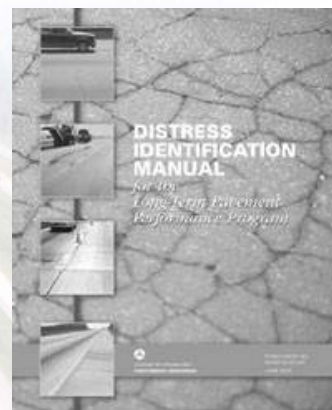


SURFACE DISTRESS SURVEYS

General Description

MnROAD Operations staff perform distress surveys at regular intervals to monitor the field performance of MnROAD test cells. In general the data collected includes the distress type, extent or amount of distress, and the severity of the distress. Similar surveys are performed for both asphalt and concrete surfaces.



COLLECTION FREQUENCY

All MnROAD cells are surveyed for distress in the spring (April) and fall (October) each year. Additional surveys are conducted in the pervious concrete (Cells 85, 89, 39) and porous asphalt (Cells 86, 87, 88) cells in the months of March and July.

Specifications

A modified LTPP Distress Manual method is used at MnROAD to collect surface distress (cracking) data. Paper copies of the crack maps are scanned and are available on the MnROAD website.

Procedure

The MnROAD Monitoring Engineer will take paper copies of all of the crack maps from the previous season and mark the new distresses with a red pen. Once all of the field data is collected, it is tallied up and entered into a spreadsheet for entry into the database.

In general, the data columns are labeled by DISTRESS TYPE_UNIT OF MEASURE_SEVERITY LEVEL.

Units of measure include:

- Area (A), Total length (L), and number (NO).

Severity levels include:

- low (L), medium (M), and high (H).

Also noted is whether or not cracks are sealed. In this case the severity reflects the condition of the sealant.

SURFACE INITIATED OR TOP-DOWN CRACKING



Definition: Surface initiated cracks predominantly parallel to pavement centerline, located in the wheelpaths.

- Low severity cracks are defined as an area of cracks with no or only a few connecting cracks; cracks are not spalled or sealed; pumping is not evident.
- Medium severity cracks are defined as an area of interconnected cracks forming a complete pattern; cracks may be slightly spalled; cracks may be sealed; pumping is not evident.
- High severity cracks are defined as an area of moderately or severely spalled interconnected cracks forming a complete pattern; pieces may move when subjected to traffic; cracks may be sealed; pumping may be evident.

TRANSVERSE THERMAL CRACKING

Definition: Cracks that extend across the pavement at approximately right angles to the pavement centerline. These cracks are created by the thermal contraction of the HMA pavement due to cold temperatures.

- Low severity cracks defined as crack width less than $\frac{1}{4}$ " wide.
- Medium severity cracks defined as crack width less than $\frac{1}{2}$ ", greater than $\frac{1}{4}$ ".
- High severity cracks defined as crack width equal to or greater than $\frac{1}{2}$ " wide.
- Sealed cracks defined as cracks sealed with an elastic, compressible sealant material. The severity rating of a sealed crack is dependent on the condition of the sealant.

LONGITUDINAL CRACKING AT CONSTRUCTION JOINTS

Definition: Cracks predominantly parallel to traffic located at the centerline construction joints (between the lanes), and at the shoulder/lane construction joints. Centerline cracks are arbitrarily assigned to the Driving (right) lane on the Mainline and to the 80K (inside) lane on the Low Volume Road. Modified LTPP Distress Manual method is used at MnROAD to collect the longitudinal construction joint data. The following definitions of severity levels were used for the longitudinal joint cracking seen at MnROAD.

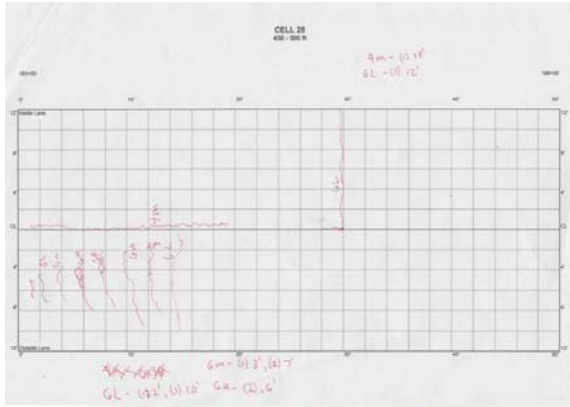
- Low severity cracks defined as crack width less than $\frac{1}{4}$ " wide.
- Medium severity cracks defined as crack width less than $\frac{1}{2}$ ", greater than $\frac{1}{4}$ ".
- High severity cracks defined as crack width equal to or greater than $\frac{1}{2}$ " wide.
- Sealed cracks defined as cracks sealed with an elastic, compressible sealant material. The severity rating of a sealed crack is dependent on the condition of the sealant.

