General Assembly

January Session, 2011

Raised Bill No. 6571

LCO No. **4389**

04389_____TRA

Referred to Committee on Transportation

Introduced by:
(TRA)

AN ACT REQUIRING AN ANALYSIS OF THE CORROSIVE EFFECTS OF CHEMICAL ROAD TREATMENTS.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

Section 1. (*Effective from passage*) The Commissioner of Transportation shall conduct an analysis of the corrosive effects of chemical road treatments on (1) state, municipal and private vehicles, (2) state, municipal and private roads, bridges, highways and other infrastructure, and (3) the environment. Such analysis shall determine the cost of corrosion created by chemical road treatments and shall include an evaluation of alternative road treatment techniques and products and a comparison of their costs and effectiveness. On or before January 1, 2012, the commissioner shall submit a report of findings, conclusions and recommendations to the joint standing committee of the General Assembly having cognizance of matters relating to transportation, in accordance with the provisions of section 11-4a of the general statutes.

This act shall take effect as follows and shall amend the following sections:

State of Connecticut General Assembly
Raised Bill No. 6571

An Act Requiring an Analysis of the Corrosive effects Of Chemical Road Treatments

The Commissioner of Transportation shall conduct an analyze of the corrosive effects of chemical road treatments on (1) state, municipal and private vehicles, roads, (2) state, municipal and private roads, bridges, highways and other infrastructure, and (3) the environment. Such analysis shall determine the cost of corrosion created by chemical road treatments and shall include evaluation of alternative road treatment techniques and products and a comparison of their costs and effectiveness. On or before January 1, 2012, the Commissioner shall submit a report of findings, conclusions and recommendations to the joint standing committee of the General Assembly having cognizance of matters relating to transportation, in accordance with the provisions of section 11-4a of the general statutes.

Mr. Chairman and members of the committee, I want to thank you for this opportunity to testify.

My Name is Bob Hamilton resident of Middletown, CT. My family has been maintaining trucks for three generations. I have been in the industry for 37 years and an executive for the past 25. I have been the Director of Fleet Maintenance at Bozzuto's Inc. for the past 7 years.

I am here to represent fellow members of the Motor Transportation Association of Connecticut in support of the proposed bill no. 6571.

Corrosive effects on Private Vehicles

My testimony will highlight the increased safety concerns and maintenance problems impacted by chemical road treatments on private vehicles.

Spear heading the concern is their high destructive nature. Anti-icing chemicals cling to the underbody of vehicles and their components and re-crystallize as they slowly dry out. This characteristic, coupled with their natural tendencies to attract and absorb moisture from the surrounding environment, keeps the chemical in a semi-solution (brine) state for extended periods of time multiplying their corrosiveness. This solution accelerates the chemical reaction between iron and water resulting in rust or corrosion. This brine solution has the ability to adversely impact all areas of the vehicle to include migrating to unexposed areas. Experience has proven component damage will occur in as little as a single winter season. Application of these chemicals prior to and during adverse weather conditions, increases vehicle exposure.

The potential impact to vehicles will result in:

1. **Failure of safety related components**
2. **Increased maintenance expense**
3. **Reduction in life cycle of the vehicle / components**
4. **Increased potential of vehicle accidents**

Examples of areas impacted are many as indicated below:

Exposed areas:

- **Fifth wheels malfunctioning**
- **Landing gear seizing**
- **Suspension components / spring hangers failing**
- **Fuel tanks and straps corroding**
- **Wheels and fasteners corroding**
- **Premature hydraulic brake line failure**
- **Premature radiator failure (photos provided pg. 4) 4 yrs VS 10 yrs**
- **Coupler plates collapsing**
- **Lift gate platforms collapsing**
- **Chrome, aluminum & stainless steel components impacted**

Unexposed areas:

- **Electrical lighting, wiring, connectors and harnesses failing**
- **Electrical components / engine ECM's, starters & alternators failing**
- **Trailer longitudinal rails (frame side rails) & cross members (photos provided pg. 4) rust jacking**
- **Life cycle shortened on brake components**

Located within my written testimony please find an important support document from the Technology & Maintenance Council (affiliated with the American Trucking Association). S.6 Chassis Study Group Information Report: 2002-1 titled "Road Chemical Induced Corrosion" should provide further explanation.

I have also provided documents from the Kentucky Transportation Center College of Engineering. I would like to draw your attention to several studies (10-388, 10-406, 10-407) which focus on corrosion to bridges.

