BURLINGTON MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

Pavement Management
Instruction Manual

March 2005

REVISED - November 2023

Table of Contents

PMS Program Revisions

Feb.2024

1. Revised workflow for preparing & uploading data to ArcGIS on-line.

Nov. 2023

1. Use *Pavement Inspection Dashboard* to download inspection data, then link CSV file to MS Access.

July 2023

1. Workflow modified to use only MS Access and ArcGIS pro to generate list of Streets Due for Inspection and upload to FieldMaps.

Dec. 14, 2022

1. Converted data collection to ArcGIS On-line Field Maps from ArcPad
2. Inspection Data is downloaded as a excel spreadsheet & imported into MS Access.
3. Workflow otherwise unchanged

Jan 17, 2020

1. Queries linked to *PMS_Inspect* causing errors because of way current PCI calculated. *CrackSealCandidates1Qry* uses *000 PavementInspection Query* to provide current Calculated PCI.

October 1, 2016

1. Streamlined Cracksealing workflow and merged PavementPreservation.MDB into PavementManagement.MDB.

July 20, 2016

1. Streamlined “Update Paving Dates” section, modified queries to simplify and prevent double entry while appending data to Paving Dates table and adding Streets Paved during season to PMS_Inspect table.

March 1, 2016

1. All updates/reinspection cycles are determined by current year – Function Year(Now())

February 1, 2016

1. MicroSurfacing discontinued – instructions left, but crossed-out & noted as discontinued.
2. All tables, queried, reports re micro deleted from database. Backup of original database in _Retired Folder.
3. CrackSeal candidates – filtered out streets Programmed to be paved w/in next 3 years.

January 5, 2015

1. Updated GIS software(ArcPad 10.2)
2. Process for creating Inspection GIS layer modified(AXF instead of SHP)
3. Revised instructions to reflect using Tablet & ArcPad for data collection.
4. Section on Digital Photos deleted – Photos no longer necessary.

Jan 2012 – TFH

1. 1.Revised inspection frequency, Main- 2 yrs, Secondary- 3yrs, Local & Dead ends – 4 yrs. (see Inspection Cycle)

2. Updated Cracksealing SOP for candidates /history.
3. Updated Micro SOP for candidates /history.

Dec. 2010 :

1. Update Paving Dates - Queries renamed in order w/ Number as prefix 1 thru 5 so data can be easily processed starting w/ "1-Append To PavingDates Streets Paved this year" and ending w/ "5-PavingDates Update Query"

Purpose

The Pavement Management System is a tool to inventory the physical road network, record and determine pavement conditions, and develop a method for prioritizing pavement restoration. The Pavement Management System enables the appropriate pavement surface treatment application to maintain acceptable roadway conditions at a reasonable operational cost. Additionally, prioritizing street paving lends itself to advance planning and coordination with other utility projects to avoid disturbing newly paved streets.

Inspection Cycle

The Pavement Management process is an ongoing perpetual cycle of Inspection, Analysis, and Application of Surface Treatment. Due to the nature of the road building materials, construction standards, and other variables, roads degrade at varying rates. Maintaining an updated pavement condition database documents pavement performance and trends over time; allowing better, more informed decisions regarding where and when surface treatment should be applied.

Although a complete network inspection each year is not practical, a percentage of the roads should be inspected on annual basis. The following is a recommended inspection schedule.

Functional Classification	Inspect per year (%)	Inspection Cycle (years)
Primary Road	50	2
Secondary Road	33	3
Local Road	25	4
Dead-end Road	20	5

The logic behind this schedule is to inspect higher volume roads more frequently since those roads degrade at a faster rate than the less used lower volume roads. Since these main roads are also longer, wider, and typically more expensive to repair, having the up to date conditions and performance history enables the application of the appropriate surface treatment, at the right time, avoiding a more expensive pavement restoration or reconstruction.

Also maintaining the current pavement conditions allows your organization to demonstrate to the public using current and up-to-date data, the logic and methodology of why certain streets are paved while others are not; showing the residents their tax dollars addressing pavement issues in an efficient manner.

