohio	Wyoming
Illinois	Mississippi	Oklahoma	

Authority to Post for Load

Which bridges are posted for load by your state government or its DOT?
( ) All bridges on public roads in the state
( ) All state-owned bridges
( ) All bridges on the National Highway System (on-system bridges)
( ) Other:

For state-owned bridges, who (what official) has the authority to post weight limits?
( ) DOT bridge load rating engineer
( ) DOT bridge engineer
( ) DOT regional or district chief engineer
( ) DOT chief engineer
( ) Head of the state transportation department (Secretary of Transportation, Executive Director, or similar title)
( ) Other state government official, not in DOT
( ) State governor
( ) Other:

TABLE A2
SURVEY RESPONSE—STATE AUTHORITY TO POST FOR LOAD

State	Bridges Posted by State	Official for State
Alabama	All bridges	State bridge load rating engineer
Alaska	All bridges[1]	State bridge engineer
Arizona	All bridges	State bridge engineer
California	State-owned bridges	DOT director
Colorado	State-owned bridges	State bridge engineer
Delaware	State-owned bridges	DOT chief engineer
Florida	State-owned bridges	DOT secretary
Georgia	State-owned bridges	State bridge engineer
Hawaii	All bridges	DOT director
Idaho	State-owned bridges	District engineer
Illinois	All bridges	State bridge engineer
Indiana	All bridges	State bridge engineer
Iowa	State-owned bridges	DOT chief engineer
Kansas	State-owned bridges	District engineer
Kentucky	State-owned bridges	DOT bridge load rating engineer

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TABLE A2
(*continued*)

State	Bridges Posted by State	Official for State
Louisiana	State-owned bridges	DOT chief engineer
Maine	All bridges	DOT chief engineer
Maryland	All bridges[2]	DOT bridge engineer
Massachusetts	All bridges	State bridge engineer
Michigan	State-owned bridges	DOT chief engineer
Minnesota	State-owned bridges	DOT bridge engineer
Mississippi	State-owned bridges	Mississippi Transportation Commission
Missouri	All bridges	DOT bridge load rating engineer
Montana	State-owned bridges	DOT bridge engineer
Nebraska	State-owned bridges	DOT director
Nevada	State-owned bridges	DOT director
New Hampshire	State-owned bridges	DOT commissioner
New Mexico	State-owned bridges	District engineer
New York	State-owned bridges	DOT bridge engineer
North Carolina	All bridges	DOT bridge engineer
North Dakota	All bridges	DOT bridge load rating engineer
Ohio	State-owned bridges	DOT director
Oklahoma	State-owned bridges	DOT bridge engineer
Oregon	State-owned bridges	DOT chief engineer, Administrator of the Motor Carrier Transportation Division
South Dakota	State-owned bridges	DOT as corporation
Tennessee	State-owned bridges	DOT bridge load rating engineer
Texas	State-owned bridges	DOT executive director
Utah	On-system bridges	DOT bridge engineer
Virginia	State-owned bridges	District engineer
Washington	State-owned bridges	DOT bridge engineer
West Virginia	State-owned bridges	Secretary of Transportation
Wisconsin	All bridges	DOT bridge load rating engineer
Wyoming	All bridges	District engineer

[1]Excludes federally owned bridges.
[2]Excludes some Maryland counties.

Load Rating Staff

What engineering staff evaluates weight limits for posted, state-owned bridges?
( ) State employees (usually state DOT employees)
( ) Consulting engineers engaged by the state
( ) Both

What percentages of evaluations of weight limits are made by state employees and by consultants or contractors?
Weight limits evaluated by state employees (percent of posted bridges): ___
Weight limits evaluated by consultants or contractors (percent of posted bridges): ___

TABLE A3
SURVEY RESPONSE—LOAD RATING STAFF

State	Load Rating Staff			Load Rating by State	Load Rating by Consultant
	State	Consultant	State + Consultants		
Alabama			Y	98%	2%
Alaska			Y	95%	5%
Arizona	Y				
California	Y				
Colorado			Y	90%	10%
Delaware			Y	90%	10%
Florida			Y	10–20%	80–90%
Georgia			Y	10%	90%
Hawaii			Y	50%	50%
Idaho			Y		
Illinois			Y	90%	10%

TABLE A3
(*continued*)

State	Load Rating Staff			Load Rating by State	Load Rating by Consultant
	State	Consultant	State + Consultants		
Indiana			Y	95%	5%
Iowa	Y				
Kansas	Y				
Kentucky			Y	95%	5%
Louisiana			Y	70%	30%
Maine			Y	25%	75%
Maryland			Y	70%	30%
Massachusetts			Y	5%	95%
Michigan			Y	50%	50%
Minnesota	Y				
Mississippi	Y				
Missouri			Y	95%	5%
Montana	Y			99%	1%
Nebraska			Y	90%	10%
Nevada	Y				
New Hampshire	Y				
New Mexico			Y	50%	50%
New York	Y				
North Carolina			Y	95%	5%
North Dakota	Y				
Ohio			Y	95%	5%
Oklahoma	Y				
Oregon	Y				
South Dakota	Y				
Tennessee			Y	99%	1%
Texas			Y	10%	90%
Utah			Y	20%	80%
Virginia	Y				
Washington	Y				
West Virginia			Y	99%	1%
Wisconsin			Y	99%	1%
Wyoming	Y				

Safety Inspections

How are safety inspections used in decisions to post bridges for load?
( ) Inspectors can recommend or request that load rating be re-evaluated for a bridge
( ) All inspection reports are reviewed by bridge load rating section
( ) Bridges having low values of general condition ratings (GCR) are reviewed by load rating section
( ) Other:

TABLE A4
SURVEY RESPONSE—ROLE OF SAFETY INSPECTION
IN DECISION TO RE-RATE FOR LOAD

State	Inspectors Recommend Re-Rate	Load Raters Review Inspection Reports	Low GCR Triggers Review
Alabama	Y		Y
Alaska	Y	Y	Y
Arizona			
California			
Colorado	Y	Y	
Delaware	Y		
Florida		Y	
Georgia	Y		
Hawaii			

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TABLE A4
(*continued*)

State	Inspectors Recommend Re-Rate	Load Raters Review Inspection Reports	Low GCR Triggers Review
Idaho	Y		Y
Illinois			Y
Indiana	Y		Y
Iowa	Y		
Kansas	Y		Y
Kentucky	Y	Y	Y
Louisiana	Y	Y	Y
Maine			Y
Maryland			
Massachusetts			
Michigan	Y	Y	Y
Minnesota			
Mississippi	Y	Y	
Missouri	Y		
Montana	Y	Y	Y
Nebraska	Y		Y
Nevada			
New Hampshire	Y	Y	
New York			
New Mexico	Y		Y
North Carolina			
North Dakota	Y		
Ohio	Y		
Oklahoma	Y	Y	Y
Oregon	Y		
South Dakota	Y		
Tennessee	Y		
Texas			
Utah	Y		Y
Virginia	Y		
Washington			
West Virginia		Y	
Wisconsin	Y		Y
Wyoming	Y		

How are reports from safety inspections used in load rating and posting?

Do critical findings trigger consideration of load posting for bridges?
( ) No
( ) Yes
( ) Other

TABLE A5
SURVEY RESPONSE—USE OF INSPECTION REPORTS AND CRITICAL FINDINGS IN LOAD RATING

State	Use of Inspection Reports in Load Rating?	Critical Finding Triggers New Load-rating?
Alabama		Yes
Alaska	Changes in dead load (wearing surface) and retrofits (rail system upgrade) may initiate a new load rating.	If the critical finding affects structural capacity the need for a new load rating is evaluated.
Arizona		Yes
California		No
Colorado	Reports are used to verify HBP on structures and if re-rating would be necessary.	Yes
Delaware		Yes
Florida	Statewide QC plans ensure that critical findings trigger a review of load ratings.	Critical findings affecting the bridge capacity will trigger a review of the load rating.

TABLE A5
(*continued*)

State	Use of Inspection Reports in Load Rating?	Critical Finding Triggers New Load-rating?
Georgia	Reports document deterioration	Yes
Hawaii		Yes
Idaho		Yes
Illinois		Yes
Indiana		Yes
Iowa		Yes
Kansas	Provides detailed section of each element still available for service. Locates and defines distressed areas. Condition rating levels trigger posting considerations. Also triggers inspectors to increase detailed inspection information on distressed areas.	Yes
Kentucky		
Louisiana		Yes
Maine	Yes	Yes
Maryland	Anytime the condition of a primary structural element has significantly worsened, a review of the current load rating is required. The load rating is then evaluated to ensure the load carrying capacity of the structure in its existing condition is accurately reflected in the load rating. As necessary, revisions are made to the load rating and consequently to the posting requirements.	It triggers a review of the load rating. The posting requirements will be dependent upon the results of the load rating.
Massachusetts		Yes
Michigan		Yes
Minnesota		It will trigger the immediate review for load rating.
Mississippi		Yes
Missouri		Yes
Montana		Yes
Nebraska		Yes
Nevada		No
New Hampshire		Yes
New Mexico		Yes
New York		The bridge's H20 operating capacity is calculated after each biennial inspection. If the H20 operating capacity falls below a specified threshold, then a posting analysis is performed.
North Carolina		Yes
North Dakota		Yes
Ohio		Yes
Oklahoma		Yes
Oregon	The safety inspection report is reviewed for comments and specific information from the inspector of the member or members that are rating out low and controlling the load capacity of the bridge. If the condition of any member of a bridge changes by 2 during an inspection cycle or when the previous load rating was performed, we have database queries that will alert load rating staff to perform a review of the load rating for the change of condition. If an inspector has an immediate concern with a bridge, they will contact the load rating staff directly to alert them of their findings and request a load rating review.	Yes
South Dakota		Depends upon the situation
Tennessee		Yes

(*continued on next page*)

TABLE A5
(*continued*)

State	Use of Inspection Reports in Load Rating?	Critical Finding Triggers New Load-rating?
Texas	Bridge inspections are used to identify bridges for analysis and reload rating if condition has changed to the point where load capacity could be affected. Licensed engineers review all inspection reports and compare previous load ratings against present condition.	Yes
Utah	Change in condition will trigger re-evaluation of load rating or a new load rating.	A critical finding would trigger a new evaluation of the bridge.
Virginia		A critical finding triggers action to protect the travelling public; if that action is a load rating then a load rating is performed.
Washington		No
West Virginia		Yes
Wisconsin		Yes
Wyoming		Yes

General Condition Ratings

Which general condition ratings (among deck, superstructure, substructure, channel and culvert) and what values of condition ratings trigger re-evaluation of load ratings for bridges?

TABLE A6
SURVEY RESPONSE—GENERAL CONDITION RATINGS AND RE-EVALUATION OF LOAD RATING

State	General Condition Rating for Re-Rating of Bridge				
	Deck	Superstructure	Substructure	Channel	Culvert
Alabama	4	4	4	3	4
Alaska	3	3	3		
Arizona					
California					
Colorado	2	4	4	3	3
Delaware					
Florida					
Georgia	4	4	4		4
Hawaii		4			4
Idaho	4	4	4		5
Illinois	4	4	4		4
Indiana	4	4			
Iowa	4	4	4		
Kansas	3	4	4	4	4
Kentucky	3	3	3		3
Louisiana	5	5	5		5
Maine					
Maryland					
Massachusetts					
Michigan	4		4		4
Minnesota					
Mississippi		4	4		4
Missouri					
Montana					
Nebraska	4	4	4		
Nevada					
New Hampshire	4	4	4		4
New Mexico	4	4	4		
New York					
North Carolina					
North Dakota					
Ohio		4	4		4

TABLE A6
(*continued*)

State	General Condition Rating for Re-Rating of Bridge				
	Deck	Superstructure	Substructure	Channel	Culvert
Oklahoma		4			
Oregon					
South Dakota		3			
Tennessee					
Texas					
Utah		4			
Virginia					
Washington					
West Virginia					
Wisconsin	4	4	4		
Wyoming					

Time Intervals

We seek information on the time required to identify, evaluate and implement weight limits at posted bridges. What are the typical intervals in your state for?
( ) Time from initial recommendation to evaluate for posting to completion of computations, interval, weeks: ___
( ) Time from completion of computations to formal decision to post bridges for load, interval, weeks: ___
( ) Time from decision to post to installation of weight limit signs, interval, weeks: ___
( ) Time from installation of signs to verification of signs by DOT staff, interval, weeks: ___
( ) Total time from initial recommendation to evaluate to verification that posting signs are in place, interval, weeks: ___

TABLE A7
SURVEY RESPONSE—TIME INTERVALS IN LOAD POSTING

State	Time Intervals (weeks unless noted)				
	Initial Recommendation to Rating Computations	Rating Computations to Decision to Post	Decision to Post to Installation of Signs	Installation of Signs to Verification	Total Time
Alabama	16	2	4	2	24
Alaska	4	2	1	varies	varies
Arizona	ASAP	ASAP	ASAP	ASAP	ASAP
California	1	1 day	1	1	1 day to several weeks
Colorado	90 days	1 day	90 days	1 day	90 days
Delaware	1	1	1.5	0.5	4
Florida	2–4, less if critical	0–1	4 by law for off-system	each inspection cycle	
Georgia	1 day	1 day	1 day state system to 4 weeks off-system	1 week	6 weeks
Hawaii	2	0	1	0	0
Idaho					ASAP
Illinois	1–3	0	1–2	0	2–5
Indiana	1/2 day	1 day	1	immediate	1.5
Iowa			4	12	24
Kansas	1	0.2	0.3	0	4.5
Kentucky	depends	immediate	2 days	4	depends
Louisiana	4 to 8	1	0.3	26–52	64
Maine	2	2	<1	0	5
Maryland	2	2	2	2	8
Massachusetts	52	1	4	8	65
Michigan	2	0	12 max	N/A	
Minnesota	<1	1–2	<1	<1	max 30 days
Mississippi	2	1	2	1	6

(*continued on next page*)

TABLE A7
(*continued*)

State	Time Intervals (weeks unless noted)				
	Initial Recommendation to Rating Computations	Rating Computations to Decision to Post	Decision to Post to Installation of Signs	Installation of Signs to Verification	Total Time
Missouri	1.5	0.5	4	varies	varies
Montana	varies	immediate	varies	varies	varies
Nebraska	2–4	2–4	4–6	2–4	10–18
Nevada	4	2	4	1	11
New Hampshire	<1	<1	<1	<1	1–2
New Mexico	0–1	0–1	0–1	0–1	2–4
New York	4	0.6	0.6	0.8	6
North Carolina	2 days	2 days	2	1	4
North Dakota	1	2	12	52	52
Ohio	2	2	2	6	12
Oklahoma	1	1	1	1	1
Oregon					
South Dakota	N/A	N/A	N/A	N/A	N/A
Tennessee	0.5	0.5	4	0	5
Texas					90 days
Utah	2	1	2	1	6
Virginia	12	<1	<4	—	16
Washington	varies	varies	varies	varies	varies
West Virginia	8	2	6	52	52
Wisconsin	4	2	1	1	8
Wyoming	5	1	2	1	9

Additional comments on time intervals in load posting?

TABLE A8
SURVEY RESPONSE—STATES' NOTES ON TIME INTERVALS IN LOAD POSTING

State	Additional Comments on Time Intervals in Load Posting
Alabama	Repair work or retrofitting is usually looked at as an option as well to avoid posting.
Alaska	All load ratings for bridges that require load posting must have a full load rating check before posting notice is issued.
Arizona	
California	
Colorado	
Delaware	
Florida	The total time depends upon several factors: 1- type of bridge—some complex bridges require more time to be evaluated; 2 - bridge can be closed until evaluation
Georgia	State-owned bridges are usually evaluated and posted in less than a week. Off-system bridges are usually evaluated and posted in five to six weeks.
Hawaii	
Idaho	There is no official time limit for installing bridge posting signs. We just ask for it to be done ASAP.
Illinois	
Indiana	
Iowa	
Kansas	Signs are installed by KDOT maintenance staff, and a picture is taken and sent to KDOT Bridge Management.
Kentucky	We get to the ratings as soon as we can. We try to do it with a day or two.
Louisiana	
Maine	
Maryland	
Massachusetts	
Michigan	First of all—there's a difference between MDOT and local agency; 90 days max and 180 days max. Also, this time frame highly depends on the severity of the finding and the severity of the posting.
Minnesota	Depending on the situation, for any critical findings, usually within one week even within a couple of days.

TABLE A8
(*continued*)

State	Additional Comments on Time Intervals in Load Posting
Mississippi	The amount of time from initial recommendation to evaluate to verification of posting signs in place can vary greatly depending on many different factors. The above intervals are a generalization.
Missouri	Verification of signs by DOT staff is done during general inspections and can take 2 years or less since general inspections are typically done on a 2-year cycle.
Montana	The interval from recommendation to evaluation for posting varies depending on the workload of the load rating engineers. Once evaluation of a bridge is complete, the decision to post is made immediately. On state-maintained bridges, the posting signs go up within a week or two of the recommendation, and bridge management staff is notified by the maintenance crew doing the work as soon as the signs are put up. On county-owned bridges, a letter is sent to the county recommending posting, and MDT works hard to ensure the signs are up within 30 days. County personnel are responsible for installation of load posting signs on their bridges, which can delay the process of sign installation.
Nebraska	
Nevada	
New Hampshire	
New Mexico	The interval can vary greatly. If NMDOT determines that a bridge should be restricted immediately, bridge could be posted on the same day.
New York	The time from initial recommendation to completion of the load posting evaluation is dependent on the bridge member's condition and redundancy. The time frame can be from 1 day to 6 weeks.
North Carolina	
North Dakota	There is one posted bridge on the state system and it is not on the mainline highway. County structure posting needs are sent via letter to county officials. They are given 180 days to reply back to us telling us what they have done to comply. DOT safety inspectors review at next inspection cycle.
Ohio	Verification is done at the next inspection cycle too.
Oklahoma	
Oregon	Once a load rating is completed, Oregon DOT has a letter of agreement with FHWA that a bridge has to be repaired, replaced, or load posted within 6 months of the load rating date.
South Dakota	We have no official requirements on the state highway system.
Tennessee	If a bridge requires closure, the time interval is compressed to just 2 weeks for the closure to be implemented once the responsible bridge owner is notified.
Texas	
Utah	These values are estimates only. No past data are available.
Virginia	12 weeks = 90 days; if the changes in loadings or conditions (including shop drawings review or as-built) are significant, the changes are evaluated immediately by the District Bridge Engineer or their designee. As a precautionary measure, engineering judgment may be used to lower the load rating capacity of the structure for the safety of the traveling public until the load rating is performed. This determination is recorded in the load rating documentation. Posting is typically completed within 1–2 weeks; however, 4 weeks is allowed to order, fabricate, deliver, and install the signs (the inventory is updated immediately with any changes to restrict all permit loads).
Washington	In general, posting of a structure, when warranted, shall occur within 60 days from date of letter sent to the region or the local agency is notified by the engineer. In instances where the load carrying capacity of a bridge is significantly reduced, such as impact to the structure, posting or closing of the bridge shall occur as soon as it is determined it is not safe to carry legal or vehicular loads.
West Virginia	
Wisconsin	The timing on the posting process will vary greatly depending on the specific bridge in question. When a recommendation to evaluate for re-rating and/or posting is received, an initial review is performed by a rating engineer to determine the relative priority of the posting analysis. If a new posting seems likely, the process will be more accelerated than what is indicated above; sometimes much more so.
Wyoming	

Quality Practices

What are your quality practices for load rating of highway bridges?

Do you use peer review of load rating computations?

TABLE A9
SURVEY RESPONSES—QUALITY PRACTICES IN LOAD RATING

State	Peer Review	QC/QA Practices for Load Rating
Alabama	Y	The models and rating are reviewed by the manager of the bridge rating office before the load test is performed.
Alaska	Y	LFR load ratings are conducted and either a conformance review or complete check is completed. New bridges are load rated to LRFR by the design engineer upon completion of the bridge construction.
Arizona		In development
California		
Colorado	Y	Rater and checker uses QC/QA sheet for compliance with rating policies.
Delaware	Y	We have a peer review process for every bridge load rating and posting.
Florida		Each of our eight districts has developed a load rating QA plan.
Georgia	Y	Calculations are done and then checked in a peer review process and the recommendations are then reviewed for posted bridges.
Hawaii		Implementation Guidelines for Load and Resistance Factor Rating (LRFR) of Highway Bridges
Idaho		
Illinois		Structural Services Manual (Ratings chapter to be added with 2013 edition)
Indiana		FHWA NBIS regulations
Iowa		I.M. 2.120 Bridge Inspections. Load Rating Engineer reviews will be conducted by the Office of Bridges and Structures utilizing SIIMS in conjunction with on-site field reviews as part of the Iowa DOT’s annual oversight of the LPA’s program.
Kansas		Bridge Inspection Manual
Kentucky		
Louisiana	Y	The Policies and Guidelines for Bridge Rating and Evaluation - 2012.1
Maine	Y	Maine DOT requires a complete review of load ratings per our 2013 Load Rating Guide.
Maryland	Y	The computations are reviewed by a second engineer. QA in the context of FHWA compliance reviews have assisted in this respect.
Massachusetts		Bridge Inspection Handbook
Michigan	Y	We QC 100% of our load ratings regardless of posting recommendation. We also QC our load rating software on approximately 10% of load ratings. We’re working on generating an official policy.
Minnesota		MN LRFD bridge design manual, Chapter 15
Mississippi		Mississippi Department of Transportation Bridge Safety Inspection Policy and Procedures Manual
Missouri		Typically there is an independent check and review of the load rating. A yearly inspection is performed on all of the bridges in 2 to 3 counties of each district to ensure that the load postings are correct.
Montana	Y	Load posting of state-owned bridges is rare—we only have 2 of them at the moment. The original load rater usually has another load rater check his or her calculations to verify they are correct. Then the Bridge Maintenance Engineer works with district maintenance forces to ensure the proper signs are installed.
Nebraska		Bridge Inspection Program Manual
Nevada	Y	Independent check and peer review of calculations.
New Hampshire	Y	Independent review of calculations to verify the recommended load posting. We have engaged a consultant to develop a manual on all of our bridge inspection practices, including bridge postings and QA/QC procedures.
New Mexico		
New York		EI 05-034: Load Rating/Posting Guidelines for State-Owned Highway Bridges
North Carolina		Database tracking
North Dakota		We have a QC/QA plan that addresses the steps taken to identify bridges that need analysis and how the postings are identified and communicated to the owner.

TABLE A9
(*continued*)

State	Peer Review	QC/QA Practices for Load Rating
Ohio DOT		QA Reviews, Shelf QAR
Oklahoma		
Oregon		The load rating staff will follow up with the District Manager who is responsible for a particular bridge to verify the status of the posting recommendation and what actions are taking place in either the repair process or posting decision. If the condition of any member of a bridge changes by 2 during an inspection cycle or when the previous load rating was performed, we have database queries that will alert load rating staff to perform a review of the load rating for the change of condition. If an inspector has an immediate concern with a bridge, they will contact the load rating staff directly to alert them of their findings and request a load rating review.
South Dakota		We have a QC/QA document covering our NBIS Bridge Inspection process.
Tennessee		TDOT Bridge Inspection Procedures Manual
Texas		TxDOT Bridge Inspection Manual - Chapter 9
Utah	Y	Initial load rating and if required the posting evaluation are QC checked and QA checked. Full procedure is outlined in Bridge Operations Manual.
Virginia		IIM-S&B-86, Load Rating and Posting of Structures
Washington	Y	QC for load rating bridges is addressed in the Bridge Inspection Manual.
West Virginia		The local district bridge engineer reviews the load ratings and prepares a posting request. The program manager reviews all posting requests and prepares legal documents for the Commissioner of Highways.
Wisconsin		Our procedures and policy document will be in-house and is currently under development.
Wyoming		Inspection reports are reviewed for deterioration of elements affecting load capacity and Load Rating Summaries are reviewed for concurrence. If not, the load rating is revisited to take defects into consideration.

What are your practices to verify the presence and adequacy of weight limit signs at bridges that are posted for load?

