ALBERTA INNOVATES

CLEAN RESOURCES

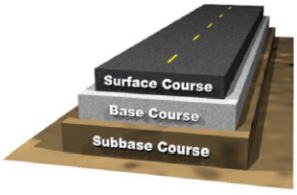
ADVANCED HYDROCARBONS

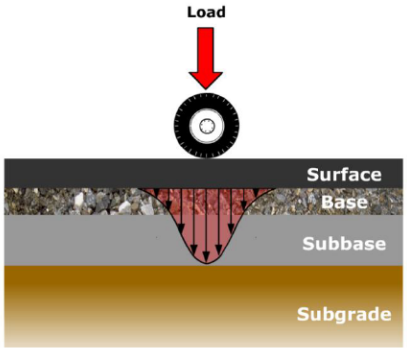
INNOVATIVE HYDROCARBON PRODUCTS – BITUMEN BEYOND COMBUSTION

FUNDING DETAILS

Performance Evaluation of Asphalt Mixes Comprised of Asphalt Binder and Asphaltenes Derived from Alberta Oil Sands

The proposed research project is focused on: 1) improving low-temperature properties of high-performance base course comprised of Alberta oil sands-derived asphaltenes-enriched binder using fibers such as Polyethylene terephthalate (PET), which has been shown to be effective in enhancing the low temperature properties of asphalt mixes; and 2) investigating the impact of using reclaimed asphalt pavement (RAP) on physical and mechanical properties of asphalt emulsion stabilized base course modified using asphaltenes. The proposed project includes a two-year laboratory investigation that will be conducted at the University of Alberta's asphalt laboratory, which has extensive asphalt binder and asphalt mix testing capabilities.





RECIPIENT:
University of Alberta (Hashemian)

PARTNERS:
None

TOTAL BUDGET:
$299,000

AI FUNDING:
$199,000

PROJECT DATES:
JUN 2021 – AUG 2023

PROJECT TRL:
Start: 4
End: 6

APPLICATION

This proposed research will investigate and understand the potential use of asphalt and asphaltenes derived from Alberta oil sands bitumen for enhancing asphalt performance used in two different base courses in flexible pavements, including high modulus base course and stabilized base course using asphalt emulsion, building on the findings of our previous research results.

ALBERTA INNOVATES

CLEAN RESOURCES

ADVANCED HYDROCARBONS

INNOVATIVE HYDROCARBON PRODUCTS – BITUMEN BEYOND COMBUSTION

PROJECT GOALS

The key goals of the project are:

- Improve the low-temperature performance of a high-modulus base course composed of;
- Alberta oil sands-derived asphaltenes-enriched binder by incorporating PET fibers;
- Improve performance properties of the stabilized base course, including asphalt emulsion and RAP, using asphaltenes.

BENEFITS TO ALBERTA

The successful implementation of this technology could result in:

- Improvements in pavement quality and durability, designing pavements with a longer life cycle and lower thickness compared to traditional pavements;
- Reduction in road construction time, pavement thickness and consequently, traffic delays;
- Reduction in road construction cost and natural resources consumption, and greenhouse emissions;
- Commercial use of asphaltenes, a waste material derived from Alberta oil sand bitumen.

6 Publications

6 Students Trained

2 New Products/Services

CURRENT STATUS

AUG 2022

For research focus 1, a series of rheological testing has been conducted on unmodified and asphaltenes modified binders derived from Alberta Oil Sands. As a result, a modified binder has been designed for high performance asphalt sample fabrication. A mix design has been developed to find the optimum fibre content. For research focus 2, three mix designs have been prepared for modified mixes using asphaltenes and asphalt emulsion with combinations of 100% RAP, 75% RAP and 25% aggregates and 50% RAP and 50% aggregates. Evaluation of performance properties of the mixes at different temperatures is in progress.