

PERMIT FOR THE TRANSPORTATION OF LOADS
OF EXCESSIVE WEIGHT

348.16 Weight Limitations on class "B" Highways
348.17 Special or seasonal weight limitations

Permit No. _____ Issued at _____ Wisconsin
on _____ 19 _____

Issued to _____ of _____
by the Town of _____ County, WI

Nature of Load _____ Gross Weight _____
Make of Truck _____ License Plate No. _____

Route over highways _____

Special Conditions:

- Maintenance and Repair of Described Route
- Speed Limit of _____
- No Travel on Weekends and Holidays
- No Travel During Hours of Darkness
- Travel Only on Days of Week Listed _____
- Travel Between ___ AM/PM and ___ AM/PM
- Other _____

Good in the Issuing Town: from _____ 19 _____
to _____ 19 _____ for: _____

One Trip or Recurring Trips
(circle one)

Issued on condition that permit holder assumes complete
responsibility for all damages resulting from this
trip.

Issued by _____

Title _____

Accepted subject to conditions imposed:

Signature of Permit Holder

Insurance Company Name _____

Policy No. _____ Expiration Date _____

PERMIT MUST BE CARRIED BY OPERATOR

349.15 STATE AND LOCAL POWERS

effect the weight limitations set forth in s. 348.16, except that no portion of any such highway which is a state trunk highway or connecting highway may be so designated.

(3) Any city of the first class may, with respect to the streets of such city, by ordinance increase the maximum weight limitations specified in ss. 348.15 and 348.16.

History: 1977 c. 29 s. 1654 (3).

The police power under this section need not be based on the condition of the roadbed, but may be exercised to promote the general welfare of the public. 66 Atty. Gen. 110.



349.16 Authority to impose special or seasonal weight limitations. (1) The officer in charge of maintenance in case of highways maintained by a town, city or village, the county highway commissioner or county highway committee in the case of highways maintained by the county and the department in the case of highways maintained by the state may:

(a) Impose special weight limitations on any such highway or portion thereof which, because of weakness of the roadbed due to deterioration or climatic conditions or other special or temporary condition, would likely be seriously damaged or destroyed in the absence of such special limitations;

(b) Impose special weight limitations on bridges or culverts when in its judgment such bridge or culvert cannot safely sustain the maximum weights permitted by statute;

(c) Order the owner or operator of any vehicle being operated on a highway to suspend operation if in its judgment such vehicle is causing or likely to cause injury to such highway or is visibly injuring the permanence thereof or the public investment therein, except when s. 84.20 is applicable or when the vehicle is being operated pursuant to a contract which provides that the governmental unit will be reimbursed for any damage done to the highway. Traffic officers also may order suspension of operation under the circumstances and subject to the limitations stated in this paragraph.

(2) Imposition of the special weight limitations authorized by sub. (1) (a) shall be done by erecting signs on or along the highway on which it is desired to impose the limitation sufficient to give reasonable notice that a special weight limitation is in effect and the nature of that limitation. Imposition of the special weight limitations authorized by sub. (1) (b) shall be done by erecting signs before each end of the bridge or culvert to which the weight limitation applies sufficient to give reasonable notice that a special weight limitation is in effect and the nature of that limitation. All weight limitation signs and their erection shall comply with the rules of the department and shall be standard throughout the state.

(3) The authority in charge of the maintenance of the highway may exempt vehicles carrying certain commodities specified by the authority or which are used to perform certain services specified by the authority from the special weight limitations which are imposed under sub. (1) (a), or may set different weight limitations than those imposed under sub. (1) (a) for vehicles carrying those commodities or which are used to perform those services, if such exemption or limitation is reasonable and necessary to promote the public health, safety and welfare. The authority in charge of the maintenance of the highway shall exempt from the special or seasonal weight limitations imposed under sub. (1) (a) a vehicle that is used to transport material pumped from a septic or holding tank if, because of health concerns, material needs to be removed from a septic or holding tank within 24 hours after the vehicle owner or operator is notified and if the vehicle is operated for the purpose of emptying the septic or holding tank and disposing of its contents and is operated on a route that minimizes travel on highways subject to weight limitations imposed under sub. (1) (a). Within 72 hours after operating a vehicle that transported material pumped from a septic or holding tank and that exceeded special or seasonal weight limitations as authorized by this subsection, the owner or operator of the vehicle shall notify the authority in

charge of maintenance of the highways over which the vehicle was operated.

History: 1975 c. 141; 1977 c. 29 s. 1654 (8) (a); 1977 c. 435; 1983 a. 307; 1999 a. 46.

349.17 Authority of cities, villages and towns to regulate heavy traffic. (1) Any city, village or town may by ordinance or resolution designate any street or highway under its jurisdiction as a heavy traffic route and designate the type and character of vehicles which may be operated thereon. A city, village or town may restrict or prohibit heavy traffic from using other streets or highways under its jurisdiction except that it may not place such restrictions on streets or highways over which are routed state trunk highways and may not prohibit heavy traffic from using a street or highway for the purpose of obtaining orders for supplies or moving or delivering supplies or commodities to or from any place of business or residence which has an entrance on such street or highway. Whenever a city, village or town designates any street or highway under its jurisdiction as a heavy traffic route, it shall cause appropriate signs to be erected giving notice thereof.

(2) In this section, "heavy traffic" means all vehicles not operating completely on pneumatic tires and all vehicles or combination of vehicles, other than motor buses, designed or used for transporting property of any nature and having a gross weight of more than 6,000 pounds.

History: 1977 c. 116; 1993 a. 246.

