

ISSUE: 07. ROAD TUNNELS IN WINTER CONDITIONS

SUB-ISSUE: Road tunnels in winter conditions

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Presentation title:

CHALLENGES RELATED TO WINTER OPERATIONS IN URBAN HIGHWAY TUNNELS

Summary:

Tunnels represent only a small part the road network length in Quebec. In Montreal, approximately 10 km of urban highway passes through tunnels such as the Louis-Hippolyte-Lafontaine Tunnel, which runs under the St. Lawrence Seaway, and the Ville-Marie and Viger Tunnel, an underground interchange that passes through the heart of downtown Montreal. These tunnels, built in the 1960s and 1970s, allow road users to circulate safely and comfortably in a well-lit, scrupulously monitored environment that is sheltered from harsh weather conditions such as snowstorms, freezing rain, strong winds and blowing snow. However, the operation of such tunnels in a northern environment, surrounded by a significant water table and subject to severe weather conditions (major fluctuations and intense cold), poses many operational challenges, and requires a wide range of extra equipment that is not found in other road tunnels. This equipment must be kept operational and periodically maintained. The case of the Ville-Marie and Louis-Hippolyte-Lafontaine tunnels will be used to illustrate problems related to the winter management of tunnels and their various systems. First, we will provide a description of the equipment and methods needed to maintain an optimal level of safety in the winter operation of the tunnels and their systems. The winter management of a tunnel will be also described. We will discuss standard winter maintenance activities, inspection procedures for the various systems, and all questions related to the logistics of icicle removal interventions, with all the inconveniences this can cause in terms of traffic flow. Second, we will present a number of problems related to the winter operation of tunnels, and we will be discussing the corrective measures implemented. The presence of a significant water table generates considerable water infiltration, and adds to the operating problems by causing the formation of ice patches on the roadway and icicles on the tunnel roof and walls, especially around expansion joints. One of the solutions that has been implemented is the use of reaming techniques and repairing connections under the curbs, which has yielded very encouraging results.

