

## **FROZEN ROAD DECLARATION, MID-SEASON THAW, ENDING THE DECLARATION, AND SPRING WEIGHT RESTRICTION DECISION PROCESS**

### **Frozen Road Declaration:**

State highways in Wisconsin are determined to be frozen at the start of the winter season when the frost has reached a depth of 18-20 inches below the pavement surface. The items listed in the resources section below are critical in making this determination. The 25+ year average date for the beginning of the frozen road period has been December 22nd.

Past practice has been for the Wisconsin Department of Transportation (WisDOT) to closely monitor frost conditions and make a decision on when the frozen road declaration would take effect a week in advance of the effective date. This gave carriers, law enforcement, municipalities, staff within WisDOT, and others time to prepare for the declaration becoming effective. As part of this year's Budget Bill the law governing implementation of the declaration was changed. Specifically, State Statute 384.175 now states in part that:

“On the first day that conditions warrant their determination of such frozen condition and freedom of damage to such highways by transportation, the officers or agencies in charge of maintenance of highways shall declare particular highways, or highways within areas of the state, as eligible for increased weight limitations, and each declaration shall be effective as of 12:01 a.m. on the 2nd day following the declaration.”

With this change in law we will no longer be providing a week's notice in advance of the frozen road declaration going into effect. The determination will now be made when the roadways are actually frozen, rather than when they are predicted to be frozen. To accomplish this we will be using a Frost Model that has been used successfully in Minnesota for the same purpose for many years. Use of this model will be supplemented with field data from frost tubes and Roadway Weather Information System (RWIS) station sensors, as well as visual observations.

To meet the new law's requirements the state will now be divided into zones. The five zones represent different and distinct climatological regions and correlate with historical declaration boundaries. A frozen road declaration will be issued for one or more of the zones once the highways in each zone are determined to be frozen such that the highways will be free of damage from the increased weight limits. The map at the end of this section shows graphically the area included in each zone. A narrative description of the limits of each zone follows:

Zone 1 (Northern Zone). Extends from the Minnesota border, Lake Superior, and the Michigan border south to and including US Highway 8.

Zone 2 (North Central Zone) Extends south from the southern limit of Zone 1 to and including a line defined by US Highway 10, south on State Highway 73, east on State Highway 54, north on Interstate 39, and east on US Highway 10. (Including highways 10, 39, 54, and 73)

Zone 3 (Southwest Zone). Extends south and west from the limits of Zones 2 and Zone 4 to the Mississippi River, the Illinois border, and to and including State Highway 78 from the junction with Interstate 90/94 to the Illinois border. (Including highway 78)

Zone 4 (East Central Zone). Extends south and east from the southern limit of the Zone 2 at the junction of US Highway 10 and Interstate 94 to and including Interstate 94, east on Interstate 90/94, north on Interstate 39, and east on State Highway 33. (Including highway 33)

Zone 5 (Southeast Zone). Extends south and east of the limits of the Zone 3 and Zone 4 to Lake Michigan and the Illinois border.

#### **Mid-Season Thaw:**

During the period of time between implementation of the frozen road declaration and ending the declaration, there may be periods of thawing when the ground immediately below the pavement structure is no longer frozen and the pavement is subject to damage due to the increased weights. This would occur when the thawing depth under the pavement surface reaches the sub-soils. If this period of thawing jeopardizes the integrity of the pavement structure, the department may temporarily suspend the frozen road declaration during the typical frozen road period. If the department determines temporary suspension of the frozen road declaration is warranted, it will provide, at a minimum, the same notification period required at the start of the declaration.

#### **Ending the Declaration:**

At the end of the winter season, state highways in Wisconsin are determined to no longer be frozen when the thawing depth under the pavement surface reaches the subsoils. The 25+ year average date for ending the frozen road period is March 4<sup>th</sup>. As with implementation of the frozen road period, the end of the frozen road declaration will occur on a zone-by-zone basis as the highways in each zone are determined to no longer be frozen. When the department determines the frozen road declaration should be ended, it will provide, at a minimum, the same notification period required at the start of the declaration.

The resources listed at the end of this section will be used to establish the appropriate date for ending the frozen road declaration in each zone, including the Frost Model, the RWIS sensors, frost tubes, and visual observations.

### **Spring Weight Restrictions:**

During spring, thawing begins at the pavement surface and moves downward. This can mean that frost under the pavement surface may still extend down to a depth of 48 to 72 inches, while thawing immediately below the pavement structure has occurred; this is the condition that creates so many problems for the pavement structure. As thawing occurs from the top down, the moisture cannot drain downward due to the frozen soil below. This trapped moisture causes the soil in this depth to act like a “sponge” and thus allows the asphaltic pavements to move up and down due to vehicle weights traveling on the pavement surface. The pavement can be weakened by this continuous oscillating movement and thus begin to crack and break down. For this reason, spring seasonal weight restrictions are imposed on state highways in late February or early March. The 40+ year average for imposing spring weight restrictions is March 9<sup>th</sup>. The 40+ year average date for ending the spring weight restrictions is May 9<sup>th</sup>.

Also during this time period, air and pavement temperatures can fluctuate greatly during the daytime and nighttime hours. Daytime temperatures in the 20's and 30's with the sun shining on a asphaltic pavement surface can produce pavement temperatures in the 50's and cause thawing of the pavement and support system. During the nighttime hours, the roadway can refreeze due to lower temperatures. This daily “freeze-thaw cycle” can also cause distress to the pavement. The distress is then multiplied by the effect of heavy loads. This is the time of the year where most of the potholes are created. For these reasons, seasonal weight restrictions need to be placed on state asphaltic pavement highways during the spring thawing period, typically from early March to early May.

## **Resources:**

The beginning and ending dates for the Frozen Road period and the Class II Road period (and suspension of divisible overweight permits) are determined by the Wisconsin Department of Transportation (WisDOT) Bureau of Highway Operations using the following resources:

- 1) Minnesota frost formula modified for use in Wisconsin.
- 2) Observations and engineering evaluation of current pavement conditions by the staff at the five WisDOT Regional Highway Operations offices. They travel on the state highway system on a daily basis and observe signs of the current pavement surface conditions that indicate whether the pavement is weakening during the spring thawing period or is gaining strength during the frozen road period.
- 3) Twenty-eight (28) frost tubes installed in asphaltic pavements that are manually read for frost and thaw depths under the pavement surface. These frost tubes are located in WisDOT's Northeast Region (2 frost tubes), North Central Region (17 frost tubes), Southwest Region (2 frost tubes), and Northwest Region (7 frost tubes).
- 4) The WisDOT Roadway Weather Information System (R.W.I.S) which includes 58 roadside weather stations located throughout Wisconsin on the state highway system. Sensors at these weather stations record current air temperatures, pavement surface temperatures, and sub-surface temperatures at 18" below the surface of the pavement.
- 5) Infrared pavement temperature sensors that continuously record the temperature of the pavement surface in the vehicles used by the WisDOT Regional Highway Operations staff as they monitor the road conditions.
- 6) National Weather Service (N.W.S.) 6-10 day and 10-14 day long range weather forecasts (available at <http://www.cpc.noaa.gov/>)
- 7) National Weather Service (N.W.S.) 30 day temperature and precipitation forecasts (available at <http://www.cpc.noaa.gov/products/predictions/30day/>)
- 8) Ten day weather forecasts for individual Wisconsin cities available from Accuweather.com available at (<http://www.accuweather.com/>)

# Seasonal Load Limits Boundaries