System Overview

The Pavement Management System uses a common sense approach and off-the-shelf technology to develop a road inventory and pavement priority list.

ESRI Field Maps, a Mobile Geographical Information System (GIS) app, is used for data collection. The Town's Road Centerline GIS data layer is used with an intuitive data entry dialog box to record type and severity pavement defects. Observations are linked directly to the road segment being evaluated, expediting data entry and reducing typographical errors; allowing roads to be quickly inventoried and pavement conditions rated in the field.

Once the inspection data is collected, it is exported to a Microsoft Access database where it is used to generate a Pavement Condition Index (PCI). Based on the PCI, as well as other factors such as proximity to other roads of similar condition and utility replacement projects, a priority list for pavement maintenance and resurfacing can be created.

Although the system is GIS based, owning a GIS is not necessary. Road data is typically available from various sources at little to no cost, and can be easily adapted to work with the *Pavement Management System*.

Data Format

GeoDatabase: PMInspect.mdb
Table: Inspect
Location: \\storage2\Engineering\ENGFILES\0000ADM\0043

The GIS GeoDatabase Layer contains the database fields which are described below:

Database Field	Description
IDNUMB	Street Identification #
ROADNAME	Road/Street Name
DATE	Date of Data Collection
BY	Person Collecting Data
CONDITION	Overall Street Condition - (Excellent, Good, Fair, Poor, Failure)
WIDTH	Pavement Width
CLASS	Functional Class - (Primary, Secondary, Local, Dead End)
FROM	Beginning of Street or Intersecting Street
TO	End of Street or Intersecting Street
EOPSHORT	Edge of Pavement Short - Indication of problem with GIS street centerline.
RAVELING	Raveling Severity - (Low, Moderate, High)
RAVPER	Percent of Pavement Raveling
CORRUGATIO	Corrugation Cracking Severity - (Low, Moderate, High)
CORRPER	Corrugation Cracking Percentage
ALLIGATORC	Alligator Cracking Severity - (Low, Moderate, High)
ALLPER	Alligator Cracking Percentage
TRANSVERSE	Traverse Cracking Severity - (Low, Moderate, High)
TRANPER	Traverse Cracking Percentage
LONGITUDIN	Longitudinal Cracking Severity - (Low, Moderate, High)
LONGPER	Longitudinal Cracking Percentage
PATCHING	Utility Patching Severity - (Low, Moderate, High)
PATCH	Utility Patching Percentage
POTHOLES	Potholes Severity - (Low, Moderate, High)
POTPER	Potholes Percentage
LOCAL_DEFE	Local Defect
DEFDESC	Description of Local defect

Physical Attributes

Physical Attributes are collected in order to inventory the street, its specific location, and document other needed information. The following information is gathered and inputted into the database.

Identification Number

Every street has a unique identification (ID) number. For ease of inspection, longer roads are divided into 500' to 2000' segments, with each segment running from intersection to intersection so they can be easily located in the field. The section number is the last digit(s) of a ID number. A segmented street ID number contains the street ID number following by a dash (-) then a segment number. For example a street with an ID number *28-2* is decoded as street number *28,* segment number *2*.

Condition

The overall street condition is evaluated and entered into this field. Five (5) choices can be selected (Excellent, Good, Fair, Poor, and Failure) and is more of a qualitative observation. Although, specific pavement defects are recorded and are ultimately used to develop a pavement condition index, the *Condition* field allows us a second check on the accuracy of the overall rating system.

The Condition can be determined using the following criteria:

Excellent - none to very minor cracking
Good - minor cracking, minor patching in good condition
Fair - moderate cracking, utility patches, potholes,
Poor - significant cracking, utility patches, potholes, raveling
Failure - Alligator cracking, rutting, major & significant defects.

Beginning/End Point

The beginning and end point are where the segment of a street begins and ends. It is important to begin or end street segments at intersections or other recognizable geographical features that can easily be identified both in the field or office.

Class (Functional Classification)

Primary streets: are main streets that carry a heavy volume of traffic on a regular basis; through or high-volume travel corridors that connect the major generators of traffic.
Secondary streets: are similar to primary streets; carrying moderate traffic volume that originates locally or between primary streets.
Local Streets: are side streets that provide direct service to residential areas and carry a low to moderate volume of traffic.