Knowing the destructive nature of these chemicals, I find myself wondering what their impact is having on our roads, bridges and our environment.

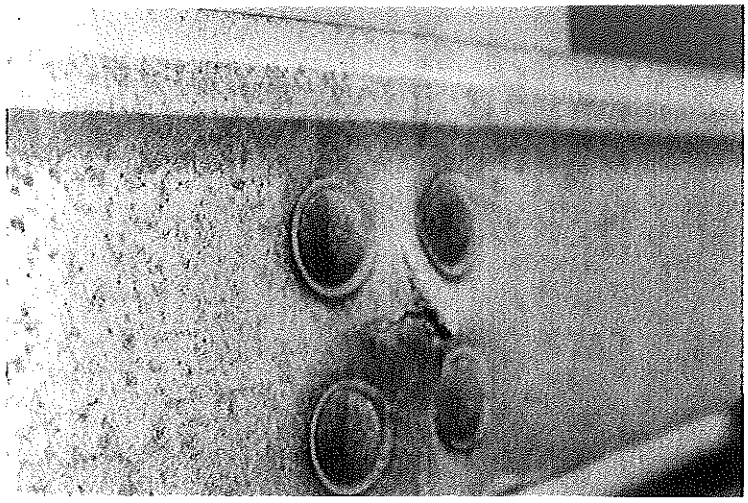
On behalf of the members of the association and myself, thank you for this opportunity to testify.

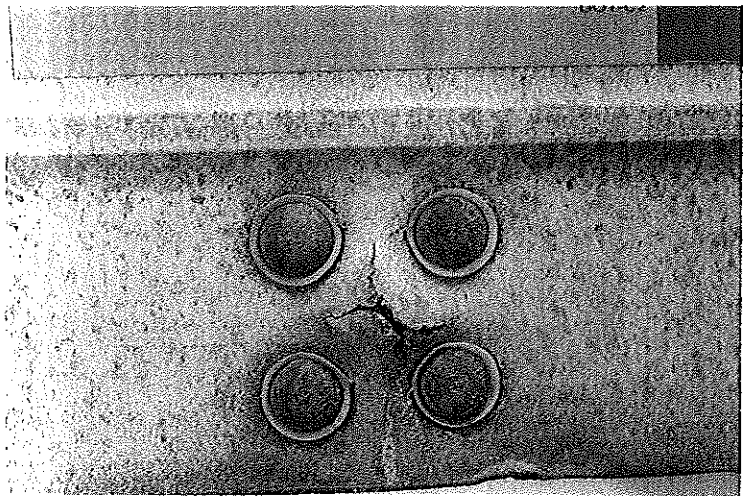
Road Ice Clearing Products and Application

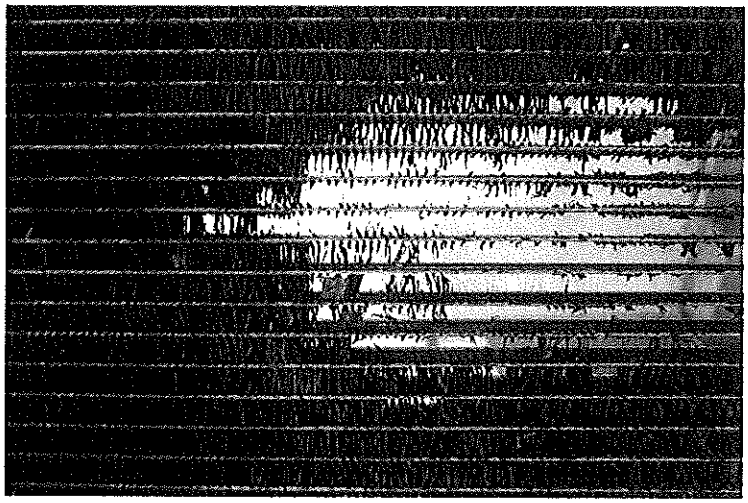
The newer chemicals replacing sodium chloride (road salt) and sand strategies do an excellent job of minimizing ice on highways.