SEALANT

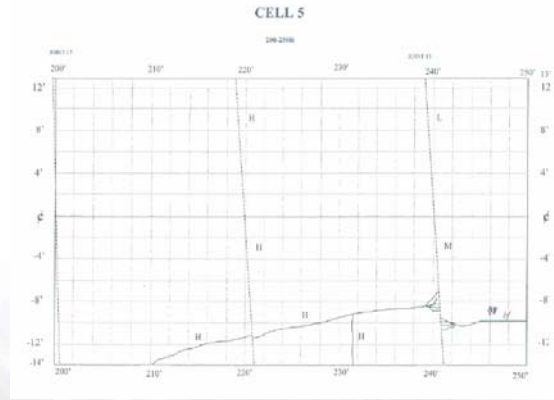
Definitions: Sealant - Compressible material used to minimize water and solid debris infiltration into the sealant reservoir and joint. Joint Seal Deterioration - Breakdown of a joint or a crack sealant, such as by adhesion or cohesion loss, which contributes to the failure of the sealant system. Joint seal deterioration permits incompressible materials or water to infiltrate into the pavement system.

- Sealed transverse cracks are defined as any crack with less than 10% of sealant failure for the length of the crack. Longitudinal cracks are measured by the linear foot of sealed and unsealed crack.





Typical HMA Distress Survey



Typical PCC Distress Survey

Database Tables

The data is stored in the database in the tables DISTRESS_AC and DISTRESS_JPCC. See below for a description of each table.

DATABASE TABLE – DISTRESS_AC

Name	Null?	Type	Name	Null?	Type
CELL	NOT NULL	NUMBER(2)	PATCH_A_L		NUMBER(6,1)
LANE	NOT NULL	CHAR(15)	PATCH_NO_M		NUMBER(3)
CONSTRUCTION_NO	NOT NULL	NUMBER(2)	PATCH_A_M		NUMBER(4,1)
SURVEY_DATE	NOT NULL	DATE	PATCH_NO_H		NUMBER(3)
SURVEYOR1		VARCHAR2(36)	PATCH_A_H		NUMBER(4,1)
FATIGUE_A_L		NUMBER(5,1)	POTHOLES_NO_L		NUMBER(3)
FATIGUE_A_M		NUMBER(5,1)	POTHOLES_A_L		NUMBER(4,1)
FATIGUE_A_H		NUMBER(5,1)	POTHOLES_NO_M		NUMBER(3)
BLOCK_A_L		NUMBER(5,1)	POTHOLES_A_M		NUMBER(4,1)
BLOCK_A_M		NUMBER(5,1)	POTHOLES_NO_H		NUMBER(3)
BLOCK_A_H		NUMBER(5,1)	POTHOLES_A_H		NUMBER(4,1)
EDGE_L_L		NUMBER(4,1)	SHOVING_NO		NUMBER(3)
EDGE_L_M		NUMBER(4,1)	SHOVING_A		NUMBER(4,1)
EDGE_L_H		NUMBER(4,1)	BLEEDING_A_L		NUMBER(4,1)
LONG_WP_L_L		NUMBER(5,1)	BLEEDING_A_M		NUMBER(4,1)
LONG_WP_L_M		NUMBER(4,1)	BLEEDING_A_H		NUMBER(4,1)
LONG_WP_L_H		NUMBER(4,1)	POLISH_AGG_A		NUMBER(4,1)
LONG_WP_SEAL_L_L		NUMBER(4,1)	RAVELING_A_L		NUMBER(5,1)
LONG_WP_SEAL_L_M		NUMBER(4,1)	RAVELING_A_M		NUMBER(5,1)
LONG_WP_SEAL_L_H		NUMBER(4,1)	RAVELING_A_H		NUMBER(5,1)
LONG_NWP_L_L		NUMBER(5,1)	PUMPING_NO		NUMBER(3)
LONG_NWP_L_M		NUMBER(4,1)	PUMPING_L		NUMBER(4,1)



LONG_NWP_L_H	NUMBER(4,1)	CONST_SHLD_JNT_SEAL_L	NUMBER(3)
LONG_NWP_SEAL_L_L	NUMBER(4,1)	CONST_SHLD_JNT_SEAL_M	NUMBER(3)
LONG_NWP_SEAL_L_M	NUMBER(4,1)	CONST_SHLD_JNT_SEAL_H	NUMBER(3)
LONG_NWP_SEAL_L_H	NUMBER(4,1)	CONST_SHLD_JNT_L	NUMBER(3)
TRANSVERSE_NO_L	NUMBER	CONST_SHLD_JNT_M	NUMBER(3)
TRANSVERSE_L_L	NUMBER	CONST_SHLD_JNT_H	NUMBER(3)
TRANSVERSE_NO_M	NUMBER	CONST_CL_JNT_SEAL_L	NUMBER(3)
TRANSVERSE_L_M	NUMBER	CONST_CL_JNT_SEAL_M	NUMBER(3)
TRANSVERSE_NO_H	NUMBER	CONST_CL_JNT_SEAL_H	NUMBER(3)
TRANSVERSE_L_H	NUMBER	CONST_CL_JNT_L	NUMBER(3)
TRANSVERSE_SEAL_NO_L	NUMBER	CONST_CL_JNT_M	NUMBER(3)
TRANSVERSE_SEAL_L_L	NUMBER	CONST_CL_JNT_H	NUMBER(3)
TRANSVERSE_SEAL_NO_M	NUMBER	COMMENTS	VARCHAR2(200)
TRANSVERSE_SEAL_L_M	NUMBER	DATE_UPDATED	DATE
TRANSVERSE_SEAL_NO_H	NUMBER	TOPDOWN_L_L	NUMBER(5,1)
TRANSVERSE_SEAL_L_H	NUMBER	TOPDOWN_L_M	NUMBER(5,1)
PATCH_NO_L	NUMBER(3)	TOPDOWN_L_H	NUMBER(5,1)