Dead End or Cul-De-Sac: roads that do not connect to other roads, provide service to individual homes.

Width

Width of pavement is recorded with each separate segment. Street length, although as important as width, is derived from street centerline from the Shape file and documented in the *StreetInfo* database.

Pavement Defects

Pavement Defects provide the bases for determining the Pavement Condition Index (PCI) as well as providing data that allows us to select the appropriate surface treatment depending on the type and severity of individual defects.

Seven type of defects/distresses that are evaluated and recorded are:

- Raveling
- Corrugations/Rutting
- Alligator Cracking
- Transverse Cracking
- Longitudinal Cracking
- Patching
- Potholes.

These defects and distresses are rated by Degree of Distress and Area Affected.

Degree of Distress

- *Slight:* minor distresses, hairline cracks.
- *Moderate*: mid-level distresses, light cracks.
- *Severe*: substantial distresses, large cracks.

Area Affected

The percent of area is how much of the area has been affected by particular defects and distresses. There are three percentage ranges.

- 1-15%: small area of the street is affected.
- 16-30%: mid-range, approximately up to 1/3 of road is affected with distresses.
- 31%-: high percentage, 1/3 and over of road is affected with distresses.

Additionally, localized defects and any inconsistencies with the GIS map can be recorded as well.

Raveling

Description:

Raveling of the pavement surface causing the asphalt wearing course to separate from the binder course. Raveling can occur in isolated area or across the entire surface, although the wheel tracks are typically the worst areas.

Possible Causes:

- Poor quality of materials and/or construction.
- Inadequate drainage.
- Freeze-thaw cycling.
- Poor utility patching.

Severity:

Slight	Less that 8” in width and less than 1.5” depth.
Moderate	From 8” to 15” in width and 1.5” to 2.5” in depth.
Severe	More than 15” in width and greater than 2.5” in depth.

Slight

Moderate

Severe

Corrugations/Rutting

Description:

Longitudinal depressions parallel to the direction of travel, typical forming in the wheel tracks.

Possible Causes:

- Poorly constructed roadway.
- Substandard or failing sub-bases.
- Inadequate lateral support, failing or steep road shoulder.

Severity:

Slight	Depth of the rut less than 0.5”.
Moderate	Depth of the rut from 0.5” to 1”
Severe	Depth of the rut is greater than 1”.

Slight to Moderate

Severe

Alligator Cracking

Description:

Blocks of interconnecting cracks resembling the skin of an alligator. The cracks are typically full depth, through the entire asphalt layer. Alligator cracks are an indicator of roadway base failure, which may require full depth reconstruction.

Possible Causes:

- Insufficient bearing support and repeated traffic loading.
- Poor base drainage.

Severity:

Slight	Fine, longitudinal hairline cracks running parallel to each other with no or only a few interconnecting cracks; the cracks are not spalled.
Moderate	Further development of light cracks into a pattern or network of cracks that may be lightly spalled; distortions of ¼" to ½".
Severe	Cracks are spalled and pieces are well defined. Some blocks may be loose or missing. Distortions of ½" or more.


Slight


Moderate


Severe

Transverse Cracking

Description

Cracks which usually appear across the road perpendicular to the centerline. They typically affect the wearing asphalt course and are usually not traffic load-related.

Possible Causes:

- Poor construction joints.
- Pavement Shrinkage due to asphalt hardening or freeze/thaw cycles.
- Reflective cracking (cracks below the wearing course)

Severity:

Slight	Hairline cracks less than 1/8” in width.
Moderate	Cracks 1/8” to ½” in width.
Severe	Cracks greater than ½” in width.


Slight


Moderate


Severe

Longitudinal Cracking

Description

Cracks which follow along the road parallel to the centerline.

Possible Causes:

- Poor construction joints.
- Pavement Shrinkage due to asphalt hardening or freeze/thaw cycles.
- Reflective cracking (cracks below the wearing course)

Severity:

Slight	Hairline cracks less than 1/8” in width.
Moderate	Cracks 1/8” to ½” in width.
Severe	Cracks greater than ½” in width .