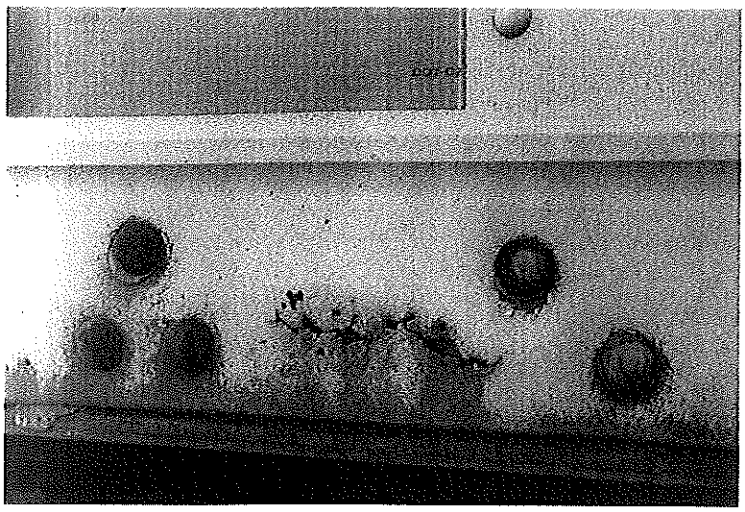
1. **Typical liquid chemicals**
   - **Salt**
   - *** Magnesium chloride**
   - *** Calcium Chloride**
   - **Calcium magnesium acetate**
   - **Potassium acetate**
   - *** Most popular**
2. **Typical application**
   - **Prior to snow fall**
   - **Prior to freezing rain**
   - **Prior to icing conditions**

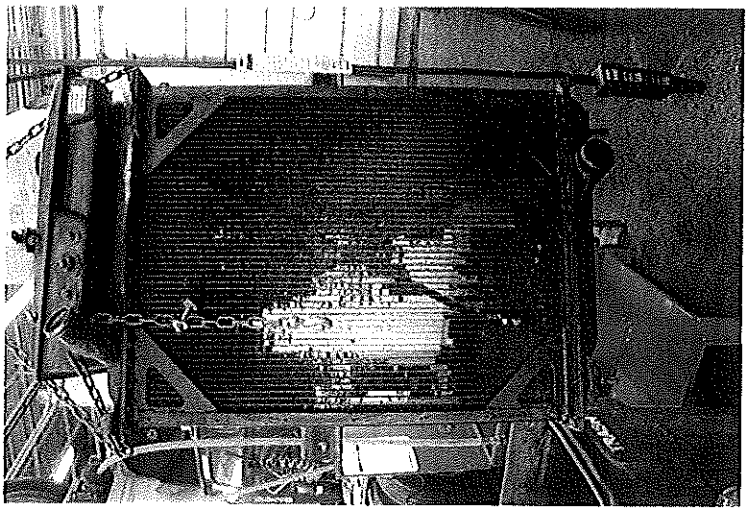
These de-icing chemicals and road salts do not melt snow or ice. They actually lower the freezing point of water by creating a brine solution.
Additional concerns are the ultimate impact on our environment and their influence on our highway infrastructure.