Legislative Council Note, 1977: Sub. (1) authorizes cities and villages to designate any street as a heavy traffic route. As defined in s. 340.01 (64), the term "street" means every highway within the corporate limits of a city or village except alleys. By adding "or highway" after "street", s. 349.17 (1) authorizes a city or village to prohibit heavy traffic from using any street or alley which has not been designated as a heavy traffic route unless such street or alley is being used to obtain orders for supplies or to deliver supplies or commodities to or from a place of business or residence with an entrance on such street or alley. "Highway" is defined in s. 340.01 (22), to mean "all public ways and thoroughfares", including alleys. [Bill 465-A]

349.18 Additional traffic-control authority of counties and municipalities. (1) Any city, village or town, by ordinance, may:

(a) Designate the number of persons that may ride on a motor bicycle at any one time and the highways upon which a motor bicycle or moped may or may not be operated.

(b) Establish a golf cart crossing point upon a highway within its limits. An ordinance enacted under this paragraph shall require that a golf cart stop and yield the right-of-way to all vehicles approaching on the highway before crossing the highway. The ordinance may require that a golf cart be equipped with reflective devices as specified in the ordinance. The city, village or town shall place a sign of a type approved by the department to mark the crossing point on both sides of the highway.

(c) Regulate the operation of a golf cart to and from a golf course for a distance not to exceed one mile upon a highway under its exclusive jurisdiction. The city, village or town shall place a sign of a type approved by the department to mark any golf cart travel route designated by the ordinance.

(2) Any city, town or village may by ordinance enacted pursuant to s. 349.06 regulate the operation of bicycles and motor bicycles and may by ordinance require registration of any bicycle or motor bicycle owned by a resident of the city, town or village, including the payment of a registration fee.

(3) Any county, by ordinance, may require the registration of any bicycle or motor bicycle owned by a resident of the county if the bicycle or motor bicycle is not subject to registration under sub. (2). Such ordinance does not apply to any bicycle or motor bicycle subject to registration under sub. (2), even if the effective date of the ordinance under sub. (2) is later than the effective date of the county ordinance. A county may charge a fee for the registration.

History: 1977 c. 116, 288; 1983 a. 243, 288, 343, 538; 1985 a. 135, 197, 298, 332; 1989 a. 167; 1993 a. 246; 1995 a. 138; 1997 a. 27.

Figure 348.15 (3) (c):

Maximum gross weight in pounds on a group of—

Distances in feet between foremost and rear-most axles of a group	2 consecutive axles of a 2-axle vehicle or any vehicle or combination of vehicles having a total of 3 or more axles	3 consecutive axles of a 3-axle vehicle or of any vehicle or combination of vehicles having a total of 4 or more axles	4 consecutive axles of any combination of vehicles having a total of 5 or more axles	4 consecutive axles of a 4-axle vehicle or of any vehicle having a total of 5 or more axles	5 consecutive axles of any combination of vehicles having a total of 5 or more axles	5 consecutive axles of a 5-axle vehicle or of any vehicle having a total of 6 or more axles	6 consecutive axles of any combination of vehicles having a total of 6 or more axles	6 consecutive axles of any vehicle having a total of 6 or more axles	7 consecutive axles of a 7-axle vehicle or of any vehicle or combination of vehicles having a total of 7 or more axles	8 consecutive axles of a 8-axle vehicle or of any vehicle or combination of vehicles having a total of 8 or more axles
4	34,000									
5	34,000									
6	34,000									
7	34,000	37,000								
7.5 to 8 more than 8 but less than 8.5	35,000	38,500								
	38,000	42,000								
9	39,000	43,000								
10	40,000	43,500	48,500							
11		44,500	49,500							
12		45,000	50,000	55,500						
13		46,000	50,500	60,000	62,500					
14		46,500	51,500	60,500	62,500					
15		47,500	52,000	61,500	62,500					
16		48,000	52,500	62,000	62,500	64,200				
17		49,000	53,500	63,000	63,200	71,700	64,000			
18		49,500	54,100	63,500	64,400	72,200	65,000			
19		50,500	55,100	64,500	65,000	73,000	65,500			
20		51,500	56,000	65,000	65,700	73,000	66,000	73,000		
21		52,200	56,800	66,000	66,900	73,000	66,900	73,000	73,000	
22		52,900	57,600	66,500	67,700	73,000	67,700	73,000	73,000	
23		53,600	58,400	67,500	68,900	73,000	68,900	73,000	73,500	
24		54,300	59,200	68,500	70,000	73,000	70,000	73,000	74,000	
25		55,000	60,000	69,000	71,000	73,000	71,000	73,000	74,500	80,000
26		55,700	60,800	69,500	72,000	73,000	72,000	73,000	75,000	80,000
27		56,500	61,600	70,500	72,800	73,000	72,800	73,000	76,000	80,000
28		57,100	62,400	71,300	73,000	73,000	73,000	73,000	76,500	80,000
29		58,000	63,200	72,000	73,000	73,000	73,000	73,000	77,000	80,000
30		58,500	64,000	72,700	73,000	73,000	73,000	73,000	77,500	80,000
31		59,500	64,000	73,000	73,000	73,000	73,000	73,000	78,000	80,000
32		60,000**	64,000	73,000**	73,000	73,000**	73,000	73,000**	78,500	80,000**
33			64,000		73,000		74,000		79,500	
34			64,500		73,000		74,500		80,000***	
35			65,500		73,000		75,000			
36			66,000		73,000		75,500			
37			66,500		73,000		76,000			
38			67,500		73,000		77,000			
39			68,000		73,000		77,500			
40			68,500		73,000		78,000			
41			69,500		73,500		78,500			
42			70,000		74,500		79,000			
43			70,500		75,000		80,000			
44			71,500		75,500		80,000			
45			72,000		76,000		80,000			
46			72,500		77,000		80,000			
47			73,500		77,500		80,000			
48			74,000		78,000		80,000			
49			74,500		78,500		80,000			
50			75,500		79,500		80,000			
51			76,000****		80,000****		80,000****			

*Maximum at 10 or more feet between axles.