TABLE A10
SURVEY RESPONSES—QUALITY PRACTICES FOR WEIGHT LIMIT SIGNS

State	Photo of Signs	Inspector Verify	QA Verify	QC/QA Practices for Weight Limit Signs?
Alabama	Y			For structures requiring posting signs, pictures are sent to the load rating office once signs have been erected. If the structure is not posted within a month then the load rating office notifies the divisional office responsible for the structure.
Alaska	Y			Posting notice requests photos of installed signs. Inspections confirm posting with photos at a later date.
Arizona				In development
California				SM&I Quality Management Plan
Colorado	Y	Y		Inspector verifies sign; photos on off-system by local government
Delaware				We have a peer review process for every bridge load rating and posting.
Florida				
Georgia		Y		Posted signs are verified by GADOT personnel within a week of posting. Pictures are taken of the posting signs during each inspection cycle.
Hawaii				Implementation Guidelines for Load and Resistance Factor Rating (LRFR) of Highway Bridges
Idaho	Y			The bridge inspector takes a picture of the posting sign during every inspection. If it is not installed properly the inspector creates a maintenance recommendation to fix it.
Illinois				Structural Services Manual (Ratings chapter to be added with 2013 edition)
Indiana				FHWA NBIS regulations
Iowa				I.M. 2.120 Bridge Inspection
Kansas				Bridge Inspection Manual
Kentucky				
Louisiana		Y		The Policies and Guidelines for Bridge Rating and Evaluation - 2012.1
Maine		Y		

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TABLE A10
(*continued*)

State	Photo of Signs	Inspector Verify	QA Verify	QC/QA Practices for Weight Limit Signs?
Maryland				The district offices responsible for installing the signs are to follow up with the bridge office to confirm that the signs are in place. We then receive posting memorandums further confirming the installation of the signs and the posting values.
Massachusetts				Bridge Inspection Handbook
Michigan	Y			We have a QA program for evaluation of local agency bridge files which includes posting signs. We also require photos of signs be sent to our management staff immediately upon posting or changes.
Minnesota				MN LRFD bridge design manual, Chapter 15
Mississippi				Mississippi Department of Transportation Bridge Safety Inspection Policy and Procedures Manual
Missouri			Y	A yearly inspection is performed on all of the bridges in 2 to 3 counties of each district to ensure that the load postings are in place and correct.
Montana		Y		District bridge inspectors evaluate posting signs during regular inspections to ensure they are in decent condition and are still in place. If they are missing or unreadable, the inspectors recommend a work item for replacing the signs.
Nebraska				Bridge Inspection Program Manual
Nevada				
New Hampshire				We have engaged a consultant to develop a manual on all of our bridge inspection practices, including bridge postings and QA/QC procedures.
New Mexico		Y		Postings are checked when the bridge is inspected as required by the NBI. Maintenance patrols may also inform DOT staff of missing signs.
New York				EI 05-034: Load Rating/Posting Guidelines for State-Owned Highway Bridges
North Carolina				
North Dakota				We have a QC/QA plan that addresses the steps taken to identify bridges that need analysis and how the postings are identified and communicated to the owner.
Ohio DOT				QA reviews, field QAR
Oklahoma				
Oregon				The load rating staff will follow up with the District Manager who is responsible for a particular bridge to verify the status of the posting recommendation and what actions are taking place in either the repair process or posting decision. Typically, the District Manager will contact the load rating staff to report when the bridge has been posted. Our bridge inspectors usually review the posting signs to make sure they are installed at their proper locations and state the correct load posting for the bridge.
South Dakota				We do have a QC/QA document covering our NBIS Bridge Inspection process but it does not cover bridge load rating/posting.
Tennessee				TDOT Bridge Inspection Procedures Manual
Texas				TxDOT Bridge Inspection Manual - Chapter 9
Utah				Initial posting is documented and is then checked each time bridge is inspected. Full procedure in Bridge Operations Manual.
Virginia				IIM-S&B-86, Load Rating and Posting of Structures
Washington		Y		Posting signs are checked as part of the routine inspection.
West Virginia				
Wisconsin				Our procedures and policy document will be in-house and is currently under development.
Wyoming	Y			Proof of load posting is required. The database is reviewed to ensure it contains the latest information.

Quality Review of Load Posting by Local Government Bridge Owners

Does your state make quality assurance reviews of load posting activities of local governments?

TABLE A11
SURVEY RESPONSES—STATES QUALITY REVIEW OF LOCAL GOVERNMENT LOAD POSTING

State	QA Review of Local (Y/N)	Describe QA Review of Local Government Owners
Alabama	Yes	The local governments have to submit the below questionnaire every 3 years. Field visits to posted structures are conducted every 6–9 years for counties (pp. 8–10) http://www.dot.state.al.us/maweb/frm/Bridge%20Inspection %20Program%20Review%20Questionnaire.pdf.
Alaska	Yes	State inspects local agency bridges. Posting sign installation is verified during inspections.
Arizona	Yes	We evaluate and review the load posting calculation.
California	No	
Colorado	Yes	
Delaware	No	
Florida	Yes	Florida DOT Bridge Load Rating Manual
Georgia	Yes	Load postings are verified by GADOT personnel.
Hawaii	No	
Idaho		The bridge inspector takes a picture of the posting sign during every inspection. If it is not installed properly, the inspector creates a maintenance recommendation to fix it.
Illinois	Yes	Structural Services Manual (Ratings chapter to be added with 2/2013 edition)
Indiana	No	
Iowa	Yes	I.M. 2.120
Kansas	No	
Kentucky	Yes	When the inspectors do the inspection, postings are verified in the field. If they are incorrect/missing, the local government is notified.
Louisiana	Yes	Bridge Inspection Directives
Maine	Yes	Maine DOT completes load posting calculations for locally owned bridges.
Maryland	Yes	No formal QA policies; periodic compliance reviews assist with this effort
Massachusetts	Yes	Bridge inspectors check the posting signs and the weight levels.
Michigan	Yes	Described above in the QA section
Minnesota	No	
Mississippi	No	
Missouri	Yes	Load postings are reviewed for being in place and correct during general inspections.
Montana	Yes	Bridge inspectors evaluate posting signs during their regular inspections to ensure the proper loads are posted on the signs and the signs are present and in good condition. If the signs need replacement or repair, the inspector notifies the local agency.
Nebraska	Yes	Bridge Inspection Program Manual
Nevada	No	
New Hampshire	No	
New Mexico	No	
New York	Yes	Most local government agencies use the state EI 05-034: Load Rating/Posting Guidelines for State-Owned Highway Bridges
North Carolina	No	
North Dakota	No	
Ohio	Yes	ODOT Bridge Inspection Manual
Oklahoma	Yes	Routine bridge inspections change in condition; presently we only have 26 posted bridges some of which are owned by Corps of Engineers or GRDA Process: (1) Inspector requires load posting (2) Bridge Div. waits for resolution from Local Gov. confirming posting in place (3) If no posting is in place within 90 days, follow-up action is taken

(*continued on next page*)

TABLE A11
(*continued*)

State	QA Review of Local (Y/N)	Describe QA Review of Local Government Owners
Oregon	Yes	Bridge inspectors are required to review and evaluate the posting signs at the bridge and the advanced posting signs. If they are out-of-spec or do not reflect the required posting, it will be reported on the bridge inspection report. This will be raised as a critical finding when the inspection report is submitted to the state DOT. ODOT's Local Agency Bridge Inspection Coordinator will then follow up with the Local Agency to correct the posting signs and bring them into compliance.
South Dakota		
Tennessee	Yes	Local governments are required to submit photographs of each end of the bridge showing that the load posting signs are in-place and showing the face of the sign so that the posting can be verified.
Texas	Yes	TxDOT Bridge Inspection Manual
Utah	No	
Virginia	Yes	IIM-S&B-86, Load Rating and Posting of Structures
Washington	Yes	Posting practice (signs and proper weight limits) is reviewed during annual review of local agency bridge inspection program.
West Virginia	Yes	Local district bridge engineer reviews the need for load postings. Bridge inspectors verify that signs are installed.
Wisconsin	Yes	Our policies and procedures document will be in-house and is under development.
Wyoming	Yes	Inspection reports are reviewed for presence of signs, accuracy of sign content, legibility of signs, etc.

Other than QA reviews, does your state monitor load postings of bridges by local governments?

TABLE A12
SURVEY RESPONSES—OTHER STATE MONITORING OF LOCAL GOVERNMENT LOAD POSTING

State	Other Monitoring	Describe Other Monitoring
Alabama	Yes	Once a month a report is run showing structures that are to be posted. After 2 months if the structure is not posted then the local government is contacted about the need to post the structure.
Alaska	Yes	State inspects local agency bridges. Posting sign installation is verified during inspections.
Arizona	Yes	By periodical safety inspection teams
California	No	
Colorado	Yes	
Delaware	No	
Florida	Yes	The state monitors length of time for which posting signs are missing.
Georgia	Yes	GADOT verifies load postings.
Hawaii	No	
Idaho	No	
Illinois	No	
Indiana	No	
Iowa	Yes	
Kansas	No	
Kentucky	Yes	We determine the load postings and then tell the local government of the recommended postings.
Louisiana	Yes	Run query every 3 to 6 months
Maine	Yes	State inspects locally owned bridges and verifies installation of posting sign.
Maryland	Yes	We keep on file the details of all load posted local government bridges.
Massachusetts	No	
Michigan	Yes	We receive photos of every posted bridge in the state from our local inspectors.
Minnesota	Yes	Through inspection auditing
Mississippi	No	
Missouri	No	

TABLE A12
(*continued*)

State	Other Monitoring	Describe Other Monitoring
Montana	Yes	Once MDT determines a bridge needs posting, a letter is sent to the local agency. Once the proper signs are installed, the local agency is required to sign and date the original letter in order to verify that the signs have been installed.
Nebraska	Yes	Use National Bridge Inventory Items to keep a record of any posting signs that are up, type of sign (R12-5 or R12-1), and values on the sign.
Nevada	No	
New Hampshire	Yes	Through our bridge inspection program. NHDOT inspects all state and municipal bridges and during these inspections is able to verify the presence or absence of load posting signs.
New Mexico	Yes	NMDOT inspects all locally owned bridges. Postings are checked when the bridge is inspected as required by the NBI.
New York	Yes	All local bridges are load rated as part of the biennial bridge inspection program. This includes verifying the current load posting is correct.
North Carolina	No	
North Dakota	Yes	During safety inspection of bridges
Ohio	No	
Oklahoma		
Oregon	Yes	When a local agency load rating is submitted to ODOT to be entered into the load rating database, one of the state load rating engineers will review the load rating. If any of the legal rating factors are less than 1.0, they will bring it to the attention of the State Bridge Engineer. A letter will then be sent from the State Bridge Engineer to the local agency giving our recommendation that the bridge be repaired or posted for load. It is ultimately the local agency's responsibility to post their bridge, so the posting recommendation letter will state that they need to have the posting signs in place by a certain date (typically 3–4 months from the date of the letter). The letter will usually request for the local agency to contact ODOT's Local Agency Load Rating Engineer to confirm when the posting signs are in place and submit a digital photo of the installed posting signs at the bridge. The Local Agency Load Rating Engineer tracks the posting recommendation letters that are sent and the dates of when each local agency is to comply, and will contact the local agency if they have not submitted a response by the required date. If a local agency fails to comply, they risk losing state and federal funding for projects.
South Dakota	Yes	Local Transportation Program—does monitor which bridges require posting and tracks those that are posted or not posted when they should. They work with the local government agencies to encourage them to post their bridges correctly.
Tennessee	Yes	Each time a bridge is re-inspected, any problems with the weight posting (missing, damaged signs, etc.) is noted.
Texas	Yes	Documentation through photographic and correspondence evidence
Utah	No	
Virginia	Yes	Typically, notifications of new/changes in weight postings are made to the VDOT District Bridge Office. Additionally, all inspection reports submitted by localities are reviewed by the VDOT District Bridge Safety Inspection Engineer, including posting information; and VDOT's public bridge condition dashboard includes postings for VDOT and non-VDOT structures.
Washington	No	
West Virginia		
Wisconsin	Yes	Load postings are monitored in part based on inspection reports submitted by the local authorities.
Wyoming	No	

Weight Limit Signs

What types of weight limit signs are used at state-owned bridges?
( ) Signs stating limits on gross vehicle weight (R12-1)
( ) Signs stating limits on axle load (R12-2)
( ) Signs stating limits on empty vehicle weight (R12-3)
( ) Signs showing silhouettes with weight limits (R12-5)
( ) Other

TABLE A13
SURVEY RESPONSES—USE OF STANDARD SIGNS
FOR WEIGHT LIMITS

State	U.S.DOT Sign (from *MUTCD*)					Other
	R12-1	R12-2	R12-3	R12-4	R12-5	
Alabama	Y				Y	
Alaska	Y	Y			Y	Y
Arizona	Y					
California	Y				Y	
Colorado	Y					
Delaware	Y	Y				
Florida					Y	
Georgia	Y				Y	
Hawaii	Y					
Idaho					Y	Y
Illinois	Y	Y				
Indiana	Y					
Iowa	Y				Y	
Kansas					Y	
Kentucky	Y				Y	
Louisiana	Y					
Maine	Y				Y	
Maryland					Y	
Massachusetts					Y	
Michigan	Y	Y		Y	Y	Y
Minnesota	Y				Y	
Mississippi	Y	Y			Y	
Missouri	Y				Y	Y
Montana	Y				Y	
Nebraska					Y	
Nevada	Y					
New Hampshire	Y					Y
New Mexico	Y				Y	
New York	Y					
North Carolina	Y					Y
North Dakota	Y	Y				
Ohio					Y	
Oklahoma	Y					
Oregon	Y				Y	Y
South Dakota					Y	
Tennessee	Y				Y	
Texas	Y	Y				Y
Utah	Y				Y	
Virginia	Y					Y
Washington	Y				Y	
West Virginia	Y				Y	
Wisconsin	Y	Y				
Wyoming					Y	

Please describe your other signs for weight limits.

TABLE A14
SURVEY RESPONSES—STATES NOTES ON WEIGHT LIMIT SIGNS

State	Please Describe Other Signs for Weight Limits
Alabama	
Alaska	Single, tandem axle, triple and quad axle groups
Arizona	
California	
Colorado	
Delaware	

TABLE A14
(*continued*)

State	Please Describe Other Signs for Weight Limits
Florida	
Georgia	R12-5 is modified for Georgia silhouettes.
Hawaii	
Idaho	R12-6B (Axle Limit Sign) used in conjunction withthe R12-5 (Weight Limit Sign)
Illinois	
Indiana	
Iowa	
Kansas	
Kentucky	
Louisiana	
Maine	
Maryland	
Massachusetts	
Michigan	
Minnesota	
Mississippi	
Missouri	We also have speed and lane restriction posting signs.
Montana	
Nebraska	
Nevada	
New Hampshire	*Excluded Bridge*: A bridge with a sign E-1, E-2, or C-3. These signs Exclude Certified Vehicles from crossing the bridge, as authorized and described in RSA 266:18-c General Weight Provisions: *Caution Crossing*: A bridge with a sign C-1, C-2, or C-3. These signs indicate that Caution Crossing Procedures are to be used by Certified Vehicles, as authorized and described in RSA 266:18-b-III-h. When multiple vehicles of more than two axles are located on the designated bridge, all loaded certified vehicles shall be required to stop and wait until other traffic passes before crossing the bridge. *E-1 Sign*: This indicates an Excluded Bridge for Single Unit Vehicles only. A Certified Vehicle that is a Single Unit Vehicle is excluded from crossing the bridge *E-2 Sign*: This sign indicates an Excluded Bridge. Certified Vehicles, both Single Unit and Combination Vehicles, are excluded from crossing the bridge. *C-3 Sign*: This indicates an Excluded Bridge for Single Unit Vehicles only; and a Caution Crossing Bridge for Combination Vehicles only. *C-2 Sign*: This indicates a Caution Crossing Bridge. Certified Vehicles, both Single Unit and Combination Vehicles, are required to wait until they can cross the bridge with no other trucks on the bridge. *C-1 Sign*: This indicates a Caution Crossing Bridge, for Single Unit Vehicles only. A Certified Vehicle that is a Single Unit Vehicle is required to wait until they can cross the bridge with no other trucks on the bridge.
New Mexico	
New York	
North Carolina	R12-18 and R12-19
North Dakota	
Ohio	
Oklahoma	
Oregon	ftp://ftp.odot.state.or.us/Bridge/LoadRating/R12-4_Posting_sign.pdf
South Dakota	
Tennessee	
Texas	Signs showing tandem axle limits
Utah	
Virginia	R12-V1; VDOT mod to the R12-5
Washington	Modified R12-5
West Virginia	
Wisconsin	
Wyoming	

What DOT staff is responsible for installing weight limit signs at state-owned, posted bridges?

( ) Central office load rating staff, using contractors for signs
( ) Central office load rating staff, making requests to DOT maintenance branch
( ) Regional/district office load rating staff, using contractors for signs
( ) Regional/district office load rating staff, making requests to DOT maintenance branch
( ) Other

TABLE A15
SURVEY RESPONSES—INSTALLATION OF WEIGHT LIMIT SIGNS

	DOT Staff Responsible for Installation of Weight Limit Signs		
State	Central office/ DOT crew	District office/ DOT crew	District office/ contractor
Alabama	Y		
Alaska	Y		
Arizona		Y	
California		Y	
Colorado	Y		
Delaware	Y		
Florida			Y
Georgia	Y		
Hawaii	Y		
Idaho	Y		
Illinois	Y		
Indiana		Y	
Iowa	Y		
Kansas	Y		
Kentucky	Y		
Louisiana		Y	
Maine	Y		
Maryland			Y
Massachusetts		Y	
Michigan	Y		
Minnesota	Y		
Mississippi		Y	
Missouri		Y	
Montana	Y		
Nebraska		Y	
Nevada	Y		
New Hampshire	Y		
New Mexico		Y	
New York		Y	
North Carolina	Y		
North Dakota	Y		
Ohio		Y	
Oklahoma			Y
Oregon		Y	
South Dakota	Y		
Tennessee	Y		
Texas		Y	
Utah		Y	Y
Virginia		Y	
Washington	Y		
West Virginia		Y	
Wisconsin	Y		
Wyoming	Y		

What DOT staff verifies the presence and adequacy of weight limit signs at posted bridges?

( ) DOT maintenance crews
( ) Bridge safety inspectors
( ) Other

TABLE A16
SURVEY RESPONSES—VERIFICATION OF WEIGHT LIMIT SIGNS

Staff Verifying Weight Limit Signs					
State	Bridge Safety Inspectors	DOT Maint. Crew	State	Bridge Safety Inspectors	DOT Maint. Crew
Alabama	Y		Missouri	Y	
Alaska	Y		Montana	Y	Y
Arizona	Y		Nebraska	Y	
California	Y		Nevada	Y	
Colorado	Y		New Hampshire	Y	
Delaware	Y		New Mexico	Y	
Florida	Y		New York	Y	
Georgia	Y	Y	North Carolina	Y	
Hawaii		Y	North Dakota	Y	
Idaho	Y		Ohio	Y	
Illinois	Y		Oklahoma	Y	
Indiana	Y		Oregon	Y	
Iowa		Y	South Dakota	Y	
Kansas	Y		Tennessee	Y	
Kentucky	Y		Texas	Y	Y
Louisiana	Y	Y	Utah	Y	
Maine	Y		Virginia	Y	
Maryland	Y		Washington	Y	
Massachusetts	Y		West Virginia	Y	
Michigan	Y		Wisconsin	Y	Y
Minnesota	Y		Wyoming	Y	
Mississippi	Y				

Are weight limit signs placed at bridges that can carry legal loads, but cannot carry one or more types of overweight permit load?

TABLE A17
SURVEY RESPONSES—WEIGHT LIMIT SIGNS AT WEIGHT-RESTRICTED BRIDGES

State	Weight Limit Signs at Restricted Bridges	State	Weight Limit Signs at Restricted Bridges
Alabama	No	Missouri	No
Alaska	No	Montana	No
Arizona	No	Nebraska	No
California	No	Nevada	No
Colorado	No	New Hampshire	No
Delaware	No	New Mexico	No
Florida	No	New York	Yes, *Note 1*
Georgia	No	North Carolina	No
Hawaii	No	North Dakota	No
Idaho	No	Ohio	No
Illinois	Yes	Oklahoma	No
Indiana	No	Oregon	Yes, *Note 2*
Iowa	No	South Dakota	No
Kansas	No	Tennessee	No
Kentucky	Yes	Texas	Yes
Louisiana	No	Utah	No
Maine	No	Virginia	Yes
Maryland	No	Washington	No
Massachusetts	No	West Virginia	No
Michigan	No	Wisconsin	No
Minnesota	Yes	Wyoming	Yes
Mississippi	No		

Note 1 New York — "No Trucks with R Permits" signs are placed at bridges that can carry legal load, but not permit loads. Signs do not display a tonnage.

Note 2 Oregon — If a bridge can carry some routine permit loads, the bridge will be placed on ODOT's restricted bridge list with the maximum vehicle/axle weights allowed. ODOT's Motor Carrier Transportation Division will then alert annual permit owners of the new restriction and manage which permit vehicles that can use the bridge. Thus, the bridge will not be signed. However, if a bridge is able to carry legal loads, but cannot carry any of the routine permit loads, a sign will also be posted at the bridge that restricts it to legal axle weights.

STATE ROLE IN LOAD POSTING OF LOCAL GOVERNMENT BRIDGES

If state and local governments share authority for load posting of bridges owned by local governments, how is this authority shared?

( ) Based on route system
( ) State performs load ratings for all bridges on truck routes
( ) Varies by local government; some cities or counties delegate rating authority to the state
( ) Case-by-case

TABLE A18
SURVEY RESPONSES—BASIS FOR SHARED AUTHORITY TO POST LOCAL BRIDGES FOR LOAD

	Basis for Shared Authority to Post for Load			
State	Route system	State load rates	Local gov't. delegates	Case-by-case
Alabama				Y
Alaska				Y
Arizona				
California				Y
Colorado		Y		
Delaware				Y
Florida	Y			
Georgia		Y		
Hawaii	Y			
Idaho				
Illinois				
Indiana	Y			
Iowa				
Kansas				
Kentucky	Y			
Louisiana				
Maine				Y
Maryland			Y	
Massachusetts				Y
Michigan				
Minnesota	Y			
Mississippi				
Missouri				
Montana				
Nebraska				Y
Nevada				Y
New Hampshire				Y
New Mexico		Y		Y
New York				
North Carolina	Y		Y	
North Dakota		Y		
Ohio				
Oklahoma				
Oregon				
South Dakota				
Tennessee				
Texas				
Utah				
Virginia				
Washington				
West Virginia				
Wisconsin				Y
Wyoming			Y	

Additional notes on state government role in load posting of local government bridges?

TABLE A19
SURVEY RESPONSES—STATES' NOTES ON SHARED AUTHORITY FOR LOAD POSTING

State	Shared Authority for Load Posting
Alabama	The local government always has the ability to post for less than the state government recommendation, but never higher.
Alaska	State calculates load posting values and recommends posting to the local authority.
Arizona	
California	State DOT makes recommendation and local agency may opt to do by ordinance or allow state DOT to post by order. Either way, state DOT determines load limits.
Colorado	Local government could post more restrictive posting than required by the CDOT Bridge Rating Manual.
Delaware	For example, DRBA[1]-owned bridges are rated by DRBA, but we keep a load rating files of those bridges.
Florida	
Georgia	GADOT load rates all bridges. GADOT posts state-owned bridges and recommends posting for off-system bridges.
Hawaii	
Idaho	
Illinois	
Indiana	
Iowa	
Kansas	
Kentucky	State performs load ratings for all bridges on truck routes.
Louisiana	
Maine	State completes load rating and recommends posting to the local authority.
Maryland	
Massachusetts	According to Massachusetts General Law Chapter 85 Sec 35, the state DOT has the authority to determine the posting for all locally owned bridges. The municipalities adopt the posting and are responsible for installing the posting signs.
Michigan	
Minnesota	
Mississippi	
Missouri	
Montana	Both state government and local governments determine weight limits.
Nebraska	State gave a load rating baseline in 2009. Counties are responsible for upkeep of that baseline including any re-rates.
Nevada	State performs load ratings on all structures and provides recommendations to locals. Locals can accept the recommendation or perform their own engineering assessment to determine allowable loads.
New Hampshire	NHDOT recommends load postings to the municipalities, who, in most instances, follow our recommendations and post the bridge.
New Mexico	State can only recommend posting to local government. Recommendation is usually accepted.
New York	
North Carolina	
North Dakota	
Ohio	
Oklahoma	
Oregon	
South Dakota	
Tennessee	
Texas	
Utah	State can only recommend posting to local government. Recommendation is usually accepted.
Virginia	
Washington	
West Virginia	
Wisconsin	Local authorities have the responsibility to post their bridges based on posting analysis. This is typically done in coordination with state authorities. However, for various reasons, local authorities can opt to post at loads lower than what analysis shows to be necessary. And with maintenance budgets stretched thin, local authorities often rely on the advice/expertise of state forces to guide posting decisions.
Wyoming	

[1]Delaware River and Bay Authority.

METHODS OF LOAD RATING

What methods does your state use for evaluation of weight limits of posted bridges?
( ) Beam line analysis using live load distribution factors
( ) 3D analysis, finite-element method, or other refined analysis
( ) Field load testing
( ) Field evaluation and engineering judgment
Load rating or posting without load rating computations. Load rating or posting based entirely on a bridge's current condition and history in its present service.
( ) Other, please describe.

TABLE A20
SURVEY RESPONSES—LOAD RATING METHODS USED BY STATES

State	Method of Load Rating				
	Beam Line Analysis	Refined Analysis	Load Test	FE/EJ	Describe Other
Alabama	Y	Y	Y	Y	
Alaska	Y	Y	Y	Y	
Arizona	Y				
California	Y	Y		Y	
Colorado	Y	Y	Y	Y	
Delaware	Y	Y	Y	Y	
Florida	Y	Y	Y		Other methods include testing of coupon and the use of results in the other methods.
Georgia	Y		Y	Y	
Hawaii	Y		Y	Y	
Idaho	Y			Y	
Illinois	Y	Y		Y	
Indiana	Y				
Iowa	Y		Y		
Kansas	Y	Y	Y	Y	
Kentucky	Y		Y	Y	
Louisiana	Y	Y	Y	Y	
Maine	Y	Y	Y		
Maryland	Y		Y		
Massachusetts	Y				
Michigan	Y	Y	Y	Y	
Minnesota	Y				
Mississippi	Y				
Missouri	Y			Y	Truss and floor beam analysis
Montana	Y	Y	Y	Y	
Nebraska	Y	Y			
Nevada	Y	Y			
New Hampshire	Y			Y	
New Mexico	Y		Y		
New York	Y	Y	Y		
North Carolina	Y				3D FEA and Load Testing used when necessary.
North Dakota	Y			Y	
Ohio	Y	Y		Y	
Oklahoma	Y	Y		Y	
Oregon	Y	Y	Y	Y	
South Dakota	Y				
Tennessee	Y	Y		Y	
Texas	Y	Y		Y	
Utah	Y	Y		Y	
Virginia	Y	Y	Y	Y	
Washington	Y				
West Virginia	Y			Y	
Wisconsin	Y	Y		Y	
Wyoming	Y			Y	

BASIS FOR LOAD RATING

What basis does your state use for evaluation of load ratings for bridges?
( ) Allowable stress load rating (AS)
( ) Load factor rating (LF)
( ) Load and resistance factor rating (LRFR)
( ) Other, please describe.

