

# **Asphalt Recycling and Pavement Preservation in Hillsborough County, Florida**



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**Systems Planning**

# Discussion Points

- Hillsborough's Inventory/Budget
- Pavement Process – “Tools of the Trade”
- Treatments – **Focus on Recycling**
  - Performance
  - Lifecycle – *Cost to Own*
- Project Examples
- Obstacles to Hot in Place Repaving - *IMHO*



# Hillsborough Inventory/Budget

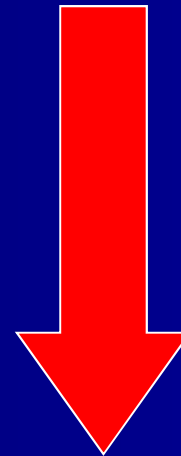
- 6,993 lane miles
  - Rural to major arterials
  - 4 lane miles of rigid pavement
  - Essentially zero dirt roads

- This Year - FY 2011 - \$7.1 M

Gas Tax: \$3.6M

CIT: \$3.5M - FY12=\$0

Ad Velorem: \$0



<i>Budget FY2009:</i> .....	<i>\$13.9M</i>
<i>Budget FY2010 <u>and</u> 11:</i> .....	<i>\$7.5M</i>
<i>Budget FY2012:</i> .....	<i>\$3.6M</i>

***More lane miles than 5 State DOT's !!!***

# The Pavement Management Process

## Accomplished by

- 1-**Inspecting** all road segments
- 2-**Planning** for projects based on budget and need
- 3-**Implementation** of appropriate treatments and evaluate performance



# Tools of the Trade-

## Step 1 – **Inspections**

### *Inspections Have Requirements*

- Inspect ALL of the roads every three years (GASB34 compliant)
- Annual report on Overall PCI: 0-100 scale
- Overall PCI is to be above 55 (Hillsborough Adopted)  
**TARGET =62.5 *i.e.*, FAIR CONDITION**
- Hillsborough Co. adopted MicroPaver as PMS

# Tools of the Trade- Inspections

## Hillsborough Pavement Inspection Vehicles

- Began development of Pavement Inspection vehicle in 2006.
- Vehicle collects visual distress as measured by an inspector
- Onboard GIS/GPS enabled equipment
- Rut Bar measures cross slope in real time
- All data is uploaded to MicroPAVER database for calculation of PCI and modeling of pavement conditions.