Slight

Moderate

Severe

Patching

Description:

A surface patch is where the top layer of roadway material has been replaced. Poor patching may be uneven, heavily rutted, contain different cracks based on quality of patch, etc.

Possible Causes:

- Poorly constructed paving, thin layer of patching.
- Not sealed along seams, water intrusion defects patch.

Severity:

Slight	Good patch, no ruts or cracks
Moderate	Moderate cracking
Severe	Significant Cracking or other distresses within the patched area.

Slight

Moderate

Severe

Pot Holes

Description

Holes in the asphalt surface which may be isolated or caused by a combination of other progressively failing pavement defects. (raveling, alligator cracking, patching).

Possible Causes:

- Poor quality of materials and/or construction.
- Inadequate drainage.
- Freeze-thaw cycling.
- Poor utility patching.

Severity:

Slight	Less than 8” wide and less than 2.5” deep
Moderate	From 8” to 15” wide and 2.5” - 4” deep.
Severe	More than 15” wide and more than 4” deep.


Slight


Moderate


Severe

Collecting and Processing Pavement Inspections

Workflow Overview

Street centerline layer is used for basic data collection. Other layers, ortho photos, or geo-referenced digital images may be added to aid orientation and help the evaluator determine their precise location. Intuitive user friendly dialog boxes with combo-boxes to expedite data entry are created in ArcGIS Field Maps. The data is exported to Microsoft Access for processing and is also used to maintain pavement treatments history in order to develop the inspection frequency.

- MS Access –Select streets to inspect
- ArcGIS Pro– Link street data to GIS Upload (overwrite web layer) revised street list to ArcGIS Online
- Field Maps - Conduct pavement inspections
- ArcGIS Online – download data to Excel spreadsheet
- MS Access – Process inspections, develop PCI, and maintain paving history.

Database: TFH-PaveManagement.MDB
Location: G:\ENGFILES\0000ADM\0043

The Microsoft Access Database TFH-PaveManagement.MDB contains Tables and Queries to process the data collected from the field as well as generate list of streets to be inspected. The following is a step by step process for using the information contained in the database.

Required Data – Assuming the Physical Road data (street name, length, width, etc) has already been collected. Two other tables need to be populated with data that can be developed based on the user's specific criteria or local knowledge of the pavement performance over time.

- *PavementPCIDeducts*
- *PMS Priority Criteria*

Pavement PCI Deducts -The PCI deduct values were developed from slightly modified collection procedure distributed by the Department of Transportation Technology sharing program. The table *PavementPCIDeducts* contains 63 records used to calculated deductions based on a particular pavement defect; it is the digital equivalent of the Inventory Data Form shown below.

INVENTORY DATA FORM

Inspection Date _____
By: _____

Street Name _____ Section No._____ Street Id# _____
From _____ To_____

Type of Distress	Degree of Distress	Percentage of Area									
		1-15 %			16-30 %			31 % -			
Raveling	Slight	5			8			10			
_____	Moderate	10			12			15			
Score	Severe	15			18			20			
Corrugations/Rutting	Slight	5			8			10			
_____	Moderate	10			12			15			
Score	Severe	15			18			20			
Alligator	Slight	5			10			15			
Cracking	Moderate	10			15			20			
_____	Severe	20			25			30			
Score		S	PS	NS	S	PS	NS	S	PS	NS	
Transverse	Slight	2	5	8	3	7	10	3	7	12	
Cracking	Moderate	5	8	10	7	10	15	7	13	15	
_____	Severe	8	10	15	10	15	20	12	15	20	
Score		S	PS	NS	S	PS	NS	S	PS	NS	
Longitudinal	Slight	2	5	8	3	7	10	3	7	12	
Cracking	Moderate	5	8	10	7	10	15	7	13	15	
_____	Severe	8	10	15	10	15	20	12	15	20	
Score											
Patching	Slight	0			2			5			
_____	Moderate	5			7			10			
Score	Severe	7			15			20			
Pot Holes	Slight	0			2			5			
_____	Moderate	5			7			10			
Score	Severe	7			15			20			