TABLE 21
SURVEY RESPONSES—BASIS FOR LOAD RATING

State	Basis for Load Rating				
	ASR	LFR	LRFR	Other:	Note
Alabama	Y	Y			
Alaska		Y			Phasing out ASR load postings
Arizona		Y			
California	Y	Y			
Colorado	Y	Y	Y	Y	
Delaware			Y		
Florida		Y	Y		
Georgia	Y	Y	Y		
Hawaii	Y	Y	Y		
Idaho	Y	Y	Y		
Illinois		Y	Y	Y	Non-analytical methods based on condition ratings when plans are not available.
Indiana		Y			
Iowa	Y	Y	Y	Y	Load testing
Kansas		Y			
Kentucky	Y	Y	Y	Y	Load testing and engineering judgment
Louisiana	Y		Y		
Maine			Y		
Maryland	Y	Y	Y		
Massachusetts	Y				
Michigan	Y	Y	Y		
Minnesota		Y			
Mississippi	Y	Y	Y		
Missouri	Y	Y			
Montana	Y	Y	Y		
Nebraska	Y	Y			
Nevada		Y	Y		
New Hampshire		Y	Y		
New Mexico	Y	Y			
New York	Y	Y			
North Carolina	Y	Y	Y		
North Dakota	Y	Y	Y		
Ohio		Y	Y		
Oklahoma	Y	Y	Y		
Oregon		Y	Y		
South Dakota		Y			
Tennessee	Y	Y	Y		
Texas	Y	Y			
Utah		Y	Y		
Virginia		Y	Y	Y	Engineering judgment (assumed capacity).
Washington	Y	Y	Y		
West Virginia	Y	Y	Y		
Wisconsin	Y	Y	Y	Y	Engineering judgment may also be used (conservatively) on certain types of structures that are not easily analyzed. Posting decisions may also be performance-based or maintenance-based (for the long-term preservation of the structure).
Wyoming	Y	Y	Y		

LEVEL FOR LOAD POSTING

What rating level is used to set weight limits for load posting?
( ) Operating rating level
( ) Inventory rating level
( ) Intermediate level between operating and inventory rating
( ) Using load posting equation in AASHTO Manual for Bridge Evaluation
( ) Other

TABLE A22
SURVEY RESPONSES—LEVEL FOR LOAD POSTING

State	Inventory Rating	Operating Rating	LRFR Posting Equation	Intermediate Level
Alabama		Y		
Alaska	Y			
Arizona		Y		
California		Y		
Colorado	for LRFR	for ASR & LFR		
Delaware			Y	
Florida				Y
Georgia	Y	Y		
Hawaii			Y	
Idaho		Y		
Illinois		Y		
Indiana	Y			
Iowa		Y		
Kansas				Y
Kentucky				Y
Louisiana			Y	
Maine				Y
Maryland		Y		
Massachusetts				Y
Michigan		Y		
Minnesota		Y		
Mississippi		Y		
Missouri				Y
Montana				Y
Nebraska		Y		
Nevada	Y			
New Hampshire		Y		
New Mexico			Y	
New York				Y
North Carolina		Y		
North Dakota		Y		
Ohio		Y		
Oklahoma		Y		
Oregon		Y		
South Dakota		Y		
Tennessee	Y			
Texas				Y
Utah		Y		
Virginia				Y
Washington		Y		
West Virginia				Y
Wisconsin				Y
Wyoming		Y		

Additional notes on level for load posting?

TABLE A23
SURVEY RESPONSES—STATES' NOTES ON LEVEL FOR LOAD POSTING

State	Notes on Level for Load Posting
Alabama	
Alaska	Posting analysis is triggered when the inventory load rating factor is less than 0.75.
Arizona	
California	
Colorado	Load testing
Delaware	Four levels depending on condition, details, enforcement, and detour length
Florida	Florida uses the LF and the LRFR methods for load posting purposes including Florida specific load factors. Operating as Florida legal load rating (LR 7.3).
Georgia	Evaluate at Operating Level. Post state bridges at Operating Level. Post local bridges at Inventory Level.
Hawaii	
Idaho	
Illinois	
Indiana	
Iowa	
Kansas	Post structure approximately midway between the inventory and operating rating.
Kentucky	If the rating falls below 75% of Fy, we post at 69% of Fy
Louisiana	
Maine	Load capacity based on state legal loads is used for posting.
Maryland	
Massachusetts	Most postings are set at the inventory level. However, if a 5% overstress over the inventory level gives statutory ratings for all posting trucks the posting is waived. If a 5% to 10% overstress over the inventory level gives statutory ratings for all posting trucks, then the bridge is posted for statutory truck weights. This policy is found in the Bridge Inspection Handbook, which is currently only available in hardcopy.
Michigan	
Minnesota	
Mississippi	
Missouri	Posting is generally established at 68% of the allowable stress for the working stress method and at 86% of the operating rating for the load factor method.
Montana	The Operating Rating for the type 3-3 truck is our trigger as to whether a bridge requires posting or not, but we post at the inventory rating for all three AASHTO legal loads.
Nebraska	
Nevada	
New Hampshire	
New Mexico	
New York	The operating capacity of the bridge member rated is reduced by a factor that is based on condition and load path and internal redundancy.
North Carolina	
North Dakota	
Ohio	
Oklahoma	
Oregon	
South Dakota	
Tennessee	
Texas	TxDOT uses both inventory and operating ratings to determine posting levels. The bridge condition is used to determine which rating level to use to set the posting load. A flowchart outlining the methodology is presented in the TxDOT Bridge Inspection Manual.
Utah	
Virginia	Posting is as follows: Load factor—steel structures at midway between inventory and operating. Load factor—concrete structures at operating; LRFR using load posting equation.
Washington	
West Virginia	We normally use the mid-point between inventory and operating but will allow posting at operating on a temporary basis. Fracture critical members are limited to inventory stress.
Wisconsin	We would use operating level for structures that were designed ASD or LFD. We would use the AASHTO load posting equation for structures designed LRFR.
Wyoming	

REFINED ANALYSIS

When does your state use refined methods of analysis to evaluate weight limits for posted bridges?

( ) All bridges
( ) Any bridge for which beam line analysis indicates need for load posting
( ) On-system bridges only
( ) Bridges on truck routes only
( ) Other, please describe.

TABLE A24
SURVEY RESPONSES—USE OF REFINED ANALYSIS

State	Avoid Posting	Complex Bridge	Use of Refined Analysis Methods in Load Rating
Alabama	Y		Usually just involves the structures that are on state routes or the Interstate that are not legal for all posting vehicles using the beam line analysis. A state structure is first modeled with a beam line and live load distribution analysis. If posting vehicles are not legal then a 3D analysis is done. If the structure is not legal for moment then a load test will be performed with multiple strain gages at midspan and twangers for deflection. Structures not legal for shear will be cored to see the current concrete compressive strength. Structures that have to be posted will be added to a list for monitoring to make sure structure becomes posted.
Alaska	Y		Bridges on truck routes and other routes where there is no detour
Arizona			
California	Y	Y	Bridges that are close to full legal capacity, unusual configurations, some state-owned bridges for which beam line analysis indicates the need to post
Colorado	Y		When posting is required for a structure analyzed using the LFR method, LRFR is used to remove posting requirements. If LRFR does not help, refined analysis is used.
Delaware		Y	If the bridges can’t be evaluated using the beam line analysis, then we use refined analysis
Florida	Y		If beam line analysis results in a posting for on-system bridges, a more refined analysis will likely be performed.
Georgia	Y		We will do it for state system bridges for which beam line analysis indicates the need for posting.
Hawaii			
Idaho			
Illinois		Y	Used for complex structures
Indiana			
Iowa			
Kansas		Y	Only used on complex bridges
Kentucky			
Louisiana	Y	Y	Load posted bridges and complex bridges
Maine	Y	Y	
Maryland			
Massachusetts			
Michigan	Y	Y	Refined methods are use when beam line analysis yields results that may be deemed conservative. In addition, refined methods are used for types of structures (pipes, 3 sided arches, curved structures) where beam line methods are either not available or known to be over-conservative.
Minnesota		Y	For complex bridge we require that the designers use same design method for ratings, such as FE models.
Mississippi			
Missouri			Not available
Montana	Y	Y	When a beam-line analysis produces extremely low rating factors, or a very complex bridge or a very complex part of a bridge is rated.
Nebraska		Y	Complicated structures that beam analysis does not properly rate (segmental box, tied arches)
Nevada	Y		Any bridge for which beam line analysis indicates need for load posting
New Hampshire			
New Mexico			
New York	Y		Refined analysis is generally performed on bridges where girder-line analysis gives conservative result requiring load posting.

TABLE A24
(*continued*)

State	Avoid Posting	Complex Bridge	Use of Refined Analysis Methods in Load Rating
North Carolina	Y		Structures critical to the local economy or industry.
North Dakota			
Ohio		Y	In special circumstances, for complex and unusual bridges where we cannot accurately model a bridge using beam line analysis
Oklahoma			On-system bridges, when load rating for Oklahoma Standard OL-1 permit truck
Oregon		Y	For complex bridges that are outside the applicable limits for a beam line analysis.
South Dakota			
Tennessee	Y		Bridges where the weight posting decision is borderline between postings or not posting may be rated using refined methods so as to reach a final conclusion.
Texas	Y		Any bridge for which beam line analysis indicates need for load posting
Utah	Y	Y	Whenever beam line analysis indicates need for posting or otherwise is not adequate.
Virginia		Y	3D analysis, finite-element method or other refined analysis are typically not used to get higher capacities; they are used when the traditional (Virtis) software is not able to analyze a structure.
Washington	Y		Refined analysis is sometimes used when line analysis results shows a need for posting of a bridge.
West Virginia			
Wisconsin	Y		We don’t often use refined analysis for posting decisions. We would potentially use these methods when the bridge in question is a “major” bridge or deemed a critical link in the transportation system.
Wyoming			

FIELD EVALUATION AND ENGINEERING JUDGMENT

Please describe your use of field evaluation and engineering judgment to set weight limits at posted bridges.

TABLE A25
SURVEY RESPONSES—USE OF FE/EJ FOR BRIDGE LOAD RATING

State	Use of Field Evaluation and Engineering Judgment
Alabama	All of these structures have concrete superstructures with unknown reinforcement. Most of these structures are concrete slabs. A Professional Engineer with inspection experience assigns the overall weight limit to these structures.
Alaska	On concrete bridges when there are no plans.
Arizona	
California	See ABME procedures manual (intranet)
Colorado	No publication
Delaware	We use field evaluation to find out the load distribution of slab bridges and find out that the formulae are overly conservative.
Florida	
Georgia	We use field evaluations for concrete elements with unknown reinforcement, masonry, etc.
Hawaii	If a route has no detour, the posted limit for the entire route is based on the lowest capacity bridge.
Idaho	
Illinois	Structural Services Manual (Ratings chapter to be added with 2/2013 edition) http://www.dot.il.gov/bridges/brmanuals.html
Indiana	
Iowa	
Kansas	Field judgment is used to determine the actual remaining carrying capacity for each element. Even with actual field measurements, engineering judgment is still required for the determination of what portion of the element is still available.
Kentucky	If we have no plans for a structure, we will use the condition of the bridge to enhance our engineering judgment to see if we need to post the bridge for weight limits.
Louisiana	MBE
Maine	
Maryland	
Massachusetts	

(*continued on next page*)

TABLE A25
(*continued*)

State	Use of Field Evaluation and Engineering Judgment
Michigan	MDOT BRIDGE Advisory 2012-3 http://www.michigan.gov/documents/mdot/MDOT_BRIDGE_ADVISORY_BA_2012-02_401291_7.pdf
Minnesota	
Mississippi	
Missouri	We use field evaluation and engineering judgment when we don't have any plans or design information on file for a structure. The load posting is based on the current condition of the structure documented in the field evaluation and history of the structure.
Montana	A licensed professional engineer evaluates the bridge and determines a reasonable load posting given the condition of the bridge, its design type, and other factors the engineer feels are pertinent in making the engineering judgment call.
Nebraska	
Nevada	
New Hampshire	Ratings are set to match RSA 266.
New Mexico	Will load test some concrete bridges with no available plans beginning in the summer of 2013.
New York	
North Carolina	
North Dakota	With bridges with minimal information (prestressed with no area of prestress strands) the bridge is posted at no more than the design load.
Ohio	District Bridge Engineer's evaluation and determination
Oklahoma	Engineering judgment is based on site conditions—oftentimes the posting is a temporary condition while repairs are being made.
Oregon	Section 8 of the ODOT LRFR Manual provides instructions for load rating concrete bridges without existing plans. Go to section 8 in the manual for more information. ftp://ftp.odot.state.or.us/Bridge/LoadRating/Tier-2/Manuals/ODOT_LRFR_Manual.doc
South Dakota	
Tennessee	TDOT Bridge Inspection Procedures Manual; not available on-line.
Texas	The Bridge Inspection Manual http://gsd-ultraseek/txdotmanuals/ins/index.htm
Utah	Bridge condition and field data are incorporated in load rating that leads to setting weight limits on a posted bridge.
Virginia	IIM-S&B-86, Load Rating and Posting of Structures http://www.extranet.vdot.state.va.us/locdes/electronic%20pubs/Bridge%20Manuals/IIM/SBIIM86.pdf
Washington	
West Virginia	Guidance in DOT document BMD P49-5, Load Rating Concrete Structures
Wisconsin	The general process would be to assess the intended design capacity of the structure and how much that capacity is compromised by the current state of the structure. When we're using field evaluation/engineering judgment to make a posting decision, we're typically erring on the side of being overly conservative. Though rare, we might use engineering judgment in the case where we have low confidence in "typical" analysis methods due to the number of assumptions that must be made regarding the composition and condition of a structure.
Wyoming	Bridges in good condition (showing no signs of distress) should be rated as follows: HS20 Inv = 28 tons, Type 3 Inv = 22 tons, Opg = 22 tons, Type 3S2 Inv = 40 tons, Opg = 40 tons, Type 3-3 Inv = 41 tons, Opg = 41 tons. If in the judgment of the rater, the ratings can be reduced to reflect the amount of distress.

Please describe your use of load tests to set weight limits at posted bridges.

TABLE A26
SURVEY RESPONSES—USE OF LOAD TESTS

State	Use of Load Tests
Alabama	Only involves structures that are on state routes or the interstate that are not legal for all posting vehicles using a 3D analysis. If the structure is not legal for moment then a load test will be performed with multiple strain gages at midspan and twangers for deflection. Structures not legal for shear will be cored to see the current concrete compressive strength. Structures that have to be posted will be added to a list for monitoring to make sure structure becomes posted.
Alaska	Bridges on major truck routes. Load distribution tests are performed to improve the load rating and posting.
Arizona	
California	

TABLE A26
(*continued*)

State	Use of Load Tests
Colorado	Not typically done at CDOT. Load tests were performed on several I-25 bridges in Colorado Springs for the HETS vehicle (Heavy Equipment Transport System) for the U.S. Army.
Delaware	When we have doubts about the rating based on our engineering experience
Florida	A load test could be used if the beam line analysis results and a more refined analysis result in recommending posting of an on-system bridge.
Georgia	Critical bridges
Hawaii	When as-builts are not available.
Idaho	
Illinois	
Indiana	
Iowa	When bridge on an important truck route
Kansas	In extreme cases when the existing condition and performance don't match with the computed rating.
Kentucky	When the bridge is borderline of being posted.
Louisiana	Critical bridges or bridges with repeat issues
Maine	Load tests performed on critical bridges when refined analysis methods are not sufficient to improve a rating and avoid posting. Load tests have also been performed to verify the results of state developed rating software.
Maryland	When analytical computations indicate posting is required; in a location where posting would be especially undesirable, a load test may be used to verify the actual capacity of the structure.
Massachusetts	
Michigan	For bridges where plans are perhaps not available and structures of high importance such as truck routes or high volume routes where refined methods do not yield desirable results.
Minnesota	
Mississippi	
Missouri	Load tests are used on non-state (city and county) structures.
Montana	On county bridges constructed of old railroad cars, the county has the option of posting the bridge at 5 tons or load testing the bridge in order to get a higher posting or no posting at all.
Nebraska	
Nevada	
New Hampshire	
New Mexico	Will load test some concrete bridges with no available plans beginning in the summer of 2013.
New York	
North Carolina	Structures critical to the local economy or industry.
North Dakota	
Ohio	Special circumstances when very heavy superloads are being considered.
Oklahoma	Not typically done in Oklahoma, no guidelines
Oregon	Any bridge for which beam line analysis indicates need for load posting.
South Dakota	
Tennessee	Not applicable
Texas	Not applicable
Utah	Not applicable
Virginia	Structure specific—unusual structure type where a capacity cannot be determined by load rating methods (including unknown details) and on routes that are critical to commerce. This is rarely used.
Washington	WSDOT does not use load testing.
West Virginia	
Wisconsin	We don't currently use load tests in posting decisions. This isn't to say that its policy is not to use load tests, but it's not currently a part of our program.
Wyoming	

LOAD RATING OF DECKS & SUBSTRUCTURES

Does your state load rate deck slabs of beam-deck bridges when evaluating weight limits for posting?

( ) No
( ) Yes
( ) Other, please describe.

Is deck condition or material a factor?

TABLE A27
SURVEY RESPONSES—LOAD RATING OF DECKS

State	Rate Decks	Poor Condition	Deck Mat'l.	Other	Note
Alabama	N				
Alaska	Y				
Arizona	N				
California	N				
Colorado	—		Y		Timber structures with timber decks are considered in the evaluation.
Delaware	N				
Florida	—			Y	Slabs are part of finite-element models, when FEM is used.
Georgia	N	N	N		
Hawaii	N				
Idaho	—	Y			
Illinois					
Indiana	Y				
Iowa	N				
Kansas	—	Y			Extreme cases only
Kentucky	Y				
Louisiana	—		Y		Timber decks and metal decks are rated. (*procedures*)
Maine			Y		Timber of steel decks is evaluated.
Maryland	N				
Massachusetts	Y				
Michigan	Y				
Minnesota	N				
Mississippi	N				
Missouri	N				
Montana					
Nebraska	—	Y			Engineering judgment
Nevada	Y				
New Hampshire	Y				
New Mexico	N				
New York	—		Y		Timber, metal
North Carolina	Y				
North Dakota	N				
Ohio DOT	N				
Oklahoma					
Oregon	—			Y	Engineering judgment
South Dakota	N				
Tennessee	Y				
Texas	—	Y			
Utah	N				
Virginia	—	Y		Y	Slabs of single-cell box bridges Excessive span between girders Engineering judgment
Washington	—	Y			
West Virginia					
Wisconsin	—				
Wyoming	N				

Does your state load rate substructures when evaluating weight limits for posting?

( ) No
( ) Yes
( ) Other, please describe.

Is substructure condition or material a factor?

TABLE A28
SURVEY RESPONSES—LOAD RATING OF SUBSTRUCTURES

State	Rate Substructure	Poor Condition	Material	Other	Note
Alabama	N				
Alaska	—	Y			
Arizona	N				
California	Y				
Colorado	N	Y		Y	When substructure condition rating is 4 or lower or has scour potential, substructures are used in the evaluation.
Delaware	N				
Florida	—				Settlement
Georgia	Y	Y	Y		
Hawaii	N				
Idaho	—	Y			
Illinois	—	Y			
Indiana	N				
Iowa	—	Y			
Kansas	—	Y			
Kentucky	Y				
Louisiana	Y		Y		Timber piers, metal piers (*procedures*)
Maine	N				
Maryland	N				
Massachusetts	—		Y	Y	Timber, steel Fracture-critical (pile bents)
Michigan	—	Y			
Minnesota	—			Y	Pier cap integrated with girders
Mississippi	Y				
Missouri	N				
Montana				Y	Substructures are only evaluated when their condition indicates that they may control the load rating of the bridge.
Nebraska	—	Y		Y	Engineering judgment
Nevada	Y				
New Hampshire	N				
New Mexico	N				
New York	—		Y		Timber, metal
North Carolina	Y				
North Dakota	N				
Ohio	—			Y	Engineering judgment
Oklahoma					
Oregon	—			Y	Crossbeams integrated with girders
South Dakota	N				
Tennessee	Y				
Texas	—	Y			
Utah	N				
Virginia	—	Y		Y	Scour, collision damage, unusual geometry
Washington	—			Y	Crossbeams integrated with girders
West Virginia	—		Y		Steel bents only
Wisconsin	—			Y	Engineering judgment
Wyoming	N				

Deterioration in Bridge Components

How is deterioration considered in evaluation of weight limits for posted bridges?

( ) Using AASHTO's condition factor, φ
( ) Using section properties computed from field-measured dimensions of deteriorated members
( ) Using stress limits based on tests of coupons or cores collected from bridges
( ) Other.

TABLE A29
SURVEY RESPONSES—USE OF CONDITION OF COMPONENTS IN LOAD POSTING

State	AASHTO Condition Factor	Section Properties, Field Measurement	Stress Limits, Coupon Test
Alabama			
Alaska		Y	Y
Arizona		Y	
California	Y	Y	Y
Colorado	Y	Y	
Delaware	Y	Y	Y
Florida	Y	Y	Y
Georgia		Y	
Hawaii	Y	Y	
Idaho		Y	
Illinois		Y	Y
Indiana		Y	
Iowa		Y	
Kansas			
Kentucky	Y	Y	
Louisiana	Y	Y	Y
Maine	Y	Y	
Maryland		Y	
Massachusetts		Y	Y
Michigan	Y	Y	Y
Minnesota	Y	Y	
Mississippi		Y	
Missouri		Y	
Montana		Y	
Nebraska		Y	
Nevada		Y	Y
New Hampshire	Y	Y	
New Mexico		Y	
New York		Y	
North Carolina	Y	Y	
North Dakota		Y	
Ohio		Y	Y
Oklahoma	Y	Y	Y
Oregon	Y	Y	Y
South Dakota		Y	
Tennessee		Y	
Texas		Y	Y
Utah	Y	Y	
Virginia	Y	Y	
Washington	Y	Y	Y
West Virginia		Y	
Wisconsin	Y	Y	Y
Wyoming		Y	

Additional notes on deterioration of bridge components in load rating?

TABLE A30
SURVEY RESPONSES—STATES' NOTES ON USE OF CONDITION OF COMPONENTS IN LOAD POSTING

State	Notes on Deterioration
Alabama	Guidelines for Operations (pp. 123–127) of the link below. http://www.dot.state.al.us/maweb/frm/Bridge%20Inspection %20Pocket%20Guide.pdf
Alaska	
Arizona	
California	Material strength is reduced based on evaluation for timber. Section loss is determined for steel/reduced capacity. Reduced capacity section loss is also considered.
Colorado	Member capacity calculations are based on reduced section and compared with demand to arrive at maximum weight limit at bridges.
Delaware	We used all methods mentioned in question 32.
Florida	Factors may be adjusted using average deterioration, extent of the maximum deterioration for specific component, and engineering judgment.
Georgia	We measure section loss.
Hawaii	Condition factors used based on The Manual for Bridge Evaluation.
Idaho	
Illinois	The load rating is re-evaluated when the condition rating drops to "4" or below.
Indiana	
Iowa	
Kansas	Superstructure health index is used as a condition factor on load ratings until posting level is reached. All ratings below posting level must be backed up with calculations and engineering judgment.
Kentucky	
Louisiana	
Maine	
Maryland	If a structure has significant deterioration in its primary structural elements, the load rating computations would take into account these reduced section properties.
Massachusetts	Actual section properties are used in the numerical calculations. Also, if material properties are unknown, coupons and cores are used to establish the actual material properties and these are used in the calculations as well.
Michigan	Bridge condition is typically included when section loss exceeds 25% in most cases. Condition factor may be used in absence of more detailed information for LRFR ratings.
Minnesota	We use measured section loss when it is available.
Mississippi	When there is loss of section in a structural member of a bridge, the remaining section properties are computed and used to determine the load carrying capacity of the structure.
Missouri	We use field measurements to reduce the section of deteriorated members in our load rating software to evaluate weight limits of posted bridges.
Montana	We have a lot of timber bridges. When members of timber bridges are in poor condition, we typically used a reduced strength when load rating that member. For other bridges, such as steel girders with section loss, we used the reduced section properties given the measurements of section loss provided to us by our bridge inspectors.
Nebraska	Only if in poor condition by NBIS inspection standards or if engineering judgment suggests to rate.
Nevada	
New Hampshire	
New Mexico	NMDOT requires field measurements for load rating structurally deficient bridges to determine amount of section loss or other section properties.
New York	The operating capacity of the bridge is reduced by a factor that is partially based on the bridge's condition.
North Carolina	Structural member capacity is computed on the basis of section properties that are computed from field-measured dimensions.
North Dakota	Loss of section is used to determine the remaining capacity in the members to rate the bridge. Additional overburden is also subtracted from the available live load.
Ohio	When physical deterioration in a bridge is discovered during inspection, we go back and determine the extent of deterioration and section losses and include in the revised load rating of the bridge to determine if a posting for the reduced load limits is warranted.
Oklahoma	Use reduced section properties
Oregon	We modify the condition factor during load rating based on the condition determined from the bridge inspection. For steel and timber members, the field-measured dimensions of deteriorated members will also be used in the analysis.
South Dakota	
Tennessee	The available live load capacity may be reduced by computing properties based upon reduced cross-sectional area of deteriorated members and/or a reduction in the allowable stress of the material.
Texas	See the TxDOT Bridge Inspection Manual—Chapter 5 for a flowchart outlining the methodology.

