



XIII
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SUSTAINABLE WINTER SERVICE FOR ROAD USERS

Tunnel Maintenance in North East Minnesota

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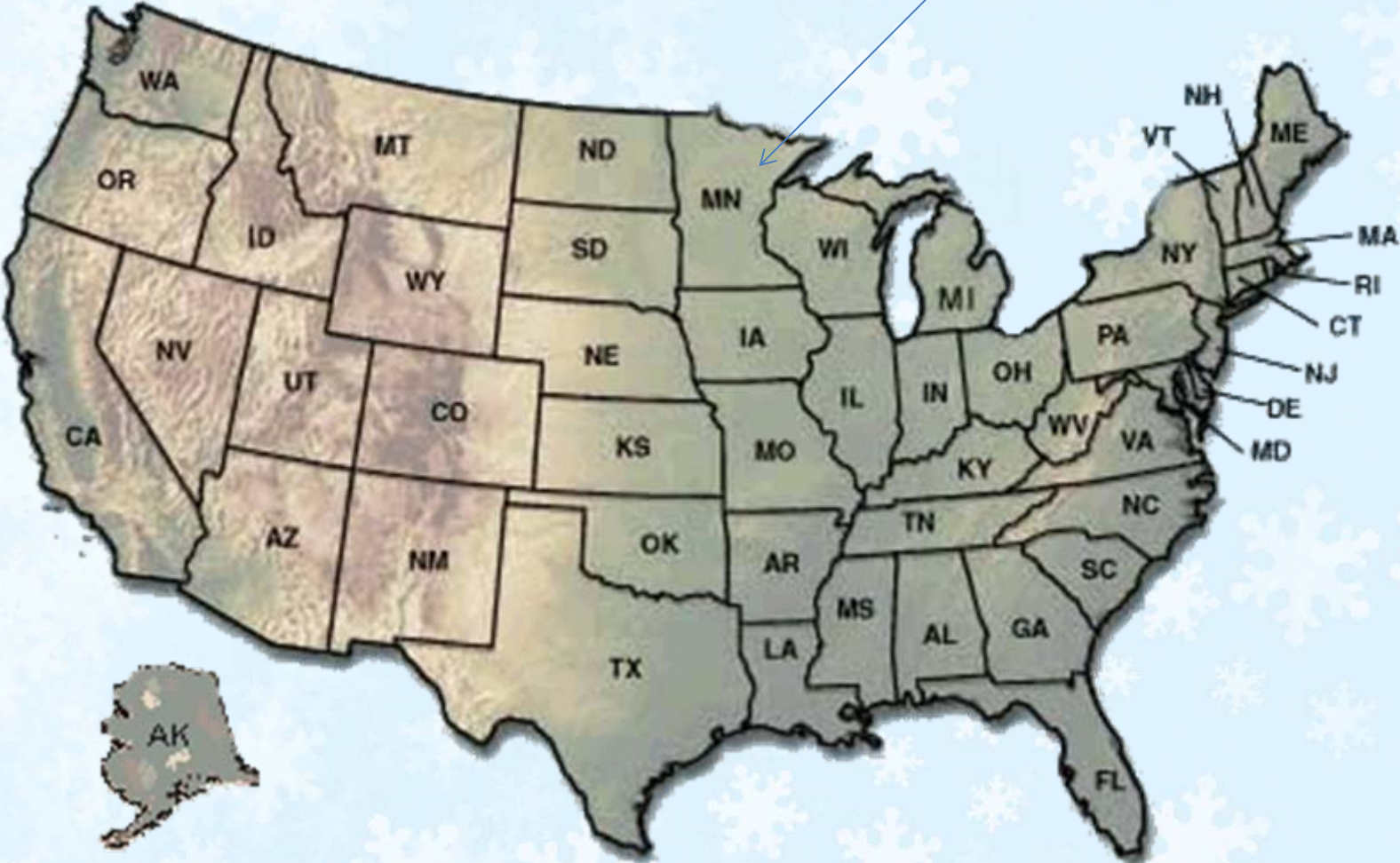


TUNNEL MAINTENANCE IN NORTH EAST MINNESOTA

- Introduction – Address procedure to mitigate environmental concern when cleaning up tunnels after the snow and ice season.

