Standard Operating Procedure Sidewalk Inspection

Definitions

DMI: Distress Manifestation Index

Fault: Difference in elevation between opposing sides of a joint or crack and is considered to have the same meaning as surface discontinuity in Ontario Regulation 239/02 Minimum Maintenance Standards for Municipal Highways.

MMS: Means Ontario Regulation 239/02 Minimum Maintenance Standards for Municipal Highways as amended from time to time.

Scaling: The deterioration of the upper concrete surface, resulting in the loss of surface mortar and aggregate.

Surface Discontinuity: Has the same meaning as Ontario Regulation 239/02 Minimum Maintenance Standards for Municipal Highways section 16.1(2) being a difference in elevation that exceeds a height of 2cm between opposing sides of a joint or crack.

Walkability: Used in this document as a proxy for sidewalk usage. Walkability has many definitions, for the purpose of this Standard Operating Procedure (SOP), walkability means choosing to walk for trips to grocery stores, restaurants, arenas, hospitals, community centres, churches, entertainment, work, etc. that are within a 30-minute walk (one way) of the sidewalk being inspected.

See Sidewalk Maintenance and Repair Priority Rating on page 5.

Objective

To provide a consistent methodology of evaluating a municipality's sidewalk network and setting a priority for the repair or replacement of the sidewalk.

Frequency of Inspection

Staff will comply with the MMS and inspect sidewalks annually, within 16 months of the previous inspection. The inspector will measure all surface discontinuities, plus look for other defects in the sidewalk and determine an overall Sidewalk Condition Rating for the section under review.

Procedure

1. The inspector will be trained as to what to look for insofar as defects in the sidewalk surface and possible causes of the defects.

2. The inspector will be equipped with an adjustable carpenter's square (for measuring surface discontinuities), orange spray paint to temporarily paint a surface discontinuity, a carpenter's level and tape measure (for measuring cross slope and heaves), a map of the municipality's sidewalk network (to check off areas completed) and a camera. If sidewalk length has not been previously recorded a measuring wheel would be required.

3. The location of surface discontinuities may be referenced by street address of adjacent homes or buildings. GPS referencing would be beneficial.

4. The area of sidewalk to be recorded on a single inspection form will typically be the sidewalk from the intersection of a cross street to the intersection of the next cross street. If there is sidewalk on both sides of the street, each side will have its own inspection form completed.

5. If the surface material changes mid-block (e.g. concrete to brick) two (2) inspection reports should

be completed. One for the section with the concrete surface and a second for the section with a brick surface.

6. The inspector shall walk all municipally owned sidewalks and make visual observations of the severity of any defect found and note the type of defect or defects by the severity of the defect on the inspection form.

7. The inspector will estimate the area over which the defect(s) occur in the total area of the block of sidewalk being inspected.

8. Only identify on the form the distresses found. If no distresses, encroachments or surface discontinuities are found on the sidewalk inspected, a form showing the date, name of the road and/or asset ID and area inspected and otherwise blank, must be signed by the inspector and identify that the Surface Condition Rating in that case would equal 100.

Sidewalk Defects

There are six defects that are included in the calculation of the Sidewalk Condition Rating which are; longitudinal & traverse cracks, spalling, heaved panels, depressed panels, scaling and excessive crossfall. Surface discontinuities are a requirement of the MMS and are measured and recorded separately.

Determining the Severity of Defects

Cracks – longitudinal and/or traverse

Very Slight	crack visible but no measurable separation
Slight	1mm to 1.9mm in width
Moderate	2mm to 4.9mm in width
Severe	5mm to 10mm in width – spalling, minor faulting <2mm may be present
Very Severe	>10mm in width – spalling and faulting may be present, faulting >5mm in height should be recorded as a surface discontinuity

Very Slight

Very Severe

D-Crack

Very Slight	crack visible but no measurable separation
Slight	1mm to 1.9mm in width
Moderate	2mm to 4.9mm in width – minor spalling of crack
Severe	5mm to 10mm in width – spalling, possible separation with the edge or joint
Very Severe	>10mm in width – spalling, possible missing sections at the edge or joint

Very Slight

Very Severe

Heaved panel(s) – but does not create a surface discontinuity.