(*continued on next page*)

TABLE A30
(*continued*)

State	Notes on Deterioration
Utah	Information is incorporated in load rating that leads to posting. As conditions change new load rating is performed and weight limits revisited.
Virginia	Condition factor—good/satisfactory/fair = 1.0; poor = 0.9. Section properties are computed from field measured dimensions of deteriorated members.
Washington	Reduce resistance factor, or use section properties based on field measurements.
West Virginia	We apply section loss where it occurs.
Wisconsin	We would typically modify section properties as required and run our posting analysis based on the modified section.
Wyoming	

LOAD RATING VEHICLES

What loads are used in evaluation of weight limits for posted bridges?

( ) AASHTO HS20
( ) AASHTO Type 3, 3S2 and 3-3
( ) AASHTO SU4, SU5, SU6 and SU7
( ) State-specific legal loads
( ) State-specific routine permit loads

TABLE A31
SURVEY RESPONSES—USE OF RATING VEHICLES

State	AASHTO			State Specific	
	HS20	Type 3, 3S2, 3-3	SU4, SU5, SU6, SU7	Legal loads	Routine permit loads
Alabama	Y	Y		Y	
Alaska	Y	Y		Y	
Arizona	Y				
California		Y			
Colorado				Y	Y
Delaware				Y	
Florida				Y	
Georgia	Y	Y		Y	
Hawaii		Y	Y		
Idaho				Y	
Illinois				Y	
Indiana	Y				
Iowa		Y		Y	
Kansas	Y	Y			
Kentucky	Y			Y	
Louisiana	Y	Y	Y	Y	
Maine	Y			Y	
Maryland	Y			Y	
Massachusetts		Y		Y	
Michigan		Y	Y	Y	
Minnesota	Y		Y	Y	
Mississippi	Y			Y	
Missouri				Y	
Montana	Y	Y			
Nebraska		Y		Y	
Nevada	Y				
New Hampshire				Y	
New Mexico	Y	Y		Y	
New York		Y		Y	
North Carolina				Y	
North Dakota	Y	Y			
Ohio				Y	
Oklahoma	Y	Y		Y	

TABLE A31
(*continued*)

State	AASHTO			State Specific	
	HS20	Type 3, 3S2, 3-3	SU4, SU5, SU6, SU7	Legal loads	Routine permit loads
Oregon		Y	Y	Y	Y
South Dakota				Y	
Tennessee	Y	Y		Y	
Texas	Y			Y	Y
Utah	Y	Y	Y		Y
Virginia	Y		Y	Y	
Washington	Y	Y	Y		
West Virginia	Y	Y		Y	
Wisconsin	Y	Y	Y	Y	Y
Wyoming	Y	Y			

Research Related to Load Posting

Is your state developing knowledge (research), practices or policies on special vehicles or loads for load rating or posting? (husbandry loads, for example)

( ) No
( ) Yes. Description or URL?

TABLE A32
SURVEY RESPONSES—RESEARCH ON SPECIAL VEHICLES OR LOADS FOR LOAD RATING OR POSTING

State	Note
Alabama	
Alaska	
Arizona	
California	
Colorado	Specialized hauling vehicles. Notional rating vehicle.
Delaware	
Florida	SU4 dump truck http://www.dot.state.fl.us/statemaintenanceoffice/LRManual82012.pdf
Georgia	Not at this time
Hawaii	
Idaho	
Illinois	Study of the Impacts of Implements of Husbandry on Bridges. Traditional bridge design and bridge rating are based on codified procedures that examine a bridge’s capability to resist traditional highway-type vehicles (e.g., trucks). It is known, however, that other vehicles (e.g., farm/agricultural vehicles or implements of husbandry) use these bridges. These farm vehicles have characteristics that are quite different from traditional vehicles; specifically, they tend to have different wheel spacing, different gage widths, different wheel footprints, dynamic coupling characteristics, and others. Further, these vehicles are carrying heavier loads as the agriculture industry has desired them to do so. Currently, the Iowa Department of Transportation Bridge Rating Engineer must make assumptions about how highway bridges resist these non-traditional vehicles. Thus, a research study is needed to more accurately characterize how applied loads from these implements of husbandry are resisted. Specifically, it is desired to understand how these agriculture loads are distributed through the structural elements comprising the bridge and to assess the magnitude of the dynamic loads these vehicles impose. Further, it is desired to know what methods of analyzing bridges for these loads are acceptable, so that accurate bridge ratings may be produced. The objective of this study is to determine how the implements of husbandry distribute their load within a bridge structural system and to provide recommendations for accurately analyzing bridges for these loading effects. To achieve this objective the distribution of live load and dynamic impact effects for different types of agricultural vehicles will be determined by load testing and evaluating two general types of bridges. The types of equipment studied will include, but will not be limited to, grain wagons/grain carts, manure tank wagons, agriculture fertilizer applicators, and tractors. Once the effect of these vehicles has been determined, recommendations for the analysis of bridges for these non-traditional vehicles will be developed. http://www.pooledfund.org/Details/Study/460

(*continued on next page*)

TABLE A32
(*continued*)

State	Note
Indiana	
Iowa	Pooled fund study on implements of husbandry. http://www.pooledfund.org/Details/Study/460
Kansas	
Kentucky	No
Louisiana	Develop LA design/rating vehicle based on WIM data
Maine	
Maryland	
Massachusetts	
Michigan	
Minnesota	
Mississippi	
Missouri	
Montana	
Nebraska	
Nevada	
New Hampshire	
New Mexico	
New York	
North Carolina	
North Dakota	
Ohio	
Oklahoma	Yes, participates in pooled-fund Study of the Impacts of Implements of Husbandry on Bridges.
Oregon	
South Dakota	
Tennessee	
Texas	
Utah	
Virginia	
Washington	
West Virginia	WV SU4 and coal haulers using WV Coal Resource Transportation System Roads
Wisconsin	The Effects of Implements of Husbandry Farm Equipment on Rigid Pavement Performance
Wyoming	

Is your state developing knowledge (research), practices or policies on special load factors for load posting? Special load posting equation or calibration?

( ) No
( ) Yes. Description or URL?

TABLE A33
SURVEY RESPONSES—RESEARCH ON SPECIAL LOAD FACTORS FOR LOAD POSTING

State	Note
Alabama	
Alaska	
Arizona	
California	
Colorado	
Delaware	
Florida	
Georgia	Not at this time
Hawaii	
Idaho	
Illinois	
Indiana	
Iowa	
Kansas	
Kentucky	No

TABLE A33
(*continued*)

State	Note
Louisiana	
Maine	
Maryland	
Massachusetts	
Michigan	
Minnesota	
Mississippi	
Missouri	
Montana	
Nebraska	
Nevada	
New Hampshire	
New Mexico	
New York	
North Carolina	
North Dakota	
Ohio	
Oklahoma	No
Oregon	Calibration of LRFR Live Load Factors for Oregon State-Owned Bridges Using Weigh-In-Motion Data Live load factors for bridge rating have been calculated using Oregon weigh-in-motion (WIM) data. These factors have been calculated for four sites, including state and Interstate routes around the state and at different seasons. This report presents the analysis methods used to determine the site-specific live load factors and the resulting live load factors based on WIM data. ftp://ftp.odot.state.or.us/Bridge/LoadRating/Tier-2/Calibration/
South Dakota	
Tennessee	
Texas	
Utah	
Virginia	
Washington	
West Virginia	No
Wisconsin	
Wyoming	

Is your state developing knowledge, practices or policies on load testing for load posting? Special load posting equation or calibration?

( ) No
( ) Yes. Description or URL?

TABLE A34
SURVEY RESPONSE—RESEARCH ON LOAD TESTING FOR LOAD POSTING

State	Note
Alabama	
Alaska	Structural Health Monitoring and Condition Assessment of the Chulitna River Bridge
Arizona	
California	
Colorado	
Delaware	Effective Width of Concrete Slab Bridges will be provided if requested and approved by the authors Internal research report
Florida	
Georgia	Not at this time
Hawaii	
Idaho	
Illinois	
Indiana	
Iowa	Demonstration of capacities and benefits of bridge load rating through physical testing

(*continued on next page*)

TABLE A34
(*continued*)

State	Note
Kansas	
Kentucky	Yes
Louisiana	
Maine	
Maryland	
Massachusetts	
Michigan	
Minnesota	
Mississippi	
Missouri	
Montana	
Nebraska	
Nevada	
New Hampshire	
New Mexico	
New York	
North Carolina	
North Dakota	
Ohio	
Oklahoma	
Oregon	
South Dakota	
Tennessee	
Texas	
Utah	
Virginia	Structural load testing and flexure analysis of the Route 701 Bridge in Louisa County, Virginia: supplemental report A continuous slab bridge in Louisa County, Virginia, on Route 701 developed a planar horizontal crack along the length of all three spans. This project was designed to determine if the current 12-ton posted load restriction of the bridge (instituted in January 2002) could be raised and to determine if the horizontal crack causes degradation in the structural integrity, specifically stiffness, over time. These objectives were accomplished through field tests performed in November 2003 and October 2004. One truck (loaded to three different weights) was used to perform static and dynamic tests on the bridge, and the truck was oriented in three test lanes. Vertical displacement sensors, or deflectometers, attached to the underside of the bridge slab were used to measure deflections during truck passes. The recorded deflections were analyzed and normalized to document the current behavior of the bridge. The 2003 values were compared to estimated design values in accordance with the AASHTO Standard Specifications for Highway Bridges. Under the testing loads, the bridge behaved elastically; thus raising the load rating of the bridge to 27 tons was considered safe. Normalized deflections from both years were compared to determine if there was progressive damage to the bridge attributable to crack growth. The researchers concluded that no degradation of the stiffness of the bridge occurred over the last year of service. Carrying out the recommendation of this report to remove the posting that restricts loading of the structure will not incur any significant cost. The benefit of removing the posting would be that trucks weighing more than 12 tons, but not exceeding the legal limit, could cross the structure. This would allow the Virginia DOT to defer superstructure replacement, at an estimated cost of $350,000, thus freeing up funds to address more pressing needs. http://www.virginiadot.org/vtrc/main/online_reports/pdf/06-r14.pdf
Washington	
West Virginia	No
Wisconsin	Effects of OSOW Vehicles on Complex Bridges In-progress (not yet initiated)
Wyoming	

Other new knowledge, practices or policies on load posting?
( ) No
( ) Yes. Description or URL?

TABLE A35
SURVEY RESPONSES—OTHER RESEARCH ON LOAD POSTING

State	Note
Alabama	
Alaska	
Arizona	
California	
Colorado	
Delaware	
Florida	
Georgia	Not at this time
Hawaii	
Idaho	
Illinois	
Indiana	
Iowa	
Kansas	
Kentucky	
Louisiana	
Maine	
Maryland	
Massachusetts	
Michigan	
Minnesota	
Mississippi	
Missouri	We're currently doing research on how fill heights affect the live load for the load rating of box culverts.
Montana	
Nebraska	
Nevada	
New Hampshire	
New Mexico	We are in the process of awarding a research project titled "Load Rating Bridges with No As-built Plans."
New York	New York State conducted a research project with City College of New York based on LRFR methodology for load rating and posting bridges in NYS. Link as follows: http://ntl.bts.gov/lib/44000/44400/44422/C-06-13__vol_1_Final_Report.pdf
North Carolina	
North Dakota	Agriculture-related loads receive a 10% increase over legal loads during harvest time.
Ohio	
Oklahoma	
Oregon	
South Dakota	
Tennessee	TDOT is considering initiating a research project to investigate load testing for load posting. This research project is currently only in the planning state.
Texas	
Utah	
Virginia	Additional load testing and bridge research information in Virginia is available through the Virginia Center for Transportation Innovation and Research (VCTIR): http://vtrc.virginiadot.org/default.htm
Washington	
West Virginia	
Wisconsin	Analysis of Permit Vehicle Loads in Wisconsin: http://wisdotresearch.wi.gov/wp-content/uploads/WisDOT-WHRP-project-0092-08-15-final-report.pdf
Wyoming	

APPENDIX B

Detailed Information on Fines, Loads, and Vehicles

OVERWEIGHT FINES

TABLE B1
DETAIL ON OVERWEIGHT FINES

State	Note	Overweight (lb)	Fine
Arizona (*53*)		1,001 to 1,250	$100
		1,251 to 1,500	$200
		1,501 to 2,000	$300
		2,001 to 2,500	$400
		2,501 to 3,000	$500
		3,001 to 3,500	$840
		3,501 to 4,000	$980
		4,001 to 4,500	$1,120
		4,501 to 4,750	$1,260
		4,751 to 5,000	$1,400
		5,001 and over	$1,400 + $100/1,000 lb excess
Colorado (*54*)	Axle or GVW	1–2,500	Fine + surcharge $50 + $(55)
		2,501–5,000	$100 + $96
		5,001–7,500	$200 + $192
		7,501–10,000	$400 + $384
		Over 10,000	$400 + $150/1,000 lb excess, plus $296 + $144/1,000 lb excess
	Permit loads	Fines doubled	
Delaware (*55*)	First offense	≤5,000	$0.023/lb
		>5,000	$0.0575/lb
		≤5,000	$0.0575/lb
		>5,000	$0.115/lb
Florida (*56*)		All	$0.05/lb
Georgia (*57*)		All	$0.05/lb
	Operation without permit	All	$0.0625/lb
Georgia (*127*)		1 to 1,000	0.008/lb
		1,001 to 3,000	plus 0.015/lb excess
		3,001 to 5,000	plus 0.03/lb excess
		5,001 to 8,000	plus 0.04/lb excess
		Over 8,000	plus 0.05/lb excess
Idaho (*58*)		1 to 1,000	$5
		1,001 to 2,000	$15
		2,001 to 4,000	$25
		4,001 to 15,000	$25 + $0.1341/lb excess
		15,001 to 20,000	$1,500 + $0.20/lb excess
		Over 20,000	$2,500 + $0.30/lb excess
Illinois (*9*)		≤2,000	$100
		2,001 to 2,500	$270
		2,501 to 3,000	$330
		3,001 to 3,500	$520
		3,501 to 4,000	$600
		4,001 to 4,500	$850
		4,501 to 5,000	$950
		>5,000	$1,500 + $150/500 excess
	Permit move, axle weight	≤1,000	2¢ to 5¢/lb
		1,001 to 2,000	5¢ to 10¢/lb
		2,001 to 3,000	10¢ to 15¢/lb
		>3,000	15¢ to 20¢/lb
	Permit move, GVW	Same schedule as permit/axle overweight violation	

TABLE B1
(*continued*)

State	Note	Overweight (lb)	Fine
Indiana (*59*)		No fixed schedule	
Iowa (*60*)	Axle, tandem axle, axle groups	Up to 1,000	$12
		1,001 to 2,000	$22
		2,001 to 3,000	$155
		3,001 to 4,000	$240
		4,001 to 5,000	$375
		5,001 to 6,000	$585
		6,001 to 7,000	$850
		7,001 to 8,000	$950
		8,001 to 9,000	$1,050
		9,001 to 10,000	$1,150
		10,001 to 11,000	$1,300
		11,001 to 12,000	$1,400
		12,001 to 13,000	$1,500
		13,001 to 14,000	$1,600
		14,001 to 15,000	$1,700
		15,001 to 16,000	$1,800
		16,001 to 17,000	$1,900
		17,001 to 18,000	$2,000
		18,001 to 19,000	$2,100
		19,001 to 20,000	$2,200
		Over 20,000	$2,200 + $0.10/lb excess
	GVW	½ of fine rate for axles, tandem axles, axle groups	
Kansas (*61*)	GVW	Up to 1,000	$40
		1,001 to 2,000	3¢/lb
		2,001 to 5,000	5¢/lb
		5,001 to 7,500	7¢/lb
		7,501 and over	10¢/lb
Louisiana (*62*)	GVW	Below 1,000	$10.00
		1,000 to 1,999	1¢/lb
		2,000 to 2,999	2¢/lb
		3,000 to 3,999	3¢/lb
		4,000 to 4,999	4¢/lb
		5,000 to 5,999	5¢/lb
		6,000 to 6,999	6¢/lb
		7,000 to 7,999	7¢/lb
		8,000 to 8,999	8¢/lb
		9,000 to 9,999	9¢/lb
		10,000 to 10,999	10¢/lb
		11,000 and over	11¢/lb
	GVW, permit load	0 to 3,000	2¢/lb
		3,001 to 5,000	3¢/lb
		5,001 to 10,000	4¢/lb
		10,001 and over	$100 + 5¢/lb
Maine (*63*)	GVW, six-axle combinations for GVW > 100,000 lb	$100 + $20 for each percent over 1%	
		$280 + $125 for each percent over 10%	
		$1,530 + $135 for each percent over 20%	
		$2,880 + $150 for each percent over 30%	
		$4,380 + $175 for each percent over 40%	
	Axle, Axle group, GVW	$10 for each percent	
		$100 + $65 for each percent over 10%	
		$750 + $75 for each percent over 20%	
		$1,500 + $105 for each percent over 30%	
		$2,550 + $140 for each percent over 40%	
		$3,950 + $180 for each percent over 50%	
Maryland (*64*)	GVW	To 1,000	1¢/lb
		1,000 to 5,000	5¢/lb
		5,001 to 10,000	12¢/lb
		10,001 to 20,000	20¢/lb
		Over 20,000	40¢/lb
Massachusetts (*65*)	Massachusetts Turnpike	Up to 10,000	3¢/lb
		Over 10,000 lb	6¢/lb excess
		To 10,000	4¢/lb excess
		Over 10,000	8¢/lb

(*continued on next page*)

TABLE B1
(*continued*)

State	Note	Overweight (lb)	Fine
Michigan (*66*)	GVW	2,500 to 3,000	4¢/lb
		3,001 to 4,000	6¢/lb
		4,001 to 5,000	8¢/lb
		Over 5,000	10¢/lb
Minnesota (*67*)	GVW	Up to 1,000	1¢/lb
		1,001 to 3,000	$10 + 5¢/lb excess
		3,001 to 5,000	$110 + 10¢/lb excess
		5,001 to 7,000	$310 + 15¢/lb excess
		Over 7,000	$610 + 20¢/lb excess
Montana (*68*)	Axle, Axle group	Up to 2,000	$30
		2,001 to 4,000	$75
		4,001 to 6,000	$125
		6,001 to 8,000	$175
		8,001 to 10,000	$250
		10,001 to 12,000	$275
		12,000 to 14,000	$300
		14,001 to 16,000	$400
		16,001 to 18,000	$500
		18,001 to 20,000	$600
		20,001 to 25,000	$1,000
		Over 25,000	$2,000
Nevada (*69*)		To 1,500	$10
		1,501 to 2,500	1¢/lb
		2,501 to 5,000	2¢/lb
		5,001 to 7,500	4¢/lb
		7,501 to 10,000	6¢/lb
		Over 10,001	8¢/lb
New York (*70*)	GVW	<2%	$150
		2% to 4%	$300
		4% to 6%	$450
		6% to 7%	$525
		7% to 8%	$600
		8% to 10%	$750
		10% to 12%	$950
		12% to 14%	$1,150
		14% to 16%	$1,350
		16% to 18%	$1,550
		18% to 20%	$1,750
		20% to 22%	$1,950
		22% to 24%	$2,150
		24% to 26%	$2,350
		26% to 28%	$2,550
		28% to 30%	$2,750
		30% to 32%	$2,950
		32% to 34%	$3,150
		34% to 36%	$3,350
		36% to 38%	$3,550
		38% to 40%	$3,750
		>40%	$3,750 + $125/percent excess
North Carolina (*71*)	Axle or tandem axle	≤1,000	6¢/lb
		>1,000	10¢/lb
	Axle group	≤2,000	2¢/lb
		2,000 to 5,000	4¢/lb
		>5,000	10¢/lb
North Dakota (*72*)		1 to 1,000	$20
		1,001 to 2,000	$40
		2,001 to 3,000	$60
		3,001 to 4,000	$140
		4,001 to 5,000	$220
		5,001 to 6,000	$305
		6,001 to 7,000	$380

TABLE B1
(*continued*)

State	Note	Overweight (lb)	Fine
		7,001 to 8,000	$495
		8,001 to 9,000	$575
		9,001 to 10,000	$655
		10,001 to 11,000	$1,100
		11,001 to 12,000	$1,200
		12,001 to 13,000	$1,300
		13,001 to 14,000	$1,680
		14,001 to 15,000	$1,800
		15,001 to 16,000	$1,920
		16,001 to 17,000	$2,550
		17,001 to 18,000	$2,700
		18,001 to 19,000	$2,850
		19,001 to 20,000	$3,000
		20,001 to 21,000	$4,200
		21,001 to 22,000	$4,400
		22,001 to 23,000	$4,600
		23,001 to 24,000	$4,800
		24,001 to 25,000	$5,000
		25,001 to 26,000	$5,200
		26,001 to 27,000	$5,400
		27,001 to 28,000	$5,600
		28,001 to 29,000	$5,800
		29,001 to 30,000	$6,000
		Over 30,000	Additional $200/1,000 lb excess
Ohio (*73*)		Up to 2,000	$80
		2,001 to 5,000	$100 + 1¢/lb excess
		5,001 to 10,000	$130 + 2¢/lb excess
		Over 10,000	$160 + 3¢/lb excess
Oklahoma (*121*)		To 2,000	1¢/lb
		Over 2,000	2¢/lb excess
Oregon (*74*)	Schedule I, violation of legal load	Up to 1,000	$100
		1,001 to 2,000	$150
		2,001 to 3,000	$200
		3,001 to 5,000	$300
		5,001 to 7,500	15¢/lb
		7,501 to 10,000	16¢/lb
		10,001 to 12,500	20¢/lb
		Over 12,500	24¢/lb
	Schedule II, violation of permit load	100 to 5,000	$200 + 10¢/lb
		5,001 to 10,000	350 + 15¢/lb
		Over 10,000	$600 + 30¢/lb
	Schedule III, violation of posted weight limits	100 to 5,000	$200 + 15¢/lb
		5,001 to 10,000	$350 + 20¢/lb
		Over 10,000	Class C misdemeanor
South Dakota (*75*)		1,001 to 3,000	5¢/lb
		3,001 to 4,000	15¢/lb
		4,001 to 5,000	22.5¢/lb
		5,001 to 10,000	37.5¢/lb
		Over 10,000	75¢/lb
Texas (*76*)	Axle, tandem axle, or GVW	5,001 to 10,000	$300 to $500
		Over 10,000	$500 to $1,000
		Second conviction in 12 months	Fines doubled
Utah (*77*)	Axle	2,001 to 5,000	4¢/lb
		5,001 to 8,000	5¢/lb
		8,001 to 12,000	6¢/lb
		12,001 to 16,000	7¢/lb
		16,001 to 20,000	9¢/lb
		20,001 to 25,000	11¢/lb
		Over 25,000	13¢/lb
	GVW	2,001 and greater	5¢/lb

(*continued on next page*)

TABLE B1
(*continued*)

State	Note	Overweight (lb)	Fine
Virginia (*78*)	Axle	To 2,000	1¢/lb
		2,001 to 4,000	3¢/lb
		4,001 to 8,000	12¢/lb
		8,001 to 12,000	22¢/lb
		Over 12,001	35¢/lb
	GVW	To 2,000	1¢/lb
		2,001 to 4,000	3¢/lb
		4,001 to 8,000	7¢/lb
		8,001 to 12,000	12¢/lb
		Over 12,001	20¢/lb
	Axle, forest or farm products	To 4,000	1¢/lb
		4,001 to 8,000	10¢/lb
		8,001 to 12,000	20¢/lb
		Over 12,001	30¢/lb
	GVW, forest or farm products	To 4,000	1¢/lb
		4,001 to 8,000	5¢/lb
		8,001 to 12,000	10¢/lb
		Over 12,001	15¢/lb
Washington (*79*)		To 4,000	3¢/lb
		4,001 to 10,000	$120 + 12¢/lb excess
		10,001 to 15,000	$840 + 16¢/lb excess
		15,001 to 20,000	$1,640 + 20¢/lb excess
		Over 20,000	$2,640 + 30¢/lb excess
West Virginia (*80*)		1 to 4,000	$20
		4,001 to 5,000	$25
		5,001 to 6,000	$60
		6,001 to 7,000	$70
		7,001 to 8,000	$80
		8,001 to 9,000	$90
		9,001 to 10,000	$100
		10,001 to 11,000	$165
		11,001 to 12,000	$180
		12,001 to 13,000	$195
		13,001 to 14,000	$210
		14,001 to 15,000	$225
		15,001 to 16,000	$320
		16,001 to 17,000	$340
		17,001 to 18,000	$360
		18,001 to 19,000	$380
		19,001 to 20,000	$400
		20,001 to 21,000	$525
		21,001 to 22,000	$550
		22,001 to 23,000	$575
		23,001 to 24,000	$600
		24,001 to 25,000	$625
		25,001 to 26,000	$780
		26,001 to 27,000	$810
		27,001 to 28,000	$840
		28,001 to 29,000	$870
		29,001 to 30,000	$900
		30,001 to 40,000	$1,200
		40,001 to 50,000	$1,400
		50,001 and Over	$1,600
Wisconsin (*81*)	1st conviction	To 2,000	1¢/lb
		2,001 to 3,000	2¢/lb
		3,001 to 4,000	3¢/lb
		4,001 to 5,000	5¢/lb
		Over 5,000	7¢/lb
	2nd conviction in 12 months	To 2,000	2¢/lb
		2,001 to 3,000	4¢/lb
		3,001 to 4,000	6¢/lb
		4,001 to 5,000	8¢/lb
		Over 5,000	10¢/lb

TABLE B1
(*continued*)

State	Note	Overweight (lb)	Fine
	Raw forest products, 1st or 2nd conviction	To 2,000	6¢/lb
		2,001 to 3,000	8¢/lb
		3,001 to 4,000	9¢/lb
		4,001 to 5,000	10¢/lb
		Over 5,000	11¢/lb
	Raw forest products, 3rd conviction	To 3,000	20¢/lb
		3,001 to 4,000	21¢/lb
		4,001 to 5,000	22¢/lb
		Over 5,000	23¢/lb

LEGAL LOADS DETAIL

TABLE B2
DETAIL ON STATE LEGAL LOADS

State	Axle, GVW	System	Configuration	Load (lb)
Alabama (*7*)	Axle	State		20,000
	Tandem	Federal		34,000
	Tandem	State		40,000
	Group	State	3 axles	60,000
	Group	State	4 axles	75,000
	Group	State	5 axles	80,000
	Group	State	6 axles	84,000
	GVW	Federal	Federal Bridge Formula	80,000 max.
Alaska (*89*)	Axle	All		20,000
	Tandem	All		38,000
	Group	All	3 axles	42,000
	Group	All	4 axles	50,000
	GVW	All	Federal Bridge Formula	No maximum
Arizona (*53*)	Axle	All		20,000
	Tandem	All		34,000
	Group	All	5+ axles	80,000
	GVW	All	Federal Bridge Formula	80,000 max.
California (*90*)	Wheel	All		10,500
	Axle	All		20,000
	Tandem	All		34,000
	GVW	All	Federal Bridge Formula	80,000 max.
Colorado (*54*)	Wheel	All		9,000
	Axle	All		20,000
	Tandem	Federal		36,000
	Tandem	State		40,000
	GVW	All	2 axle	36,000
	GVW	All	3 axle	54,000
	GVW	All	Colorado Bridge Formula, W = 1000(L +40)	85,000 max.
Delaware (*55*)	Axle	State		22,400
	Tandem	State		40,000
	Tandem	Federal		40,000
	GVW	Federal	3 axle	54,000
	GVW	State	3 axle	65,000
	GVW	State	4 axle	73,280
	GVW	Federal	4 axle	74,000
	GVW	State	5 axle	80,000
	GVW	Federal	5 axle	80,000
	GVW	Federal	Federal Bridge Formula	80,000 max.
Florida (*91*)	Axle	All		20,000
	GVW	All	Federal Bridge Formula	80,000 max.