**Maximum at 32 or more feet between axles.

***Maximum at 34 or more feet between axles.

****Maximum at 51 or more feet between axles.

(d) Notwithstanding par. (c), 2 consecutive sets of tandem axles may impose on the highway a gross load of 34,000 pounds each if the overall distance between the first and last axles of such consecutive sets of tandem axles is 36 feet or more.

(e) Notwithstanding pars. (a), (b) and (c), in the case of a vehicle or combination of vehicles transporting exclusively livestock, the gross weight imposed on the highway by the wheels of any one axle or axle group may exceed the applicable weight limit

specified in pars. (a), (b) and (c) by 15% if the gross weight of the vehicle or combination of vehicles does not exceed the maximum gross weight specified for that vehicle or combination of vehicles under par. (c). This paragraph does not apply to the national system of interstate and defense highways, except for that portion of USH 51 between Wausau and STH 78 and that portion of STH 78 between USH 51 and the I 90/94 interchange near Portage upon their federal designation as I 39.

WISCONSIN TOWN LAW FORMS
[Section numbers refer to Wisconsin Statutes.]

SECTION 9 – PENALTY PROVISIONS

Any person, partnership, corporation, or other legal entity that fails to comply with the provisions of this ordinance shall, upon conviction, pay a forfeiture of not less than \$ _____ nor more than \$ _____, plus the application surcharges, assessments, and costs for each violation. Each day a violation exists or continues shall be considered a separate offense under this ordinance. In addition, the town board may seek a injunctive relief from a court of record to enjoin further violations.

SECTION 10 – EFFECTIVE DATE

This Ordinance is effective on publication.

The town clerk shall properly post or publish this ordinance as required under s. 60.80, Wis. stats.

Adopted this _____ day of _____ 20__.

[Signatures of town board]

Attest: [Signature of town clerk]

Ordinance
348.16, 349.15, and 349.16 * ~~Resolution~~ establishing special or seasonal weight limits.

STATE OF WISCONSIN

Town of _____
_____ County

The town board of the Town of _____, _____ County, Wisconsin, by this resolution, adopted on proper notice with a quorum and by a roll call vote of a majority of the town board present and voting resolves, and orders as follows:

The following seasonal or special weight limits shall be effective on _____ 20__ on the following Town of _____ town highways, which are declared to be class "B" highways under s. 349.15 (2), Wis. stats.: (CITE SPECIFIC TOWN HIGHWAYS AND THE APPROPRIATE WEIGHT LIMITS).

The town chairperson, or his or her designee shall erect signs as required under s. 349.16 (2), Wis. stats., on or before the effective date noted above.

No persons shall operate any vehicles on the above noted highways, in violation of the above noted weight limits, without a written permit issued by the town board of the Town of _____, and any violation shall be subject to penalties under s. 348.21, Wis. stats.

The town clerk shall properly post or publish this resolution as required under s. 60.80, Wis. stats.

Adopted this _____ day of _____ 20__.

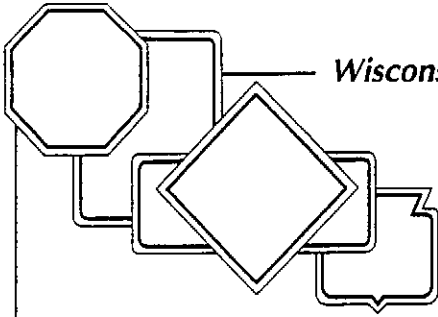
[Signatures of town board]

Attest: [Signature of town clerk]

348.26, 348.27 * Permit for overweight vehicles.

STATE OF WISCONSIN

Town of _____
_____ County



Using weight limits to protect local roads

Wisconsin's extensive local road system is a lifeline for our state and local economies. Farms and businesses depend heavily on these roads to move manufactured, forest and agricultural products. Highway and street agencies need them to economically transport road-building materials. The public also relies on truck transportation to receive goods at reasonable prices. However, heavy truck loads can damage local road pavements, especially in spring when they are weakened because they are saturated with water.

Local officials have a responsibility to preserve our investment in roads by protecting them from excess damage caused by trucks carrying heavy loads. They have the authority to restrict truck weights under state statutes. However, local officials must carefully balance the public good in protecting roads with the legitimate need for efficient transportation.

We can't do anything to control the weather, but we can regulate how much weight is carried on certain roads, especially during spring thaw. According to a national study by the Federal Highway Administration (FHWA), reducing truck weights by just 20% between late February and early May can increase the life of vulnerable pavements by 62%. Cutting weights in half increases pavement life by 95%. To be most effective, truck weight control programs should be coordinated with the Wisconsin Department of Transportation, adjoining local road agencies, the trucking industry, and the public.

This bulletin describes the causes of spring weakness in roads, how heavy loads do damage, and the characteristics of vulnerable roads. Techniques for determining which roads need protection in spring and when roads are vulnerable are introduced, along with guidelines on how to set weight limits. Year round restriction on roads and bridges is also discussed briefly. Another Wisconsin Transportation Information Bulletin, *How Vehicle Loads Affect Pavement Performance, No. 2*, discusses in more detail how heavy trucks damage pavements.



As spring thaw weakens pavements, trucks carrying heavy loads can damage them.

How freezing affects pavements

A road's design is based on a reasonable estimate of the average loads it will carry during its projected life. That is why Interstate highways carrying thousands of trucks a day have thick concrete pavements while rural roads, built for local traffic and a few trucks, are often a few inches of compacted gravel or asphalt laid on a shallow base. Soil types and local drainage characteristics also affect design and load capacity.