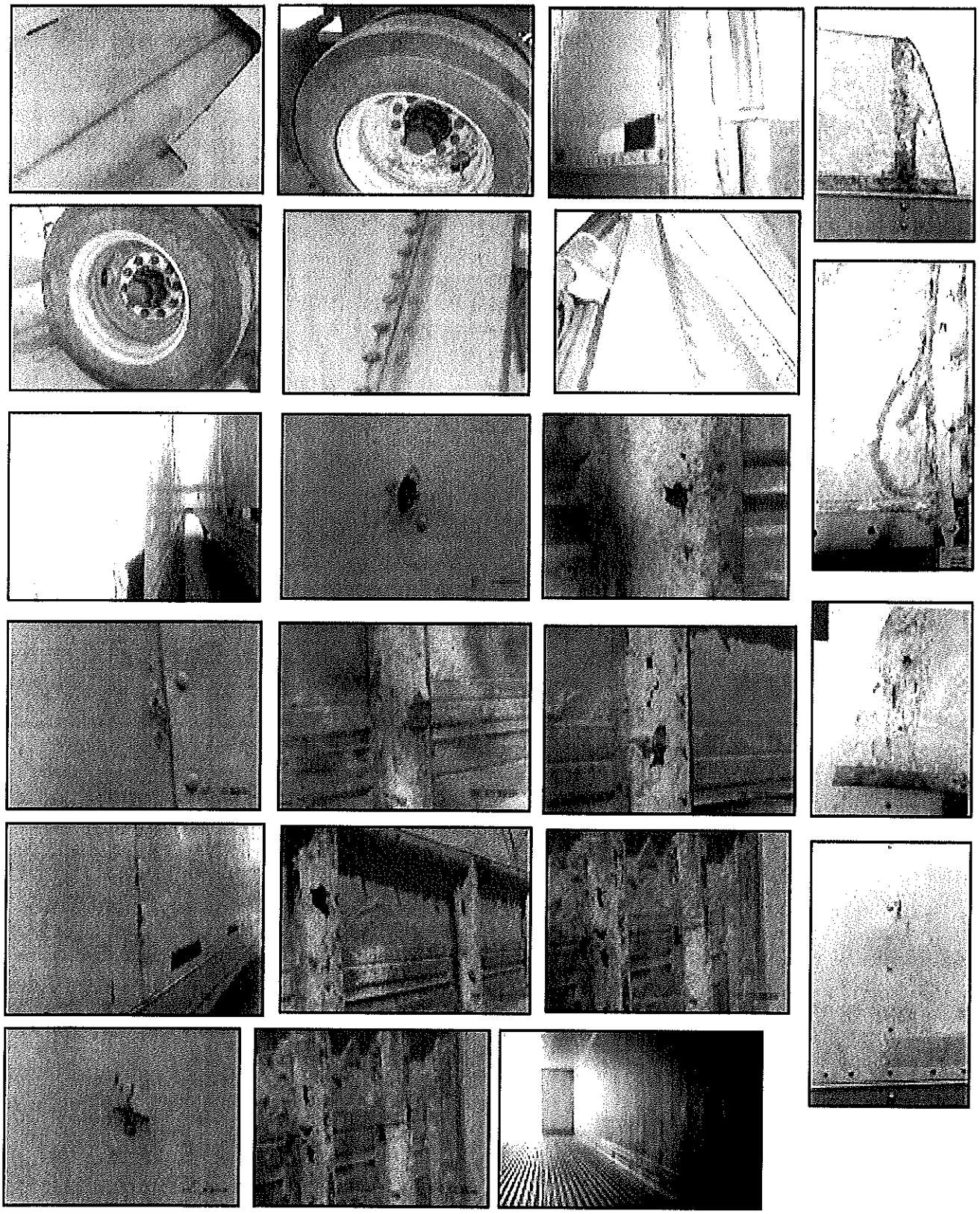






APPENDIX

The following photos are examples of corrosion caused by new road ice clearing chemicals as described in this information report. What also follows are reprints from TMC's *Maintenance Manager Magazine* and *The Trailblazer*, also describing the problem.



Issued: 11/2002

S.6 Chassis Study Group Information Report: 2002-1

Road Chemical Induced Corrosion

Developed by the Technology & Maintenance Council's (TMC)
Ice-Clearing Chemical Induced Corrosion Task Force
Under the Auspices of the S.6 Chassis Study Group

ABSTRACT

Aggressive corrosion, caused by new formulations of road ice clearing chemicals, has recently become a serious maintenance problem for many equipment users. Use of magnesium chloride- and calcium chloride-based products by certain states is especially associated with increased incidence of corrosion on vehicles, causing damage in as little as a single winter season. In order to reduce this problem, the Technology & Maintenance Council (TMC) of the American Trucking Associations (ATA) is calling on suppliers of road ice clearing chemicals to change the formulation of their products to make them less prone to cause corrosion in commercial vehicles, road and bridge surfaces and underlying structures. If this is not possible, then TMC is asking that manufacturers of vehicles make design and/or material changes to their product to resist road ice clearing chemical induced corrosion.

INTRODUCTION

A new form of aggressive corrosion on commercial vehicles has recently come to the attention of fleet managers in certain areas of North America, specifically in areas of the United States and Canada where new technology chemicals are used to clear roadways of ice and snow. These new formulations of road ice clearing chemicals, which have replaced sodium chloride (road salt) and sand strategies, do an excellent job of minimizing ice on highways. The problem for fleets, however, is that its use has recently become a serious maintenance problem for many equipment users. Use of magnesium chloride- and calcium chloride-based products by certain

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states has been associated with increased incidence of corrosion on vehicles. And the chemicals reportedly can cause significant damage in as little as a single winter season.

Corrosion on vehicles operating in these areas has been reported on chrome, aluminum—even stainless steel. According to some fleet managers, the corrosion is found most frequently on:

- trailer longitudinal rails.
- electrical connectors.
- exposed aluminum components.
- exposed chrome components.
- brake tables.
- fifth wheel and landing gear.