(*continued on next page*)

TABLE B2
(*continued*)

State	Axle, GVW	System	Configuration	Load (lb)
Georgia (*57*)	Axle			18,000
	Tandem	Federal		34,000
	Tandem	State		40,680
	Tandem	Federal	GVW < 73,280 lb	40,680
	GVW	County		56,000
	GVW		4 axles	70,000
	GVW	All	Federal Bridge Formula	80,000
Hawaii (*92*)	Wheel	Federal		11,250
	Axle	Federal		22,500
	Tandem	Federal	Tandem axle spacing ≤ 40 in.	22,500
	Tandem	Federal	Tandem axle spacing > 40 in.	34,000
	GVW	Federal	Federal Bridge Formula	80,000 max.
	GVW	State	Hawaii Bridge Formula, $W = 900(L + 40)$	88,000 max.
Idaho (*58*)	Wheel	All		10,000
	Axle	All		20,000
	Tandem	Federal		34,000
	Tandem	State	GVW ≤ 80,000 lb	37,800
	GVW	Federal		80,000
	GVW	State		105,500
	GVW	State	Federal Bridge Formula	129,000 max.
Illinois (*9*)	Axle	All		20,000
	Tandem	All		34,000
	GVW	Local access	3-vehicle combo, towing	40,000
	GVW	Local access	Combination vehicles	80,000
	GVW	All	5+ axles	80,000
	GVW	All	Federal Bridge Formula	80,000 max.
Indiana (*93*)	Tandem	All		32,000
	Tandem	All		34,000
	Axle	All		18,000
	Axle	All		20,000
	Axle	All	Heavy duty highway	22,400
	GVW	All	Highways not designated ‘heavy duty’	73,280
	GVW	All	Federal Bridge Formula	80,000 max.
Iowa (*60*)	Axle			20,000
	Tandem			34,000
	GVW			80,000
	GVW	non-Interstate	6 axles	90,000
	GVW	non-Interstate	7 axles	96,000
Kansas (*94*)	Wheel	All		10,000
	Axle	All		20,000
	Tandem	All	4 ft spacing	34,000
	GVW	Federal		80,000
	GVW	All	3 axles, 57 ft wheelbase	83,500
	GVW	All	7 axles, 32 ft wheelbase	84,500
	GVW	All	6 axles, 34 ft wheelbase	85,500
	GVW	All	5 axles	85,500
	GVW	All	4 axles, 53 ft wheelbase	85,500
	GVW	All	2 axles, wheelbase	85,500
Kentucky (*95*)	Axle	Interstate	Class “AAA” highway	20,000
	Tandem	Interstate		34,000
	Tridem	Interstate	GVW < 73,280 lb	48,000
	GVW		Class “A” highway	44,000
	GVW		Class “AA” highway	62,000
	GVW	Interstate	Class “AAA” highway	80,000
	GVW	Interstate	Federal Bridge Formula	80,000 max.
Louisiana (*96*)	Axle	All		20,000
	Tandem	All		34,000
	Group	All	3 axle	42,000
	Group	All	4 axle	50,000
	GVW	All		80,000
	GVW	All	Federal Bridge Formula	80,000 max.
	GVW	Federal	3 or 4 axle	83,400
	GVW	State	3 or 4 axle	88,000

TABLE B2
(*continued*)

State	Axle, GVW	System	Configuration	Load (lb)
Maine (*63*)	Axle	Interstate	GVW > 73,280 lb	20,000
	Axle	Interstate	GVW ≤ 73,280 lb	22,000
	Axle		3-axle truck tractor + tri-axle semi-trailer	22,400
	Tandem	Interstate		34,000
	Tandem		3-axle truck tractor + tri-axle semi-trailer	38,000
	Tandem	non-Interstate	3-axle truck tractor + tri-axle semi-trailer	41,000
	Tri-axle		3-axle truck tractor + tri-axle semi-trailer	48,000
	Tri-axle	non-Interstate	3-axle truck tractor + tri-axle semi-trailer	50,000
	GVW	Me Tpk. & non-Interstate	2-axle vehicle	34,000
	GVW	Me Tpk. & non-Interstate	3-axle vehicle or combination	54,000
	GVW	Me Tpk. & non-Interstate	4-axle vehicle or combination	69,000
	GVW	Me Tpk. & non-Interstate	Combination vehicles with 5 or more axles	80,000
	GVW		4-axle truck + 2-axle trailer	94,000
	GVW	Me Tpk. & non-Interstate	3-axle truck tractor + tri-axle semi-trailer	100,000
	GVW	Interstate	Federal Bridge Formula	
Maryland (*10*)	Axle	All	GVW > 73,000 lb	20,000
	Axle	All	GVW < 73,000 lb	22,400
	Tandem	All		34,000
	GVW	All	3 axle	55,000
	GVW	All	Combination, 3 axle	55,000
	GVW	All	4 axle	66,000
	GVW	All	Combination, 4 axle	66,000
	GVW	Local		73,000
	GVW	All	5 axle	80,000
	GVW	All	Combination, 5 axle	80,000
	GVW	All	Federal Bridge Formula	80,000 max.
	GVW	Local	6 axle, Garrett County	87,000
Massachusetts (*97*)	Axle	All		24,000
	Tandem	All	Per axle, <6 ft spacing	18,000
	Tandem	All	Per axle, 6 ft spacing	22,400
	Group	All	2 axle	46,000
	GVW	All	3 axle	80,000
	GVW	All	Federal Bridge Formula	80,000 max.
Michigan (*119*)	GVW	All	Federal Bridge Formula	80,000 max.
Michigan (*98*)	Axle	All	GVW ≥ 80,000, 3.5 ft spacing	13,000
	Axle	All	Per axle in tandem, GVW ≥ 80,000	16,000
	Axle	All	GVW ≥ 80,000, 9 ft spacing	18,000
	Axle	All	GVW < 80,000, 9 ft spacing	20,000
	Tandem	All	Per axle, GVW ≥ 80,000, spacing < 3.5 ft	9,000
	Tandem	All	GVW < 80,000	34,000
	GVW			164,000
Minnesota (*99*)	Group	All	Tandem axle	34,000
	Group	All	3 axles, 7 ft spacing	37,000
	Group	All	3 axles, 8 ft spacing	38,500
	GVW	All	4 axle	80,000
	GVW	All		80,000 max.
	GVW	Exempt	Hauling livestock	88,000
	GVW	State exempt	Forest products	99,000
Mississippi (*100*)	Axle	All		20,000
	Tandem	All	Tandem axle	34,000
	Group	All	36 ft spacing to next group	57,650
	Group	All	38 ft spacing to next group	64,650
	GVW	All	Federal Bridge Formula	80,000 max.
Missouri (*101*)	Axle	All		20,000
	Tandem	All		46,000
	Group	All	3 axle	60,000
	Group	All	4 axle	72,000
	GVW	All		80,000

(*continued on next page*)

TABLE B2
(*continued*)

State	Axle, GVW	System	Configuration	Load (lb)
Montana (*102*)	Axle			20,000
	Tandem			34,000
	GVW		Federal Bridge Formula	131,060
	GVW	All	23 USC 658 App C	137,800
Nebraska (*103*)	Axle	All		20,000
	Tandem	All	4 ft spacing	34,000
	Tandem	All	8 ft spacing	38,000
	Tandem	All	10 ft spacing	40,000
	Group	All	3 axles, 8 ft length	34,000
	Group	All	3 axles, 32 ft length	60,000
	Group	All	4 axles, 57 ft length	80,000
	Group	non-Interstate	5 axles, 60 ft length	85,500
	Group	non-Interstate	6 axles, 60 ft length	90,000
	Group	non-Interstate	7 axles, 60 ft length	95,000
	GVW	Federal		80,000
Nevada (*113*)	Tandem	All	10 ft spacing	40,000
	Group	All	5 axles, 83 ft length	100,000
	Group	All	6 axles, 110 ft length	120,000
	Group	All	7 axles, 118 ft length	129,000
	Group	All	8 axles, 110 ft length	129,000
	Group	All	9 axles, 101 ft length	129,000
	Group	All	3 axles, 32 ft length	60,000
	Group	All	4 axles, 57 ft length	80,000
New Hampshire (*13*)	Axle	Federal	GVW > 73,280, spacing ≤ 8 ft	17,000
	Axle	Federal	GVW ≤ 73,280, spacing < 10 ft	18,000
	Axle	State	GVW ≤ 73,280, spacing < 10 ft	18,000
	Axle	Federal	GVW > 73,280, spacing > 8 ft	20,000
	Tandem	Federal		33,400
	Tandem	State		33,400
	Tandem	State	4-axle vehicle, additional registration	36,000
	Tandem	State	Additional registration	37,400
	Group	Federal	3 axles, per axle, GVW ≤ 73,280, spacing ≥ 10 ft	22,400/axle
	Group	State	3 axles, per axle, GVW ≤ 73,280, spacing ≥ 10 ft	22,400/axle
	Group	State	3 axles of 4-axle vehicle, additional registration	54,000
	Group	State	3 axle	55,000
	Group	State	4 axle	60,000
	Group	State	3 axles, additional registration	65,000
	Group	State	4 axles, additional registration	73,000
	GVW	Federal	3 axle	47,500
	GVW	Federal	4 axle	47,500
	GVW	Federal	Federal Bridge Formula	80,000 max.
	GVW	State	Federal Bridge Formula	80,000 max.
	GVW	State	Additional registration	99,000
New Mexico (*105*)	Axle	All		21,600
	GVW	All	56 ft and over	86,400
	Wheel	All		11,000
New York (*70*)	Wheel	All		11,200
	Axle	All		22,400
	Tandem	All	Spacing < 8 ft	36,000
	Tandem	All	Conform to Federal Bridge Formula	40,000 max.
	Tandem	All	Spacing ≥ 8 ft	40,000
	Group	All	3+ axle	80,000
	GVW	All	New York Bridge Formula, 34,000 + (1000 x L)	71,000 max.
	GVW	All	Federal Bridge Formula	80,000 max.
North Carolina (*106*)	Axle	All		20,000
	Axle	All	Conform to Federal Bridge Formula	21,000
	Tandem	All		38,000
	Tandem	All	Conform to Federal Bridge Formula	40,000
	Group	All	2 tandem axles, per tandem, 36 ft wheelbase	34,000
	GVW	All	Federal Bridge Formula	80,000 max.

TABLE B2
(*continued*)

State	Axle, GVW	System	Configuration	Load (lb)
North Dakota (*72*)	Wheel	Federal		10,000
	Axle	All		20,000
	Tandem	Federal		34,000
	Tandem	State		48,000
	GVW	Federal	Federal Bridge Formula	80,000 max.
	GVW	State	Conform to Federal Bridge Formula	105,000 max.
Ohio (*73*)	Axle	All		20,000
	Tandem	Federal		34,000
	Tandem	State	Wheelbase 10ft	40,000
	Group	State	3 axles, wheelbase 18 ft	48,000
	GVW	Federal	Federal Bridge Formula	
Oklahoma (*107*)	Axle	State		20,000
	Tandem	State		40,000
	Triple	State		60,000
Oregon (*74*)	Wheel	All		10,000
	Axle	All		20,000
	Tandem	All		34,000
	GVW	State	4 axle, 35 ft wheelbase	70,000
	GVW	All	Federal Bridge Formula	80,000 max.
South Dakota (*122*)	Axle	All		20,000
	Tandem	All		34,000
South Dakota (*75*)	GVW	All	5 axle, 83 ft wheelbase	100,000
	GVW	All	6 axle, 110 ft wheelbase	120,000
	GVW	All	7 axle	124,000
	GVW	All	8 axle	129,000
	GVW	All	9 axle	134,000
	GVW	All	10 axle	139,000
	GVW	All	11 axle	144,500
	GVW	All	12 axle	150,000
	GVW	All	13 axle	155,500
	GVW	Federal		80,000
Tennessee (*109*)	Axle	All		20,000
	Tandem	All		34,000
	GVW	All	Federal Bridge Formula	80,000 max.
Texas (*76*)	Axle	All		20,000
	Tandem	All		34,000
	GVW	All	Federal Bridge Formula	80,000 max.
Utah (*77*)	Wheel	All		10,500
	Axle	All		20,000
	Tandem	All		34,000
	GVW	All	Federal Bridge Formula	80,000 max.
Virginia (*78*)	Axle			20,000
	Tandem			34,000
	GVW		Federal Bridge Formula	80,000 max.
Washington (*79*)	Axle	All		20,000
	Tandem	All		34,000
	GVW	All	Federal Bridge Formula	105,500 max.
	GVW	State	Comply with bridge formula	115,000
West Virginia (*110*)	Axle	Interstate		20,000
	Tandem	Interstate		34,000
	Tandem	non-Interstate	3 axle	60,000
	Tridem	non-Interstate	4 axle	70,000
	Quadrem	non-Interstate	5 axle	73,000
	GVW	Local		65,000
	GVW	Interstate	Federal Bridge Formula	80,000
Wisconsin (*81*)	Wheel	Class A Hwy		11,000
	Axle	Class A Hwy		20,000
	Tandem	Class A Hwy		34,000
	GVW	Class A Hwy	Federal Bridge Formula	80,000 max.

(*continued on next page*)

TABLE B2
(*continued*)

State	Axle, GVW	System	Configuration	Load (lb)
Wyoming (*111*)	Wheel	All		10,000
	Axle	All		20,000
	Tandem	All		36,000
	Group	All	3 axle	42,000
	GVW	State	Conforming to Table 2	80,000
	GVW	All	Federal Bridge Formula	117,000 max.

EXEMPT VEHICLES BY WEIGHT

TABLE B3
DETAIL ON STATE EXEMPT VEHICLES BY WEIGHT

State	Axle, GVW	System	Configuration	Load (lb)
Alabama (*7*)	Axle		Dump trucks	20,000
	Axle		Trailer, farm agricultural commodities	10,000
	GVW		Dump trucks	66,000
	GVW		Trailer, farm agricultural commodities	36,000
California (*90*)	Axle		Livestock hauling, dump trucks, cranes, buses, ready-mix trucks, public utility, garbage trucks, log haulers, cotton modules	
Colorado (*54*)	Axle	State	Utility truck	21,000
Delaware (*55*)	GVW	State	3 axles, agricultural products	70,000
	GVW		Fire apparatus	
	GVW		Farm equipment	
Florida (*91*)	Axle		Dump truck	20,000
	GVW		Dump truck	70,000
Georgia (*57*)	Axle		Forest products, live poultry, cotton, feed, granite, any other naturally occurring raw ore or mineral, construction aggregates, solid waste or recovered materials, concrete that is in a freshly mixed and unhardened state, poultry waste	23,000
	Tandem		Forest products, live poultry, cotton, feed, granite, any other naturally occurring raw ore or mineral, construction aggregates, solid waste or recovered materials, concrete that is in a freshly mixed and unhardened state, poultry waste	46,000
	GVW		Forest products, live poultry, cotton, feed, granite, any other naturally occurring raw ore or mineral, construction aggregates, solid waste or recovered materials, concrete that is in a freshly mixed and unhardened state, poultry waste	80,000
Idaho (*58*)	Tandem	Exempt	Logs, pulpwood, stull, poles or piling; ores, concentrates, sand and gravel, and aggregates thereof, unprocessed agricultural products, including livestock, GVW ≤ 79,000 lb	37,800
Illinois (*9*)	Axle	State	Collection of rendering materials	22,000
	Axle	State	Garbage, refuse, or recycling operations	22,000
	Tandem	State	Collection of rendering materials	40,000
	GVW	Local access	3-vehicle combo, towing	40,000
	GVW	State	2 axle, garbage, refuse, or recycling operations	40,000
	GVW	State	3 axle, garbage, refuse, or recycling operations	54,000
	GVW		Combination vehicle, registered before 2014	72,000
	GVW	Local access	Combination vehicles	80,000
	GVW		4-axle mixer, transporting concrete in plastic state	
Indiana (*93*)	Axle	State	Garbage truck	24,000
	Tandem	State	Garbage truck	42,000
	GVW	State	Farm commodities, logs, wood chips, bark, sawdust, and bulk milk	
Iowa (*60*)	Axle		Fence-line feeder, grain cart, or tank wagon, seasonal, GVW ≤96,000 lb	28,000
	GVW		Implement of husbandry	96,000
Louisiana (*96*)	GVW		Forest products, lumber, sand, gravel, agricultural products, loose or mixed concrete, or bulk liquid commodities	

TABLE B3
(*continued*)

State	Axle, GVW	System	Configuration	Load (lb)
Maine (*63*)	Axle		Materials that absorb moisture in transit, raw ore, dump trucks, concrete ready-mix trucks, refrigerated products	24,200
	Tandem		Materials that absorb moisture in transit, raw ore, dump trucks, concrete ready-mix trucks, refrigerated products	46,000
	Tri-axle		Materials that absorb moisture in transit, raw ore, dump trucks, concrete ready-mix trucks, refrigerated products	54,000
	Tri-axle		4 axle, forest products	64,000
	GVW	Interstate	Forest products, raw ore, construction materials	48,000
Maine (*149*)	GVW		Unprocessed milk, farm produce, dump trucks, ready-mix trucks, concrete products, building materials, forest products, raw ore, rock, soil, road salt, refrigerated products, incinerator ash, solid waste	100,000
Maryland (*10*)	Axle		Seagoing container	22,400
	Tandem		Seagoing container	44,000
	GVW		Dump, 2 axle	40,000
	GVW		Dump, 3 axle	55,000
	GVW		Dump, 4 axle	70,000
	GVW	Local		73,000
	GVW	Local	6 axle, Garrett County	87,000
	GVW		Seagoing container	90,000
Michigan (*98*)	GVW		Saw logs, pulpwood, and tree length poles	164,000
Minnesota (*99*)	Axle		Public utility vehicle	20,000
	GVW		Hauling livestock	88,000
	GVW	State	Forest products	99,000
Mississippi (*100*)	GVW		Knuckle boom log loader	41,000
	GVW		Concrete products, cotton harvest, solid waste	60,000
Montana (*180*)			Perishable seed potatoes, hay grinders and their towing units	
	GVW		Logging	80,000
Nevada (*104*)	Axle	State	Mass transit	25,000
	Tandem	State	Refuse	40,000
New York (*70*)	Wheel	State	State- or municipally owned vehicle	16,000
	Axle	State	State- or municipally owned vehicle	32,000
	Tandem	State	Spacing < 10 ft, state- or municipally owned vehicle	42,000
	GVW	State	2 axle, state- or municipally owned vehicle	52,000
	GVW	State	3 axle, state- or municipally owned vehicle	62,000
North Carolina (*106*)	Axle	State	Agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock or live poultry, forest products, wood residuals, raw logs, Christmas trees, hauling bulk soil, bulk rock, sand, sand rock, or asphalt millings, unhardened ready-mixed concrete, firefighting	22,000
	Axle		Garbage hauler	23,500
	Axle	State	5+ axles, agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock or live poultry, forest products, wood residuals, raw logs, Christmas trees	26,000
	Tandem	State	Agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock or live poultry, forest products, wood residuals, raw logs, Christmas trees, hauling bulk soil, bulk rock, sand, sand rock, or asphalt millings, firefighting	42,000
	Tandem	State	5+ axles, agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock or live poultry, forest products, wood residuals, raw logs, Christmas trees	44,000
	Tandem	State	Unhardened ready-mixed concrete	46,000
	Tandem	State	Cotton seed	50,000
	Group	State	3 axles, firefighting	50,000
	Group	State	Hauling aggregates	53,850
	GVW	State	3 axle, unhardened ready-mixed concrete	66,000
	GVW	State	Hauling aggregates	69,850
	GVW	State	4 axle, unhardened ready-mixed concrete	72,600
	GVW	State	Firefighting	90,000
	GVW	State	5+ axles, agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock or live poultry, forest products, wood residuals, raw logs, Christmas trees	90,000

(*continued on next page*)

TABLE B3
(*continued*)

State	Axle, GVW	System	Configuration	Load (lb)
North Dakota (*72*)	Axle		Agricultural equipment	22,000
Oklahoma (*121*)	GVW		Utility vehicle, 5 axles	85,500
	GVW		Utility vehicle, 6 axles	90,000
	GVW		Refuse, 6 axles	90,000
	GVW	All	Agricultural commodities	90,000
Oregon (*74*)	Axle		Garbage or refuse operations	22,000
	Tandem		Farm vehicle, 10 ft wheelbase,	37,800
	GVW		Farm vehicle, 3 axles, 29 ft wheelbase	66,000
	GVW	State	Farm vehicle, 4 axles, 35 ft wheelbase	70,000
	GVW		Farm vehicle, 5+ axles, 43 ft wheelbase	80,000
South Dakota (*122*)	GVW		Hauling logs	
	GVW		Hauling agricultural products, exempt from weight limits, 50 mi radius of farm	
Tennessee (*109*)	Axle		Logging, sand, coal, clay, shale, phosphate, solid waste, recovered materials, farm trucks and machinery trucks	22,000
	Tandem		Logging, sand, coal, clay, shale, phosphate, solid waste, recovered materials, farm trucks and machinery trucks	37,400
	GVW		Logging, sand, coal, clay, shale, phosphate, solid waste, recovered materials, farm trucks and machinery trucks	88,000
Texas (*76*)	Axle	State	Transporting recyclable materials	21,000
	Axle	State	Concrete ready-mix truck, concrete pump truck	23,000
	Tandem	State	Transporting recyclable materials	44,000
	Tandem	State	Concrete ready-mix truck, concrete pump truck	46,000
	Group	State	Milk hauling, 28 ft wheelbase	68,000
	GVW	State	Chile pepper modules	54,000
	GVW	State	Transporting recyclable materials, cotton seed or equipment	64,000
	GVW	State	Concrete ready-mix truck, concrete pump truck	69,000
	GVW	State	Raw wood products, 39 ft wheelbase	80,000
	GVW	State	Fire department vehicle	
Utah (*124*)	Tandem	State	Hauling livestock or grain; GVW ≤ 80,000 lb	36,000
Utah (*77*)	GVW	State	Fire-fighting apparatus; highway construction and maintenance equipment operated as authorized by a highway authority; implements of husbandry; transporting logs or poles from forest to sawmill; tow trucks or towing vehicles	80,000
Washington (*79*)	Axle		Firefighting apparatus	24,000
	Tandem		Firefighting apparatus	43,000
	GVW		Farm implements, GVW < 45,000, length < 70 ft	
	GVW		Highway improvement vehicles	
Wisconsin (*81*)	Axle	Class A Hwy	Dairy products/supplies	21,000
	Axle	Class A Hwy	Forest products, scrap metal, septage	21,500
	Tandem	Class A Hwy	Dairy products/supplies, forest products, scrap metal, septage	37,000
Wyoming (*111*)	GVW		Implements and produce of husbandry, forest products, gravel, and agricultural products	

