Current Transportation Alliance Projects

Optimal Traffic Noise Reduction with Asphalt Rubber Pavement

This research project aims at the establishment of a novel methodology for systematically assessing and comprehensively understanding the traffic noise of the Asphalt Rubber (AR) roads, such that the traffic noise of the AR pavement can be reduced effectively with least the cost.

The public has been consistently demanding that traffic noise be mitigated and reduction of tire-pavement noise has become an increasingly important environmental consideration for highway agencies. On the other hand, millions of used tires need to be recycled and the used tires and the treatment of the used tires cause serious environmental concerns. This project intends to establish a methodology for comprehensively understanding the tire-pavement noise and an optimization technique in controlling the traffic noise for Canadian urban areas with utilization of asphalt rubber (AR) as road pavement material using crumb rubber from recycled tires.

Proponent: University of Regina
Supporters: Communities of Tomorrow, City of Regina, Ministry of Highways and Infrastructure, National research Council, Saskatchewan Scrap Tire Corporation

Innovative Porous Materials for Urban Traffic Noise Reduction

This project aims to reveal the mechanism of traffic noise reduction and generation on porous materials, especially for pavement materials used in urban environments where traffic noise is of major concern to city residents.

Traffic noise is the largest noise pollutant in cities and it is becoming an increasingly important issue for road designers, civil engineers, government and private sectors in transportation and researchers in traffic noise and industrial noise control. With investigations performed by the Acoustics Research Group at the University of Regina, it was discovered that traffic noise in a city such as Regina can become a problem. Traffic noise in some areas within the city can be 80 dB or higher. The problem of traffic noise in Canadian cities is serious as it creates an annoyance in residential areas and generates social costs. Traffic noise pollution must be solved in order to obtain a sustainable society.

Proponent: University of Regina
Supporters: Communities of Tomorrow, University of Regina, National Research Council, Saskatchewan Scrap Tire Association

Smart Snow Plow

The Smart Snow Plow (SSP) project aims at developing technologies that enable ordinary snowplows to operate more safely and efficiently by (1) informing the driver of the proximity of the snowplow blade to the curb, (2) alerting him/her of vehicles and obstacles approaching from front and behind, (3) enabling the snowplow to gather geographically referenced information about the status of snow removal operation, including the volume of snow pile at side roads and the need for de-icing (i.e., salt or sand application).

Winter road maintenance, and in particular snow-removal is a major concern for most Canadian municipalities and highway departments. Snowplows are the key players in winter-time road maintenance. Their operation, however, is associated with increased risks for the driver, other road users and road infrastructures. Broadly speaking, these risks can be divided into three categories, (1) damages to the infrastructure, such as the curbs, guide rails, fire hydrants and the snowplow itself, (2) traffic hazards due to slow movement and whiteout condition for other vehicles, (3) hazards to the driver due to accidents involving objects hidden in snow.

Proponent: University of Regina
Supporters: Communities of Tomorrow, SpringBoard West, City of Regina, Ministry of Highways and Infrastructure

Transit Tracker

The purpose of this project is to develop new technology to provide accurate and timely bus location information to transit users and the general public on a continuous basis through an on-board GPS system, cellular phone technology and Web based technology. This information will be extremely useful for transit users as it will allow them to plan their arrival at bus stops precisely to coincide with the arrival of their bus.

The system will track the movement of all the buses on several bus routes and provide both a web site interface and a cell phone interface as a mechanism for knowing the next bus's current location at all times. From the sustainability perspective, the general public will be more inclined to use public transportation due to the increased convenience of the experience. The paradigm shift towards a user centric transit informational resource will increase rider-ship, decrease the number of cars on the road, lower the emissions of green house gases and provide transit authorities with technology usage statistics.

Proponent: TR Labs
Supporters: Communities of Tomorrow, University of Regina, City of Regina, Sasktel

Self Sustaining Snow and Ice Removal

The purpose of this project is to research and develop a better understanding of, if the combining of the current technologies (solar power and geothermal heating systems), that have been used in other geographical areas and climates are able to be combined and used in a full scale snow and ice melt application, for roads, highway, and bridge surfaces. As well, it will provide an opportunity to better evaluate the need for such a technology and system application in Regina, Saskatchewan, and Canadian cities.

There are several projects where geothermal and radiant heating have been combined to minimize annual energy costs. However, geothermal can be problematic as depending on the geographical area the ΔT may not be great enough to provide sufficient warming of the roadway surface in very cold climates. As well, the depth of the wells may be too great to make such a project economical or the geothermal activity may not be sufficient to sustain the system for the entire lifespan of the bridge or roadway (i.e. geothermal is not a renewable resource).

Proponent: WestSource Solutions Inc.
Supporters: Communities of Tomorrow, University of Regina, SpringBoard West Innovations

Roadway Preservation in Place

The purpose of this project is to build a new piece of equipment that would be an attachment for a skid steer loader, powered by the auxiliary hydraulic system of the same and would remove broken pavement material to an accurate depth on a level plane so compaction can be consistent. While doing this, the additive materials for new pavement would be well blended with the recycled material. Finally the attachment would level the recycled pavement material producing a “machine finish” considered to be much more desirable repaired section of road of higher quality than hand finished material.

