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Sponsor

Alaska Department of
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Project Title

Synthesis of Railroad Engineering Best Practices in Deep Seasonal Frost and Permafrost Areas

Project Manager

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Co-Investigators

Michigan Tech University
Dr. Theresa Ahlborn
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Project Summary

Technology Transfer Outreach Publication

Arctic Environment Presents a Challenge for Railroads

A rail link from Alaska to the rest of the North American rail system has been under consideration since the Alaska Railroad was started in 1914. Recently, a renewed interest in resource deposits in Alaska, Yukon, and British Columbia, as well as changing world markets, global trade dynamics and supply chains, has rekindled interest in that link..

Deep seasonal frost and permafrost in the arctic environment create conditions that require different standards for the design, construction, maintenance, and operation of rail infrastructure. The geodynamic properties of roadbeds exposed to these conditions create problems that will have to be studied and understood before construction of the proposed rail link can begin.

Research Objectives

- Synthesize the findings on current design practices, implementation, durability, and limitations of prestressed concrete ties with a specific focus on the impact of arctic conditions.
- Review and identify differences in the design, construction, and maintenance standards of current and planned rail infrastructure at deep seasonal and permafrost areas around the world. Specific topics investigated include utilized cross-sections, materials, and construction and maintenance techniques.
- Synthesize the findings on current design practices, implementation, durability, and performance of prestressed concrete ties with a specific focus on the impact of arctic conditions.
- Based on the findings, develop general recommendations toward the development of construction methods and design criteria during the next phases of the project. Recommendations on important considerations when selecting preferred tie types will be included.

Project Summary

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University Facts

Total Enrollment	6,550
Graduate Enrollment	916
Number of Faculty	417
Placement Rate	95%

Michigan Tech is located in Houghton, MI on the south shore of Lake Superior. This rural area is known for natural beauty, pleasant summers, abundant snowfall, and numerous all-season outdoor activities. In addition, the University maintains its own downhill and cross-country ski facilities and golf course. There are numerous cultural activities and opportunities on campus and in the community. Michigan Tech has also been rated as one of the safest college campuses in the United States, and the local community provides excellent resources conducive to an outstanding quality of life.

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Anticipated Research Findings

This research is expected to be complete in January, 2010. The final product will be a narrated report that summarizes the results of the literature reviews and field investigations conducted during the project. Important findings will be identified and their relevance to the project will be highlighted.

Benefits

The results of this research will be used to develop recommendations for the next phases of the project that provide guidance to the future investigations and project development, thus improving the design, construction, maintenance, and operations of the proposed Alaska-Canada rail link. Information contained in the final report can also be used by existing rail companies in arctic regions to benchmark their assets and operations against other entities that function in similar environments.

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