Very Slight	<1cm
Slight	1cm to 1.9cm
Moderate	2cm to 4.9cm
Severe	5cm to 8cm
Very Severe	>8cm

Depressed or sagged panel(s) – where water may pond on the sidewalk.

Very Slight	<1cm may pond water on sidewalk on < ½ of the sidewalk width or if monolithic does not create a trip edge with curb
Slight	1cm to 1.9cm may pond water on ½ to the full sidewalk width or if monolithic does not create a trip edge with curb
Moderate	2cm to 4.9cm water ponds on sidewalk or if monolithic a trip edge is created between sidewalk and curb
Severe	5cm to 8cm water ponds on sidewalk or if monolithic a trip edge is created between sidewalk and curb
Very Severe	>8cm water may pond on multiple sidewalk panels or if monolithic a trip edge is created between sidewalk and curb

Scaling	
Very Slight	Sporadic pock marks
Slight	Loss of surface mortar and aggregate <1mm in depth
Moderate	Loss of surface mortar and aggregate 1mm to 5.9mm in depth
Severe	Loss of surface mortar and aggregate 6mm to 12mm in depth
Very Severe	Loss of surface mortar and aggregate >12mm in depth

Slight

Severe

Excessive Cross Slope – normal cross slope is 2% or 20mm per meter.

Very Slight	21mm to <25mm per metre
Slight	25mm to 29mm per metre
Moderate	30mm to 39mm per metre
Severe	40mm to 50mm per metre
Very Severe	>50mm per metre

Determining the Severity of Defects

The inspector will estimate how frequently each defect occurs over the total area of sidewalk included in the inspection report.

Measuring Surface Discontinuities

1. Using the adjustable carpenter's square (or similar device), the square must be set on the upper portion of the discontinuity and the ruler on the lower portion. The square must be adjusted until the bubble on the square is level. A close-up picture of the square resting on the discontinuity must be taken and be capable of showing that the square is level, and the measurement is readable. An overall picture of the sidewalk must also be taken showing the location of the measurement.

2. For a 1.5m wide sidewalk, a minimum of 3 measurements must be taken at each discontinuity location. One at each edge of sidewalk and one in the middle of the sidewalk. On wider sidewalks additional measurements may be taken at the discretion of the inspector.

3. The location of the discontinuity can be measured either, linearly from the intersecting road, by stating the discontinuity is in front of house number xxx, or by using GPS coordinates.

4. At the end of the day all surface discontinuities must be reported to a supervisor. NOTE: "If a surface discontinuity on or within a sidewalk exceeds two centimetres, the standard is to treat the surface discontinuity within 14 days after acquiring actual knowledge of the fact". MMS Section 16.1(2)

Encroachment in Area Adjacent to Sidewalk

An encroachment in area adjacent to sidewalk is anything that is placed, installed, constructed or planted within the highway that was not placed, installed, constructed or planted by the municipality. If the encroachment is identified, in policy, as highly unusual given its character and location or constitutes a significant hazard to pedestrians, the sidewalk inspector must identify the encroachment on the inspection form. NOTE: ". . . the standard is to treat the encroachment within 28 days after making such a determination, and the encroachment is deemed in a state of repair for 28 days from the time of the determination by the municipality". MMS Section 16.2(5)

Calculating Sidewalk Condition Rating

The condition rating is calculated as follows
SCR = 100 - DMI

Where

Distress Manifestation Index (DMI)
equals the sum of W_i x (S_1 + D_i)

An example calculation of DMI would be – For scaling the W_i factor is 1.25 (see inspection report), for moderate severity the severity S_i factor is 2 and the density factor for 45% of the sidewalk area D_i is 3 therefore the DMI for this defect would be 1.25 x (2+3) = 7.5.

