

## HR-334 Field Measurements of Plow loads During Ice Removal Operations

**Key Words:** Snow Removal, Winter Maintenance, Plow Blades, Ice Removal

### ABSTRACT

One of the more severe winter hazards is ice or compacted snow on roadways. While three methods are typically used to combat ice (salting, sanding and scraping), relatively little effort has been applied to improve methods of scraping ice from roads. In this project, a new test facility has been developed, comprising a truck with an underbody blade, which has been instrumented such that the forces to scrape ice from a pavement can be measured. A test site has been used, which is not accessible to the public, and ice covers have been sprayed onto the pavement and subsequently scraped from it, while the scraping loads have been recorded. Three different cutting edges have been tested for their ice scraping efficiency. Two of the blades are standard (one with a carbide insert, the other without) while the third blade was designed under the SHRP H-204A project.

Results from the tests allowed two parameters to be identified. The first is the scraping efficiency which is the ratio of vertical to horizontal force. The lower this ratio, the more efficiently ice is being removed. The second parameter is the scraping effectiveness, which is related (in some as yet unspecified manner) to the horizontal load. The higher the horizontal load, the more ice is being scraped. The ideal case is thus to have as high a horizontal load as possible, combined with the lowest possible vertical load. Results indicate that the SHRP blade removed ice more effectively than the other two blades under equivalent conditions, and furthermore, did so with greater efficiency and thus more control. Furthermore, blade angles close to  $0^\circ$  provide for the most efficient scraping for all three blades.

The study has shown that field testing of plow blades is possible in controlled situations, and that blades can be evaluated using this system. The system is available for further tests as are deemed appropriate.