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Pavement Management Overview

In 1999, the Department of Public Works (DPW) had a study performed that developed a database of pavement condition for the City roadway network. To keep the database current and assist in pavement management selection, the DPW has an annual contract with Vanasse Hangen Brustlin, Inc. (VHB) to physically re-evaluate and update pavement condition. The entire roadway network is physically re-evaluated on a rolling basis over a four year period.

Roadways are evaluated by pavement management sections having similar characteristics. A roadway may consist of one or more pavement management sections depending on its construction history. For each pavement management section, the severity and extent of nine major pavement distresses are recorded, and then entered into a weighted formula to arrive at a Pavement Condition Index (PCI).

The distresses are categorized as base related or surface related distresses. Base related distresses indicate that the subsurface soil strength is inadequate for the existing traffic load. Streets that show significant base related distresses may need to have the subsurface soils fortified with stone to strengthen the structure and/or the street may need a significantly thicker layer of pavement. Surface related distresses are caused by age and weathering of the pavement. Streets that have predominantly surface related distresses are excellent candidates for maintenance sealing to inhibit further pavement oxidization (the main effect of aging). Streets with more of the base related distresses will most likely need some full depth patching, structural overlays or reclamation/reconstruction. The four base related distresses and five surface related distresses are shown in Table 1 below.

Table 1

Base Related Distresses	Surface Related Distresses
Potholes	Block cracking
Alligator cracking	Transverse or longitudinal cracking
Distortion	Bleeding or polished aggregate
Rutting	Surface wear or raveling
	Corrugations, shoving and slippage

A PCI is generated for each inventoried pavement management section in Northampton using the surface distress data collected by VHB. PCI is measured on a scale of one hundred to zero, with one hundred representing a pavement in perfect condition and zero describing a road in impassable condition.

Each type of observed pavement distress is assigned a deduct value based on the type, severity and extent of the defect. A more severe distress type, such as non-utility patching, has a higher deduct point value than a lesser distress such as transverse cracking. A weighted sum of the deduct points is then subtracted from the perfect “one hundred” road in order to generate a PCI for each roadway segment. In general, base related (pavement foundation) distresses are weighted more heavily than surface related distresses.

VHB’s RoadManager™ software uses broad ranges to group the individual repair types into five major treatment bands. Treatment bands are a useful tool to summarize data on a City-wide basis. An individual road segment will fall into a particular category based on the strategy table’s output of repair types and will vary due to functional classification. The goal is to gain a broad understanding of the existing conditions in simple yet meaningful terms. The treatment bands are summarized in Table 2 below.

Table 2

Treatment Band	PCI*	Description
Do Nothing	93-100	Excellent condition – in need of no maintenance.
Routine Maintenance	86-92	Good condition – may be in need of crack sealing or minor localized repair.
Preventive Maintenance	73-85	Fair condition – pavement surface may be in need of surface sealing, full depth patch and/or crack sealing.
Structural Improvement	61-72	Deficient condition – pavement surface structure in need of added strength for exiting traffic. Typical repairs are overlay with or without milling.
Base Rehabilitation	0-60	Poor condition – in need of base improvement. Typical repairs are reclamation or full depth reconstruction.

*These are only general PCI ranges for reference purposes, and represent only one pavement type. There are several fields considered by the strategy table when assigning repair types to each individual street.