EXEMPT VEHICLES BY USE

TABLE B4
DETAIL ON STATE EXEMPT VEHICLES BY USE

State	Axle, GVW	Use	Configuration	Load (lb)
Alabama (*7*)	Axle	Agriculture	Farm agricultural commodities	10,000
	GVW	Construction	Dump truck	66,000
California (*90*)	Axle	Agriculture	Livestock, cotton modules	
	Axle	Construction	Dump trucks, cranes, ready-mix trucks	
	Axle	Forest	Log haulers	

TABLE B4
(*continued*)

State	Axle, GVW	Use	Configuration	Load (lb)
	Axle	Misc.	Buses, public utility	
	Axle	Refuse	Garbage trucks	
Colorado (*54*)	Axle	Misc.	Utility truck	21,000
Delaware (*55*)	GVW	Agriculture	Farm equipment	
	GVW	Agriculture	Agricultural products	70,000
	GVW	Fire	Fire apparatus	
Florida (*91*)	Axle	Construction	Dump truck	20,000
	GVW	Construction	Dump truck	70,000
Georgia (*57*)	Axle	Agriculture	Live poultry, cotton, feed	23,000
	Tandem	Agriculture	Live poultry, cotton, feed	46,000
	GVW	Agriculture	Live poultry, cotton, feed,	80,000
	Axle	Construction	Unhardened concrete, construction aggregates	23,000
	Tandem	Construction	Unhardened concrete, construction aggregates	46,000
	GVW	Construction	Unhardened concrete, construction aggregates	80,000
	Axle	Forest	Forest products	23,000
	Tandem	Forest	Forest products	46,000
	GVW	Forest	Forest products	80,000
	Axle	Materials	Granite, raw ore or mineral	23,000
	Tandem	Materials	Granite, raw ore or mineral	46,000
	GVW	Materials	Granite, raw ore or mineral	80,000
	Axle	Refuse	Solid waste or recovered materials, poultry waste	23,000
	Tandem	Refuse	Solid waste or recovered materials, poultry waste	46,000
	GVW	Refuse	Solid waste or recovered materials, poultry waste	80,000
Idaho (*58*)	Tandem	Agriculture	Unprocessed agricultural products, livestock	37,800
	Tandem	Forest	Logs, pulpwood, stull, poles, or piling	37,800
	Tandem	Materials	Ores, concentrates, sand and gravel, and aggregates	37,800
Illinois (*9*)	Axle	Agriculture	Rendering materials	22,000
	Tandem	Agriculture	Rendering materials	40,000
	GVW	Construction	4-axle mixer, transporting concrete in plastic state	
	GVW	Misc.	Combination vehicle, registered before 2014	72,000
	GVW	Misc.	Local access, combination vehicles	80,000
	Axle	Refuse	Garbage, refuse, or recycling operations	22,000
	GVW	Refuse	2 axle, garbage, refuse, or recycling operations	40,000
	GVW	Refuse	3 axle, garbage, refuse, or recycling operations	54,000
	GVW	Towing	Towing	40,000
Indiana (*93*)	GVW	Agriculture	Farm commodities, bulk milk	
	GVW	Forest	Logs, wood chips, bark, sawdust	
	Axle	Refuse	Garbage truck	24,000
	Tandem	Refuse	Garbage truck	42,000
Iowa (*181*)	Axle	Construction	Crane to construct alternative energy facility	
	Axle	Construction	Special mobile equipment	
	Axle	Misc.	Equipment manufactured in Iowa	
Louisiana (*96*)	GVW	Agriculture	Agricultural products	
	GVW	Construction	Loose or mixed concrete	
	GVW	Forest	Forest products, lumber	
	GVW	Materials	Bulk liquid commodities	
	GVW	Materials	Sand, gravel	
Maine (*63*, *149*)		Agriculture	Transporting potatoes	
	GVW	Agriculture	Unprocessed milk, farm produce	100,000
	Axle	Construction	Dump trucks, concrete ready-mix trucks	24,200
	Tandem	Construction	Dump trucks, concrete ready-mix trucks	46,000
	Tri-axle	Construction	Dump trucks, concrete ready-mix trucks	54,000
	GVW	Construction	Interstate highway, construction materials	48,000
	GVW	Construction	Dump trucks, ready-mix trucks, concrete products, building materials	100,000
		Fire	Fire fighting vehicle	
	Tri-axle	Forest	4 axle, forest products	64,000
	GVW	Forest	Interstate highway, forest products	48,000
	GVW	Forest	Forest products	100,000

(*continued on next page*)

TABLE B4
(*continued*)

State	**Axle, GVW**	**Use**	**Configuration**	**Load (lb)**
	Axle	Materials	Materials that absorb moisture in transit, raw ore	24,200
	Tandem	Materials	Materials that absorb moisture in transit, raw ore	46,000
	Tri-axle	Materials	Materials that absorb moisture in transit, raw ore	54,000
	GVW	Materials	Interstate highway, raw ore	48,000
	GVW	Materials	Raw ore, rock, soil, road salt	100,000
		Misc.	Plowing snow	
	Axle	Misc.	Refrigerated products	24,200
	Tandem	Misc.	Refrigerated products	46,000
	Tri-axle	Misc.	Refrigerated products	54,000
	GVW	Misc.	Refrigerated products	100,000
	GVW	Refuse	Incinerator ash, solid waste	100,000
Maryland (*10*)	GVW	Construction	Dump, 2 axle	40,000
	GVW	Construction	Dump, 3 axle	55,000
	GVW	Construction	Dump, 4 axle	70,000
	Axle	Misc.	Seagoing container	22,400
	GVW	Misc.	Garrett County	87,000
Michigan (*98*)	GVW	Forest	Saw logs, pulpwood, and tree length poles	164,000
Minnesota (*99*)	GVW	Agriculture	Livestock	88,000
	GVW	Forest	Forest products	99,000
	Axle	Misc.	Public utility vehicle	20,000
Mississippi (*100*)	GVW	Agriculture	Cotton harvest	60,000
	GVW	Construction	Concrete products	60,000
	GVW	Forest	Knuckle boom log loader	41,000
	GVW	Refuse	Solid waste	60,000
Montana (*180*)		Agriculture	Perishable seed potatoes, hay grinders and their towing units	
		Forest	Logging	80,000
New York (*70*)	Wheel	Misc.	State- or municipally owned vehicle	16,000
	Axle	Misc.	State- or municipally owned vehicle	32,000
	Tandem	Misc.	Spacing < 10 ft, state- or municipally owned vehicle	42,000
	GVW	Misc.	2 axle, state- or municipally owned vehicle	52,000
	GVW	Misc.	3 axle, state- or municipally owned vehicle	62,000
North Carolina (*106*)	Axle	Agriculture	Agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock, or live poultry	22,000
	Axle	Agriculture	5+ axles, agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock, or live poultry	26,000
	Tandem	Agriculture	Agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock, or live poultry	42,000
	Tandem	Agriculture	5+ axles, agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock, or live poultry	44,000
	Tandem	Agriculture	Cotton seed	50,000
	GVW	Agriculture	5+ axles, agriculture crop, water, fertilizer, pesticides, seeds, fuel, or animal waste, meats, livestock, or live poultry	90,000
	Tandem	Construction	Unhardened ready-mixed concrete	46,000
	Group	Construction	Hauling aggregates	53,850
	GVW	Construction	3 axle, unhardened ready-mixed concrete	66,000
	GVW	Construction	Hauling aggregates	69,850
	GVW	Construction	4 axle, unhardened ready-mixed concrete	72,600
	Tandem	Fire	Firefighting	42,000
	Group	Fire	3 axles, firefighting	50,000
	GVW	Fire	Firefighting	90,000
	Axle	Forest	Forest products, wood residuals, raw logs, Christmas trees	22,000
	Axle	Forest	5+ axles, forest products, wood residuals, raw logs, Christmas trees	26,000
	Tandem	Forest	Forest products, wood residuals, raw logs, Christmas trees	42,000
	Tandem	Forest	5+ axles, forest products, wood residuals, raw logs, Christmas trees	44,000
	GVW	Forest	5+ axles, forest products, wood residuals, raw logs, Christmas trees	90,000
	Axle	Materials	Bulk soil, bulk rock, sand, sand rock, or asphalt millings	22,000
	Tandem	Materials	Hauling bulk soil, bulk rock, sand, sand rock, or asphalt millings, firefighting	42,000
	Group	Materials	Hauling aggregates	53,850
	Axle	Refuse	Garbage hauler	23,500

TABLE B4
(*continued*)

State	Axle, GVW	Use	Configuration	Load (lb)
North Dakota (*72*)	Axle	Agriculture	Agricultural equipment	22,000
Oklahoma (*121*)		Agriculture	Grain, flour	
	GVW	Agriculture	Agricultural commodities	90,000
		Forest	Vehicles transporting timber, pulpwood, and chips in their natural state	
		Materials	Rock, sand, gravel, coal	
		Misc.	Oil field fluids, oil field equipment, or equipment used in oil and gas well drilling or exploration	
	GVW	Misc.	Utility vehicle, 5 axles	85,500
	GVW	Misc.	Utility vehicle, 6 axles	90,000
	GVW	Refuse	Refuse, 6 axles	90,000
		Towing	Wrecker or tow vehicle	
Oregon (*74*)	Tandem	Agriculture	Farm vehicle, 10 ft wheelbase	37,800
	GVW	Agriculture	Farm vehicle, 3 axles, 29 ft wheelbase	66,000
	GVW	Agriculture	Farm vehicle, 4 axles, 35 ft wheelbase	70,000
	GVW	Agriculture	Farm vehicle, 5+ axles, 43 ft wheelbase	80,000
	Axle	Refuse	Garbage or refuse operations	22,000
South Dakota (*75*)	GVW	Agriculture	Hauling agricultural products, exempt from weight limits, 50 mi radius of farm	
	GVW	Forest	Hauling logs	
Tennessee (*109*)	Axle	Agriculture	Farm trucks and machinery	22,000
	Tandem	Agriculture	Farm trucks and machinery	37,400
	GVW	Agriculture	Farm trucks and machinery	88,000
	Axle	Forest	Logging	22,000
	Tandem	Forest	Logging	37,400
	GVW	Forest	Logging	88,000
	Axle	Materials	Sand, coal, clay, shale, phosphate	22,000
	Tandem	Materials	Sand, coal, clay, shale, phosphate	37,400
	GVW	Materials	Sand, coal, clay, shale, phosphate	88,000
	Axle	Refuse	Solid waste, recovered materials	22,000
	Tandem	Refuse	Solid waste, recovered materials	37,400
	GVW	Refuse	Solid waste, recovered materials	88,000
Texas (*76*)	Group	Agriculture	Milk hauling, 28 ft wheelbase	68,000
	GVW	Agriculture	Chile pepper modules	54,000
	GVW	Agriculture	Cotton seed or equipment	64,000
	Axle	Construction	Concrete ready-mix truck, concrete pump truck	23,000
	Tandem	Construction	Concrete ready-mix truck, concrete pump truck	46,000
	GVW	Construction	Concrete ready-mix truck, concrete pump truck	69,000
	GVW	Fire	Fire department vehicle	
	GVW	Forest	Raw wood products, 39 ft wheelbase	80,000
	Axle	Refuse	Transporting recyclable materials	21,000
	Tandem	Refuse	Transporting recyclable materials	44,000
	GVW	Refuse	Transporting recyclable materials	64,000
Utah (*77*)	GVW	Agriculture	Implements of husbandry	80,000 max.
	GVW	Construction	Highway construction and maintenance equipment operated as authorized by a highway authority	80,000 max.
	GVW	Forest	Transporting logs or poles from forest to sawmill	80,000 max.
	GVW	Towing	Tow trucks or towing vehicles	80,000 max.
	GVW	Fire	Fire-fighting apparatus	80,000 max.
Utah (*124*)	Tandem	Agriculture	Livestock or grain	36,000
Washington (*79*)	GVW	Agriculture	Farm implements	
	GVW	Construction	Highway improvement vehicles	
	Axle	Fire	Firefighting apparatus	24,000
	Tandem	Fire	Firefighting apparatus	43,000

(*continued on next page*)

TABLE B4
(*continued*)

State	Axle, GVW	Use	Configuration	Load (lb)
Wisconsin (*81*)	Axle	Agriculture	Dairy products/supplies	21,000
	Tandem	Agriculture	Dairy products/supplies	37,000
	Axle	Forest	Forest products	21,500
	Tandem	Forest	Forest products	37,000
	Axle	Refuse	Scrap metal, septage	21,500
	Tandem	Refuse	Scrap metal, septage	37,000
Wyoming (*111*)	GVW	Agriculture	Agricultural products	
	GVW	Agriculture	Agricultural products, implements of husbandry	
	GVW	Forest	Forest products	
	GVW	Materials	Gravel	

OVERWEIGHT PERMIT DETAIL

TABLE B5
DETAIL ON STATE ROUTINE PERMIT LOADS

State	Axle, GVW	System	Configuration	Load (lb)
Alabama (*7*)	Axle			22,000
	Axle		Mining equipment, refractory grade bauxite	27,000
	GVW			150,000
Alaska (*89*)	GVW		Single move	150,000
Arizona (*143*)	GVW		Within 20 miles of state border	111,000
	GVW	National truck routes	9 axle	121,000
	GVW	National truck routes	10 axles	123,500
	GVW		Vehicle hauling a houseboat	150,000
Arizona (*144*)	GVW		Envelope permit, non-reducible load	250,000
California (*123*, *182*)	Axle		Orange route	21,000
	Axle		Green route	26,000
	Axle		Purple route	30,000
	Tandem		Orange route	42,000
	Tandem		Green route	52,000
	Tandem		4 axle crane, Purple route	54,300
	Tandem		Purple route	60,000
	Tridem		Purple route	60,000
	Tridem		Green route	52,000
	Group		3 axles, 4 axle crane, Purple route	59,500
	GVW		Truck cranes, 1.5(700)(L+40) + 7000, Purple route	
	GVW		Truck cranes, 1.3(700)(L+40) + 6000, Green route	
	GVW		Conforms to Federal Bridge Formula	131,600
Colorado (*54*)	GVW	Interstate	Permit	85,000
	GVW		2+ axle	97,000
	GVW		4-axle	110,000
	GVW		Single trip permit	200,000
	GVW		Super-load, vehicle occupies two travel lanes	500,000
Delaware (*183*)	GVW		Super-load	>120,000
Florida (*125*)	Axle		Map 3, Blanket permit	22,000
	Axle		Map 3, Truck cranes	22,000
	Axle		Map 1, Blanket permit	25,000
	Axle		Map 2, Blanket permit	25,000
	Axle		Map 1, Wreckers	25,000
	Axle		Map 1, Truck cranes	27,500
	Axle		Map 2, Truck cranes	27,500
	Axle		Map 2, Wreckers	45,000
	Tandem		Map 2, Blanket permit	44,000
	Tandem		Map 3, Blanket permit	44,000
	Tandem		Map 3, Truck cranes	44,000
	Tandem		Map 1, Blanket permit	50,000

TABLE B5
(*continued*)

State	Axle, GVW	System	Configuration	Load (lb)
	Tandem		Map 1, Wreckers	50,000
	Tandem		Map 1, Truck cranes	55,000
	Tandem		Map 2, Truck cranes	55,000
	Tandem		Map 2, Wreckers	90,000
	Group		3 axles, Map 3, Blanket permit	54,000
	Group		4 axles, Map 3, Blanket permit	54,000
	Group		3 axles, Map 1, Truck cranes	55,000
	Group		3 axles, Map 1, Blanket permit	60,000
	Group		4 axles, Map 1, Blanket permit	66,000
	Group		3 axles, Map 2, Blanket permit	66,000
	Group		3 axles, Map 2, Truck cranes	66,000
	Group		3 axles, Map 3, Truck cranes	66,000
	Group		4 axles, Map 3, Truck cranes	66,000
	Group		3 axles, Map 1, Wreckers	66,000
	Group		4 axles, Map 1, Wreckers	66,000
	Group		4 axles, Map 2, Blanket permit	72,000
	Group		3 axles, Map 2, Wreckers	90,000
	Group		4 axles, Map 2, Wreckers	90,000
	GVW		4 axles, 17 ft wheelbase, Map 1, Truck cranes	88,000
	GVW		4 axles, 22 ft wheelbase, Map 2, Truck cranes	97,000
	GVW		9 axles, 51 ft wheelbase, Map 3, Truck cranes	125,000
	GVW		7 axles, 65 ft wheelbase, Map 1, Wreckers	140,000
	GVW		7 axles, 61 ft wheelbase, Map 2, Wreckers	140,000
	GVW		8 axles, 75 ft wheelbase, Map 2, Blanket permit	160,000
	GVW		10 axles, 90 ft wheelbase, Map 1, Blanket permit	162,000
	GVW		11 axles, 100 ft wheelbase, Map 3, Blanket permit	199,000
Georgia (*127*)	Axle		Wrecker emergency tow	21,000
	Axle (*55*)		Annual permit	25,000
	Tandem		Wrecker emergency tow	40,000
	GVW		Multitrip permit, 4 axles	92,000
	GVW		Standard annual permit	100,000
	GVW		NHS annual permit	100,000
	GVW		Multitrip permit, 5 axles	100,000
	GVW		Multitrip permit, 6 axles	125,000
	GVW		Multitrip permit, 7 axles	148,000
	GVW		Multitrip permit, 8 axles	150,000
	GVW (*54*)		Superload	180,000
Idaho (*118*)	Axle		Yellow routes, single axle	22,500
	Axle		Orange routes, single axle	24,000
	Axle		Green routes, single axle	25,500
	Axle		Blue routes, single axle	27,000
	Axle		Purple routes, single axle	30,000
	Axle		Black routes, single axle	33,000
	Tandem		Yellow routes, tandem axle	38,000
	Tandem		Orange routes, tandem axle	41,000
	Tandem		Green routes, tandem axle	43,500
	Tandem		Blue routes, tandem axle	46,000
	Tandem		Purple routes, tandem axle	51,500
	Tandem		Black routes, tandem axle	56,000
	Group		Yellow routes, 3 axles	48,000
	Group		Orange routes, 3 axles	51,500
	Group		Green routes, 3 axles	54,500
	Group		Blue routes, 3 axles	57,500
	Group		Purple routes, 3 axles	64,500
	Group		Black routes, 3 axles	70,500
	GVW	Federal		105,000
	GVW		Yellow routes, Idaho Formula, W = 560 ((LN/N-1) + 12N + 36)	200,000 max.
	GVW		Orange routes, Idaho Formula, W = 600 ((LN/N-1) + 12N + 36)	200,000 max.
	GVW		Green routes, Idaho Formula, W = 640 ((LN/N-1) + 12N + 36)	200,000 max.

(*continued on next page*)

TABLE B5
(*continued*)

State	Axle, GVW	System	Configuration	Load (lb)
	GVW		Blue routes, Idaho Formula, W = 675 ((LN/N-1) + 12N + 36)	200,000 max.
	GVW		Purple routes, Idaho Formula, W = 755 ((LN/N-1) + 12N + 36)	200,000 max.
	GVW		Black routes, Idaho Formula, W = 825 ((LN/N-1) + 12N + 36)	200,000 max.
Illinois (*9*)	Tandem		4 or more axles, tandem axle	44,000
	Tandem		5 or more axles, tandem axle	48,000
	Tandem		6 or more axles, tandem axle	60,000
	GVW		3 or more axles, GVW	68,000
	GVW		Mobile crane or water well-drilling vehicle, 4-axle	72,000
	GVW		4 or more axles, GVW	76,000
	GVW		Tractor, semi-trailer	88,000
	GVW		5 or more axles, GVW	100,000
	GVW		6 or more axles, GVW	120,000
Illinois (*128*)	Axle		In tandem, limited continuous operations	26,000
	Axle		Off-road equipment, 25 mile travel limit	30,000
	Tandem		3 axle, tractor	48,000
	Tandem		Truck crane or drill rig, 3 axle, 18 ft wheelbase	48,000
	Tandem		In tandem, limited continuous operations	50,000
	Tandem		3 axle, semi-trailer	60,000
	Group		3 axles, limited continuous operations	60,000
	GVW		Truck crane or drill rig, 3 axle, 18 ft wheelbase	68,000
	GVW		4 axle, 23 ft wheelbase	76,000
	GVW	State	Raw milk	80,000
	GVW		Combination, 2 axle semi-trailer	100,000
	GVW		3 axle semi-trailer	120,000
Indiana (*129*)	Axle	Extra heavy-duty highway		65,000
	GVW		Ocean-going container	95,000
	GVW		Extra heavy-duty highway, Includes “Michigan Train” permits	134,000
	GVW	Extra heavy-duty highway		264,000
Indiana (*146*)	GVW		Tractor-trailer-trailer	127,000
	GVW		Tractor-trailer-trailer-trailer	127,400
	GVW	Extra heavy-duty highways	Non-divisible load	134,000
Iowa (*96*)	Axle		Crane	24,000
	Axle		Implement of husbandry	25,000
Iowa (*148*)	GVW		Construction equipment	126,000
	GVW	non-interstate	Annual permit	156,000
	GVW		Multitrip permit	156,000
Iowa (*60*)	GVW		Tracked implement of husbandry	96,000
Iowa (*147*)	GVW		Alternative energy construction	256,000
Kansas (*184*)	Axle		Annual permit	24,000
	Tandem		Annual permit	45,000
	Tandem		Special mobile equipment	49,000
	Tandem		Cotton modules	50,000
	Group		Annual permit, 3 axles	60,000
	Group		Annual permit, 4 axles	65,000
	GVW		Special vehicle combination	110,000
	GVW		Annual permit	120,000
	GVW		Superload	150,000
	GVW		Standard permit, 91 ft wheelbase	150,000
	GVW		Special mobile equipment, 64 ft wheelbase	150,000
Kentucky (*130*)	Axle		Self-propelled truck crane	23,000
	Axle			24,000
	Tandem		5 axle vehicle	45,000
	Tandem		Self-propelled truck crane	46,000
	Tandem		6+ axle vehicle	48,000
	Tridem			60,000

TABLE B5
(*continued*)

State	Axle, GVW	System	Configuration	Load (lb)
	Tridem		Self-propelled truck crane	69,000
	GVW		Self-propelled truck crane, 4 axles	92,000
	GVW		5 axles	96,000
	GVW		Self-propelled truck crane, 5 axles	115,000
	GVW		6 axles	120,000
	GVW		7 axles	160,000
Louisiana (*131*)	Axle		Off-road equipment	30,000
	Tandem	Federal	Bagged rice	34,000
	Tandem	State	Bagged rice	37,000
	Tandem	State	Cotton modules	48,000
	Tandem		Off-road equipment	54,000
	Group	Federal	Bagged rice, 3 axles	42,000
	Group	State	Bagged rice	45,000
	GVW	State	Cotton modules, GVW	68,000
	GVW		Sealed containerized cargo	90,000
	GVW		Bagged rice	95,000
	GVW		Sugarcane, agronomic, or horticultural crops	100,000
	GVW		Timber equipment	105,000
Maine (*63*)	GVW		Pilot project, 3 axle tractor + 3 axle semi-trailer	108,900
	GVW		Pilot project, 8 axle combination	137,700
Maine (*149*)	GVW	Me Tpk. & non-Interstate	5 axle, multi-state permit	108,000
	GVW	Me Tpk. & non-Interstate	6+ axle, multi-state permit	120,000
Maryland (*132*)	Axle		International freight	22,400
	Group		3 axles, milk tank, forestry products	63,000
	Group		4 axles, milk tank, forestry products	72,000
Maryland (*10*)	GVW		Milk tank, forestry products	87,000
	GVW		International freight	90,000
	Tandem		International freight	44,000
	Tandem		Milk tank, forestry products	52,000
Maryland (*150*)	GVW		Blanket permit	80,000
	GVW		Book permit	90,000
Massachusetts (*151*)	GVW		3 axle, 10 wheel dump truck	73,000
	GVW		3 axle, dump truck	77,000
	GVW		Tractor-trailer	99,000
	GVW		5+ axles, non-reducible	130,000
Michigan (*133*)	Axle		Construction equipment	24,000
	GVW		Raw forest products	90,000
	GVW		Construction equipment	150,000
Michigan (*84*)	GVW		5 axle, 45 ft wheelbase, Class A Highway	195,000
	GVW		7 axle, 53 ft wheelbase, Class A Highway	211,200
	GVW		9 axle, 61 ft wheelbase, Class A Highway	238,000
	GVW		11 axle, 84.7 ft wheelbase, Class A Highway	272,700
	GVW		10 axle, 99.7 ft wheelbase, Class A Highway	277,200
	GVW		9 axle, 84 ft wheelbase, Class A Highway	283,300
Minnesota (*99*)	Axle		Refuse-compactor vehicles	22,000
	Tandem		Refuse-compactor vehicles	38,000
	Group		Refuse-compactor vehicles, 3 axles	46,000
	GVW		Refuse-compactor vehicles	62,000
	GVW		Pole-length pulpwood, 6-axle	82,000
	GVW		Hauling livestock	88,000
	GVW		Livestock	88,000
	GVW	State	Paper products, 2-unit	99,000
	GVW	State	Farm products, 6-axle	99,000
	GVW		Sealed intermodal container	99,000
	GVW	State	Canola hauling, 3-unit	105,500
	GVW	State	Paper products, 3-unit	108,000
	GVW		Construction equipment, boat hauler, farm machinery	145,000
	GVW		Mobile cranes, construction equipment, machinery, and supplies; implements of husbandry; and commercial boat hauling	155,000

