

Product Information Bulletin 1012

PlastiSpan HD Insulation Use for Sidewalk Construction

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PlastiSpan® HD Insulation for Sidewalk Construction

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In September 2000, the National Research Council of Canada (NRC) published a report entitled **Field Trials for Sidewalk Mitigative Measures**.¹ The report summarizes results of a project jointly funded with six Canadian municipalities, as well as Lafarge Canada and the Canadian Plastics Industry Association, to investigate measures to mitigate sidewalk cracks that plague many Canadian municipalities and provide recommendations on measures to reduce them.

One option the NRC research program investigated was the use of granular fill material in combination with rigid insulation to help alleviate the problem of concrete sidewalk cracking. Figure 1 illustrates typical types of sidewalks cracks encountered.

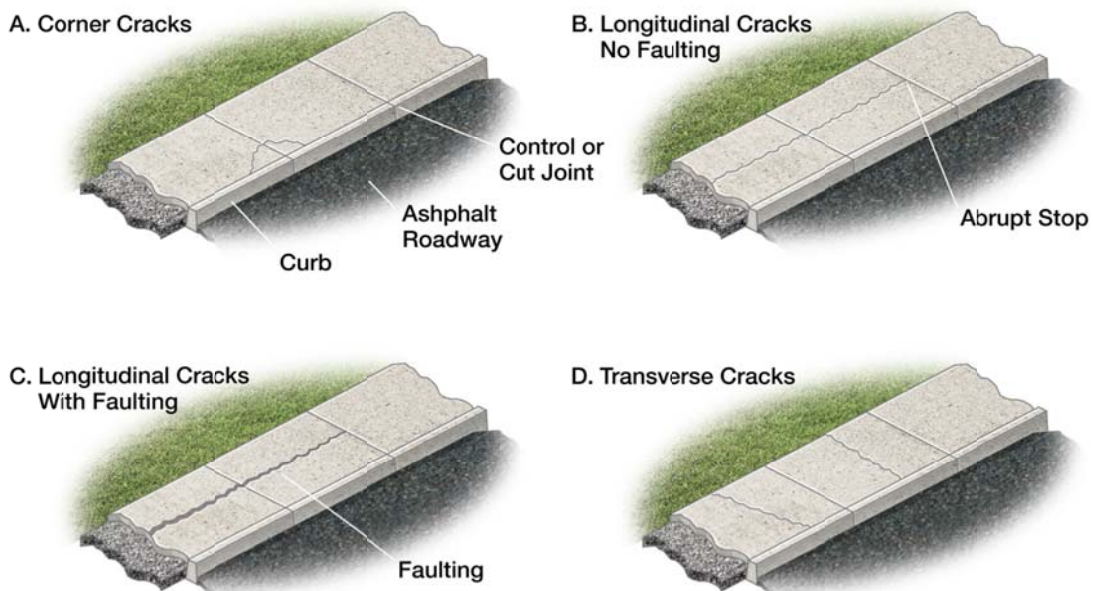


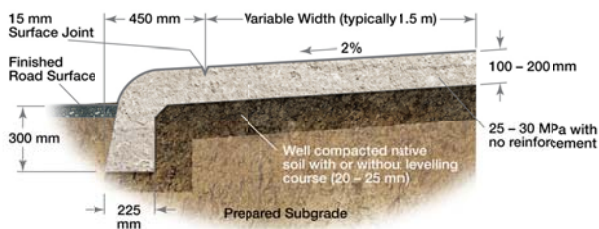
Figure 1 - Typical Types of Sidewalk Cracks

The NRC research program report included construction and monitoring of the performance of sidewalk sections in Edmonton, Winnipeg and Québec City. The construction requirements incorporated typical sidewalk and curb cross-sections in the cities where the test sections were built.

Sensors were installed in the concrete sidewalks and in the soil beneath the test sections. The sensors monitored frost depth at the center of sidewalk sections, tensile stress in the concrete and soil moisture content changes over a three year period.

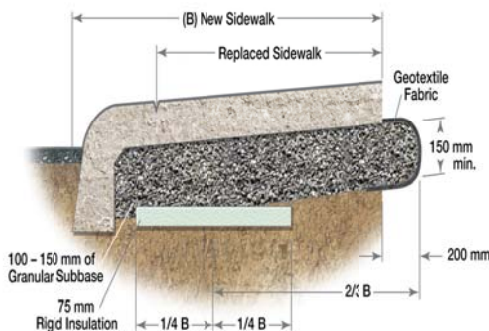
¹ NRC-CNRC Final Client Report B-5501.4, **Field Trials for Sidewalk Mitigative Measures**, September 2000.

The figure below illustrates a typical sidewalk cross section constructed over a native soil subbase, a thin layer of granular material placed on top of the prepared native soil subgrade. Field surveys conducted by NRC to assess the damage to sidewalks in Winnipeg, Saskatoon, Regina, Edmonton and Calgary showed that most sidewalks crack in both longitudinal and transversal directions, i.e., mixed mode. While longitudinal cracks can be attributed to seasonal changes, transverse cracks usually occur due to lack of uniform compaction of the subbase or subgrade rather than the level (quality) of compaction under the sidewalk section between cut lines (control joints).



The NRC sidewalk surveys also showed that cities with native soils that had a higher plasticity index had a higher percentage of longitudinal sidewalk cracks. Clay soils encountered in Regina and Winnipeg have higher plasticity than the clays in Calgary. And that clay soils encountered in these two cities and surrounding areas result in a higher degree volume change due to their mineral content.

Snow banking on either edge of the sidewalk provides additional insulation in the area along the edge of sidewalks and contributes to deeper frost penetration at the center of the un-insulated sidewalks than along the edges. This change in frost penetration promotes soil movement at the centre of the sidewalk which increases the likelihood of cracking.



The figure in the adjacent column illustrates the sidewalk cross section that was tested in the NRC project using expanded polystyrene (EPS) insulation beneath the middle half of the sidewalk. The test sections used a 75 mm (3") thick layer of CAN/ULC-S701², type 2 EPS insulation with 50 mm (2") of granular fill material beneath it for drainage.

EPS insulation placed with granular material above and below it provides the independent functions of thermal insulation and good drainage to reduce frost penetration and sidewalk cracking.

² CAN/ULC-S701, **Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering**, National Standard of Canada published by Underwriters Laboratories of Canada.