To build roads, designers use calculations based on strength and moisture tests of the natural soil or subgrade. The road base and surface depth are then designed for the average condition. Roads can be designed for the worst soil conditions but the cost is usually not justified by the expected use.

When the weather gets cold, pavements and the water trapped within them freeze near the surface. As cold temperatures persist and go lower, the frost line moves deeper into the soil. Frost depth may range from relatively minor—one or two feet during mild winters in southern Wisconsin—to extremes of five to eight feet during severe winters in the northern part of the state.

Frost action and frost heaves

Pavements can be severely damaged in winter by frost heaves from water freezing in the soil. Damage can be particularly bad when the heaving is greater in one pavement section than another or when it occurs next to structures that don't move, like bridges or manholes.

There are three critical factors in frost heave: freezing temperatures, a source of water, and susceptible soils. Frost heave results not just from the natural expansion of water as it freezes, but from the buildup of a series of ice layers called lenses that form at the freezing front as it penetrates downward. This can cause heaves of a few inches to several feet.

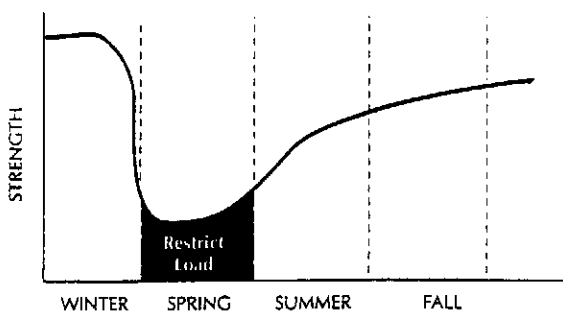
Water comes from the normal water table. Problems are more severe when the water table is near the pavement surface, but significant frost heaving can occur even when it is many feet below the actual frost depth.

Frost-susceptible soils are fine-grained like silt and clay. These permit water to move from the water table to the freezing front through capillary action. Silt is usually the worst because it has enough capillary action to move water and its pore spaces are big enough to transmit large amounts of water. Granular soils like sand have relatively large pore spaces which generally do not have sufficient capillary action to be frost susceptible.

Spring thaw

In spring, roads begin to thaw from both the top and bottom. As ice in the pavement melts, water saturates the road's base and subgrade. These layers lose strength, like a handful of mud compared to dry soil. As thawing continues, melt water becomes trapped in the upper subgrade, unable to drain away through the frozen soils below. Pavements weaken considerably in a very short time under these conditions.

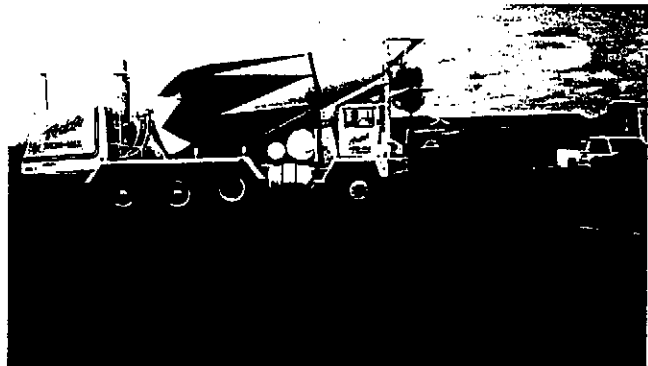
The weakness can continue for weeks or months after the pavement is completely thawed. It takes a long time for the water to leave the pavement because frost-susceptible silt and clay soils are relatively slow to drain.



Variation in pavement strength throughout the year.

How heavy vehicles damage roads

Without adequate support, a pavement or gravel surface deflects too much under trucks carrying heavy loads, developing cracks or ruts. These then let more moisture penetrate, worsening the cycle until the road fails completely. The amount of damage a road sustains is directly related to the weight of the load and how often it is applied, according to tests by AASHTO (the American Association of State Highway and Transportation Officials). Passenger autos and light duty vehicles are not a problem. It is trucks carrying legal weight loads of up to 80,000 GVW over weakened surfaces which do the damage. When trucks carry loads that are heavier than the statutory weight limit, the potential for damage is much higher.



Another factor is the amount of weight and the number of tires on each axle. Damage increases rapidly with higher axle loads and actually worsens at a faster rate than the load increase. One nine-ton axle load, for example, causes about ten times more damage than a five-ton axle load. By distributing the weight of the vehicle and its payload over more axles and tires, the load is lighter at each point of contact, protecting the road from damage.

Imposing spring restrictions on truck weight limits is a reasonable and practical way to protect vulnerable local roads when they are at their weakest. Weight limits should begin with the first thawing and continue until the pavement is again strong enough to carry normal loads.

Choosing roads for spring weight restrictions

Consider the following factors in deciding which roads or segments should have restrictions.

- *Pavement thickness* Asphalt surfaces of two inches or less, or total pavement less than 12 inches thick.
- *Type of subgrade* Fine-grained subgrade soils, like silts and clays, and areas with a high water table and poor drainage.

- *Past experience* Areas with alligator cracking or rutting that break up every year and need frequent patching and repair.
- *Amount and type of truck traffic* Consider all truck traffic and especially seasonally higher volumes of trucks carrying heavy loads.
- *Surface deflection* Pavement sections where the surface deflects or bends 50% more during spring thaw than in summer. Also, increased deflection lower than 50% on weaker pavements where summer deflections are relatively high.
- *Pavement age/condition* Weight restrictions can protect your investment in new pavements and prolong the life of weak or aging pavements.

Year round restrictions — Class II and Class B roads

All public roads are considered to be Class A unless designated otherwise. Vehicle weight restrictions established in Chapter 348 are intended for travel on Class A highways. Some roads, designated Class II or Class B, have permanent weight restrictions.