# Hillsborough Pavement Inspection Vehicles



# Hillsborough Pavement Inspection Vehicles

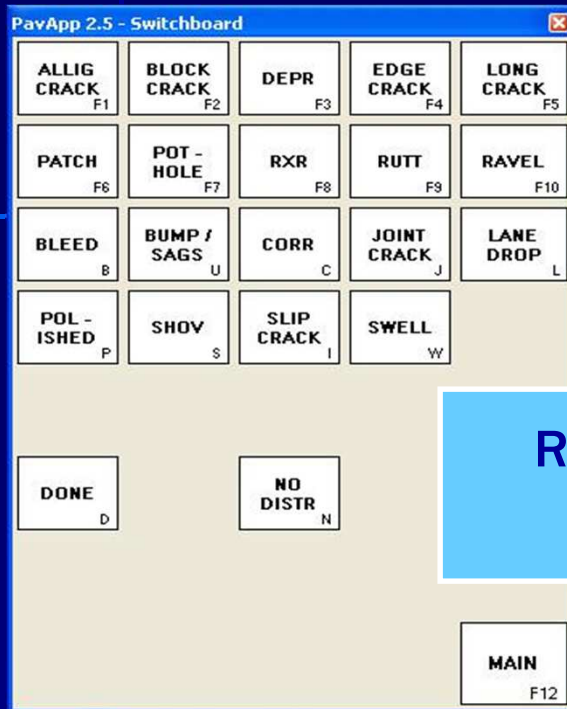




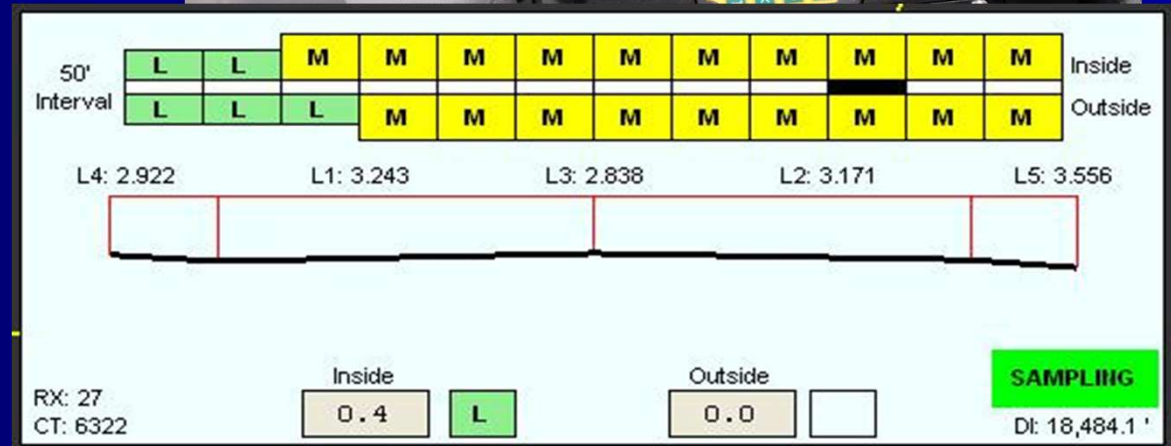
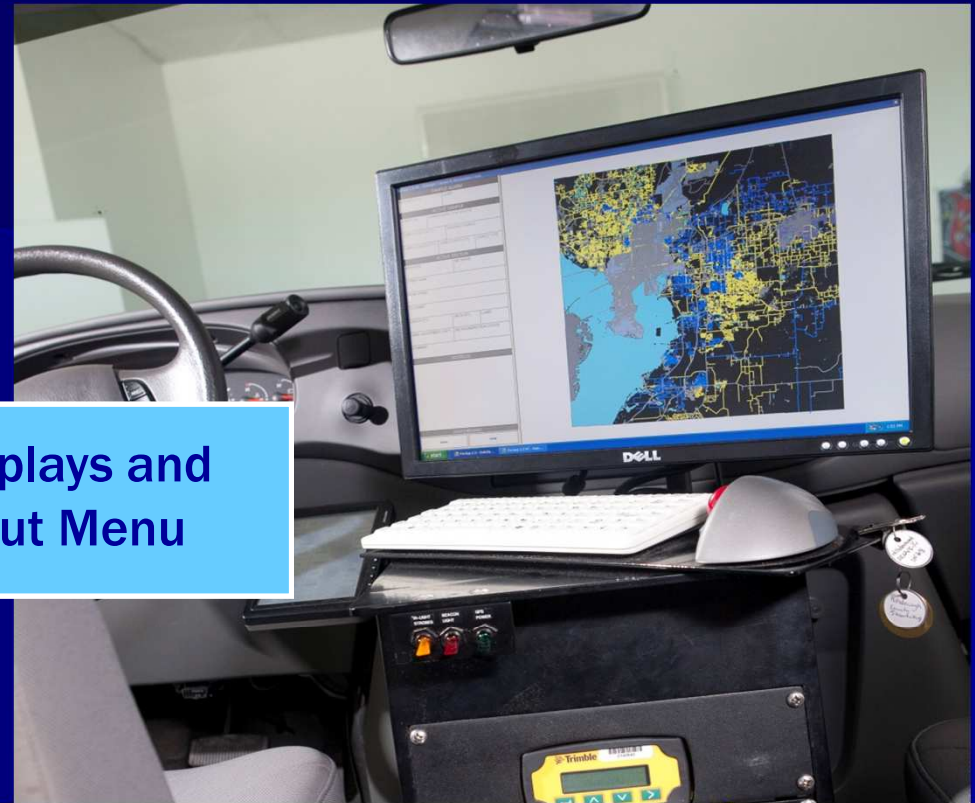
# Hillsborough Pavement Inspection Vehicles



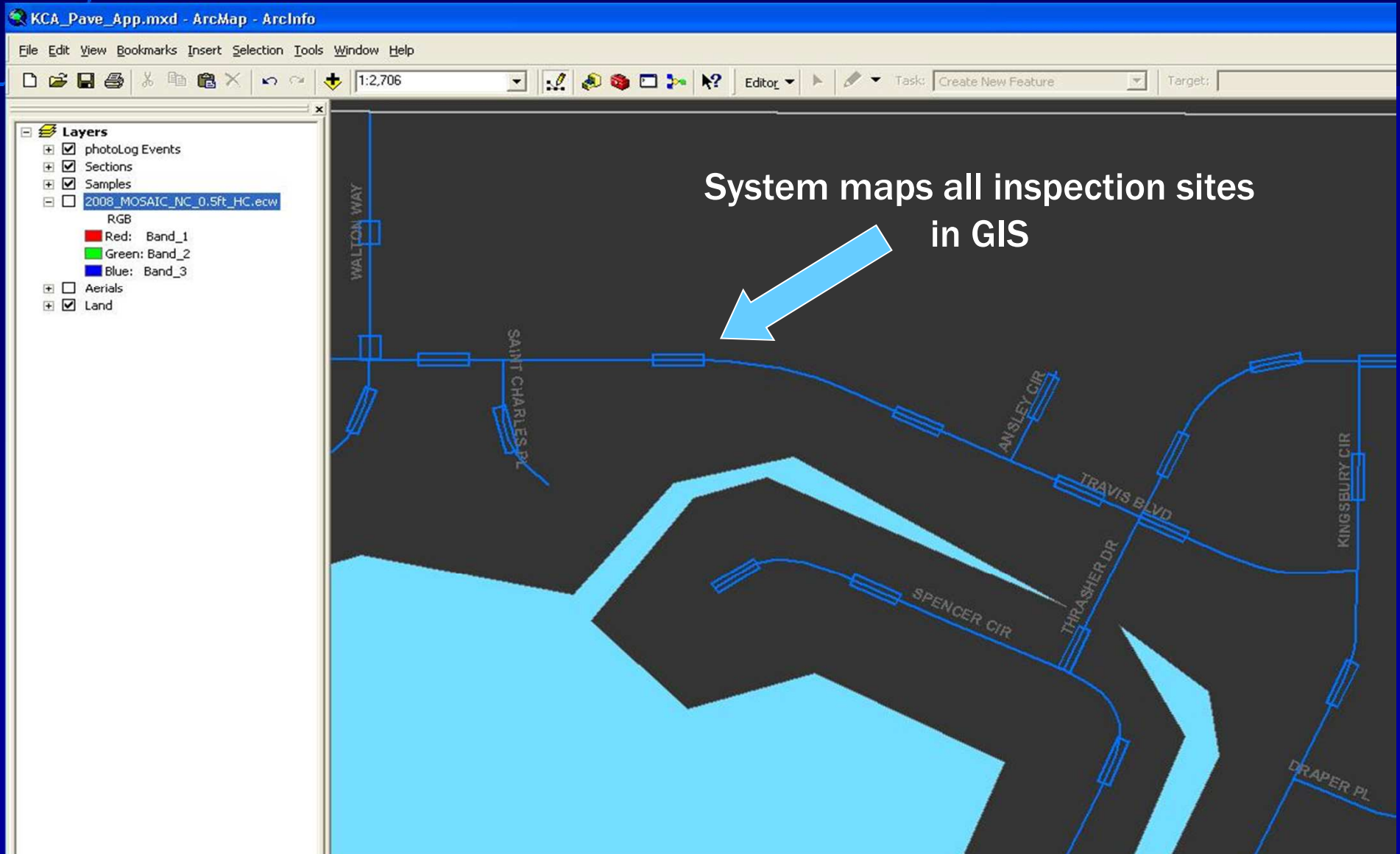
# Hillsborough Pavement Inspection Vehicles



