

## Radial Floating Ice Deflector: An Innovative Approach

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### Abstract

A radial floating ice deflector (FID) was developed, designed and constructed for a cable ferry crossing in northern Manitoba, Canada. The purpose of the FID is to protect the ferry from future floe impacts. In this paper, the concept development process including the conceptual design of the FID is presented, the problems such as floe - FID interactions, design ice load and design constructability arising from the conceptual design are discussed, and the solutions for the problems are introduced. At the end of this paper, potential applications of the structural system reflected by the FID are discussed and recommendations are made for the design and construction of future similar ice control structures.

**Keywords:** cable ferry; radial ice floating deflector; float; strut; chain; chain anchor; bollard; floe; ice load; constructability

### 1 Introduction

The South Indian Lake Cable Ferry Crossing (the crossing) is situated in northern Manitoba to primarily provide access to the community of O-Pipon-Na-Piwin Cree Nation. It is accessible from Thompson, the nearest city, by driving along Highway PR 493. The South Indian Lake Airport where the PR 493 terminates is 5 kilometers away from the crossing. Manitoba Infrastructure (MI) has been operating the crossing since 1973 to provide year-round services for the community. The previous self-propelled ferry serving the crossing, M.V. Charles Robert, was replaced in 2004 by the present operating ferry, M.V. Johnny Paul. The M.V. Charles Robert had since then been secured to the north of the eastern landing acting as an ice deflector to partially shelter the operating ferry from impacting floes. Intense floes drifting from the north of the crossing occur in a two-week period every year during ice break-up in May. To address potential environmental

concerns over the M.V. Charles Robert, MI decided to remove it and construct a new ice deflector as the Phase 1 project of a rehabilitation program. Replacement of the existing landings of the crossing is to follow as the Phase 2 project. SNC-Lavalin Inc. (SLI) was selected to undertake the concept development and design of the new ice deflector and the replacement landings. A radial floating ice deflector shown in *Figure 1* was constructed in 2016 for the Phase 1 project.



*Figure 1. Radial Ice Deflector for South Indian Lake Cable Ferry Crossing (looking East, 2017 February)*