To calculate the Sidewalk Condition Rating (SCR), if scaling is the only defect on this block of sidewalk, then 7.5 would equal the total DMI and the SCR would be calculated:

SCR = 100 – 7.5 = 92.5

Sidewalk Condition Inspection

Inspection Date: _____ Evaluated by: _____

Road (Street) Name: _____ Asset ID:_____

Location: from _____ to _____ Side of Road (circle) N S E W

Length of Sidewalk _____ m Width of Sidewalk _____ m Material (circle) Concrete Asphalt Brick

		Severity S_i					Density D_i					
	Weight	Very Slight	Slight	Moderate	Severe	Very Severe	<10% of sidewalk area	10 to 19% of sidewalk area	20 to 39% of Sidewalk area	40 to 80% of sidewalk area	>80% of sidewalk area	DMI = W_i * (S_1 + D_i)
Distress	W_i	0	1	2	3	4	0	1	2	3	4	
Cracks – longitudinal & traverse	3.75											
D-Crack – at joints or edge of Swk	1.25											
Heaved Panels	1.25											
Depressed or Sagged Panels	2.5											
Scaling	1.25											
Excessive Cross Slope	2.5											
Surface Condition Rating		SCR = 100 - ∑DMI										

	Location	Measured 3 times across width of sidewalk		
		1	2	3
Surface Discontinuity				
Maintenance Priority Rating				

Encroachment in area adjacent to sidewalk yes/no		Describe:
Comments:		

Sidewalk Maintenance and Repair Priority Rating

Surface discontinuities must be addressed in accordance with the MMS.

For all other defects the inspector may use the table to this section to calculate a Maintenance and Repair Priority Rating. When assembling a priority list for staff to follow for maintenance and repair of sidewalks, and depending on budget, it would be considered reasonable for maintenance crews to address defects on other sidewalk blocks on the same street which may have a lower rating ahead of other areas, instead of jumping from street to street and return to the first street.

Factor	Description	Rating	Weight	Max Score
MPR_{Defect} Severity of Defect	Severity of the defect is very slight Severity of the defect is slight Severity of the defect is moderate Severity of the defect is severe Severity of the defect is very severe	0 1 2 3 4	3.75	15
MPR_{Area} Area of Defect	<10 % of sidewalk area 10 to 19% of sidewalk area 20 to 39% of sidewalk area 40 to 80% of sidewalk area >80% of sidewalk area	0 1 2 3 4	2.5	10
MPR_{Use} Adjacent Land Use	Residential Commercial Industrial Residential/Commercial mix Downtown core	0 1 2 3 4	1.25	5
MPR_{Walk} Walkability	All trips require a car Most trips require a car Some trips can be accomplished on foot Most trips can be accomplished on foot All trips do not require a car	0 1 2 3 4	10	40
MPR_{RPI} Reported Pedestrian Incidents (e.g. trip and fall)	No incidents reported in last 5 years 1 incident reported in the last 5 years 2 or more reported incidents in last 5 years	0 2 4	5	20
MPR_{AODA} AODA	All AODA requirements are met Some AODA requirements are met AODA requirements have not been met	0 2 4	2.5	10
Maintenance Priority Rating = MPR_{Defect} + MPR_{Area} + MPR_{Walk} + MPR_{RPI} + MPR_{AODA}				

Public Reporting of Sidewalk Condition

The public doesn't understand if an SCR Rating of 92.5 means it is a sidewalk in good state of repair or a sidewalk that is starting to need some work. The table below is provided to present condition data in a form the public understands.

SCR Rating	Condition	Possible Actions
>90	Excellent	Monitor condition on an annual basis
70 to 90	Good	Routine maintenance when and where required
40 to 69	Fair	Preventive maintenance to minimize deterioration
10 to 39	Poor	Rehabilitate distressed areas or replace if more economical
<10	Very poor	Replace

intact public entities