Rut Bar Visual Displays and Touch Tablet Input Menu



# Hillsborough Pavement Inspection Vehicles - Inspection Samples



# MicroPAVER - PMS

## Hillsborough Pavement Inspections

**Automatically  
Populated  
from  
Upload Process**

The screenshot displays the MicroPAVER 5.3.6 software interface. The main window is titled "Inventory:ROADS-14872.00-0050" and shows a "List Selector" with fields for Network (ROADS), Branch (14872.00), and Section (0050). Below this, there are tabs for "1. Network", "2. Branch", and "3. Section". The "1. Network" tab is active, showing "Network ID: ROADS" and "Network Name: ROADS".

A secondary window titled "PCI:ROADS-14872.00-0050" is overlaid on the main window. It contains the following information:

- Summary data at time of inspection:**
  - Branch Use: ROADWAY
  - Section Surface Type: AAC
  - Section True Area: 6,951.72 SqFt
  - Section Length: 315.99 Ft
  - Section Width: 22 Ft
- Inspection Date: 8/4/2008
- Sample Unit: 01
- Sample Unit Size: 2199.93 SqFt
- Buttons: Edit Inspections, Detailed Inspection Comments, Edit Sample Units
- Distress Type (radio buttons):
  - 01 ALLIGATOR CR
  - 02 BLEEDING
  - 03 BLOCK CR
  - 04 BUMPS/SAGS
  - 05 CORRUGATION
  - 06 DEPRESSION
  - 07 EDGE CR
  - 08 JT REF. CR
  - 09 LANE SH DROP
  - 10 L\_T CR
  - 11 PATCH/UT CUT
  - 12 POLISHED AG
  - 13 POTHOLE
  - 14 RR CROSSING
  - 15 RUTTING
  - 16 SHOVING
  - 17 SLIPPAGE CR
  - 18 SWELL
  - 19 WEATH/RAVEL (Selected)
- Distress Severity: Low (Selected), Medium, High, N/A
- Distress Quantity: 2199.93 SqFt
- Buttons: Calculate Conditions (circled in blue)

At the bottom of the secondary window, there is a table of defects:

Distress	Description	Severity	Quantity	Units
19	WEATH/RAVEL	L	2,199.93	SqFt
3	BLOCK CR	L	2,199.93	SqFt

Buttons below the table: Add Distress, Delete Distress, Replace Distress.

At the bottom of the secondary window, there are buttons for "Previous Sample Unit", "Next Sample Unit", "Images (0)", and "Close".

Sample Defects

Area of Defects in Sample

# MicroPAVER

## Hillsborough Pavement Inspections

**Assessment Results**

Network ID:

Branch ID:  Branch Name:  Section Area:

Section ID:  Section Length:   Section Width:

Index:  Date:  Condition:  Satisfactory Std Dev.:

Condition Indices | Sample Distresses | Sample Conditions | Section Extrapolated Distresses