Other areas affected include ECM and headlight connectors, various sections of trailer frames and bodies, spring hangers, fuel tank straps, wheels and wheel fasteners, and fins on aluminum radiators. The areas affected generally are splash-prone areas on the front, underside, and lower portions of tractors and trailers, and on foot pedal linkages in cabs.

This problem has been reported at recent meetings of the Technology & Maintenance Council (TMC) of the American Trucking Associations (ATA). Examples of failed parts attributed to this phenomenon were displayed at a special Failure Analysis session of TMC's Shop Talk, and during a technical session on the same topic. The pictures that appear at the end of this paper, and in the special appendix, illustrate the problem well. In some cases, fleets have reported success in dealing with the problem through more aggressive vehicle washing. However, no washing can solve the problem as it pertains to electrical connectors, brake components, and many other affected systems, just because the components are not readily accessible.

Based on member concern, TMC has launched a Task Force to study the problem and develop recommendations to help solve it. In its study on the matter, TMC has identified other groups who also share concern with these new formulations—specifically electrical utilities, whose infrastructure is compromised by the same chemicals through aggressive corrosion, state trucking associations such as the Colorado Motor Carriers Association, and the Pacific Northwest Snowfighters Association.

TMC is, therefore, recommending the following action to solve this serious durability and safety problem.

1. TMC is calling on suppliers of road ice clearing chemicals to change the formulation of their products to make them less prone to cause corrosion in commercial vehicles. TMC is aware that some suppliers of both trucks and components are doing laboratory work on the effects of certain deicers on their products. With a little extra work and coordination with deicer suppliers, the opportunity exists to develop different chemical formulations as part of the ongoing projects.

2. If this is not possible, then TMC is asking that states stop using these chemicals to clear road ice.

3. If states will not agree to do this because of the advantages of these new formulations, then TMC is asking that manufacturers of vehicles make design and/or material changes to their product to resist road ice clearing chemical induced corrosion.

Kentucky Transportation Center

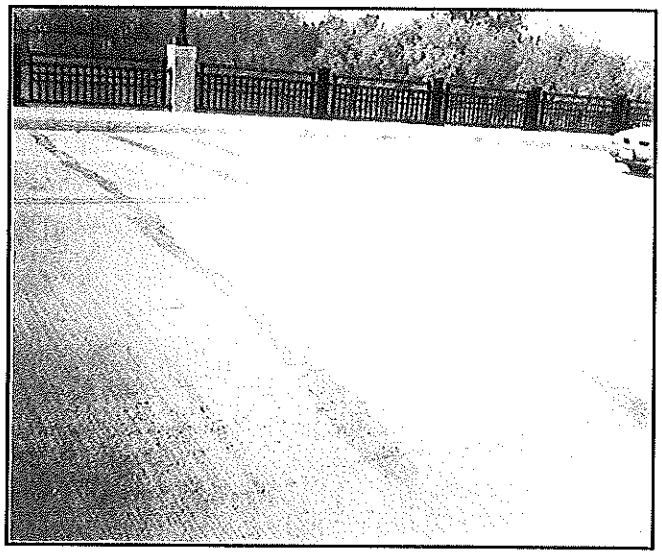
College of Engineering

Research Previews - FY 2010

Fall 2009

Twenty-three new research studies were begun during 2009/2010 on a wide range of topics as highlighted below. For more information on these projects, please contact the Kentucky Transportation Center or the staff person listed. These projects are being conducted for the Kentucky Transportation Cabinet.

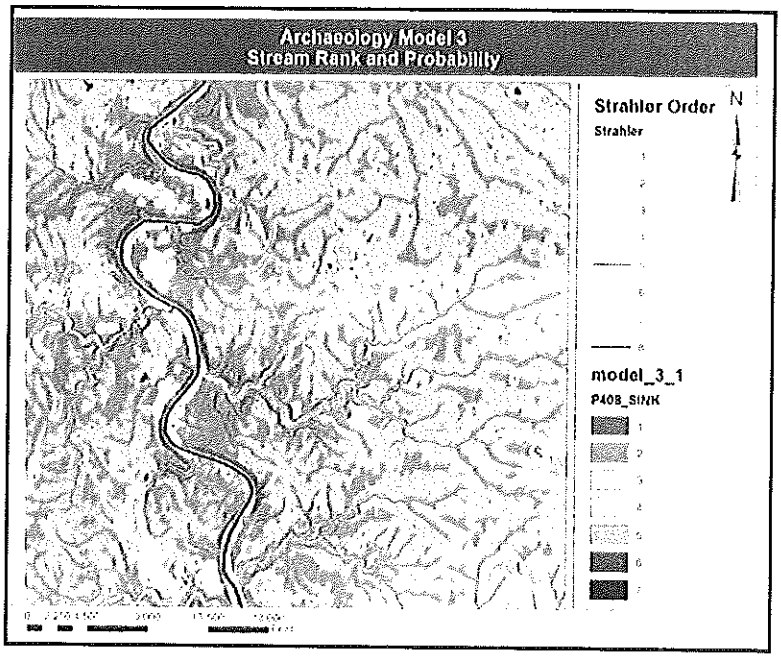
Sealants, Treatments and Deicing Salt Practices to Limit Bridge Deck Corrosion (Study #10-388)



Bridge deck repair/replacement is a major maintenance expense for agencies. Those are primarily caused by the ingress of deicing salts into deck concrete and subsequent corrosion of deck reinforcing steel. This project will determine current Cabinet practices for applying deicing salts to bridge decks including monitoring deicing materials, methods of deicing application (i.e. wet/dry), application frequency and application rates statewide. Candidate bridges will be identified for annual monitoring of all deicing salt application, chloride penetration and resultant deck deterioration (spalling and/or corrosion). The Center will be providing recommendations to implement bridge preservation actions including the application of sealers, densifiers, and/or inhibitors. Guidelines for using those treatments on specific categories of bridges will be provided. Additional recommendations will be provided for the use of effective salt substitutes, inhibitors and extenders or related treatments/practices found to be effective will also be recommended.

(Contact: Ted Hopwood, (859)-257-2501, thopwood@engr.uky.edu) [Study Advisory Chair: Nasby Stroop]

GIS Archeological Predictive Modeling Phase III (Study #10-389)

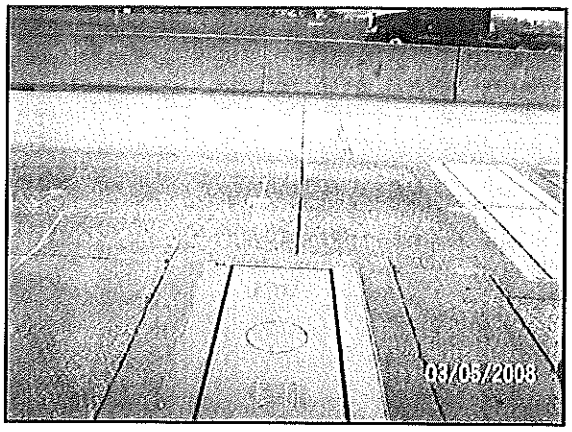


Previous research applied the Woodford County model across the inner Bluegrass Region and a modified version to Pike County, as a test bed. The results of those applications have been reviewed and revised models will be tested. This modeling process is being revised to better account for lake impoundments, an infrequent occurrence in the Bluegrass, and mining and road construction, which have greater impacts in the more mountainous regions of eastern Kentucky.

This project will take the existing Pike county archeological modeling protocol and extend it across the Hazard Hills Physiographic Region. Working in cooperation with the existing research team, Center researchers will explore the nature of model modification necessary to adjust for a broader, but similar, spatial context for archeological sites. This project will develop a predictive surface for the Hazard Hills Physiographic Region as well as exploring the potential for new model parameters such as underlying geology, so that future modeling approaches can be as uniform as possible across the state.

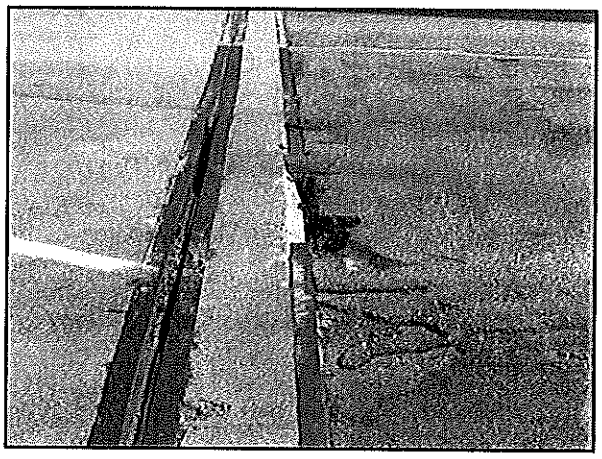
(Contact: Ted Grossardt, (859) 257-7522, thgros00@pop.uky.edu) [Study Advisory Chair: Carl Shields]