The state may designate certain highways as Class II. These are limited to legal loads. No overloads are allowed, even when the hauler has an overload permit. About 1600 miles of state highway, mostly in the north and west, are Class II.

State, county and local authorities may designate all or a portion of their systems as Class B highways under Sections 349.15 and 349.16, *Wisconsin Statutes*. This designation reduces the permitted weight, year round, not to exceed 60% of the legal load limits. It takes effect when signs are posted and remains in effect until the signs are removed.

Class B highway designation, which in general is permanent, not seasonal, is intended for situations where the pavement cannot withstand normal, legal truck weights. Such roads may not have been constructed to adequately handle these loads, or they may be roads through low areas with poor supporting soils. The Class B designation offers considerable protection and is well understood by industry. It is a reasonable option for local



authorities when they believe it is necessary to protect pavement. WisDOT recognizes this local authority through administrative code. For example Trans Rule 255.12(6) requires explicit written permission for movement on Class B local roads even if a state permit has been issued.

Some bridges may also need protection. Although their strength is not affected by freezing, bridges may be weakened by age. Load limits should be determined by a competent bridge inspector or consulting engineer. As with roads, local agencies have authority to post weight limits for bridges under Chapter 349 of the *Wisconsin Statutes*. In addition to a sign at the bridge, there must be an advance warning sign at the nearest intersection.

Determining weight limit reductions

A weight reduction of just 20% during critical weeks in March and April can make a major difference in pavement life according to a study by the Federal Highway Administration. As weights are reduced further, potential pavement life increases even more.

Pavement load reduction	20%	30%	40%	50%
Pavement life increase	62%	78%	88%	90%

Local agencies have the authority to determine seasonal weight limits on their road systems. About 50% of the normal limit is typical, but establishing limits that are consistent with those set by the state DOT and adjoining agencies on nearby roads is strongly recommended. For state highways WisDOT normally uses a spring weight limit of 6 tons per single axle and 10 tons per tandem axle.

To be effective, loads should be reduced at least 20%, while over 60% reduction may have little added benefit. Nationally, the average reduction is 44% which would lengthen pavement life by about 88%, according to study results. Consider other factors also, however. Thin or weak pavements may need significant reductions during spring thaw; small or even modest load reductions will not prevent damage.

Since limits will be ineffective if local haulers do not cooperate with them, the most effective restrictions are reasonable and directly related to pavement damage.

Other remedial actions

Along with restricting load limits, consider other methods of protecting pavements. When haulers seek exemptions for local deliveries, consider including special requirements. For example, a local delivery or pick-up could be made in two smaller loads. The route could be modified so that pick-up or delivery is made at the start or end, or so that the route is traveled in a different direction. The goal is to minimize the length of travel and number of truck loads on weak road sections.

Another common approach to exceptions is to require that deliveries be made at night or in the early morning when roads may be stronger due to overnight freezing. Be careful not to overuse this approach. If substantial subgrade thawing has started, a light frost in the pavement surface offers limited value.

Physical changes can also help. For example, where pavements are shaded, you can increase their exposure to sunlight by removing trees, billboards or other obstacles. Eliminate standing water in roadside ditches and fill pavement surface cracks to reduce the amount of water getting to the freezing zone.

Improve drainage in the roadbed by removing frost susceptible soils. A three foot combined depth of pavement and replacement base will prevent substantial subgrade freezing in the coldest winter in 10, according to the 1993 AASHTO *Design* guide.

Install geosynthetics between the free water layer and the freezing zone. Optimal placement depth and whether multiple layers are needed remains to be determined, however. Geosynthetic reinforcements may also limit damage during spring thaw by helping bridge weak areas and limiting pavement spread.

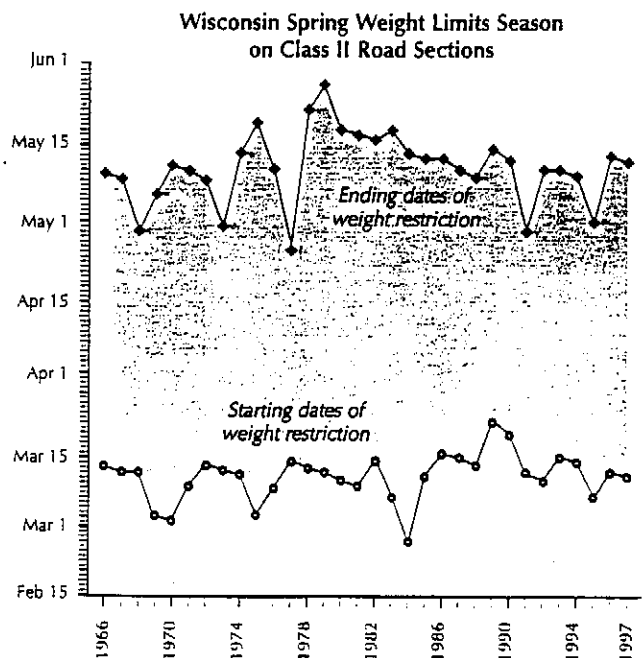
When to begin restrictions

It can be difficult to determine when the thaw begins. In Wisconsin, it generally starts in early March and is complete by early May. According to 32 years of data from the Wisconsin Department of Transportation (WisDOT), the average date for legal load restrictions on some state highways is March 10. Posting usually begins between March 11–17 in the southern half of the state and March 16–18 in the north. The posted road period generally ends between April 25–May 1 in the south, May 1–14 in the north. However conditions can vary considerably from north to south in the state, and even between roads in the same county. Unusually warm winters also affect when roads should be posted. Local knowledge of typical thaw periods is extremely helpful.