(*continued on next page*)

TABLE B5
(*continued*)

State	Axle, GVW	System	Configuration	Load (lb)
Mississippi (*100*)	Tandem		Harvest permit, pre-package products	40,000
	GVW		Harvest permit	84,000
Missouri (*101*)	Axle		Blanket permit, well drill rig, concrete pump truck	20,000
	Tandem		Blanket permit, well drill rig, concrete pump truck	40,000
	Group		Blanket permit, 3 axles	60,000
	GVW		5 axle	105,000
	GVW		6 axle	120,000
	GVW		7 axle	150,000
	GVW		8+ axle	160,000
Montana (*134*)	Axle			21,500
	Tandem			43,000
	Tridem			53,000
	GVW			160,000
Montana (*152*)	Tandem		Eureka Mt. to British Columbia	37,500
	Tridem		Eureka Mt. to British Columbia	50,700
	GVW		Eureka Mt. to British Columbia	137,500
New Mexico (*105*)	GVW	Federal		86,400
	GVW		Port of entry + 6 miles, reducible load OK	96,000
	GVW		Annual permit	140,000
New York (*153*)	GVW		Divisible load	102,000
New York (*154*)	GVW		Type 2 (F4), 3 axle, 17 ft wheelbase	79,000
	GVW		Type 2A (F4), 5 axle, 17 ft wheelbase	79,000
	GVW		Type 4 (F5), 5 axle, 30 ft wheelbase	93,000
	GVW		Type 1 (F1), 3 axle, 16 ft wheelbase	97,400
	GVW		Type 1A (F1), 5 axle, 16 ft wheelbase	102,000
	GVW		Type 7 (F2), 6 axle, 35.5 ft wheelbase	107,000
	GVW		Type 9 (F2), 7 axle, 43 ft wheelbase	117,000
	GVW		Type 6A (F5), 6 axle, 36.5 ft wheelbase	120,000
	GVW		Type 6B (F5), 7 axle, 43 ft wheelbase	120,000
North Carolina (*135*)	Axle		Annual permit	25,000
	Axle		Self-propelled off-highway construction equipment	37,000
	Tandem		Annual permit	50,000
	Tandem		Self-propelled off-highway construction equipment	50,000
	Group		Annual permit, 3 axles	60,000
	Group		Annual permit, 4 axles	68,000
	GVW		3 axle single vehicle	70,000
	GVW		2 axle single vehicle, self-propelled off-highway construction equipment	70,000
	GVW		3 axle single vehicle, self-propelled off-highway construction equipment	80,000
	GVW		Annual permit	90,000
	GVW		4 axle single vehicle	90,000
	GVW		4 axle single vehicle, self-propelled off-highway construction equipment	90,000
	GVW		5 axle single vehicle	94,500
	GVW		6 axle single vehicle	108,000
	GVW		5 axle combination vehicle	112,000
	GVW		6 axle combination vehicle	120,000
	GVW		7 axle single vehicle	122,000
	GVW		7 axle vehicle combination	132,000
North Dakota (*72*)	Axle		Trucks, combination vehicles	24,000
	Axle		Cranes, truck-mounted equipment	30,000
	Axle		Self-propelled workover rigs	30,000
	Axle		Self-propelled workover rigs “SE”	31,200
	Axle		Earthmoving equipment	52,000
North Dakota (*140*)	Tandem		Trucks, combination vehicles	45,000
	Tandem		Cranes, truck-mounted equipment	50,000
	Tandem		Self-propelled workover rigs	50,000
	Tandem		Self-propelled workover rigs “SE”	52,000
	Group		3 axles, trucks, combination vehicles	60,000
	Group		3 axles, cranes, truck-mounted equipment	60,000

TABLE B5
(*continued*)

State	Axle, GVW	System	Configuration	Load (lb)
	Group		3 axles, self-propelled workover rigs	60,000
	Group		3 axles, self-propelled workover rigs "SE"	62,400
	Group		4 axles, trucks, combination vehicles	68,000
	Group		4 axles, cranes, truck-mounted equipment	68,000
	Group		4 axles, self-propelled workover rigs	68,000
	Group		4 axles, self-propelled workover rigs "SE"	70,720
	GVW		4 axle, special mobile equipment	96,800
	GVW		4 axle, self-propelled workover rigs	100,700
	GVW		5 axle, special mobile equipment	106,800
	GVW		5 axle, self-propelled workover rigs	111,100
	GVW		6 axle, special mobile equipment	114,800
	GVW		6+ axle, self-propelled workover rigs	114,800
	GVW		Identification supplement, workover service rig	119,500
	GVW		Identification supplement	150,000
Ohio (*73*)	Axle			29,000
	Tandem		Spacing ≤ 4 ft	36,000
	Tandem		Spacing ≤ 16 ft	50,000
	Group		3 axles, short tandem + wheelbase ≤ 16 ft	47,000
	Group		3 axles, wheelbase ≤ 16 ft	60,000
	Group		4 axles, short tandem + wheelbase ≤ 16 ft	60,000
	Group		4 axles, wheelbase ≤ 16 ft	80,000
	GVW		Toledo, Ohio to Delta, Ohio	154,000
Oklahoma (*141*)	Tandem	non-interstate	Annual envelope permit	40,000
	Triple	non-interstate	Annual envelope permit	60,000
	GVW	non-interstate	Annual envelope permit	120,000
Oklahoma (*107*)	GVW		5 axles	95,000
	GVW		6 axles	115,000
	GVW		7 axles	135,000
Oklahoma (*185*)	GVW		8 axles, 79 ft wheelbase	155,000
	GVW		9 axles, 84 ft wheelbase	172,000
	GVW		10 axles, 94 ft wheelbase	189,000
	GVW		11 axles, 87 ft wheelbase	195,000
	GVW		14 axles, 101 ft wheelbase	202,000
	GVW		13 axles, 113 ft wheelbase	209,000
	GVW		12 axles, 113 ft wheelbase	211,000
Oklahoma (*186*)	GVW	Interstate		90,000
Oregon (*74*)	GVW	Federal	4 axle, 35 ft wheelbase	70,000
	GVW		Non-divisible	200,000
Oregon (*137*)	Axle		Heavy haul weight	21,500
	Tandem		Heavy haul weight	43,000
	GVW		5+ axle, self-loading log trucks, 51 ft wheelbase	80,000
	GVW	Federal	4 axle, 57 ft wheelbase	80,000
	GVW		Heavy haul weight	98,000
	GVW		Divisible load	105,000
	GVW		Extended weight	105,000
	GVW		7 axle, 78 ft wheelbase, Permit Weight Table 2	105,500
	GVW		11+ axle, 150 ft wheelbase, Permit Weight Table 3	228,000
	GVW		15+ axle, 150 ft wheelbase, Permit Weight Table 4	304,000
Pennsylvania (*108*)	Axle		Aircraft refueling vehicle	26,000
	Axle		Self-propelled crane, during road test	27,000
	Tandem		Wood chips	42,000
	Tandem		Float glass	44,000
Pennsylvania (*187*)	GVW	Interstate	Blanket permit—Containerized cargo, load type 56 A-E	90,000
	GVW		Annual permit—Waste coal, Load Type 38A	95,000
	GVW		Annual permit—Beneficial combustion ash, Load Type 38B	95,000
	GVW		Annual permit—Limestone, Load Type 38C	95,000
	GVW		Annual permit–Course of Manufacturing–Raw coal, Load Type 50E	95,000

(*continued on next page*)

TABLE B5
(*continued*)

State	Axle, GVW	System	Configuration	Load (lb)
	GVW		Annual permit—Course of Manufacturing ≤ one mile (milk/coal), Load Type 50F	95,000
	GVW		Annual permit—Course of Manufacturing—Pulpwood/chips (5 axle), Load Type 50H	95,000
	GVW	non-interstate	Blanket permit—Live domestic animals, Load Type 44	95,000
	GVW	non-interstate	Blanket permit—Animal feed, Load Type 45	95,000
	GVW	non-interstate	Blanket Permit—Course of manufacturing—Raw milk, Load Type 50A	95,000
	GVW		Annual permit—Course of manufacturing—Raw water (6 axle), Load Type 50G	96,900
	GVW		Annual permit—Crane (self-propelled), Load Type 35A	100,000
	GVW		Annual permit—Float/flat glass (5 axle), Load Type 37A	100,000
	GVW		Annual permit—Course of manufacturing—Flat rolled steel coils/slabs, Load Type 50C	100,000
	GVW		Annual permit—Refined oil, in bulk, Load Type 39	107,000
	GVW		Annual permit—Particleboard/fiberboard, Load Type 41	107,000
	GVW		Annual permit—Course of manufacturing—Pulpwood/chips (6 axle), Load Type 50J	107,000
	GVW		Annual permit—Containerized cargo—Refrigerated meat products (6 axle), Load Type 56F	107,500
	GVW		Annual permit—Building structural component, Load Type 42B	116,000
	GVW		Annual permit—Excessive damage (steel coils), Load Type 34	125,000
	GVW		Annual permit—Course of Manufacturing—Hot ingot, Load Type 50B	150,000
	GVW		Annual permit—Course of Manufacturing—Road tested crane, Load Type 50D	150,000
	GVW		Annual permit—Crane (self-propelled), Load Type 35B	201,000
Tennessee (*109*)	GVW		Annual permit	200,000
Texas (*76*)	GVW		Annual permit, implement of husbandry, water well drilling machinery, harvesting equipment or super heavy or oversize equipment	120,000
	GVW		Permit by Port Authority	125,000
	GVW		Victoria County Navigation District Permits	140,000
	GVW		Permit	200,000
Utah (*77*)	GVW		Annual permit, non-divisible load	125,000
	GVW		Annual permit, divisible load	129,000
Utah (*124*)	Axle		Annual permit, GVW < 125,000	29,500
	Axle		Single trip, special mobile equipment (farm tractors, off-road construction equipment)	40,000
	Axle		Annual permit, trunnion; GVW < 125,000	60,000
	Tandem		Annual permit, GVW < 125,000	50,000
	Group		Annual permit, 3 axles, GVW < 125,000	61,750
	GVW		Single trip, special mobile equipment	125,000
	GVW		Non-divisible load table, 6 axles, 10 ft width, 60 ft wheelbase	152,000
	GVW		Single trip, max. 50 mi travel	950,000
	GVW		Non-divisible, single trip 1.47 x 500 (LN/N-1 + 12N + 36), GVW > 125,000	
Virginia (*78*)	GVW	non-interstate highway	Annual permit	84,000
	GVW	non-interstate highway	Hauling farm or forest products	84,000
Virginia (*138*)	Axle			24,000
	Tandem			44,000

TABLE B5
(*continued*)

State	Axle, GVW	System	Configuration	Load (lb)
	GVW		2 axle, 8 ft wheelbase	48,000
	GVW		3 axle, 32 ft wheelbase	71,500
	GVW		4 axle, 61 ft wheelbase	96,000
	GVW		5 axle, 64 ft wheelbase	102,500
	GVW		6 axle, 64 ft wheelbase	108,500
	GVW		7 axle, 64 ft wheelbase	115,000
Washington (*79*)	Axle	State		22,000
	Tandem	State		43,000
	Group		Formula c 6,500 lb × (wheelbase ft); 7 ft ≤ wheelbase < 10 ft	
	Group		Formula d 2,200 lb (20 ft + wheelbase); 10 ft ≤ wheelbase < 30 ft	
	Group		Formula e 1,600 lb (40 ft + wheelbase); wheelbase ≥ 30 ft	
	GVW		Firefighting apparatus	50,000
	GVW		Farm implements	65,000
	GVW	State	Logging trucks, 37 ft wheelbase	68,000
	GVW		Heavy haul industrial corridor	105,500
	GVW		To/from Oroville railhead	139,994
	GVW		Greater load by special review	200,000
Washington (*139*)	Axle		8 tires, 8 ft axle width	24,725
	Axle		8 tires, 10 ft axle width	26,875
	Axle		8 tires, 12 ft axle width	29,025
	Axle		8 tires, ≥16 ft axle width	43,000
West Virginia (*80*)	Axle		Single trip permit	28,000
	Tandem		Single trip permit	45,000
	Tridem		Single trip permit	50,000
	Quadrem		Single trip permit	55,000
	GVW	non-interstate	Routine permit	90,000
	GVW	Interstate	Routine permit	110,000
	GVW		Single trip permit	120,000
Wisconsin (*81*)	GVW		Moving farm machinery, sealed loads for international trade	90,000
	GVW		6 axles, 60 ft wheelbase	90,000
	GVW		7 axles, 52 ft wheelbase	90,000
	GVW		8 axles, 42 ft wheelbase	90,000
	GVW		Among manufacturing plants along SH 31; raw forest or agricultural products	98,000
Wisconsin (*188*)	GVW		Without special investigation	150,000
Wisconsin (*142*)	Axle		Pole, pulpwood, or coal hauling	18,000
	Axle		Garbage, refuse, or scrap hauling	25,000
	Axle		Annual permit	30,000
	Axle		Rear axle, transporting an earthmover	35,000
	Tandem		Garbage, refuse, or scrap hauling permits	42,000
	Tandem		Annual permit	60,000
	Group		Annual permit, 3 axles	70,000
	Group		Annual permit, 4 axles	80,000
	GVW		Raw forest or agricultural products hauling permits	90,000
	GVW		Hauling seed potato, granular roofing material	90,000
	GVW		Annual permit, 2 + 2 axles, 18 ft interior spacing	115,000
	GVW		Annual permit, 4 + 4 axles, 18 ft interior spacing	150,000
	GVW		Pole, pulpwood, or coal hauling	154,000
	GVW		Within 11 miles of the Wisconsin−Michigan border	154,000
Wyoming (*111*)	Axle		Permit	25,000
	Tandem		Class B or C Permit	55,000
	Group		Permit, 3 axles	65,000
	GVW		Self-issuing permit	117,000
	GVW		Permit	150,000

POSTING VEHICLES FOR LOAD RATING

TABLE B6
DETAIL ON STATE POSTING VEHICLES

State	ID	Wheelbase, ft	Axles	GVW, kip	GVW Ratio	Source
AASHTO	H20	14	2	40	0.91	*5*
AASHTO	Type 3	19	3	50	1.00	*5*
AASHTO	SU4	18	4	54	1.00	*5*
AASHTO	SU5	22	5	62	1.00	*5*
AASHTO	SU6	26	6	69.5	1.00	*5*
AASHTO	HS20	28	3	72	1.26	*5*
AASHTO	HS20 long	44	3	72	1.04	*5*
AASHTO	Type 3S2	41	5	72	0.98	*5*
AASHTO	SU7	30	7	77.5	1.00	*5*
AASHTO	Type 3-3	54	6	80	0.93	*5*
Alaska	2-Axle	7	2	38	1.03	*89*
Alaska	3-Axle	7	3	42	1.02	*89*
Alaska	3-Axle Semi 1	7	3	42	1.02	*89*
Alaska	3-Axle Semi 2	10	3	43.5	1.00	*89*
Alaska	3-Axle Semi 3	12	3	45	1.00	*89*
Alaska	4-Axle	10.5	4	50	1.02	*89*
Arkansas	Code 4	0	3	45	1.25	*189*
Arkansas	Code 9	0	4	62	1.476	*189*
Arkansas	Code 5	0	5	80	1.667	*189*
Colorado	Type 3	17.5	3	48	0.98	*16*
Colorado	Type 3	17.67	3	54	1.10	*16*
Colorado	Type 3S2	45	5	76	1.00	*16*
Colorado	Type 3-2	50	5	78	0.98	*16*
Colorado	Type 3-2	50	5	85	1.07	*16*
Colorado	Type 3S2	45	5	85	1.12	*16*
Delaware	S220	12	2	40	0.95	*17*
Delaware	S327	16.83	3	54	1.11	*17*
Delaware	T330	33	3	60	0.99	*17*
Delaware	S335	16.83	3	70	1.44	*17*
Delaware	T435	37	4	70	1.05	*17*
Delaware	S437	17	4	73	1.37	*17*
Delaware	T540	82	5	80	0.81	*17*
Florida	SU4	17.51	4	70	1.30	*18*
Florida	C5	36.01	5	80	1.13	*18*
Florida	ST5	67	5	80	0.89	*18*
Iowa	3S3B	60	6	90	1.00	*191*
Iowa	4S3	62	7	96	1.00	*191*
Louisiana	Type 3	12	3	41	0.91	*192*
Louisiana	Type 3-S2	24	5	73	1.16	*192*
Louisiana	LA Type 6	40	5	80	1.10	*20*
Louisiana	LA Type 8	39	6	88	1.14	*20*
Michigan	Truck 1 NL & DL	9	2	33.4	0.86	*84*
Michigan	Truck 2 NL & DL	12.5	3	47.4	1.04	*84*
Michigan	Truck 9 NL & DL	18	3	51.4	1.04	*84*
Michigan	Truck 3 NL & DL	16	4	54.4	1.03	*84*
Michigan	Truck 10 NL	21.5	4	59.4	1.05	*84*
Michigan	Truck 10 DL	21.5	4	65.4	1.16	*84*
Michigan	Truck 21 NL	25	5	67.4	1.06	*84*
Michigan	Truck 4 NL & DL	19.5	5	67.4	1.12	*84*
Michigan	Truck 27 DL	41	5	72	0.98	*84*
Michigan	Truck 21 DL	25	5	73.4	1.15	*84*
Michigan	Truck 11 NL	30.5	5	77.4	1.15	*84*
Michigan	Truck 5 NL	28	6	78	1.10	*84*
Michigan	Truck 28 DL	54	6	80	0.93	*84*
Michigan	Truck 11 DL	30.5	5	83.4	1.24	*84*

TABLE B6
(*continued*)

State	ID	Wheelbase, ft	Axles	GVW, kip	GVW Ratio	Source
Michigan	Truck 8 NL	34	6	85.4	1.15	*84*
Michigan	Truck 20 NL & DL	36	5	87.4	1.24	*84*
Michigan	Truck 8 DL	34	6	91.4	1.23	*84*
Michigan	Truck 6 NL	39.5	6	95.4	1.23	*84*
Michigan	Truck 5 DL	28	6	96	1.36	*84*
Michigan	Truck 6 DL	39.5	6	101.4	1.31	*84*
Michigan	Truck 12 NL	41	8	111.4	1.25	*84*
Michigan	Truck 19 NL	46.5	8	111.4	1.20	*84*
Michigan	Truck 7 NL	48.5	7	113.4	1.28	*84*
Michigan	Truck 24 NL	49	7	116	1.31	*84*
Michigan	Truck 12 DL	41	8	117.4	1.31	*84*
Michigan	Truck 19 DL	46.5	8	117.4	1.27	*84*
Michigan	Truck 13 NL	44.5	9	119.4	1.23	*84*
Michigan	Truck 7 DL	48.5	7	119.4	1.35	*84*
Michigan	Truck 24 DL	49	7	122	1.38	*84*
Michigan	Truck 13 DL	44.5	9	125.4	1.29	*84*
Michigan	Truck 14 DL	42.5	10	132.4	1.30	*84*
Michigan	Truck 14 NL	42.5	10	132.4	1.30	*84*
Michigan	Truck 16 NL	42.5	10	132.4	1.30	*84*
Michigan	Truck 15 NL	51	11	137.4	1.23	*84*
Michigan	Truck 16 DL	42.5	10	138.4	1.36	*84*
Michigan	Truck 15 DL	51	11	143.4	1.28	*84*
Michigan	Truck 17 NL	46	11	145.4	1.33	*84*
Michigan	Truck 18 NL	49.5	11	145.4	1.31	*84*
Michigan	Truck 23 NL	51	11	148	1.32	*84*
Michigan	Truck 17 DL	46	11	151.4	1.39	*84*
Michigan	Truck 18 DL	49.5	11	151.4	1.36	*84*
Michigan	Truck 23 DL	51	11	154	1.37	*84*
Michigan	Truck 22 NL	62.5	11	155.4	1.31	*84*
Michigan	Truck 25 NL	61	11	158	1.34	*84*
Michigan	Truck 22 DL	62.5	11	161.4	1.36	*84*
Michigan	Truck 25 DL	61	11	164	1.40	*84*
Minnesota	M3	16	3	48	1.00	*37*
Minnesota	M3S2-40	51	5	80	1.00	*37*
Minnesota	M3S3-40	47	6	80	0.97	*37*
Missouri	H20	15.9	3	40	0.83	*161*
Missouri	Type 3S2	42.98	5	73.28	0.98	*161*
Missouri	MO5	42.98	5	92	1.23	*161*
Nebraska	Nebraska Type 3	19	3	50	1.00	*162*
Nebraska	Nebraska Type 3S2	41	5	74	1.01	*162*
Nebraska	Nebraska Type 3-3	54	6	86	1.00	*162*
New Mexico	Two axle	14	2	33.6	0.76	*46*
New Mexico	3A axle	19	3	46.32	0.92	*46*
New Mexico	3 axle	19	3	50	1.00	*46*
New Mexico	3B axle	22	3	55.2	1.05	*46*
New Mexico	4 axle	35	4	67.92	1.04	*46*
New Mexico	5 axle	41	5	72	0.98	*46*
New Mexico	6 axle	54	6	80	0.93	*46*
New Mexico	5A axle	51	5	80.64	1.01	*46*
New Mexico	5B axle	56	5	86.4	1.04	*46*
Oklahoma	H23	14	2	46	1.05	*33*
Oklahoma	OK Type 3-3	54	6	90	1.04	*33*
Virginia	VA Type 3	24	3	54	1.00	*25*
Virginia	VA Type 3S2	51	5	80	1.00	*25*
Wisconsin	SU4	18	4	54	1.00	*27*
Wisconsin	PUP	51.09	6	98	1.16	*27*
Wisconsin	Semi Unit	50.93	6	98	1.16	*27*

OVERWEIGHT PERMIT VEHICLES FOR LOAD RATING

TABLE B7
DETAIL ON STATES' OVERWEIGHT PER MIT RATING VEHICLES

State	ID	Wheelbase, ft	Axles	GVW, kip	GVW Ratio	Source
California	P5	36	3	122	1.94	*193*
California	P7	54	4	170	2.18	*193*
California	P9	72	5	218	2.34	*193*
California	Fatigue Permit Truck	72	5	242	2.60	*194*
California	P11	90	6	266	2.46	*193*
California	P13	108	7	314	2.55	*193*
California	P15	126	8	404	2.93	*194*
Colorado	50 ton	20	4	100	1.81	*16*
Colorado	96 ton	77	8	192	1.75	*16*
Florida	Crane 55k	10	2	55	1.38	*125*
Florida	Crane 66k	12	3	66	1.47	*125*
Florida	Crane 70k	15	3	70	1.48	*125*
Florida	Crane 75k	18	4	75	1.39	*125*
Florida	Crane 88k	17	4	88	1.65	*125*
Florida	Crane 95k	20	4	95	1.72	*125*
Florida	Crane 97k	22	4	97	1.71	*125*
Florida	TTT 112k	51	5	112	1.40	*125*
Florida	TTT 118k	62	6	118	1.29	*125*
Florida	FL120	28	3	120	2.11	*18*
Florida	TTT 122k	51	7	122	1.36	*125*
Florida	Crane 125k	51	9	125	1.24	*125*
Florida	TTT 127k	62	7	127	1.32	*125*
Florida	TTT 137k	68	8	137	1.31	*125*
Florida	Wrecker 140k	61	7	140	1.46	*125*
Florida	TTT 145k	75	9	145	1.27	*125*
Florida	TTT 152k	90	9	152	1.24	*125*
Florida	TTT 162k	90	10	162	1.27	*125*
Florida	TTT 185k	90	9	185	1.51	*125*
Florida	TTT 195k	95	9	195	1.55	*125*
Florida	TTT 197k	95	10	197	1.51	*125*
Florida	TTT 199k	100	11	199	1.43	*125*
Indiana	Truck 89.6k	37	4	89.6	1.34	*19*
Indiana	Truck 90k	28	5	90	1.37	*19*
Indiana	Truck 126k	76	7	126	1.21	*19*
Indiana	Michigan Train #5	57.5	8	134	1.36	*19*
Indiana	Michigan Train #8	57	11	134	1.16	*19*
Indiana	258k Truck	197	11	258	1.34	*19*
Indiana	267k Truck	128	13	267	1.61	*19*
Indiana	305k Truck	148	19	305	1.45	*19*
Indiana	350k Truck	141	14	350	1.97	*19*
Indiana	480k Truck	180	19	480	2.12	*19*
Iowa	3 axle 90k	52	6	90	1.06	*196*
Iowa	3 axle 136k	56	7	136	1.47	*196*
Iowa	4 axle 136k	56	7	136	1.47	*196*
Iowa	4 axle 156k	60	8	156	1.63	*196*
Louisiana	OFRD #1–annual	68	5	133	1.47	*20*
Louisiana	OFRD #2–annual	26	5	143	2.22	*20*
Louisiana	OVLD #1–single trip	78.5	9	180	1.55	*20*
Louisiana	OFRD #3–annual	64.4	10	209	1.84	*20*
Louisiana	OVLD #3–single trip	122	12	240	1.53	*20*
Louisiana	OVLD #2–single trip	117	13	260	1.63	*20*
Maryland	No review–Two axles	4.67	2	52	1.50	*150*
Maryland	No review–Three axles	9.34	3	63	1.46	*150*
Maryland	No review–Four axles	14.0	4	72	1.40	*150*
Maryland	No review–Five+ axles	18.7	5	90	1.51	*150*