WIM Data Collection and Analysis (Study #10-404)



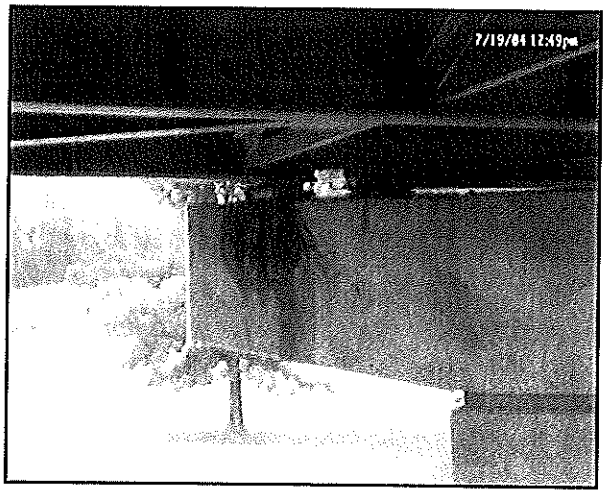
WIM data has traditionally been used primarily for pavement design, bridge design, highway cost allocations, and to determine the characteristics of vehicles traveling on roadways. The use of weight data has been in integral component of the procedure for estimating ESALs for many years, with earlier use of static weight data now exclusively replaced with WIM equipment. A previous research report recommended more attention to calibration and overall monitoring of WIM equipment. A review of the WIM data collection and analyses, along with evaluation of alternative equipment, will be undertaken to identify a process to improve and optimize procedures to be implemented by the Cabinet's Division of Planning. The Transportation Center will assume responsibility for WIM data collection, monitoring, and quality control to the extent directed by the Division of Planning. Currently WIM sites will be evaluated to determine if they are strategically located. Calibration procedures and monitoring procedures will also be evaluated.
(Contact: Jerry Pigman, (859) 257-4521, jpigman@engr.uky.edu) [Study Advisory Chair: Scott Thomson]

Improved Bridge Expansion Joints (Study #10-405)



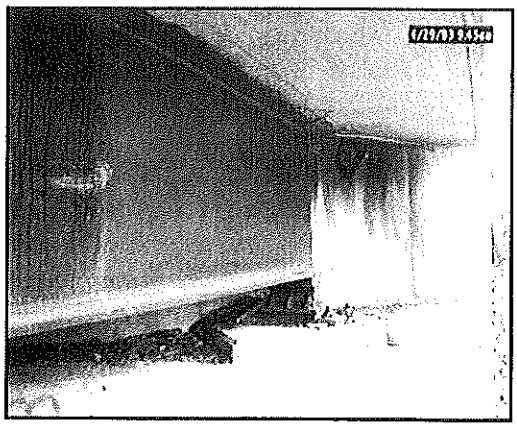
Both opened and closed bridge expansion joints and associated details have proved problematic. Several joint types are believed to provide superior performance compared to others. Some agencies have modified existing joint types/details to provide improved placement and better performance. The improved performance of expansion joints will increase their durability and prevent damage to underlying bridge components by eliminating joint leakage. The objectives of this project are to: 1) conduct a literature review and survey selected states and the Cabinet's districts to obtain information/opinions about expansion joint/header installation, performance, and special maintenance requirements/practices; 2) obtain cost, performance data, specifications, installation instructions, and maintenance requirements on specific joint designs from manufacturers/materials suppliers; 3) develop guidance on joint selection enumerating preferred joints for both new construction and maintenance and identify joint performance tests that may be used to evaluate new joints after they are placed; 4) review the best performing deck joints and identify potential areas for joint performance enhancements; and 5) assist in the development of experimental projects incorporating bridge expansion joints that offer improved performance and monitor the placement of experimental joints during construction. *(Contact: Ted Hopwood, (859) 257-2501, thopwood@engr.uky.edu) [Study Advisory Chair: Marvin Wolfe]*

Evaluation of Deterioration of Structural Concrete Due to Chloride Entrainment and other Damaging Mechanisms (Study #10-406)