	Condition Index	Condition Value
▶	PCI	77.0

*PCI for section*

Print Close

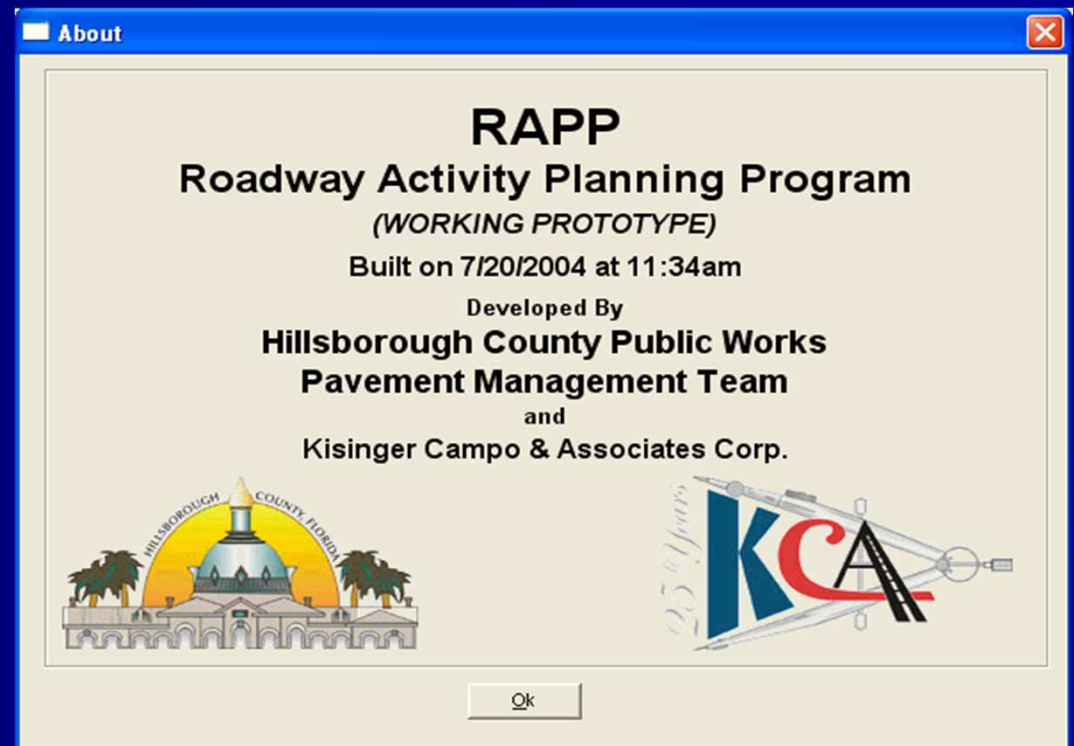
# Tools of the Trade – Step 2 - **Planning**

- Groups of **Projects** Based on **Treatment** and **Fiscal Year**
- A group is a “list” of roads that will be treated in any given fiscal by a given treatment based on:
  - **Condition**
  - **Budget**
  - **Strategy** (i.e. pavement philosophy)
    - Worst First (bring lots of cash!! – Which one is actually worst?)
    - Last Year’s Budget
    - Standard Program – (time re-occurrence, i.e. Treat Every 7 years)
    - “Fighting Fires” – (citizen driven)
    - Political Pressure – (Political considerations to establish priorities)
    - Gut Feel
  
- ***HILLSBOROUGH STRATEGY –  
KEEP THE GOOD ROADS GOOD!!***

## Tools of the Trade - Planning

# Hillsborough's Planning tool is called RAPP

*This was actually developed FIRST!!*



# RAPP- Yeah.... What is That???

Data window that creates and displays pavement management **project groups** based on **selections** made from a spatial environment



***RAPP Keeps Track of  
WHEN  
WHAT  
WHERE***

**Roadway  
Activity  
Planning  
Program**



# RAPP Data Window consists of a map, and a data screen

**RAPP (Working Prototype)**

SEARCH: Fiscal Year: [2007] Go View All / Refresh  
Group Name: [ ]  
Street Name/ID: [ ]

GROUP INFO: Fiscal Year: [2007]  
Group Name: [FY07\_RESURF\_301INDPK]  
Activity: [RPRSRF]  
Contract: [Unknown]

GROUP SELECTION

Year	Group Name	Activity
2007	FY07_MICROSURF	RPMCS
2007	FY07_MICROSURF_LAKEVIEW	RPMCS
2007	FY07_MICROSURF_PINEHOLLOW	RPMCS
2007	FY07_MICROSURF_SUNCITY_S	RPMCS
2007	FY07_MICROSURF_SUNCITY_SE	RPMCS
2007	FY07_MICROSURF_SUNCITY_VENTANA	RPMCS
2007	FY07_RESURF	RPRSRF
2007	FY07_RESURF_301INDPK	RPRSRF
2007	FY07_RESURF_HENRY GEORGE	RPRSRF
2007	FY07_RESURF_JOE EBERT	RPRSRF
2007	FY07_RESURF_KELLY	RPRSRF