Since a uniform system of spring weight restrictions is more understandable and enforceable, it is vital to coordinate with the Wisconsin DOT, the county, and adjoining road agencies. Also, when weight limits are not uniform or when some communities post limits and others don't, vulnerable unposted roads may be damaged by truck traffic taking alternate routes.

Local officials should time their road postings to coincide with the spring weight restrictions that WisDOT posts on the state highway system. The county highway department, WisDOT district maintenance office, and the WisDOT central maintenance office can tell you when they will begin.

To decide on a posting date, WisDOT uses information from frost tubes buried in pavements around the



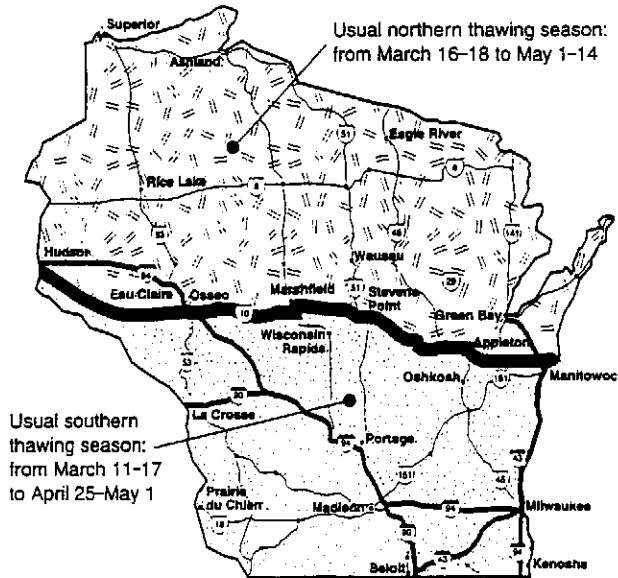
state. A liquid in the tubes changes color when it freezes. District maintenance staff check the tubes periodically to determine frost depth and location.

There are also more than 50 automatic pavement and weather monitoring stations in place around the state. By watching reports from these stations on temperatures in the pavement and at 18 inches below the surface, county and state highway staffs can better predict when spring thawing is underway.

For local roads, you generally must use judgment and experience. However, a simple Thawing Index, which is calculated like the heating degree days used by winter fuel suppliers, can help you predict when to begin restrictions. Figuring thawing degree days involves recording daily high and low air temperatures in your community and making a simple calculation. For weaker or problem pavements you may want to record daily highs and lows at the site. Also, studies show that the Thawing Index is more reliable for fine-grained soils than coarse-grained ones.

Begin using the Thawing Index when the average daily temperature rises over 29° F. This number is used as a reference temperature because tests show that an asphalt pavement's surface is 32° F when the air temperature is about 29° F. You can use high and low temperature predictions from a five-day advance weather forecast to project when load restrictions must take effect. This will allow you to prepare the public and alert local heavy haulers.

Pavement thickness determines how many thawing degree days are needed for applying spring load restrictions. The FHWA study *Guidelines for Spring Highway Use Restrictions* has established "should" and "must"



Thawing conditions can vary considerably from north to south.

Thawing Index levels for thick and thin pavements (see table). The "should" level estimates thaw to the bottom of the base course. The "must" level estimates thaw to about four inches below the bottom of the base course.

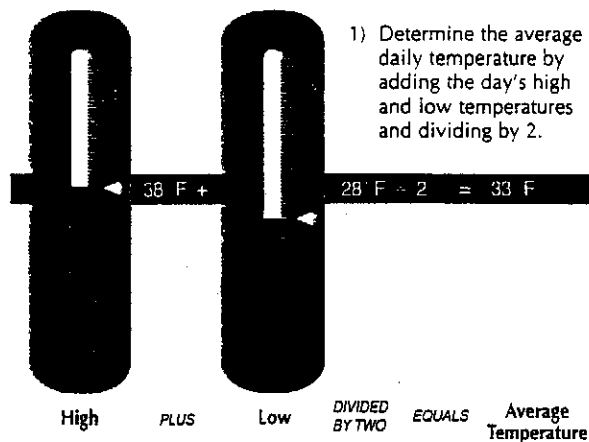
For midwinter thaws, use 31° F as the reference temperature for the Thawing Index. This is necessary because the sun's angle is lower and there is more cloud cover in midwinter.

Thawing Index levels for posting load restrictions on asphalt

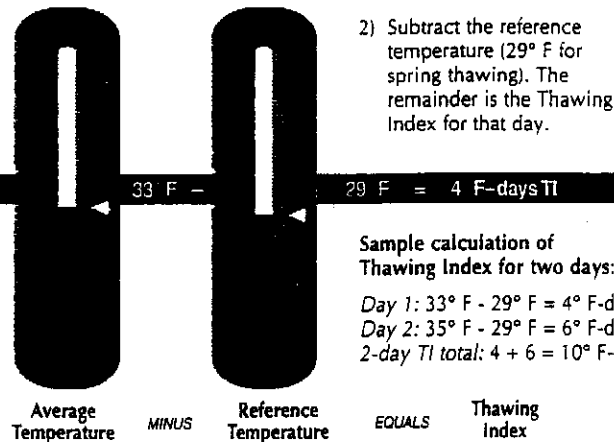
Pavement structure		Thawing Index	
		"Should" Level	"Must" Level
Thin	Asphalt 2" or less Base course 6" or less	10° F-days	40° F-days
Thick	Asphalt more than 2" Base course more than 6"	25° F-days	50° F-days

Calculating the Thawing Index

Compute average daily temperature



Compute Thawing Index (TI)



When to remove restrictions

In general, keep weight restrictions in place until soils are completely thawed and drained to normal moisture levels. The most accurate way to tell is by testing for deflection. However, combining judgement and experience with an estimate based on the Thawing Index is very economical and will suffice in many cases.