TUNNEL MAINTENANCE IN NORTH EAST MINNESOTA

DULUTH,
MINNESOTA



TUNNEL MAINTENANCE IN NORTH EAST MINNESOTA



TUNNEL MAINTENANCE IN NORTH EAST MINNESOTA

- **Facts about Lake Superior**
 1. **Lake Superior is, by surface area, the world's largest freshwater lake.**
 2. **Lake Superior contains 10% of all the earth's fresh surface water.**
 3. **The average underwater visibility of Lake Superior is 27 feet, making it easily the cleanest and clearest of the Great Lakes.**

TUNNEL MAINTENANCE IN NORTH EAST MINNESOTA

- There are six examples of Tunnels on the Highway System in North East Minnesota.
- Four of these are cut and cover tunnels within the City of Duluth, Minnesota. These tunnels were constructed in order to blend the extension of I-35 into the City of Duluth.

I-35 CUT AND COVER TUNNELS



TUNNEL MAINTENANCE IN NORTH EAST MINNESOTA

- The remaining two tunnels are mined hard rock tunnels along the North Shore of Lake Superior. These tunnels were constructed improve the safety of the T.H. 61 road alignment which was cut into the face of bluffs protruding out into the Lake.

T.H. 61 HARD ROCK TUNNELS



TUNNEL WASHING NEED

- Tunnel walls are lined with reflective tiles.
- The tiles are designed to enhance mobility by providing a bright environment for tunnel users.
- At the end of winter, the tiles are covered with dirt, grime and ice reducing chemicals.
- These walls are washed on an annual basis each spring.
- Tunnel washing is performed as a night time operation in order to minimize disruption to traffic. It takes one work week to complete washing of all six tunnels.

TUNNEL WASHING ENVIRONMENTAL CONCERN

- Due to the proximity to Lake Superior, all sediment, cleaning products and wash water must be recovered and disposed into a treatment facility.
- Special procedures have been developed for completing this work in an environmentally sensitive manner.

TUNNEL WASHING PROCESS

- Traffic control is performed with lane closures during the operation.

TRAFFIC CONTROL



TUNNEL WASHING PROCESS

- The tunnel walls are pre-wet with a water tanker truck fixed with a spray nozzle system.

