

Background

Hot In-Place Recycling (HIR) is an on-site, in-place method that rehabilitates deteriorated asphalt pavements and thereby minimizes the use of new materials while extending the asset life. This process consists generally of four steps:

1. Softening of the asphalt pavement surface with heat;
2. Scarification and/or mechanical removal of the surface material;
3. Mixing of the material with recycling agent, asphalt binder, or new mix; and,
4. Placement of the recycled mix on the pavement surface.

The primary purpose of HIR is to correct surface distresses not caused by structural inadequacy, such as raveling, non-structural cracks, minor rutting, and shoves and bumps. The HIR may be left as the surface course or covered with a new wearing course. The advantages of HIR are that elevations are maintained, it is comparatively economical, and needs less traffic control than the other rehabilitation techniques. HIR is usually performed to a depth of 20 mm to 50 mm, with 50 mm being a typical depth.

At the June 11, 2019, Council Meeting, \$700,000 for an asphalt recycling pilot project was approved with Council Resolution CC2019-189.

Research and Discussion Summary

From the research and discussions the following criteria are required for a successful HIR project:

1. The existing pavement needs to be in the right condition. The pavement should be generally free of major structural distress, and the asphalt is to be of similar properties (placed at the same time and the same mix for the entire length). Pothole repair material or crack sealing is to be removed prior to the HIR process. Areas with extensive repairs or cuts are to be avoided. The HIR process is not meant to address structural failures of the pavement such as structural rutting, existing mixture instability, or underlying failures in the subbase.
2. The existing asphalt cement needs to be conducive to the HIR process. Samples of the existing asphalt cement need to be tested prior to issuing a contract to ensure that the recycling agent will achieve the desired results.
3. The geometry of the road has to be conducive to the long train of the HIR process. The equipment train of the HIR process includes pre-heating units, scarifiers, mixing unit, placement unit, and compaction equipment (and can include equipment that introduces new material into the mix if required). This equipment has difficulty making the sharp corners and cul-de-sacs that exist in many subdivisions.
4. The size of the project needs to be sufficient to be cost effective. There are few HIR contracts being tendered in Ontario currently, and contractors have indicated that contracts in the range of 100,000 to 150,000 square metres are required for them to be cost competitive with other rehabilitation techniques. The contracts currently being tendered by the MTO are in the Thunder Bay and Kenora region, and are over 300,000 square metres in quantity.

Cost

In discussions with the HIR Contractors, they indicated that the City can expect to receive pricing in the \$14 to 16 per square metre range (50 mm depth) provided there is sufficient quantity included in the contract and that the road segment selected provides the opportunity for high productivity.

The sufficient quantity was stated to be in the 100,000 to 150,000 square metre range. An alternative to the City issuing a contract for this quantity is to partner with others on a HIR contract. Staff reached out to the MTO Northeast Region, and while they consider HIR, it is unlikely that they have a suitable road candidate scheduled for construction in 2020. Staff will remain in contact with the MTO Northeast Region and other nearby municipalities to see if there are future procurement partnership opportunities.

For comparison purposes, the most common asphalt recycling technique currently used by the City is Cold In-place Recycling with Expanded Asphalt Mix (CIREAM). The City specifies 100 mm of CIREAM and in relatively small quantities, ranging from 20,000 to 35,000 square metres. In the last five years the cost has ranged from \$12 to \$17 per square metre, making it approximately half the cost of HIR when prorated for depth.

One of the main differences between CIREAM and HIR, is that CIREAM cannot be left as surface, and must be covered, typically with new hot mix asphalt.

There is competition in the Sudbury market for CIREAM, as one of the local contractors can produce the product and there are sub-contractors available that competitively bid in the area.

Some examples of past CIREAM projects include MR 84 (Capreol Road), MR 89 (Longyear Road), and MR 15 (Main Street).

Next Steps

Through all of the discussions and research, it was stressed that the right road needs to be selected. The road cannot have structural deficiencies and must have asphalt cement that can be rejuvenated in the HIR process.

In order to provide the HIR pilot project the opportunity for success, a geotechnical consultant with HIR experience will be retained. The geotechnical consultant will assist Staff in identifying the appropriate road segment, and will core the existing asphalt and test the asphalt cement for compatibility with the HIR process. This will also be coordinated with contractors in the HIR business.

Some of the roads being considered for HIR evaluation include the Kingsway (between the bypass and Falconbridge Highway), MR 35 (between the LaSalle Extension and Azilda), Skead Road/Radar Road, and road segments.

The scope of the contract will also be reviewed. Council set aside \$700,000 of the Additional Federal Gas Tax Funding for the pilot project, the need to add ancillary items to any contract, such as culvert replacement, curb repair, or guide rails, will mean that the suggested minimum square metres of HIR will not be met. HIR will not be considered at a location where underground infrastructure (ie. water main) requires replacement.

A report will be prepared for the Operations Committee in 2020 summarizing the findings of the geotechnical work.

Reference

Federal Gas Tax Additional Funding, Council Report of June 11, 2019

<http://agendasonline.greatersudbury.ca/index.cfm?pg=feed&action=file&agenda=report&itemid=14&id=1324>