~~Localized Defects:~~

~~General Comments:~~

Select Streets to be Inspected – MS Access

Note:

- ***** Before making any changes backup **TFH-PaveManagement.MDB ****
  - Save backup file by date to folder _RetiredDataBases
- Current system date is used to calculate Re-inspection frequency
  - Inspection list for the current year can only be generated in inspection year.
  - For example: Inspection for 2016 can only be uploaded after January 1, 2016. If attempted in late 2015, say to anticipate 2016 inspections, only inspections scheduled for 2015 will be uploaded.
- Many of the below referenced tables & queries are tagged as Hidden to prevent damage to data structures.

MS Access - Populate & Export Streets due for Inspection

- ✓ Open: G:\ENGFILES\0000ADM\0043\TFH-PaveManagement.MDB\
- ✓ Run: *DueForInspection2023MAKE_QRY* to populate *ArcGIS-onlineInspect* Table with Street data
- ✓ Export: *ArcGIS-onlineInspect* table as an Excel file to: G:\Engineering\GIS\GeoDatabases\0043PaveGIS\ ArcGIS-onlineInspect.xlsx

Criteria used to select Streets due for Inspection

Frequency- Mains – 2 years, Secondary - 3 years, Local – 4 years, Dead ends – 5 years

Do Not Inspect:

- Poor or Failed.
- Programed within next 2 years
- Paved within past 3 years

DueForInspection2023MAKE_QRY – links below tables/queries

- 000 Pavement Conditions (Query) - Condition based on most current inspection (see below for more detail)
- DueForInspection_Crosstab (Query) – Calcs most recent inspection date
- StreetInfo (Table)
- PavingDatesLATEST_Crosstab (Query) – Calcs most recent paving date
- PMS Class (Table)

Field		**Criteria Calculation**
Status		T or PPU
Last Inspection		Last Inspection Year + Class Number < Current Year
Not programed		>Year(Now())+1.9 Or Is Null
PCI (calculated)		Not Failure or Poor
Last Paved		<Year(Now())-2 Or Is Null

000 Pavement Conditions (Query) – links below tables/queries

- StreetInfo (Table)
- PCIPavementMngtSys(Query) – Calcs PCI base on most recent inspection
- PMS Priority Criteria(Table) - contains a list of surface treatment options PCI thresholds where a that particular treatment option may be appropriate.
- PavingType(Table) – Paving methods & costs

PMS Priority Criteria(table) determines surface treatment based on Calculated PCI and PCI Condition Ranges The Pavement Condition corresponds with the following PCI ranges:

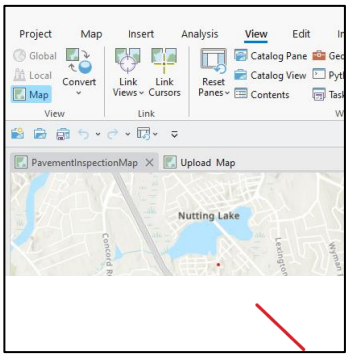
CONDITION	**PCI High**	**PCI Low**
Excellent	100	90
Good	89	75
Fair	75	50
Poor	49	25
Failure	24	0

The *000 Pavement Conditions* Query uses a false link to join all records from two tables together. The Query is then filtered based on user specified design criteria. This is useful when linking to a range of data. Link field for all records in *PMS Priority Criteria*(table) is "1", an expression in *PCIPavementMngtSys*(Query) is calculated as "1", those fields are joined so all the records link to the tables. The PCI has a High and Low threshold & based on the calculated PCI only one record will be joined to the query. Since for example if the "CalcdPCI" is 78, it would fall between "PCI Low" of 75 and "PCI High" of 80, and therefore only one record from "PMS Priority Criteria" would link to the other table.