GROUP STREETS

Street ID	Seg	Street Name	Length	Committed	Scheduled Date	Activity Completed Date	Segment From (ft)	Segment To (ft)	O
12596.00	0050	BASELINE CT from MAISLIN DR to DEAD END	436.13	<input type="checkbox"/>			0.00	436.13	<input type="checkbox"/>
12597.00	0050	MAISLIN DR from DEAD END to INDUSTRIAL LN	347.95	<input type="checkbox"/>			0.00	347.95	<input type="checkbox"/>
12597.00	0075	MAISLIN DR from INDUSTRIAL LN to PROFESSIONAL PL	1,367.62	<input type="checkbox"/>			347.95	1,715.47	<input type="checkbox"/>
12597.00	0100	MAISLIN DR from PROFESSIONAL PL to BASELINE CT	589.78	<input type="checkbox"/>			1,715.47	2,305.25	<input type="checkbox"/>
12597.00	0125	MAISLIN DR from BASELINE CT to N US HIGHWAY 301	967.30	<input type="checkbox"/>			25	3,272.54	<input type="checkbox"/>
12598.00	0050	PROFESSIONAL PL from DEAD END to MAISLIN DR	1,697.52	<input type="checkbox"/>			0.00	1,697.52	<input type="checkbox"/>
12598.00	0075	PROFESSIONAL PL from MAISLIN DR to DEAD END	394.42	<input type="checkbox"/>			1,697.52	2,091.94	<input type="checkbox"/>
15783.00	0050	INDUSTRIAL LN from INDUSTRIAL DR to VENTURE COVE	891.79	<input type="checkbox"/>			0.00	891.79	<input type="checkbox"/>
15783.00	0075	INDUSTRIAL LN from VENTURE COVE to ENTERPRISE COVE	731.79	<input type="checkbox"/>			891.79	1,623.58	<input type="checkbox"/>
15783.00	0100	INDUSTRIAL LN from ENTERPRISE COVE to MAISLIN DR	1,626.24	<input type="checkbox"/>			1,623.58	3,250.00	<input type="checkbox"/>
15784.00	0050	INDUSTRIAL LN from INDUSTRIAL LN to DEAD END	711.74	<input type="checkbox"/>			0.00	711.74	<input type="checkbox"/>
15984.00	0050	INDUSTRIAL LN from INDUSTRIAL LN to DEAD END	340.03	<input type="checkbox"/>			0.00	340.03	<input type="checkbox"/>
15984.00	0075	INDUSTRIAL LN from INDUSTRIAL LN to DEAD END	501.00	<input type="checkbox"/>			340.03	841.03	<input type="checkbox"/>
15985.00	0050	INDUSTRIAL LN from INDUSTRIAL LN to DEAD END	715.44	<input type="checkbox"/>			0.00	715.44	<input type="checkbox"/>
16035.00	0050	INDUSTRIAL LN from MALTA LN to DEAD END	322.08	<input type="checkbox"/>			0.00	322.08	<input type="checkbox"/>
16035.00	0075	INDUSTRIAL LN from MALTA LN to DEAD END	255.02	<input type="checkbox"/>			322.08	577.10	<input type="checkbox"/>
16036.00	0050	INDUSTRIAL LN from MALTA LN to N US HIGHWAY 301	755.04	<input type="checkbox"/>			0.00	755.04	<input type="checkbox"/>

(Total segments: 17) TOTAL 11,768.06

**Data Screen**

These two work together

# Tools of the Trade – Step 3 – **Implementation / Evaluations**

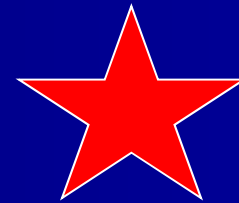
**Right Treatment**  
**Right Road**  
**Right Time**

**...AND**  
**what was the benefit?**

# Tools of the Trade – Step 3 – **Implementation**

## Hillsborough Treatments (Current)

- Crack seal – With Micro-Overlay
- Micro surface (Single-DbI)
- Micro pave (sp4.75 w/76-22)
- **Hot in Place Recycle Repaving  
(single pass – virgin lift)**
- Overlay (SuperPave)
- Mill and Overlay (Wedge Mill)
- Full Depth Reclamation
- Conventional Reconstruction



**10 HIR projects  
since 2002**

# Project Comparison - COST

## Hot In Place Recycle Repaving- Example

- Cost comparison based on 2009 pricing
- Compare 2 " mill and fill vs. Hot in Place Repaving
- Virgin HMA 1" lift Superpave SP9.5 w/64-22 binder
- Assume that the road selection is correct.

### Conventional Repaving

- Cost comparison based on 2009 pricing – HC Contract
- Compare 2 " mill and resurface
- Superpave SP12.5 w/64-22 binder

### Hot in Place Re-paving

- Cost comparison based on 2008 pricing – HC Contract
- Single Pass Hot in Place Repaving
- 1" Scarification Heat and Rework
- HMA 1" lift Superpave SP9.5 w/64-22 binder



# Project Cost Comparison - COST

- Cost comparison based on 2009 pricing
- Compare 2 " mill and fill vs. Hot in Place Repaving
- HMA 1" lift Superpave SP9.5 w/64-22 binder
- Assume that the road selection is correct.

## Conventional Repaving

Tonnage SP12.5.....\$85.00/ton (in place)

Mill 2"..... \$2.30 per SY

Price per SY .....**\$10.80 per SY**

## Hot in Place Re-paving

Heat and Re-work.....\$2.20 SY

Recycle Agent..... \$0.15 per SY

Tonnage SP9.5.....\$82.11/ton (in place)

Price per SY.....**\$6.45 per SY**

# Project Cost Comparison

- Cost comparison based on 2009 pricing
- Compare 2" mill and fill vs. Hot in Place Repaving
- HMA 1" lift Superpave SP9.5 w/64-22 binder
- Assume that the road selection is correct.

## Conventional Repaving

Tonnage SP12.5.....\$85.00/ton (in place)

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Price per SY .....**\$10.80 per SY**

## Hot in Place Re-paving

Heat and Re-work.....\$2.20 SY

Recycle Agent..... \$0.15 per SY

Tonnage SP9.5.....\$82.11/ton (in place)

Price per SY.....**\$6.45 per SY**

**Cost Savings = 40%**

# Project Cost Comparison – Life Cycle

Cost to Own per Year = Cost per SY/Year

- Recycle project Life Cycle.....10 years (assume)
- Conventional Resurfacing project.....15 Years