To make this estimate you must know the Winter Freezing Index. The Freezing Index is calculated the same way as the Thawing Index, using 32° F as the reference temperature. Beginning when the average daily temperature has been below 32° F for several days calculate daily average temperatures. (Add the high and the low for the day and divide by 2.) Subtract the average daily temperature from 32° F and record the result. Keep a running total until spring thawing begins. This total is the winter's freezing index in your area. High and low temperatures reported in the local media may also work well enough for this purpose.

To calculate the total number of thawing degree days until the thaw is complete, multiply the Winter Freezing Index by 0.3. For example, for a Winter Freezing Index of 1375° F-days, the Thawing Index would be 412° F-days.

$$0.3 \text{ TIMES } 1375 \text{ EQUALS } 412$$

Implementing local weight limits

Authority

To institute a permanent weight limit on a road, the local elected board or council should pass an appropriate ordinance. For a temporary restriction like spring load limits, the "authority in charge of maintenance" can impose the limits under Section 349.16 of the *Wisconsin Statutes*.

It may not be clear who is the "authority in charge of maintenance." It is best for the local board or council, at

a regularly scheduled meeting, to specifically identify a person or position to have that authority. For county trunk highways, the highway commissioner is commonly chosen. Towns, villages or cities should designate their highway superintendent, road foreman, street superintendent, or similarly titled officer. The board or council should also give this person or position authority to issue special weight permits.

The local authority can impose weight limits on a highway or bridge that they believe will be damaged because of roadbed weakness or other special conditions. Signs must be posted to give notice of the restrictions, and these signs must conform to the *Manual on Uniform Traffic Control Devices* and the *Wisconsin Supplement* to that manual. For bridges there must be an advance warning sign at the nearest intersection. Limits become enforceable as soon as signs are in place.

It can be complicated to analyze the capacities of individual pavements and bridges. Local authorities may use their judgement and knowledge of existing pavement conditions or may hire a consultant to conduct engineering analyses. Limits based on actual testing will stand up to potential litigation better than those based on experience alone.

Legal authority for establishing weight limits is found in Chapters 348 and 349 of the *Wisconsin State Statutes*. Chapter 348 establishes restrictions on the size, weight and loading of vehicles. Section 348.15 establishes specific truck weight limitations and exemptions. Sections 348.25, 348.26 and 348.27 outline the provisions for permits for vehicles of excessive size and weight. Such permits are generally issued by the state Department of Transportation for state highways. Local officials also have authority to issue credentials for their road systems under Section 348.26(2).

Chapter 349 gives state and local agencies authority to regulate movement of heavy vehicles. Section 349.15

provides the authority to establish Class B highways on local roads. Section 349.16 gives the authority for local officials to impose special or seasonal weight limitations. Section 349.17 is the authority for cities, villages, and towns to establish designated truck routes.

Exemptions and enforcement

State statutes have many provisions permitting overloads for specific commodities such as milk and logs. As a result, some people believe that this special treatment applies to local roads with load restrictions. This is not the case. In fact, local weight limits override *all* special permits in the statutes. Local officials *may* make exceptions, but are not required to.

Once load limits are posted, numerous requests for exceptions to allow local delivery and services are likely. Local agencies may make exceptions, but it is important to be consistent and reasonable. Overusing exceptions weakens the effectiveness of load limit programs.

Public agency vehicles are not exempt from weight and size restrictions. All statutory restrictions and locally adopted weight restrictions apply uniformly to public vehicles as well as private trucks.

To implement your authority to issue exemptions under Section 349.16(3) it is best to put the exemptions in writing. For commodities that will be exempted either seasonally or permanently, make a good faith effort to publish these rules. If, as a local official, you intend to exempt some commodities, you can still restrict their movement by specifying how often each day they may travel on a road. You may also require that they travel at specific times during the day, such as before 7:30 am when overnight temperatures may have temporarily strengthened the road. Like the basic exemptions, these restrictions should be in writing and publicized.

Before posting roads, local agencies should plan how to enforce the limits. Law enforcement officers can order an apparent violator off the highway and issue citations. Repeat violators must pay higher amounts, and the amount to be paid increases with the amount of weight over the limit.

State Patrol officers and county deputies are authorized to enforce weight limits. The State Patrol offers annual training sessions on enforcing truck sizes and weights for local law enforcement officials. Scales used to enforce weight laws must be certified accurate.

Haulers have another considerable incentive to comply. Under Section 86.02 of the *Statutes*, a party which has caused damage to the highway is liable for triple the cost to repair the damages. These are collected through civil court.

Speed enforcement is also important because damage is increased at high speed.



Permits

Haulers with loads over the weight and size limitations can request permits for travel on state trunk highways from the Wisconsin DOT. Permits can be for a single trip or multiple trips and are issued at the WisDOT central office in Madison.

Except for vehicles authorized in the *Statutes* to have excess axle weights (Sections 348.15(3) (bg, br, & bv), trucks which intend to also use local road systems must obtain permission from the local maintenance authority.