Upload Inspection Layer – ArcGIS Pro/On-line

ArcGIS Pro

- ✓ Open: PM_2022.aprx
- ✓ Location: \\storage2\Engineering\GIS\Projects\0043 - PavementGIS\PM_ArcGIS_Pro\PM_2023

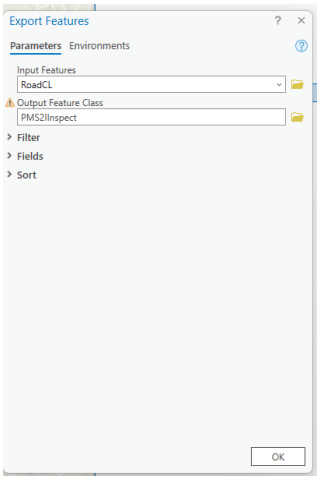


The Project contains 2 maps:

1. PavementInspectionMap – used to Join:
   a. RoadCL layer – Road Centerline layer
   b. ArcGIS_onlineInspect.xlsx – list of Streets due to inspect generated above.
   c. PMInspDATA – a table in the Geodatabase that contains the inspection template with domains
2. Upload Map – used to upload PMS2Inspect to ArcGIS online.

The joined RoadCL layer is exported & overwrites PMS2Inspect which is then uploaded to ArcGIS online from the Upload Map and used in Fieldmaps for data collections. The reason for the workflow is that a joined layer creates an error: "In-memory joins are not supported". By exporting the join to a single layer and copied to another map the layer can be uploaded without errors.

- Starting with *PavementInspectionMap*
  - ✓ Right click on RoadCL -> Data-> Export Features
  - ✓ Navigate to: G:\GIS\GeoDatabases\0043PaveGIS\PavementInspections.gdb
  - ✓ Select: PMS2IInspect
  - ✓ Copy PMS2IInspect & paste in *Upload Map*

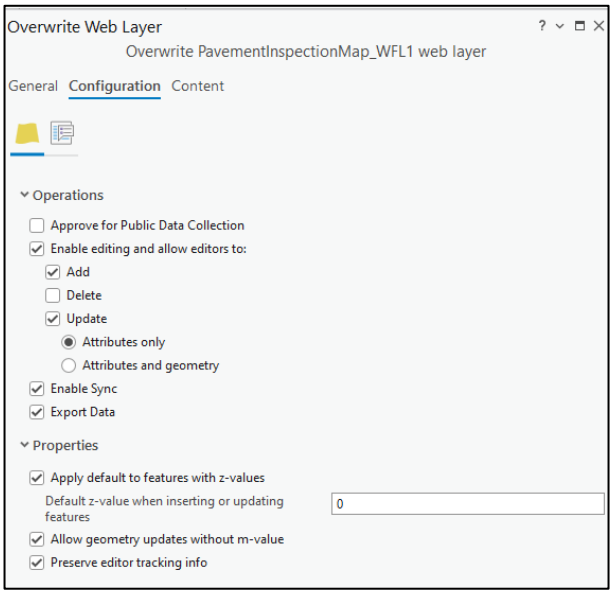


- Using Upload Map
  - ✓ Enable Editor Tracking
  - ✓ Analysis Tab-> click Tools
  - ✓ Geoprocessing menu -> use search box to find *Enable Editor Tracking*
  - ✓ *Input Dataset:* – navigate to PMS2Inspect
  - ✓ Creator Field: CreateBy
  - ✓ Creation Date Field: CeateDate
  - ✓ Last Editor Field: InspBy
  - ✓ Last Edit Date Field: InspDate
  - ✓ *Add Fields* checkbox NOT selected
  - ✓ *Record Dates in:* Time zone of database
  - ✓ *Run*