## Hot in Place Repaving

- Cost per SY....\$6.45
- Cost to own = \$6.45/10Years

Cost per SY/Year = \$0.64

## Conventional Resurfacing

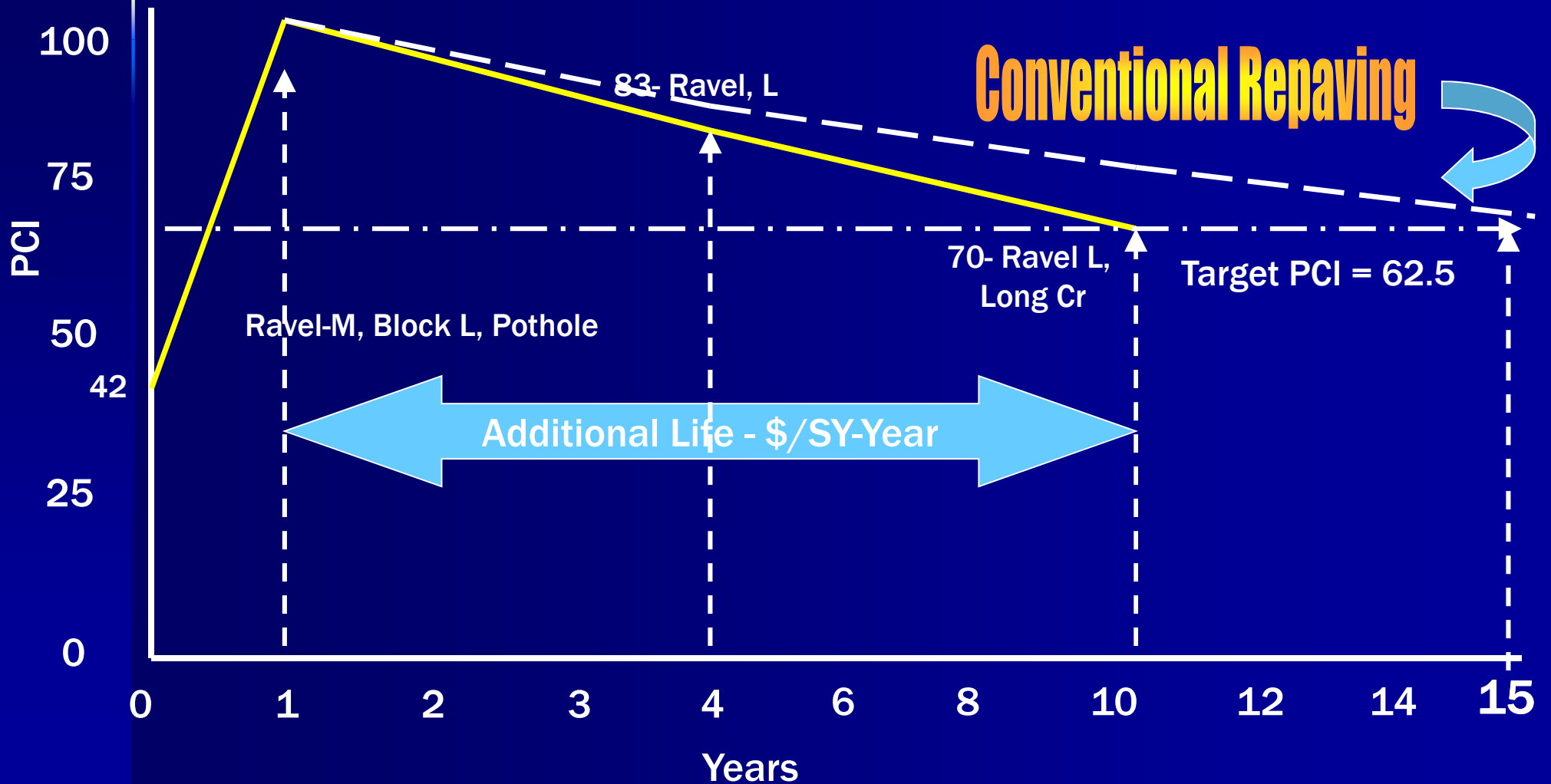
- Cost per SY....\$10.80
- Cost to own = \$10.80/15Years

Cost per SY/Year = \$0.72

- Cost per square yard year appears to be similar... so this looks viable!!!
- The deterioration (PCI) curves will be different, with HIR being potentially steeper.