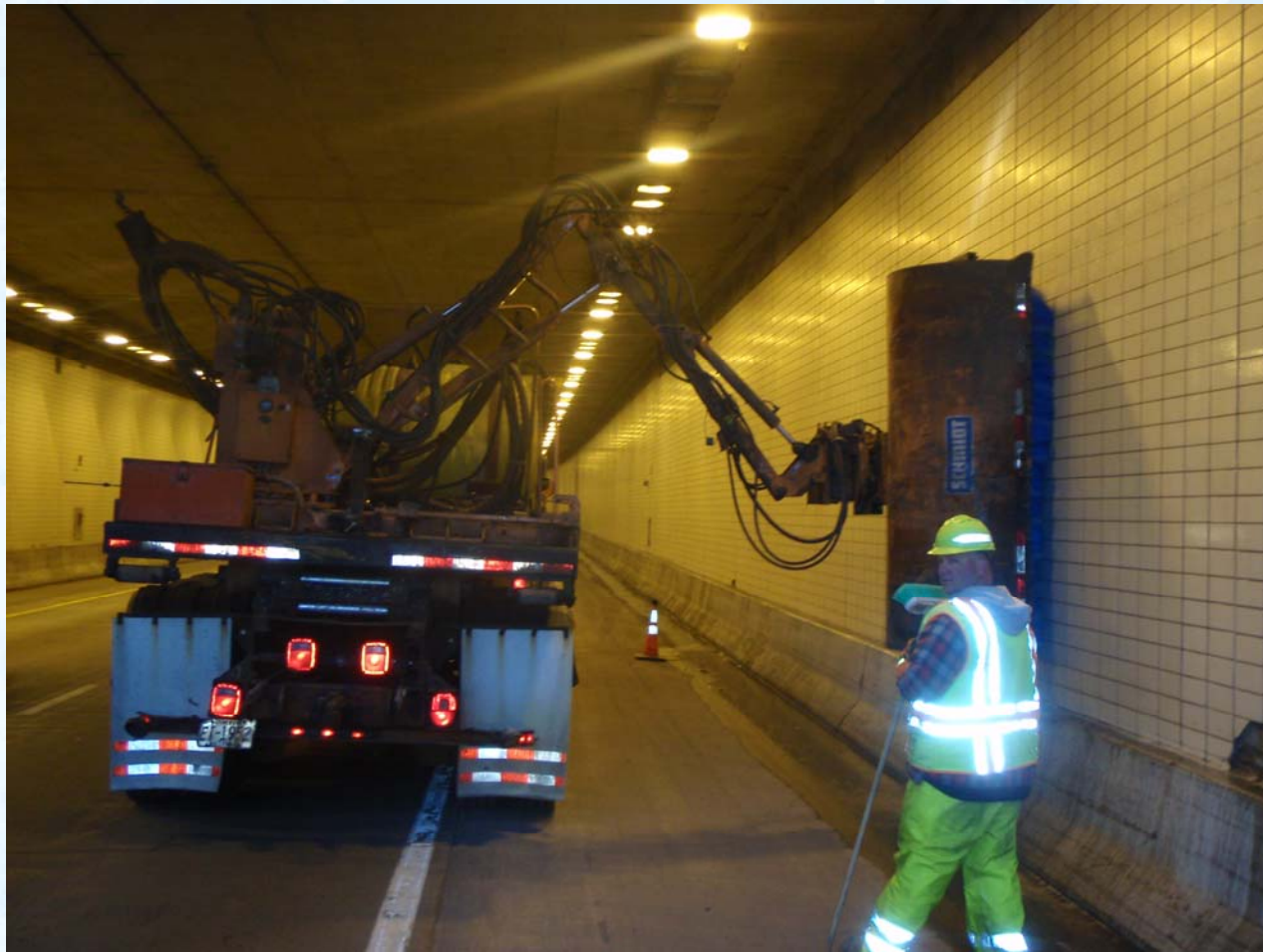
PRE-WETTING THE TUNNEL WALLS



TUNNEL WASHING PROCESS

- A tunnel washing machine with a rotary brush is used to scrub the walls. The machine applies soapy water.

TUNNEL WASHING SCRUBBER



TUNNEL WASHING PROCESS

- Difficult to reach areas are scrubbed with long handled brushes and washed with a high pressure wand.
- Some of these areas include near man doors, along traffic barriers and near light fixtures.
- The walls are rinsed.

HAND SCRUBBING AROUND FIXTURES



TUNNEL WASHING PROCESS

- Storm Sewers are covered with impervious drain covers.
- Most of the wash water is removed by employing a vactor truck.
- The dirty wash water is disposed at the sanitary sewage treatment plant.

DRAIN COVERS



TUNNEL WASHING MATERIAL PICK UP



VACTOR NOZZEL



TUNNEL WASHING PROCESS

- Additionally, the maintenance employees have employed sediment filter pads that are installed inside the catch basins to ensure that water escaping this procedure has sediment removed before it reaches Lake Superior.
- The cleaning agent used is an environmentally friendly “green” soap product to reduce the environmental impact of any material that escapes this process.

TUNNEL WASHING PROCESS

- Testing of any water that has escaped this process at the storm drain outlets has been completed to ensure that hazardous materials are not present.
- Testing has shown that there are not measurable levels of regulated contaminants in the residual drainage that reaches Lake Superior.
- Testing has shown that there are nutrients present in the wash water in the form of Nitrates and Phosphate. There is also oil and grease present.

SUMMARY

- Tunnel Washing enhances mobility by providing a bright tunnel environment.
- This simple process minimizes the pollutants that leave the storm drain system, and in this case enter Lake Superior.