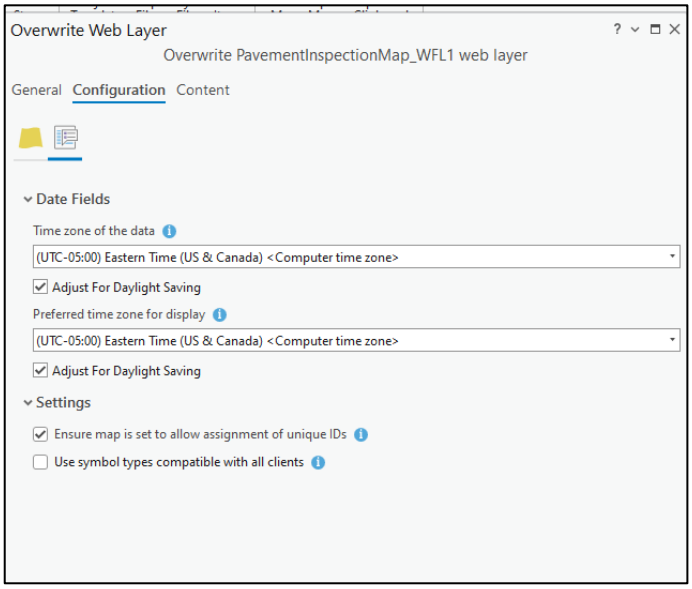
- Overwrite feature layer
  - ✓ Share tab -> Share As group -> click Web Layer -> Select Overwrite Web Layer
  - ✓ Select Pavement Inspection folder -> PavementInspectionMap_WFL1 (feature layer)

- ✓ Overwrite Web Layer menu
  - Under Configuration (see below for settings)

Configure Layers



Configure Parameters



- ✓ Analyze, (fix any errors)
- ✓ Publish.

Conduct Pavement Inspection – Field Maps

- ✓ Open Field Maps App,
- ✓ Select *PavementInspectionMap*
- ✓ Select Street segment
- ✓ Inspector (user login) & Date added is the background by Field Maps.
- ✓ Evaluate pavement surface for **Degree of Distress.** The drop-down boxes will allow for *Severe, Moderate, and Low*. Each defect identified must also have a corresponding **Area Affected**. Selecting from the drop-down evaluate the pavement for percent of roadway the defect is affecting; three (3) choices are available: *<15%, 15% - 30%, and >30%.*
- ✓ Confirm *Inspected Complete* is yes. (required field)
- ✓ Save record.

Download data - ArcGIS Online

Use Hub

or

Sign into ArcGIS Online to select to select *Pavement Inspection Dashboard*

Pavement Inspection Dashboard

- ✓ Zoom to full map extent
- ✓ Download data (use download icon @ left bottom of table)
- ✓ Save to:
  - g:\ENGFILES\0000ADM\0043\PavementMngt_GIS\ArcGIS_Online
- ✓ Rename: *Inspect.csv*

Process Street Inspections – MS Access

- ✓ In file 0043 make backup copy TFH-PaveManagement.MDB
- ✓ Open TFH-PaveManagement.MDB
- ✓ *Inspect* table is linked to Inspect.csv (see above Download Data section.)
- ✓ Run append query *PMS_InspectionAPPEND-Qry*.
  - This appends records from *Inspect* to *PMS_Inspect* table.
  - *PMS_InspectionAPPEND-Qry* uses two other linked queries *PMS_InspectionQry* and *PMSInspectIDandDate-Qry* to add records that are not currently in PMSInspect table. (prevents duplicate records from being added)

Update Paving Dates – MS Access

1. Check data in the PROGPAVE field of the *StreetInfo* table to ensure that Year road paved is correct. This date can be coded using tenths to designate particular project or phase (2008 for HMA, 2008.1 for Phase 1 Micro, etc)
2. Update *PavingType* table with:
   - PavingContractor who performed each PavingType (links to StreetInfo Table)
   - ProgramedPaved year (links to StreetInfo Table)

PavingType

PavingYear	PavingContractor	ProgramedPaved	PavingType
2016	Contractor - PJ Albert - see file #7191	2016	Coldplane
			CrackSeal
			Micro
2016	Contractor - DPW/Highway	2016.2	Overlay
2016	Contractor - Lazaro - see file #7168	2016	Reclaim

Record: 1 of 5 | No Filter | Search

3. Run *0-AppendNewStreet2PMS_Inspect-QRY* to add New Streets to the inspection cycle.
4. Run *1-Append To PavingDates Streets Paved this year Query* query to append streets paved to PavingDates table.
5. Use *7-PCI Append PavedStreets* query to append records to *PMS_Inspect* .
   - This will add new streets and update any streets paved during the construction season to Excellent condition with PCI = 100.