The current technology ,smaller scale equipment, commonly referred to as pot hole patchers offers the same process with the exception that the end quality has suffered up until now because it entails a lot of hand work. Currently two deficiencies are common:

a) inconsistent depth, particularly in cold corners and surrounding cracks that cross the area and may be full of wet material that inhibits heating resulting in an uneven surface to pave over and uneven compaction due to bridging.
b) Lack of the ability to accurately add new materials and recycling agents and mix them thoroughly by hand.

These deficiencies can result in poor riding characteristics and material that has a short life span.

Proponent: Battle River Asphalt
Supporters: Communities of Tomorrow, City of Regina, City of Saskatoon, University of Regina, National Research Council, Ministry of Highways and Infrastructure

Composite Structural Module for bridge decks and floor structures

This project will allow NorthWind Innovations Inc. to investigate an innovative concept for lightweight, pre-finished bridge decking. This would be known as Composite Structural Module (CSM). Currently, the product most often used is a hollow core precast concrete deck module. The proposed project will investigate the initial product design and feasibility and potential market commercialization of North Winds CSM. This system could greatly reduce the materials needed for bridge construction. Because of the adaptation of new coatings technology, there would also be a reduction in the need for resurfacing and maintenance costs. Additionally, the inherent qualities of the CSM would naturally limit or eliminate the formation of frost on the bridge deck.

Proponent: NorthWind Innovations Inc.
Supporters: Communities of Tomorrow

Mechanistic Structural Asset Management Survey of Saskatchewan Thin Paved Road Network for Strategic Upgrade Optimization and Valuation (Pending Approval)

This project is to quantify more accurately the actual in situ structural condition state of highway infrastructure assets that will be used in the development of a structural asset management system.

Saskatchewan Ministry of Highways and Infrastructure (MHI) manages an extensive highway network of thin paved roads that consists of diverse road segments that exhibit a wide spectrum of structural performance. MHI manages the preservation of the thin paved road network through needs based programming based on surface condition and road roughness measures. One of the limitations of these measures is the lack of information available to assess the load carrying capacity of individual road segments.

In the 2008 Provincial budget, MHI announced a mandate to significantly expand the primary weight road network in support of the Provincial economy. A portion of the thin paved secondary weight road network requires upgrading to support the primary weight expansion. In order to make better informed decisions on infrastructure investment a better understanding of the structural condition of individual road segments across the road network is required.

Proponent: Pavement Scientific International
Supporters: Communities of Tomorrow, University of Saskatchewan, City of Saskatoon, Ministry of Highways and Infrastructure

Mechanistic Characterization of Saskatchewan Asphaltic Mixes across Various Mix Properties (Pending Approval)

This project is to conduct a study to undertake advanced mechanistic-climatic laboratory characterization of typical Saskatchewan Ministry of Highways and Infrastructure asphalt concrete mixes.

Saskatchewan Ministry of Highways and Infrastructure (MHI) use asphalt concrete mix extensively in its construction and rehabilitation of its paved road network. The quality of the asphalt concrete mix is highly variable and depends on the mix types, aggregate types, additives, asphalt cement binder types, and various fine aggregate crush fraction. In some areas of the province gravel pit depletion has resulted in the utilization of marginal aggregate materials.

In order to make better informed decisions on the utilization of different qualities of asphalt mix materials it is important to understand the long-term performance characteristics of the asphalt mix. There is a need to utilize mechanistic characterization methods to revisit current asphalt concrete specifications to ensure specified field performance are meeting the current transportation needs.

Proponent: Pavement Scientific International
Supporters: Communities of Tomorrow, University of Saskatchewan, City of Saskatoon, Ministry of Highways and Infrastructure

Effect of Fibre-Reinforced Seal Coats on Saskatchewan Pavements

This project is to assess the effect of fibre-reinforced seal coats on Saskatchewan pavements. Fibre-reinforced seal coats are used as a thin surfacing system to reduce the impacts of cracking and more specifically reflective cracking on surfaced roads. These types of systems were developed in the United Kingdom in the late 1980's and are being incorporated throughout a number of countries worldwide to inhibit pavement cracking and/or to mitigate reflective cracking. The first road trials known in North America were completed in the United States in the fall of 2003 near Niagara Falls in upper New York State. The first known trials in Canada were placed in York Region north of Toronto, Ontario in the summer of 2005.[1]

Currently no fibre-reinforced seals coats have been constructed in Saskatchewan. The Saskatchewan Ministry of Highways and Infrastructure is looking for more cost-effective alternative methods that provide more sustainable solutions for preserving their pavements. Various test sections are planned to be completed in 2009 to evaluate the performance of fibre-reinforced seal coats using different types of seal coat aggregates.

