

Paired Intersection Study

Shingle Creek flows through a 43-square-mile urbanized watershed that is criss-crossed with a dense network of local, county, and state streets and highways. Shingle Creek was the first stream in the state to be designated an Impaired Water for excess chloride, most of which comes from road salt for de-icing. A study estimates that the chloride load to the Creek needs to decrease by 71 percent - a daunting task to do without compromising public safety.

The Shingle Creek Watershed Management Commission won a \$282,000 research grant from the Minnesota Pollution Control Agency (MPCA) and Environmental Protection Agency (EPA) to explore chloride reduction from a different angle. Parking lots paved with pervious pavement experience less snow and ice build up and need less frequent plowing and salting. Instead of just using less road salt, why not try to reduce the buildup of ice by using pervious pavement on residential streets? The research grant is funding a paired intersection study to estimate the effectiveness of pervious pavement in reducing the need for road salt and reducing runoff volume and pollutant loading to downstream water resources. The secondary research questions are to better understand pervious pavement performance and maintenance requirements on a cold-climate city street.

The first paired intersection was constructed in September 2009 in Robbinsdale. Two adjacent residential intersections were reconstructed as part of a neighborhood-wide street and utility improvement project. The "control" intersection at Zenith and 41st Avenues North was constructed with traditional asphalt pavement. Part of the "test" intersection at Abbott and 41st Avenues North was reconstructed with porous asphalt pavement. Paired intersections in Plymouth will be constructed in the same way in 2010 in a commercial area.

Abbott Ave with dry pavement



Zenith Ave with pooling water



The porous area is 150 feet of the southbound approach to the intersection, ending at the stop bar. Underneath the four inches of porous asphalt pavement is a 12 inch layer of 2-3" stone. This reservoir will store the rain water and snowmelt that will pass through the porous pavement, allowing it to soak into the ground. If the reservoir fills up, a drain tile will discharge the overflow into a nearby storm sewer.

Because this is a research project, various instrumentation has been built into the pavement of both the test and control sections. Sensors in the pavement will measure pavement temperature at the surface and at various pavement depths. Another sensor will monitor the amount of water being stored in the 12 inch reservoir. Equipment housed in boxes on the boulevard will automatically take samples of runoff from both sections so that that water quality can be compared. Finally, cameras mounted on nearby utility poles will record the buildup and melt of snow and ice from each intersection.

The intersections will be monitored for two winter seasons following construction. The three-year project is expected to be completed in mid-2012.