# Tools of The Trade – **ADDITIONAL LIFE**

## Hot-in-Place Repaving



## Conventional Repaving

83- Ravel, L

70- Ravel L,  
Long Cr

Ravel-M, Block L, Pothole

Target PCI = 62.5

Additional Life - \$/SY-Year

Years



# Project Examples



**Example**



Hot in Place Repaving – 13 years old

New Construction – 10 years old

***Right Treatment***

***Right Road***

# Project Example - Westshore Blvd



Hot in Place Repaving – 13 years old

# Project Example - Westshore Blvd



Hot in Place Repaving - 13 years old

# Project Example - Westshore Blvd



Hot in Place Repaving - 13 years old

# Tools of The Trade – Get it RIGHT!



Hot in Place Repaving – 13 years old

# Project Example - Westshore Blvd



Hot in Place Repaving - 13 years old

# Project Example – Orient Road



Hot in Place Repaving – 7 Years old  
Recycled Structural Course

# Project Example – Orient Road



Hot in Place Repaving – 7 Years old  
Recycled Structural Course



# Project Example – Orient Road



Hot in Place Repaving – 7 Years old  
Recycled Structural Course

# Project Example – Orient Road



Hot in Place Repaving – 7 Years old

Recycled Structural Course

# Project Example – Causeway Blvd



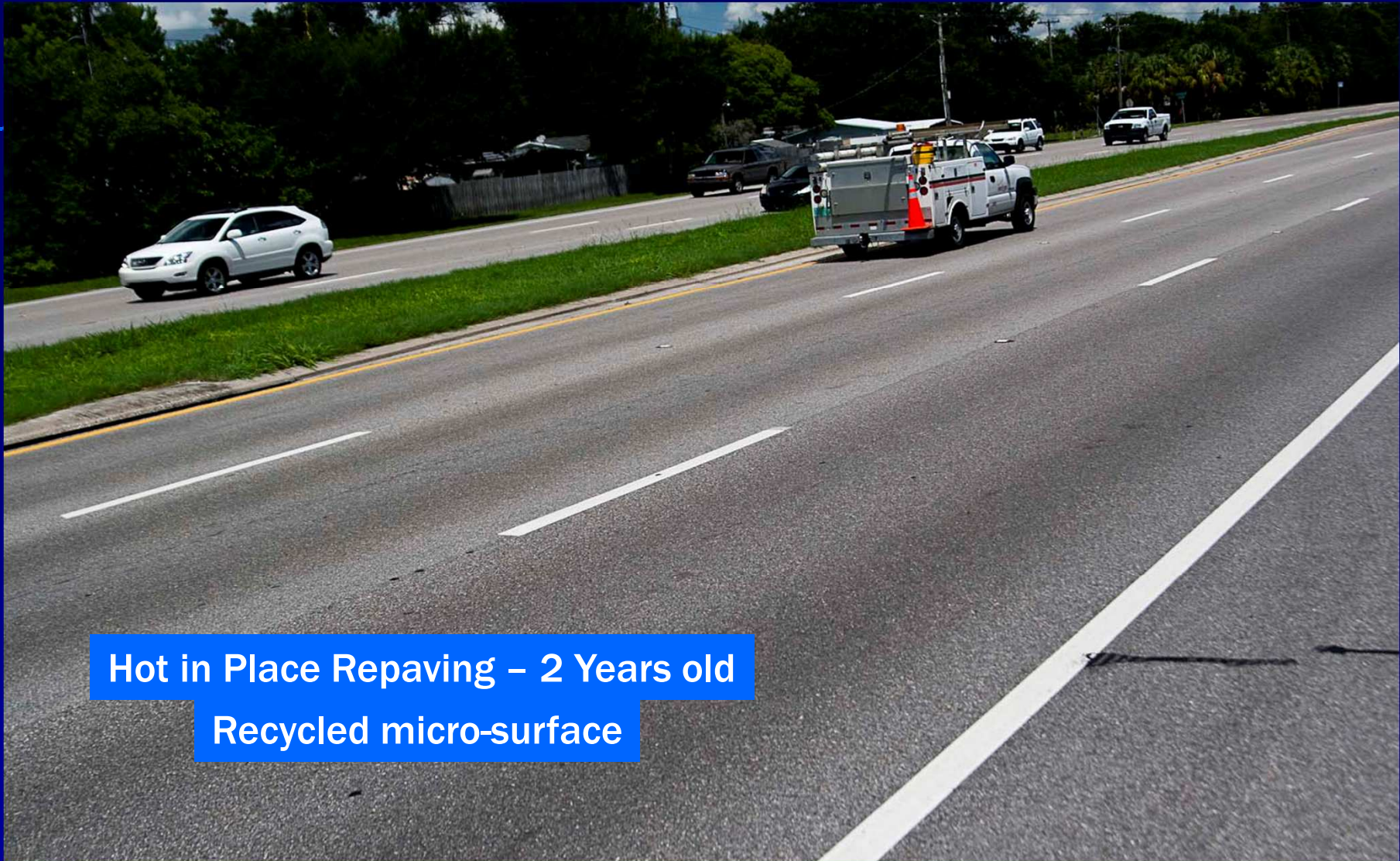
# Project Example – Causeway Blvd



# Project Example – Causeway Blvd



# Project Example – Causeway Blvd



Hot in Place Repaving – 2 Years old  
Recycled micro-surface

# Project Example – Causeway Blvd



Hot in Place Repaving – 2 Years old

Recycled micro-surface

# Project Example – Causeway Blvd



Hot in Place Repaving – 2 Years old  
Recycled micro-surface



# Project Example – Causeway Blvd



Hot in Place Repaving – 2 Years old  
Recycled micro-surface

# Project Example – Waters Avenue



Hot in Place Repaving

Recycled Microsurface /Friction Course

# Tools of The Trade – Pre Construction



Micro surface on arterial – 3 years old  
treatment on friction coarse

# Tools of The Trade – Post Construction

1" New HMA

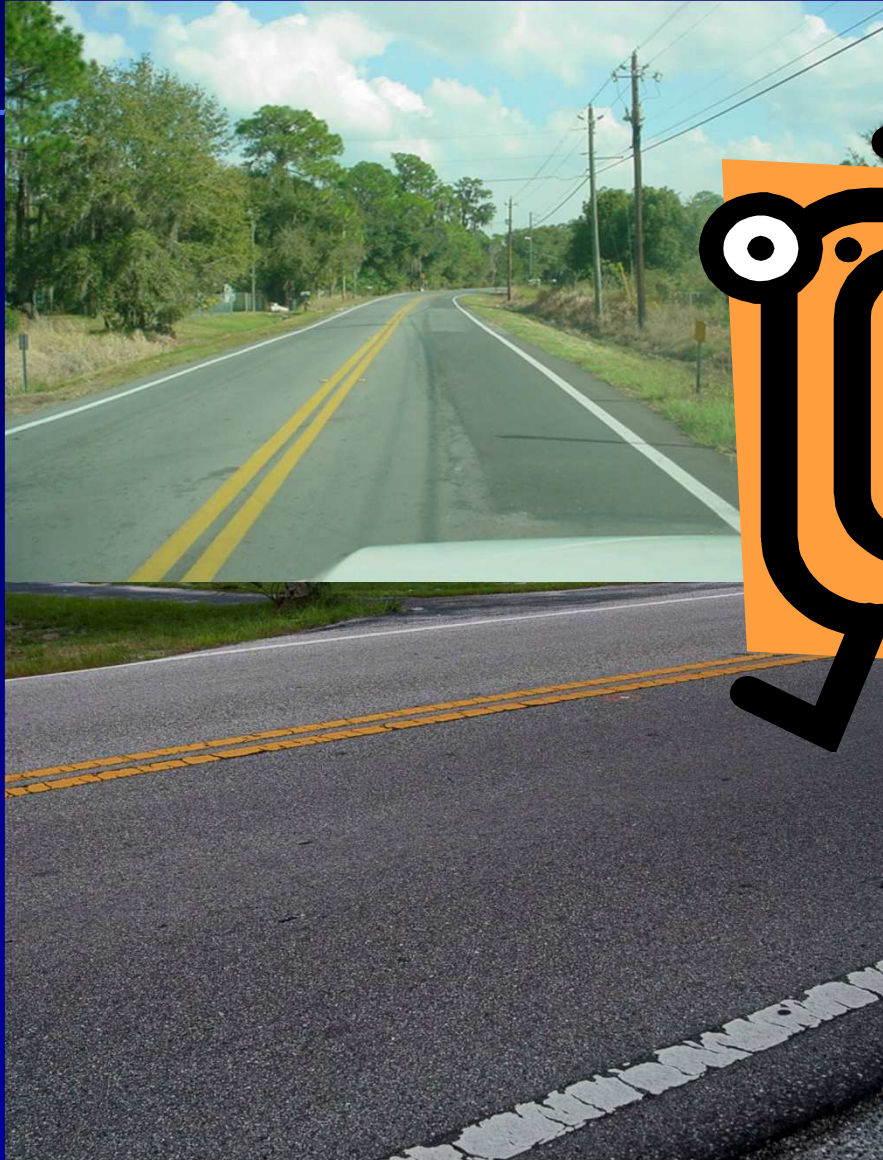
1" Recycle

Hot in Place Repaving  
Recycled micro surface



# Obstacles to Hot in Place Repaving

*IMHO*



# Obstacles to Hot in Place Repaving - *IMHO* *Recycling could benefit from additional clarity of terms.*

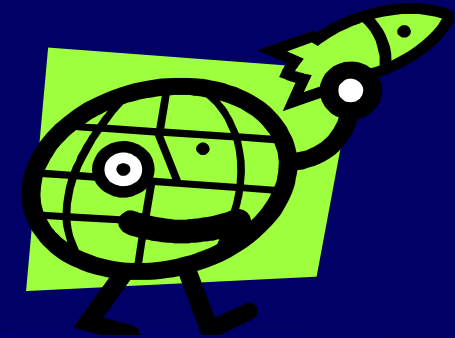