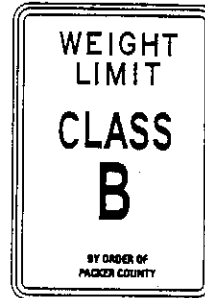
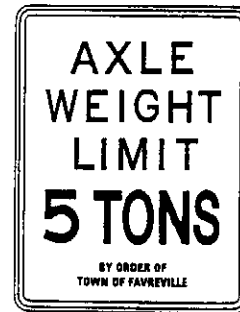
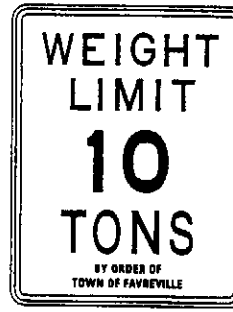
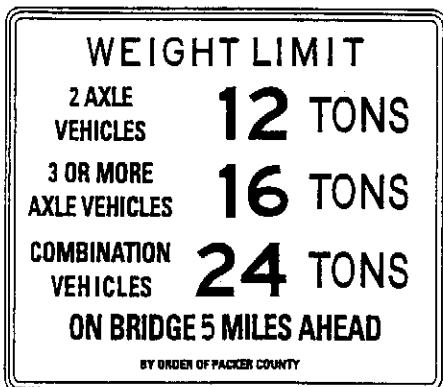
Local agencies should establish permit procedures and designate a person with authority to issue them. Assigning this to the same person who establishes weight limits is reasonable and convenient. However, if a different person is issuing permits—the town clerk, for example—it is a good idea to coordinate with the local authority which establishes the limits. Local permit forms may be individualized, but many local officials have found it useful to copy WisDOT forms.

Single trip permits authorize an overweight or oversized vehicle to make one trip over a specifically designated route. The local authority should carefully select roads and bridges that can adequately handle the excess load. Determining these permitted routes can be complex and may require help from an engineering consultant.

When the state puts roads into “thaw status,” it reduces maximum weights for single trip permits. It also suspends the authority for moving overweight loads that are divisible (like garbage, logs, agricultural products), and declares certain vulnerable state highways as Class II roadways which limits the maximum weight during spring thaw to a GVW of 80,000. Class II roadways may also be temporarily posted for even lower weight limits.

Signing for weight restrictions

Weight restriction signs are regulatory and should be white with black lettering to conform with the federal *Manual on Uniform Traffic Control Devices (MUTCD)* and the *Wisconsin Supplement*. Uniform signing improves cooperation and makes enforcement easier. All weight limit signs must say: “by order of” the local agency.



Class B highway signs should be installed at intersections with other highways. Bridge weight restriction signs must follow instructions from WisDOT. These signs must include the gross weight and maximum limits for axle loads.

Signs should be posted at the bridge and also far enough in advance that trucks can detour around the limited structure.

Permanent special weight signs must be permanently installed and designate the maximum gross weight. Temporary weight limits such as spring load restrictions should also be on standard signs that are reflectorized and that meet the standards of the *MUTCD*. Hand painted and faded signs are not appropriate.

Communication

Effective communication with the public, your own agency, and affected haulers is essential. Alert the local media when weight restrictions are imminent. Remind drivers of public works trucks that weight restrictions apply to them too. Contact industries which make local deliveries or supply local services and tell them what the limits are and when limits will be begin.

Consult with local haulers about ways to protect particularly vulnerable roads. For example, milk haulers could alter the order of pick up to lessen the weight at a bad site, or septic pumpers may limit how full their tanks are when traveling problem roads to service customers.

Large construction projects that require hauling heavy construction materials need special coordination in advance. Local officials and contractors should plan together well before the limits are imposed. They can agree on specific hauling routes using roads that are both strong enough and reasonably efficient.

Advance agreements with contractors and other heavy haulers can be very effective. Informal agreements or formal contracts assign responsibility to these haulers for repairing damage along their routes. Some agencies require bonds or escrow accounts in advance to ensure

compliance. Inspecting haul routes ahead of time is important in enforcing these agreements. Photographing or video taping is also helpful in documenting existing condition. These techniques establish pavement conditions before spring thaw begins.

The alternative to advance agreements—establishing very restrictive weight limits after bids are in or construction is underway—can be very disruptive and costly, and may result in litigation. Both contractors and local agencies are responsible for this advance coordination.

Summary

Protecting local roads from damage by heavy vehicles is the responsibility of local authorities. *Wisconsin Statutes* provide adequate authority to exercise this control. In establishing weight restrictions, local authorities must use judgment and common sense to balance the need for protecting roads with maintaining commerce and an efficient transportation system. Close coordination with Wisconsin DOT and adjoining local agencies is essential to an effective program. Also, set a good example with your own agency. Be sure that all publicly-owned equipment observes the weight restrictions.

Resources

Guidelines for Spring Highway Use Restrictions, Federal Highway Administration, Report No. FHWA-TS-87-209, Turner-Fairbank Highway Research Center, 6300 Georgetown Pike, McLean, VA 22101-2296. And related videotapes.

State Highway Maintenance Manual, Guideline 30.06, January 1, 1993, Wisconsin Department of Transportation, State Maintenance Engineer for Highways, PO Box 7916, Madison, WI 53707-7916.

How Vehicle Loads Affect Pavement Performance, Wisconsin Transportation Information Bulletin, No. 2, Wisconsin Transportation Information Center—LTAP, 432 N. Lake St., Madison, WI 53706.

Other references

Frost Heave: What causes it and how we can interfere with it, Special Bulletin #19, November 1995. Written by Dr. Rich Reid, Asst. Prof. of Civil Engineering, South Dakota State University, for South Dakota Transportation Technology Transfer Service.

A Guide to Spring Highway Use Restrictions: When to Apply, How Long to Apply, and When to Remove. The Bridge Fact Sheet, Spring 1994, Michigan Local Technical Assistance Program, Houghton, Michigan.

Posting and Bonding Local Roads: A Solution to Damages Caused by Heavy Haulers, LTAP Technical information Sheet #57, January 1994, by Alan L. Gesford, LTAP Engineer, Pennsylvania Local Roads Program, Penn State Harrisburg, 777 West Harrisburg Pike, Middletown, PA 17057-4898.

Walsh County's Load Limit Enforcement Program, by Harvey Melstad, in **The Center Line**, Fall 1990, North Dakota State University.

Legal Opinions by Attorney J.R. Habeck, in the newsletter of the Wisconsin Towns Association.

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