DATABASE TABLE – DISTRESS_JPCC

Name	Null?	Type	Name	Null?	Type
CELL	NOT NULL	NUMBER(2)	LONG_SPALLING_L_L		NUMBER(4,1)
LANE	NOT NULL	VARCHAR2(20)	LONG_SPALLING_L_M		NUMBER(4,1)
CONSTRUCTION_NO	NOT NULL	NUMBER(2)	LONG_SPALLING_L_H		NUMBER(4,1)
SURVEY_DATE	NOT NULL	DATE	TRANS_SPALLING_NO_L		NUMBER(2)
SURVEYOR1		VARCHAR2(24)	TRANS_SPALLING_NO_M		NUMBER(2)
SURVEYOR2		VARCHAR2(24)	TRANS_SPALLING_NO_H		NUMBER(2)
CORNER_BREAKS_NO_L		NUMBER(3)	TRANS_SPALLING_L_L		NUMBER(4,1)
CORNER_BREAKS_NO_M		NUMBER(3)	TRANS_SPALLING_L_M		NUMBER(4,1)
CORNER_BREAKS_NO_H		NUMBER(3)	TRANS_SPALLING_L_H		NUMBER(4,1)
DURAB_CRACK_NO_L		NUMBER(3)	SCALING_NO		NUMBER(3)
DURAB_CRACK_NO_M		NUMBER(3)	SCALING_A		NUMBER(5,1)
DURAB_CRACK_NO_H		NUMBER(3)	POLISH_AGG_A		NUMBER(4,1)
DURAB_CRACK_A_L		NUMBER(4,1)	POPOUTS_NO_AREA		NUMBER(4)
DURAB_CRACK_A_M		NUMBER(4,1)	BLOWUPS_NO		NUMBER(3)
DURAB_CRACK_A_H		NUMBER(4,1)	PATCH_FLEX_NO_L		NUMBER(3)
LONG_CRACK_L_L		NUMBER(5,1)	PATCH_FLEX_NO_M		NUMBER(3)
LONG_CRACK_L_M		NUMBER(5,1)	PATCH_FLEX_NO_H		NUMBER(3)
LONG_CRACK_L_H		NUMBER(5,1)	PATCH_FLEX_A_L		NUMBER(4,1)
LONG_CRACK_SEAL_L_L		NUMBER(5,1)	PATCH_FLEX_A_M		NUMBER(4,1)
LONG_CRACK_SEAL_L_M		NUMBER(5,1)	PATCH_FLEX_A_H		NUMBER(4,1)
LONG_CRACK_SEAL_L_H		NUMBER(5,1)	PATCH_RIGID_NO_L		NUMBER(3)
TRANS_CRACK_NO_L		NUMBER(3)	PATCH_RIGID_NO_M		NUMBER(3)



TRANS_CRACK_NO_M	NUMBER(3)	PATCH_RIGID_NO_H	NUMBER(3)
TRANS_CRACK_NO_H	NUMBER(3)	PATCH_RIGID_A_L	NUMBER(4,1)
TRANS_CRACK_L_L	NUMBER(5,1)	PATCH_RIGID_A_M	NUMBER(4,1)
TRANS_CRACK_L_M	NUMBER(5,1)	PATCH_RIGID_A_H	NUMBER(4,1)
TRANS_CRACK_L_H	NUMBER(5,1)	PUMPING_NO	NUMBER(3)
TRANS_CRACK_SEAL_L_L	NUMBER(5,1)	PUMPING_L	NUMBER(4,1)
TRANS_CRACK_SEAL_L_M	NUMBER(5,1)	OTHER	VARCHAR2(80)
TRANS_CRACK_SEAL_L_H	NUMBER(5,1)	RECORD_STATUS	VARCHAR2(1)
JT_SEALED	VARCHAR2(2)	MAP_CRACK_NO	NUMBER(3)
JOINT_SEAL_TRANS_NO_L	NUMBER(2)	MAP_CRACK_A	NUMBER(5,1)
JOINT_SEAL_TRANS_NO_M	NUMBER(2)	LONG_CRACK_NO_L	NUMBER(3)
JOINT_SEAL_TRANS_NO_H	NUMBER(2)	LONG_CRACK_NO_M	NUMBER(3)
LONG_JT_SEAL_NO	NUMBER(1)	LONG_CRACK_NO_H	NUMBER(3)
LONG_JT_SEAL_DAM_L	NUMBER(4,1)	DATE_UPDATED	DATE

For more information:

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MnROAD is a state of the art cold weather pavement and transportation testing facility located in Minnesota