## *"Hot in Place Recycling" sub-categories:*

- **Surface Recycle** – Process used to soften the asphalt surface
  - could use multiple heating units
  - could use spring activated teeth, tines or a small diameter milling head.
  - could use recycling agent in scarified material (if required)
  - could be used to prepare for an HMA overlay (new surface)
- **Remixing** – Same as Surface Recycle but new HMA is added and mixed thoroughly.
  - could be left as the wearing course
  - could be overlaid
  - could be single stage, scarify in single pass
  - could be multi-stage, scarify in multiple passes-(windrow)
- **Repaving** – Combines Surface Recycling **OR** Remixing with the simultaneous placement of overlay of new HMA
  - could mix the recycle in a pug mill or using augers
  - could be single pass (two screeds)
  - could be multi-pass (conventional paver used for final riding course)

## Obstacles to Hot in Place Repaving – *IMHO*

- **Specifications** - Many DOT's do not have standard specifications for HIR/Recycling/Remixing/Repaving. Leaves some local agencies to develop own specs.
- **Experience** - Some agencies lack experience with these processes and become reluctant to attempt projects. *Nobody really likes trial and error.*
- **Poor Road Selection** – “Wrong Road” leads to failed projects.
- **Procurement** - Poor understanding of processes and application techniques leads to bids that are unclear.

# *Conclusions*



- HIR processes can increase PCI at a cost savings when applied to the correct road.
- HIR processes are cost effective when compared to like conventional treatments.
- The HIR cost per SY year is comparable to conventional processes. However re-treatment may occur earlier.
- Standard DOT specifications would be beneficial to the proliferation of HIR processes.
- Clearer definitions and education could reduce confusion concerning HIR sub-categories.
- Clearer understanding of the differences in the sub-categories of HIR would assist in the bidding process.



# Asphalt Recycling and Pavement Preservation in Hillsborough County, Florida

**Thanks!!!!**



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