# Sunflower Village Pavement Management

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A Pavement Management System (PMS) is used to make cost-effective decisions about design, construction, maintenance and rehabilitation of pavements.

► Where – which pavement in the network

When - timing of Maintenance and Repair

▶ What - what type of Maintenance and Repair to perform





# PMS Should Answer the Following Questions

- What is the current health of the pavement network?
- Which pavement sections need work?
- Which sections should be worked on first?
- How much money do we need?
- What impacts will funding changes have?

# Sunflower Village Pavement System

Previous Pavement Survey Results based on PASER rating system

#### North Neighborhoods



#### South Neighborhoods



# PASER Pavement Rating System

- Previous surveys utilized PASER system
- Based on a visual inspection of current rating
- ▶ 1-10 scale, 1-worst, 10-best
- No individual distress identification and measurements



# Pavement Distress Surveys

#### Characterization of distresses by

- ▶ Туре
- Severity
- Extent



# **Distress Identification Manual**

- Benefits
  - Consistent definitions
  - Standardized
  - Calibration

#### Degree of Sophistication

- PCI (Pavement Condition Index) developed by US Army Corps of Engineers, ASTM D5340 and D6433 for roads and airports - used in this study
- LTPP (US, Network management)
- ▶ PASER Used by Michigan Counties

# Manual Distress Surveys

#### Pre-survey activities

- Network definition
- Sampling
  - ▶ 10%-25% for network level
  - ► Higher for project level
- Initial windshield survey
- Detailed distress survey
  - Record type, severity and extent
  - Distress Maps



# Data Collection Method

- Five groups of students evaluated all of the roads
- PCI method of random sampling
- Sample size = 6 -9 slabs
- Additional sampling of particularly deteriorated areas







# **Observed Distresses**





# **Observed Distresses**





# Sampling (Example)

Sub Division		Section	Surface		PASER	Length	Width	No. of Sample	Min. No. of Sample	Rounded	# Samples to
No	Road Name	ID	Туре	Area	Rating	(ft)	(ft)	Units	Units	up	be inspected
N/A	Baldwin Ct.	S103	concrete	6232	2	249	25	4.15	3.82	4.00	1
N/A	Baldwin Ct.	S104	concrete	4549	3	181.00	25	3.02	2.86	3.00	1
N/A	Edgewood Rd.	S105	concrete	10513	3	420.52	25	7.01	6.01	6.00	2
7/9	Hanford Rd.	S50	concrete	24148	5	689.94	35	11.50	8.90	9.00	2
9	Lambeth Way	S51	concrete	16380	5	655.20	25	10.92	8.56	9.00	2
9	Glenhurst Dr.	S52	concrete	8635	6	345.40	25	5.76	5.08	5.00	2
9	Glenhurst Dr.	S53	concrete	10694	5	427.76	25	7.13	6.09	6.00	2
9	Larchmont Dr.	S54	concrete	11513	6	460.52	25	7.68	6.47	6.00	2
9	Larchmont Dr.	S55	concrete	14648	6	585.92	25	9.77	7.85	8.00	2
9	Glenhurst Dr.	S56	concrete	9444	6	377.76	25	6.30	5.49	5.00	2
9	Larchmont Dr.	S57	concrete	4769	6	190.76	25	3.18	3.00	3.00	1
9	Larchmont Dr.	S58	concrete	18136	7	725.44	25	12.09	9.24	9.00	2
9	Moorgate Dr.	S59	concrete	7611	6	304.44	25	5.07	4.56	5.00	2
9	Larchmont Dr.	S60	concrete	26419	7	1056.76	25	17.61	12.05	12.00	2
6/9	Hanford Rd.	S65	concrete	11929	4	340.83	35	5.68	5.03	5.00	2
9	Gallery Dr.	S66	concrete	5669	5	226.76	25	3.78	3.51	4.00	1
9	Gallery Dr.	S67	concrete	5011	3	200.44	25	3.34	3.14	3.00	1
9	Gallery Dr.	S68	concrete	13537	6	541.48	25	9.02	7.38	7.00	2
9	Larchmont Dr.	S69	concrete	8494	6	339.76	25	5.66	5.01	5.00	2
10	Larchmont Dr.	S70	concrete	7998	5	319.92	25	5.33	4.76	5.00	2
10	Morningside Dr.	S71	concrete	14256	4	570.24	25	9.50	7.69	8.00	2

# Pavement Condition Index (PCI)



# Deduct Curves apply weighing values for each distress.

#### Depend on:

- Distress Type
- Severity
- Amount of Density



# **ArcGIS Integration**

- Attractive way to display pavement management information
- Combined system to track historical pavement data
- Allows historical analysis of pavement repair effectiveness
- Pavement deterioration monitoring













#### PCI Breakdown – South Section



# Pavement Rehabilitation Costs

- Pavement maintenance repair categories
  - Localized safety Concrete patching
  - Localized preventive Crack sealing
  - ▶ Global preventive Crack sealing, Diamond grinding
  - ► Major Maintenance and Rehabilitation Overlay, Reconstruction



# Sample Unit Costs (Based on MDOT Unit Costs)

#### Localized safety and preventive type treatments

- \$1.25/LF Crack/Joint Fill
- ▶ \$5.41/SF Slab Replacement
- Major M&R treatments were not considered

## Sample Repair Recommendation

Table 3: Work to be Completed by Section

Section ID	Work to be Completed	Section ID	Work to be Completed
S103	Complete Pavement Replacement	S70	Only Fill Cracks
S104	Complete Pavement Replacement	S71	Only Fill Cracks
S105	Complete Pavement Replacement	S72	Only Fill Cracks
S50	No Repairs Necessary	S73	Only Fill Cracks
S51	No Repairs Necessary	S74	Only Fill Cracks
S52	No Repairs Necessary	S75	Only Fill Cracks
S53	Only Fill Cracks	S76	No Repairs Necessary
S54	Only Fill Cracks	S77	Selective Slab R&R and Crack Fill
S55	No Repairs Necessary	S78	Only Fill Cracks
S56	No Repairs Necessary	S79	Only Fill Cracks
S57	No Repairs Necessary	S80	Only Fill Cracks
S58	No Repairs Necessary	S81	Only Fill Cracks
S59	Only Fill Cracks	S82	No Repairs Necessary
S60	Only Fill Cracks	S83	Selective Slab R&R
S65	Only Fill Cracks	S84	Only Fill Cracks
S66	Selective Slab R&R	S85	Only Fill Cracks
S67	Selective Slab R&R and Crack Fill	S86	No Repairs Necessary
S68	Only Fill Cracks	S87	Only Fill Cracks
S69	Only Fill Cracks	S91	Only Fill Cracks

#### Pavement Rehabilitation Cost Calculation

- > PCI vs. Repair Cost per Square Feet was calculated based on a sample of pavement sections
- Poor correlation
- Can be improved by including all sections



#### Pavement Repair Costs - North Section



#### Pavement Repair Costs - South Section



# Summary - Number of Sections in Each PCI Level



### Summary - Total Pavement Area in Each PCI Level



## Summary - Total Repair Cost in Each PCI Level



#### Summary

- Excel Based Pavement Inventory was developed
- Arc GIS based pavement management system was developed for easy visualization of PMS data

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- Every two years pavement condition data will be updated
- Sunflower Home Owners Association can use the developed data and results for
  - Understanding the current health of the road network
  - Funding needs
  - prioritizing repair decisions

# **Questions?**

Thank you