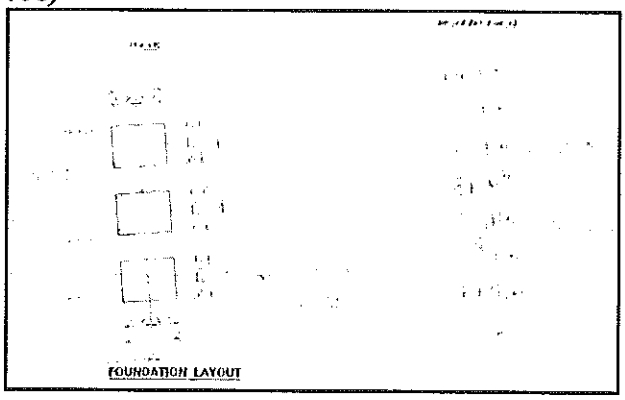
Structural concrete is widely used in Kentucky bridges, culverts, and other structures. The deterioration of structural concrete in those structures is problematic, with the most prevalent form of distress due to chloride entrainment. Other potential deterioration mechanisms include carbonation, sulfate attack and alkali-silicate reactions. To properly evaluate structural concrete for deterioration, additional tests may be needed beyond visual inspection and sounding. This study will identify the susceptibility of structural concrete in Kentucky to the various forms of deterioration and evaluate advanced test methods used to analyze concrete for those types of distress. Tests will be performed on bridge decks, barrier walls, retaining walls, abutments, beams and piers. *(Contact: Ted Hopwood, (859) 257-2501, thopwood@engr.uky.edu) [Study Advisory Chair: Kevin Sandefur]*

Evaluation of the Use of Painted and Unpainted Weathering Steel on Bridges (Study #10-407)



Weathering steels have proved problematic for exposures involving deicing salts and extended time-of-wetness. Some evidence indicates that once unhindered corrosion begins, this type of steel performs poorly even when subsequently coated. For severe exposures, conventional coated steel may prove more desirable. This project will: 1) review the performance of uncoated and coated weathering structural steels and associated problems with corrosion on highway applications; 2) conduct laboratory accelerated weathering/corrosion tests of painted/uncoated weathering and conventional steels of various grades along with equivalent grades of conventional structural steels; and 3) provide recommendations on the use of weathering steels for applications involving complete and/or spot painting. *(Contact: Ted Hopwood, (859) 257-2501, thopwood@engr.uky.edu) [Study Advisory Chair: Michael Baase]*

Effect of Thermal Loads on Bridge Substructures (Study #10-408)



The design of footings for short bridge piers is primarily controlled by the AASHTO thermal loads requirements. Accurate estimates of the thermal loads on footings is essential for proper design and can be achieved by instrumenting footings in new bridges, monitoring the soil pressure on the footing under different ambient conditions for a period of three or more years, and by comparing the actual soil pressure with ones estimated by the AASHTO code equations. The objective of this study is to instrument, on a multi-span bridge, the bottom horizontal surface at the base of the footing of the pier with five soil pressure cells and temperature gages, and instrument the vertical face of the footing and pier with three temperature gauges each, and to continuously monitor the soil pressure and temperatures and compare the soil pressures with one derived using the AASHTO code. *(Contact: Issam Harik (859) 257-3166, iharik@engr.uky.edu) [Study Advisory Chair: Kevin Standefur]*

Evaluation of Warm-Mix Asphalt (Study #10-409)

Warm-mix asphalt technology is becoming more prevalent in routine highway construction across the county. It provides many benefits over conventional hot-mix asphalt (HMA), including reduced mixing and placement temperatures, lower fuel consumption, and the potential to realize easier placement. There are a variety of technologies utilized for achieving lower mixture temperatures, including the use of chemical additives, the use of organic additives (primarily wax-based), and injection of water into a typical HMA mixture, sometimes referred to as "foamed asphalt". However, temperature reduction may be limited more with the "foamed" method than with the additive methods. Kentucky has utilized the "foamed" technology on two projects on the shoulders of interstate highways. One of the projects exhibited some "tenderness" during initial placement. This project will monitor this issue among others associated with the use of warm-mix technology. *(Contact: Clark Graves, (859) 257-7388, cgraves@engr.uky.edu) [Study Advisory Chair: Allen Myers]*

For a copy of a project's work plan or general information regarding
the Kentucky Transportation Center, contact
Don Hartman, Interim Director
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176 Raymond Building
Lexington, KY 40506-0281
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