Proponent: Colas Canada
Supporters: Ministry of Highways and Infrastructure

Asset Valuation Methods Pilot Study

This project is to do a pilot test on the condition based asset valuation methods used in the U.K., Australia and New Zealand on a sample of the Provincial Highway network as well as a sample of the City of Saskatoon streets.

Saskatchewan Ministry of Highways and Infrastructure (MHI) utilizes a comprehensive asset management program to optimize funding based on network conditions. Network conditions describe the state of the network at a point in time; however, network condition is not easily understood by people that are not directly involved with the asset management program. An alternative to describing the state of the road networks is asset valuation which indicates how the value of assets (i.e. road network) changes over time. This pilot study will attempt to use road condition data to develop a methodology for MHI to determine the value of the pavement assets.

Proponent: VMax
Supporters: University of Saskatchewan, City of Saskatoon, Ministry of Highways and Infrastructure

Mechanistic Characterization of Saskatchewan Granular Base Materials (Pending Approval)

The objective of the study is to undertake advanced mechanistic-climatic laboratory characterization of typical Saskatchewan Ministry of Highways and Infrastructure granular base road materials.

Saskatchewan Ministry of Highways and Infrastructure (MHI) use granular base material extensively in its construction and rehabilitation of its paved road network. The quality of the granular base is highly variable and depends on the gradation and fines content of the material. In some areas of the province gravel pit depletion has resulted in the utilization of marginal aggregate materials. Marginal granular base material has a tendency to retain moisture resulting in decreasing strength and reduced field performance.

In order to make better informed decisions on the utilization of different qualities of granular base material it is important to understand the long-term performance characteristics of the material. There is a need to utilize mechanistic characterization methods to revisit current granular specifications to ensure specified field performance are meeting the current transportation needs.

Proponent: Pavement Scientific International
Supporters: Communities of Tomorrow, University of Saskatchewan, City of Saskatoon, Ministry of Highways and Infrastructure

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Proponent: Colas Canada
Supporters: Ministry of Highways and Infrastructure

Effect of Rubber-Modified Binders on Asphalt Concrete

This project is assessing the effect of rubber-modified binders on asphalt concrete characteristics and performance for Saskatchewan's 2005 demonstration project.

The use of rubber asphalt cement (RAC) in cold climates is currently limited in Canada. Although there has been some research in Alberta, the paving material has yet to be assessed in Saskatchewan. A section of Highway 11 near Findlater, SK, has been overlaid with RAC (using rubber from recycled tires) and research will be conducted on instrumented test sections of both RAC and conventional asphalt over a two-year period to assess the pavement performance. In July 2005, sensors were installed to monitor the temperature, pressure and strain in each test section. In addition, a University of Regina team is assessing the noise reduction achieved by adding rubber to the asphalt.

Proponent: SH&T, Prairie Rubber Corporation
Supporters: University of Regina, Saskatchewan Scrap Tire Corporation, City of Regina, National Research Council, Communities of Tomorrow

Effect of Stabilized Base on Granular Pavements

The purpose of this project is assessing the effect of emulsified base stabilized material on granular pavements using mechanistic design methods.

The use of emulsified base stabilized material on granular pavements using mechanistic design methods is currently limited in Saskatchewan. Saskatchewan is looking for more cost-effective alternative methods that provide more sustainable solutions for rehabilitating and constructing granular pavements. A section of Highway 15 east of Kenaston requires rehabilitation and strengthening to accommodate increased loading. The following test sections will utilize mechanistic design procedures to evaluate the performance of the stabilized granular base structure.

Proponent: Pavement Scientific International
Supporters: University of Saskatchewan, City of Saskatoon, Ministry of Highways and Infrastructure

Road construction utilizing recycled materials

This project is to design, build and evaluate the performance and suitability of typical residential and commercial roadways in the City of Saskatoon utilizing recycled construction materials.

The City of Saskatoon's current design standard for local roadways does not consider the extensive heavy traffic that occurs during the construction and/or development phase of a neighborhood. Furthermore, trench settlement often occurs following completion of roadway construction. As a result, conventional road structures in new neighborhoods have not performed as expected and are often failing early in their service life.

The City of Saskatoon currently generates a significant amount of asphalt and Portland cement concrete rubble from utility cuts and repairs. In the past, this stockpiled material has been crushed and used primarily for utility trench backfill.

In order to address concerns with respect to failing roads and to improve the value of stockpiled materials, Infrastructure Services has partnered with the University of Saskatchewan's Centre of Excellence in Transportation and Infrastructure (U of S), the Communities of Tomorrow (CT) and PSI Technologies (PSI) to develop alternative designs and construction processes which will utilize the asphalt and concrete rubble as recycled aggregate. The Ministry of Highways and Infrastructure and the Ministry of the Environment are supportive of this project.

Proponent: Pavement Scientific International
Supporters: City of Saskatoon, University of Saskatchewan, Central Asphalt, Communities of Tomorrow