Town of Burlington
Engineering Division
November 2023

6. Run *8-PavementConditionAndPaveDate4GIS* Query to create a table to be linked to GIS called *PavementConditions4GIS* (see details below in section **Preparing Data for GIS**)

Crackseal Pavement Maintenance – MS Access

Use Database: \\storage2\Engineering\ENGFILES\0000ADM\0043\TFH-PaveManagement.MDB

Develop Crackseal Candidates

Note:

- Before Starting - check status of table for crackseal streets from previous season, update and add to *Pavement Maintenance* table to document street maintenance. See procedure below (Updating Cracksealed Streets)

- The Crack Seal candidates list is based on date & condition criteria in Make Table Query described below, so **query only can be run in year streets are being sealed.**

For example:

Crack sealing program for 2021 can be run once all inspections and paving updates from 2020 have been entered in the database and only after January 1, 2021.

Update Cracksealed Streets (from previous season)

- ✓ Update *CrackSealCandidate* Table to ensure work was complete & street was cracksealed. **Delete any streets not cracksealed**
- ✓ Run *AppendCrackSeal-Qry*
  - This query appends streets cracksealed this past season year to *Pavement Maintenance* Table.
  - *AppendCrackSeal-Qry* uses two other linked queries *CrackSealCandidates* and *Pavement Maintenance* to append records that are not currently in *AppendCrackSeal-Qry* table. (prevents duplicate records from being added)

Generate Crackseal Candidates

Make Table Query " CrackSealCandidates1Qry"

- ✓ **The query links Tables:** StreetInfo, PavingDatesLATEST_Crosstab, PaveMaintCurrentQry_Crosstab, DueForInspection_Crosstab, 000 PavementInspection Query
- ✓ **Paving older than 5 years** : Year(Now())-Nz([LastYrPaved]) > 5
- ✓ **Crackseal older than 2 years:** Round((Year(Now())-Nz([Total Of LastYrCracked])),0) >2
- ✓ **Paving not Scheduled for 3 years:** (Year(Now())+3)-Nz([progPave]) > 3
- ✓ **PCI Greater than 70 and less than 90:** CalcedPCI > 60 AND I<90

- ✓ Run make table query *CrackSealCandidates1Qry*
- ✓ New Table will be created named *CrackSealCandidates*
- ✓ Use this table to develop Contract Documents.
- ✓ Field check streets – add/delete streets as needed.

- ✓ Revised *CrackSealCandidates* table with actual streets sealed so updates to *Pavement Maintenance* Table can be expedited and accurate maintenance history maintained. **If adding streets input ST_IDNUMB, STREET, & CURRENTYEAR**

Preparing Data for ArcGIS On-line

Pavement Conditions, History, Schedule, and Moratorium Streets

1. Open g:\ENGFILES\0000ADM\0005\EngSts.Mdb
2. Run *8-PavementConditions4GIS* Make Query
3. Paving Conditions and History table created: *PavingDatesType4GIS*.
4. *PavingDatesType4GIS* is joined to RoadCenterline GIS layer to create Pavement Conditions layer in the Basemap Extract project & Uploaded to ArcGIS on-line see Instructions 7578
5. ArcGIS Online
   - ✓ Web Map: *PavementManagement*
   - ✓ Dashboard: *Pavement Condition and Paving History*
   - ✓ Dashboard: *Moratorium Streets - Paved within last 5 years*.
6. Dashboards shared as a public & embedded in DPW web site under: *Projects & Programs, Pavement Management*

Update GIS instructions for below:

- HMA Candidates
- Micro Candidates
- Crack seal Candidates
- Final Paving Program

Reports

Reports provide the means of organizing and presenting the data in a format that can be easily read and analyzed. Primarily the Pavement Management System is designed to identify a suitable surface treatment and assign a construction cost based on the length and width of the paved street.

Several Stock Reports are Available:

Paving Program – Current paving program for the upcoming construction season. It is based on the PavingProgram query , which filters street that are programmed for the current year.

Pavement Priorities – Overall list of all streets with proposed pavement surface treatments ranging from "Do Nothing" to "Reconstruction" as well as associated costs.

PMS Local Defects – List of all identified local defects from the *PMS Local Defects* query.