TABLE B7
(*continued*)

State	ID	Wheelbase, ft	Axles	GVW, kip	GVW Ratio	Source
Maryland	Case 2	62	8	147	1.45	*150*
Maryland	Case 1	66	7	150	1.52	*150*
Maryland	Case 3	62	8	150	1.48	*150*
Michigan	Overload Class 5	11	2	120	2.93	*84*
Michigan	Overload Class 6	16	3	126	2.63	*84*
Michigan	Overload Class 7	21	4	138	2.46	*84*
Michigan	Overload Class 8	25.5	5	150	2.34	*84*
Michigan	Overload Class 9	28	6	158	2.24	*84*
Michigan	Overload Class 10	34.5	7	177	2.21	*84*
Michigan	Overload Class 11	37	3	180	2.82	*84*
Michigan	Overload Class 12	37	5	191	2.68	*84*
Michigan	Overload Class 13	45	5	195	2.56	*84*
Michigan	Overload Class 14	53	7	211	2.32	*84*
Michigan	Overload Class 15	61	9	238	2.24	*84*
Michigan	Overload Class 16	64.5	10	244	2.15	*84*
Michigan	Overload Class 20	90.6	10	264	2.06	*84*
Michigan	Overload Class 17	84.7	11	273	2.09	*84*
Michigan	Overload Class 19	99.7	10	277	2.08	*84*
Michigan	Overload Class	84	9	283	2.38	*84*
Minnesota	G-80 Standard 'A' Truck	46	7	104	1.20	*37*
Minnesota	G-80 Standard 'B' Truck	49	7	136	1.54	*37*
Minnesota	G-07 C152b	53	8	152	1.58	*37*
Minnesota	G-80 Standard 'C' Truck	57	9	159	1.53	*37*
Minnesota	G-07 C174b	66.5	9	174	1.59	*37*
Minnesota	G-07 C198-23	82	9	198	1.68	*37*
Minnesota	G-07 C200j	88	10	200	1.58	*37*
Minnesota	G-80 P411	93	11	207	1.53	*37*
Minnesota	G-07 C214b	92.3	11	214	1.59	*37*
Minnesota	G-07 C237b	109	13	237	1.53	*37*
Minnesota	G-80 P413	117	13	255	1.60	*37*
Minnesota	G-07 C256b	118	13	256	1.60	*37*
Nevada	Design truck	108	7	314	2.55	*31*
New Hampshire	Addtl. Regis 4 axle	18	4	69	1.28	*197*
New Hampshire	Addtl. Regis 5 axle	29	5	84	1.27	*197*
New Hampshire	Addtl. Regis 6 axle	36	6	99	1.31	*197*
New York	Type 2A	17	5	27	0.46	*154*
New York	Type 2	17	3	79	1.62	*70*
New York	Type 4	30	5	93	1.39	*70*
New York	Type 1	16	3	97.4	2.03	*70*
New York	Type 1A	16	5	102	1.76	*70*
New York	Type 7	35.5	6	107	1.42	*70*
New York	Type 9	43	7	117	1.38	*70*
New York	Type 6A	36.5	6	120	1.58	*70*
New York	Type 6B	43	7	120	1.41	*70*
Oklahoma	1.2.2	43.0	5	93	1.24	*185*
Oklahoma	App E 5 axle	53.5	5	95	1.17	*107*
Oklahoma	1.2.2.A	27.5	5	95	1.46	*185*
Oklahoma	1.2.2.B	55.0	5	95	1.15	*185*
Oklahoma	1.2.2.C	55.5	5	95	1.15	*185*
Oklahoma	1.2.2.D	60.6	5	95	1.11	*185*
Oklahoma	1.3.2	47.0	6	110	1.34	*185*
Oklahoma	1.2.3	47.0	6	111	1.35	*185*
Oklahoma	1.2.3.B	49.0	6	113	1.35	*185*
Oklahoma	1.2.3.C	53.0	6	113	1.32	*185*
Oklahoma	1.2.3.D	57.0	6	113	1.28	*185*
Oklahoma	App E 6 axle	57.8	6	115	1.30	*107*
Oklahoma	1.2.3.A	47.8	6	115	1.39	*185*
Oklahoma	1.2.3.E	59.5	6	115	1.28	*185*
Oklahoma	1.2.3.F	60.5	6	115	1.27	*185*
Oklahoma	1.3.2.A	47.8	6	115	1.39	*185*
Oklahoma	1.3.2.B	59.5	6	115	1.28	*185*
Oklahoma	1.3.2.C	60.0	6	115	1.28	*185*

(*continued on next page*)

TABLE B7
(*continued*)

State	ID	Wheelbase, ft	Axles	GVW, kip	GVW Ratio	Source
Oklahoma	1.3.2.D	65.1	6	115	1.24	*185*
Oklahoma	1.2.4	51.0	7	119	1.33	*185*
Oklahoma	App E 7 axle-b	62.0	7	120	1.25	*107*
Oklahoma	1.2.4.D	52.0	7	120	1.33	*185*
Oklahoma	1.2.4.E	53.0	7	123	1.35	*185*
Oklahoma	1.2.4.I	64.0	7	123	1.26	*185*
Oklahoma	1.2.4.A	53.0	7	124	1.36	*185*
Oklahoma	1.2.5.H	55.0	8	126	1.29	*185*
Oklahoma	1.2.4.F	57.0	7	127	1.36	*185*
Oklahoma	1.2.4.J	65.5	7	127	1.29	*185*
Oklahoma	1.3.3	51.0	7	129	1.44	*185*
Oklahoma	1.3.3.B	51.0	7	130	1.45	*185*
Oklahoma	1.2.5.I	68.5	8	130	1.24	*185*
Oklahoma	1.2.4.G	61.0	7	131	1.37	*185*
Oklahoma	1.3.3.C	57.0	7	131	1.40	*185*
Oklahoma	1.3.3.D	61.0	7	131	1.37	*185*
Oklahoma	1.2.4.B	57.0	7	132	1.42	*185*
Oklahoma	1.2.4.C	61.0	7	132	1.38	*185*
Oklahoma	1.2.4.H	61.0	7	132	1.38	*185*
Oklahoma	1.2.4.L	69.5	7	132	1.31	*185*
Oklahoma	1.3.4	55.0	8	132	1.35	*185*
Oklahoma	1.2.5	57.0	8	133	1.35	*185*
Oklahoma	App E 7 axle-a	62.0	7	135	1.40	*107*
Oklahoma	1.2.4.K	70.5	7	135	1.33	*185*
Oklahoma	1.2.4.M	70.5	7	135	1.33	*185*
Oklahoma	1.2.4.N	73.6	7	135	1.31	*185*
Oklahoma	1.2.4.O	74.6	7	135	1.30	*185*
Oklahoma	1.3.3.A	52.0	7	135	1.49	*185*
Oklahoma	1.3.3.E	64.0	7	135	1.39	*185*
Oklahoma	1.3.3.F	65.0	7	135	1.38	*185*
Oklahoma	1.2.5.D	58.0	8	135	1.36	*185*
Oklahoma	1.2.6	59.0	9	135	1.28	*185*
Oklahoma	1.4.3	55.0	8	136	1.40	*185*
Oklahoma	1.2.5.J	70.5	8	137	1.29	*185*
Oklahoma	1.4.3.C	58.0	8	139	1.40	*185*
Oklahoma	1.2.5.A	61.0	8	140	1.39	*185*
Oklahoma	1.3.4.E	56.3	8	140	1.43	*185*
Oklahoma	1.4.3.F	58.0	8	140	1.41	*185*
Oklahoma	1.2.6.A	61.0	9	140	1.32	*185*
Oklahoma	1.2.6.D	60.5	9	140	1.32	*185*
Oklahoma	1.2.4.2	61.0	9	140	1.32	*185*
Oklahoma	1.3.4.F	57.0	8	141	1.43	*185*
Oklahoma	1.2.5.E	62.0	8	142	1.40	*185*
Oklahoma	1.3.4.A	57.0	8	142	1.44	*185*
Oklahoma	1.4.3.A	59.0	8	142	1.42	*185*
Oklahoma	1.2.4.2.C	62.3	9	142	1.33	*185*
Oklahoma	1.3.4.H	68.5	8	143	1.36	*185*
Oklahoma	1.3.5	59.0	9	144	1.37	*185*
Oklahoma	1.4.4.D	62.3	9	144	1.35	*185*
Oklahoma	1.2.5.B	65.0	8	145	1.41	*185*
Oklahoma	1.3.4.G	61.0	8	145	1.44	*185*
Oklahoma	1.4.3.E	58.5	8	145	1.46	*185*
Oklahoma	1.3.4.B	61.0	8	146	1.45	*185*
Oklahoma	1.4.4	59.0	9	146	1.39	*185*
Oklahoma	1.3.4.I	70.0	8	147	1.39	*185*
Oklahoma	1.2.4.2.A	65.0	9	147	1.35	*185*
Oklahoma	1.2.5.F	66.0	8	148	1.43	*185*
Oklahoma	1.3.4.D	65.5	8	148	1.43	*185*
Oklahoma	1.4.3.B	67.0	8	148	1.42	*185*
Oklahoma	1.2.6.B	65.0	9	148	1.36	*185*
Oklahoma	1.4.3.D	62.0	8	149	1.47	*185*
Oklahoma	1.3.5.A	61.0	9	149	1.40	*185*

TABLE B7
(*continued*)

State	ID	Wheelbase, ft	Axles	GVW, kip	GVW Ratio	Source
Oklahoma	1.2.5.C	65.0	8	150	1.45	*185*
Oklahoma	1.3.4.C	65.0	8	150	1.45	*185*
Oklahoma	1.3.5.D	60.5	9	150	1.41	*185*
Oklahoma	1.3.5.F	73.0	9	150	1.33	*185*
Oklahoma	1.2.4.2.D	66.3	9	150	1.37	*185*
Oklahoma	1.2.5.G	66.0	8	151	1.46	*185*
Oklahoma	1.2.4.2.B	69.0	9	151	1.36	*185*
Oklahoma	1.2.5.K	78.1	8	152	1.37	*185*
Oklahoma	1.4.4.F	63.0	9	152	1.41	*185*
Oklahoma	1.4.5	63.0	10	152	1.35	*185*
Oklahoma	1.5.4	63.0	10	152	1.35	*185*
Oklahoma	1.3.4.L	78.1	8	153	1.38	*185*
Oklahoma	1.4.4.A	63.0	9	153	1.42	*185*
Oklahoma	1.3.6.A	63.0	10	153	1.35	*185*
Oklahoma	1.2.5.L	79.6	8	154	1.38	*185*
Oklahoma	1.3.5.B	65.0	9	154	1.42	*185*
Oklahoma	1.4.5.D	66.5	10	154	1.34	*185*
Oklahoma	1.3.4.J	75.0	8	155	1.42	*185*
Oklahoma	1.3.4.K	79.1	8	155	1.39	*185*
Oklahoma	1.2.4.2.E	70.3	9	155	1.39	*185*
Oklahoma	1.3.5.G	75.0	9	157	1.37	*185*
Oklahoma	1.3.4.2	65.0	10	157	1.38	*185*
Oklahoma	1.2.6.C	69.0	9	158	1.43	*185*
Oklahoma	1.3.6.B	65.0	10	158	1.38	*185*
Oklahoma	1.3.5.C	69.0	9	159	1.43	*185*
Oklahoma	1.5.5	67.0	11	159	1.32	*185*
Oklahoma	1.4.4.E	66.3	9	160	1.46	*185*
Oklahoma	1.3.6.E	64.8	10	160	1.40	*185*
Oklahoma	1.5.4.A	67.0	10	161	1.40	*185*
Oklahoma	1.5.4.E	67.0	10	161	1.40	*185*
Oklahoma	1.3.4.2.C	66.5	10	161	1.40	*185*
Oklahoma	1.4.6	67.0	11	161	1.33	*185*
Oklahoma	1.4.4.G	71.0	9	162	1.45	*185*
Oklahoma	1.4.5.A	67.0	10	163	1.41	*185*
Oklahoma	1.5.4.B	68.3	10	163	1.41	*185*
Oklahoma	1.5.4.H	68.3	10	163	1.41	*185*
Oklahoma	1.3.4.2.A	69.0	10	163	1.40	*185*
Oklahoma	1.3.6.C	69.0	10	164	1.41	*185*
Oklahoma	1.4.6.D	70.8	11	164	1.33	*185*
Oklahoma	1.2.7	87.1	10	165	1.31	*185*
Oklahoma	1.5.5.D	71.0	11	165	1.34	*185*
Oklahoma	1.4.4.2	69.0	11	165	1.35	*185*
Oklahoma	1.4.4.B	71.0	9	167	1.49	*185*
Oklahoma	1.3.4.2.D	70.5	10	167	1.43	*185*
Oklahoma	1.6.5	71.0	12	167	1.30	*185*
Oklahoma	1.2.7.A	89.6	10	168	1.31	*185*
Oklahoma	1.3.4.2.B	73.0	10	168	1.42	*185*
Oklahoma	1.5.5.G	70.8	11	168	1.37	*185*
Oklahoma	1.4.4.2.C	70.8	11	168	1.37	*185*
Oklahoma	1.5.6	71.0	12	168	1.31	*185*
Oklahoma	1.3.5.E	80.0	9	169	1.44	*185*
Oklahoma	1.4.6.A	71.0	11	169	1.37	*185*
Oklahoma	1.5.5.A	71.0	11	169	1.37	*185*
Oklahoma	1.3.5.H	82.6	9	170	1.44	*185*
Oklahoma	1.4.4.H	79.0	9	170	1.46	*185*
Oklahoma	1.4.5.E	74.5	10	170	1.42	*185*
Oklahoma	1.3.6.D	73.0	10	170	1.43	*185*
Oklahoma	1.3.7	73.0	11	170	1.37	*185*
Oklahoma	1.4.4.C	79.0	9	171	1.47	*185*
Oklahoma	1.3.6.G	87.1	10	171	1.35	*185*
Oklahoma	1.5.5.E	73.0	11	171	1.38	*185*
Oklahoma	1.3.5.I	84.1	9	172	1.44	*185*

(*continued on next page*)

TABLE B7
(*continued*)

State	ID	Wheelbase, ft	Axles	GVW, kip	GVW Ratio	Source
Oklahoma	1.3.4.2.E	77.5	10	172	1.42	*185*
Oklahoma	1.3.7.B	73.0	11	172	1.39	*185*
Oklahoma	1.3.6.H	89.1	10	173	1.36	*185*
Oklahoma	1.5.4.C	76.3	10	173	1.44	*185*
Oklahoma	1.4.4.2.A	73.0	11	173	1.39	*185*
Oklahoma	1.4.5.B	75.0	10	174	1.45	*185*
Oklahoma	1.5.4.D	74.5	10	174	1.46	*185*
Oklahoma	1.5.5.H	74.8	11	174	1.39	*185*
Oklahoma	1.3.7.A	77.0	11	174	1.38	*185*
Oklahoma	1.5.6.D	75.0	12	174	1.33	*185*
Oklahoma	1.6.5.A	75.0	12	174	1.33	*185*
Oklahoma	1.6.5.D	75.0	12	174	1.33	*185*
Oklahoma	1.6.6	75.0	13	174	1.27	*185*
Oklahoma	1.5.4.F	75.0	10	175	1.46	*185*
Oklahoma	1.4.4.2.D	74.8	11	175	1.40	*185*
Oklahoma	1.5.6.A	75.0	12	175	1.34	*185*
Oklahoma	1.4.4.2.B	77.0	11	176	1.39	*185*
Oklahoma	1.5.4.I	76.3	10	178	1.48	*185*
Oklahoma	1.5.5.F	77.0	11	178	1.41	*185*
Oklahoma	1.3.6	84.3	10	179	1.43	*185*
Oklahoma	1.3.4.2.F	87.1	10	179	1.42	*185*
Oklahoma	1.4.6.E	78.8	11	179	1.41	*185*
Oklahoma	1.3.7.C	78.8	11	180	1.41	*185*
Oklahoma	1.4.4.2.E	78.8	11	180	1.41	*185*
Oklahoma	1.6.5.E	79.0	12	180	1.35	*185*
Oklahoma	1.3.4.2.G	89.1	10	181	1.42	*185*
Oklahoma	1.5.5.B	79.0	11	181	1.42	*185*
Oklahoma	1.5.6.E	79.0	12	181	1.36	*185*
Oklahoma	1.6.6.A	79.0	13	181	1.30	*185*
Oklahoma	1.5.4.G	83.0	10	182	1.47	*185*
Oklahoma	1.5.5.I	78.8	11	182	1.43	*185*
Oklahoma	1.6.6.D	79.3	13	182	1.31	*185*
Oklahoma	1.4.5.C	83.0	10	183	1.47	*185*
Oklahoma	1.4.6.B	79.0	11	183	1.44	*185*
Oklahoma	1.3.7.D	89.8	11	185	1.39	*185*
Oklahoma	1.6.5.F	83.0	12	186	1.38	*185*
Oklahoma	1.3.6.F	90.3	10	187	1.46	*185*
Oklahoma	1.5.4.J	84.3	10	187	1.50	*185*
Oklahoma	1.3.7.E	94.1	11	188	1.38	*185*
Oklahoma	1.4.7	83.0	12	188	1.39	*185*
Oklahoma	1.6.6.E	83.3	13	188	1.33	*185*
Oklahoma	1.3.6.I	94.1	10	189	1.45	*185*
Oklahoma	1.5.6.F	83.0	12	189	1.40	*185*
Oklahoma	1.6.5.B	83.0	12	189	1.40	*185*
Oklahoma	1.5.6.B	83.0	12	190	1.40	*185*
Oklahoma	1.4.7.B	84.8	12	192	1.41	*185*
Oklahoma	1.4.6.C	87.0	11	195	1.48	*185*
Oklahoma	1.5.5.C	87.0	11	195	1.48	*185*
Oklahoma	1.4.7.A	91.0	12	196	1.40	*185*
Oklahoma	1.6.6.F	87.3	13	196	1.37	*185*
Oklahoma	1.6.6.B	87.0	13	197	1.38	*185*
Oklahoma	1.5.7	87.0	13	198	1.38	*185*
Oklahoma	1.6.5.C	91.0	12	200	1.43	*185*
Oklahoma	1.5.7.B	89.0	13	200	1.39	*185*
Oklahoma	1.6.7.A	93.3	14	200	1.31	*185*
Oklahoma	1.5.6.C	91.0	12	201	1.44	*185*
Oklahoma	1.5.6.I	109	12	201	1.34	*185*
Oklahoma	1.6.6.C	95.0	13	201	1.36	*185*
Oklahoma	1.5.7.A	95.0	13	201	1.36	*185*
Oklahoma	1.6.7	99.0	14	201	1.29	*185*
Oklahoma	1.5.7.C	97.0	13	202	1.36	*185*
Oklahoma	1.6.7.B	101	14	202	1.29	*185*

TABLE B7
(*continued*)

State	ID	Wheelbase, ft	Axles	GVW, kip	GVW Ratio	Source
Oklahoma	1.4.7.C	102	12	204	1.40	*185*
Oklahoma	1.4.7.D	106	12	205	1.39	*185*
Oklahoma	1.4.7.E	109	12	206	1.38	*185*
Oklahoma	1.5.6.H	107	12	207	1.40	*185*
Oklahoma	1.5.7.D	106	13	207	1.35	*185*
Oklahoma	1.5.6.G	108	12	208	1.40	*185*
Oklahoma	1.5.7.E	110	13	208	1.34	*185*
Oklahoma	1.5.7.F	113	13	209	1.33	*185*
Oklahoma	1.3.8	113	12	211	1.39	*185*
Oregon	Table 2–2 axle	4	2	43	1.26	*198*
Oregon	Table 2–3 axle	19	3	64.5	1.28	*198*
Oregon	Table 4–3 axle	10	3	64.5	1.48	*199*
Oregon	Table 4–3 axle	13	3	72	1.57	*199*
Oregon	Table 2–4 axle	32	4	86	1.36	*199*
Oregon	Table 4–4 axle	19	4	86	1.57	*199*
Oregon	Table 2–5 axle	67	5	90	1.00	*199*
Oregon	Table 4–4 axle	24	4	96	1.66	*199*
Oregon	Type OR-CTP-3	43	5	98	1.31	*200*
Oregon	Type OR-CTP-3	43	5	98	1.31	*200*
Oregon	Type OR-STP-4A	39	5	99	1.37	*199*
Oregon	Table 2–6 axle	71	6	103	1.06	*198*
Oregon	Type OR-CTP-2B	75.5	8	106	0.97	*200*
Oregon	Type OR-CTP-2B	75.5	8	106	0.97	*200*
Oregon	Type OR-CTP-2A	82	8	106	0.93	*200*
Oregon	Table 2–8 axle	69	8	106	1.00	*198*
Oregon	Table 2–7 axle	78	7	106	1.00	*198*
Oregon	Table 2–5 axle	50	5	108	1.36	*198*
Oregon	Table 4–5 axle	29	5	108	1.63	*199*
Oregon	Table 4–5 axle	35	5	120	1.72	*199*
Oregon	Type OR-STP-3	70	6	121	1.26	*200*
Oregon	Table 2–6 axle	68	6	129	1.36	*198*
Oregon	Table 4–6 axle	41	6	129	1.64	*199*
Oregon	Table 4–6 axle	50	6	144	1.71	*199*
Oregon	Table 2–7 axle	85	7	150	1.37	*198*
Oregon	Table 4–7 axle	55	7	151	1.63	*199*
Oregon	Type OR-STP-4C	73.5	8	151	1.39	*200*
Oregon	Type OR-STP-4D	65	8	163	1.58	*200*
Oregon	Table 4–7 axle	65	7	168	1.72	*199*
Oregon	Table 2–8 axle	104	8	172	1.37	*198*
Oregon	Table 4–8 axle	66	8	172	1.66	*199*
Oregon	Type OR-STP-4B	100	9	185	1.44	*200*
Oregon	Table 4–8 axle	80	8	192	1.72	*199*
Oregon	Table 2–9 axle	122	9	194	1.38	*198*
Oregon	Table 4–9 axle	81	9	194	1.65	*199*
Oregon	Type OR-STP-5BW	99	9	204	1.60	*200*
Oregon	Table 2–10 axle	140	10	215	1.38	*198*
Oregon	Table 4–10 axle	95	10	215	1.64	*199*
Oregon	Table 4–9 axle	95	9	216	1.72	*199*
Oregon	Table 2–11 axle	150	11	228	1.37	*198*
Oregon	Table 4–11 axle	108	11	237	1.65	*199*
Oregon	Table 4–10 axle	110	10	240	1.73	*199*
Oregon	Table 4–12 axle	122	12	258	1.65	*199*
Oregon	Type OR-STP-4E	126	13	258	1.57	*200*
Oregon	Table 4–11 axle	125	11	264	1.73	*199*
Oregon	Table 4–13 axle	135	13	280	1.65	*199*
Oregon	Table 4–12 axle	140	12	288	1.73	*199*
Oregon	Table 4–14 axle	149	14	301	1.65	*199*
Oregon	Table 4–13 axle	150	13	304	1.72	*199*
Oregon	Table 4–15 axle	150	15	304	1.61	*199*
Utah	UT-P6	64	6	96	1.04	*34*
Utah	UT-P8	63	8	105	1.03	*34*
Utah	UT-P9a	64	9	106	0.98	*34*

(*continued on next page*)

TABLE B7
(*continued*)

State	ID	Wheelbase, ft	Axles	GVW, kip	GVW Ratio	Source
Utah	UT-P7	65	7	108	1.10	*34*
Utah	UT-P9b	89	9	132	1.08	*34*
Virginia	BP-90	44	5	90	1.19	*25*
Virginia	BP-115	64	7	115	1.18	*25*
Washington	Axle Formula 1	10	2	66	1.65	*25*
Washington	Overload 1	30	5	96	1.44	*25*
Washington	Overload 2	70	10	207	1.77	*25*
Wisconsin	Wis-SPV	63	8	190	1.86	*27*

Abbreviations used without definitions in TRB publications:

A4A	Airlines for America
AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
MAP-21	Moving Ahead for Progress in the 21st Century Act (2012)
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation