



# Technology & Development Status Report

## Engineering Program

FY 2009



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**PROJECT:** **Techniques for Removing Spring Thaw Load Restrictions**

**Number:** 3E31L10

**SPONSOR:** [WO-ENG](#)

**Proposer:** [Maureen Kestler](#)

**CENTER:** [SDTDC](#)

**PROGRAM LEADER:** [Alan Yamada](#)

**Project Leader:** Charles Aldrich

### **PROJECT OBJECTIVES**

Roads in seasonal frost areas have less than half the maintenance-free lives as those in non-frost areas. During the spring thaw, a few heavy vehicles on a thaw-weakened road can cause more damage than design-level traffic during the remainder of the year. Quantitative techniques for determining when traffic should be restricted are generally limited to using a Falling Weight Deflectometer (FWD) or using instrumentation installed in the road structure at specific sites. The FWD's are generally trailer mounted, quite expensive if purchased or rented, and are labor and equipment intensive. The instrumentation option includes installing TDR's and/or thermisters and is labor intensive and relatively expensive to obtain specific information at each site. Both techniques work well, but the initial investment in the former is beyond realistic Forest Service budgets and the later is site specific with a relatively high cost per site. As a result, determining when a the road has thawed to a point where a load restriction is needed, and when the road has recovered sufficient strength to remove restrictions is generally left to personal experience and subjective judgment. A recent poll of road maintenance agencies showed that only 15 percent used quantitative methods for load restriction management.

Hence, it would be advantageous to have simple, less expensive, quantitative methods to manage spring thaw load restrictions for low volume roads (LVR's). This project will evaluate two methods: 1) Use of Portable Falling Weight Deflectometer (PFWD) and 2) Use of Thaw Index (TI) Method. The PFWD is a scaled down version of the FWD, able to be transported to a site in a pickup truck and operated by a single technician. It can quickly check the subgrade modulus of the road surface and multiple sites may be tested in a day. The TI method is a simple energy balance approach that relies on air temperatures, soil type, and other environmental conditions. This is a 3-year project which will use the two proposed methods in conjunction with FWD's and instrumentation at several sites on Forest Service LVR's, and possible county LVR's across the northern US.

**Changes to objectives:**

### **SIGNIFICANT ACCOMPLISHMENTS**

- a) White Mountain National Forest (NF) site instrumented, testing will use US Army CRREL PFWD;
- b) Kootenai National Forest, MT, site has been instrumented w/ FWD testing by MDOT. Will use Forest Service PFWD at this site in future. c) Maine sites to be instrumented/tested jointly w/ UofM and New England Transportation Consortium. Graduate student (paid by NETC) is helping. Will use their labor and PFWD when it arrives. d) Chippewa NF, MN, site has been instrumented and testing done by MnDOT FWD and PFWD, and their labor. e) Alaskan site(s) being negotiated with Federal Lands Highways (FLHW's), they would use FS PFWD after MT site finished.
- Other: FS PFWD has been procured and shipped from Denmark. A possible joint effort with

Canadian FERIC is in negotiation.

**Output:**

**Planned:** A summary evaluating the use of the two thaw load restriction methods will be prepared. Guidelines for the use of the PFWD and Thaw Index method will be presented in a technical publication (hard copy and web based) for technology transfer.

**Actual:**

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