

CITY OF EL PASO, TEXAS  
AGENDA ITEM  
DEPARTMENT HEAD'S SUMMARY FORM

DEPARTMENT: Capital Improvement Department  
AGENDA DATE: April 2, 2018  
CONTACT PERSON/PHONE: Sam Rodriguez, P.E., City Engineer, 212-0065  
DISTRICT(S) AFFECTED: ALL  
STRATEGIC GOAL: No. 7: Enhance and Sustain El Paso's Infrastructure Network

**SUBJECT:**

Presentation on best practices in pavement management.

**BACKGROUND / DISCUSSION:**

The City Council previously authorized the Pavement Conditions Index (PCI) Assessment to evaluate all roadways in the City of El Paso. The PCI Assessment establishes a Pavement Management Program based on best practices. The PCI Assessment includes the following components: 1) data collection, field data and image capture for all roadways, 2) pavement condition evaluation with new rating for each roadway, 3) new database and viewer, 4) combine data with best practices, 5) final report and City Council presentation, and 6) ADA ramp inventory. This presentation will provide examples of best practices and possible options to consider moving forward to maintain and improve the pavement conditions of roadways in the City of El Paso.

**PRIOR COUNCIL ACTION:**

N/A

**AMOUNT AND SOURCE OF FUNDING:**

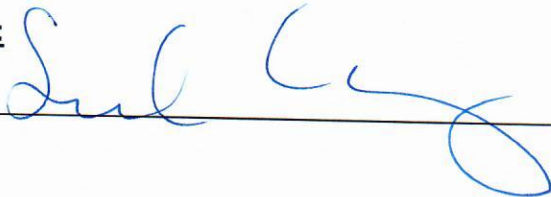
N/A

**BOARD / COMMISSION ACTION:**

N/A

\*\*\*\*\*REQUIRED AUTHORIZATION\*\*\*\*\*

**DEPARTMENT HEAD:**

  
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# City Council Work Session



**April 2, 2018**

*"Delivering Outstanding Services"*



# City Council Work Session

## Overview

The following items will be reviewed:

- Street Reconstruction Projects
- Street Resurfacing Program
- PCI Assessment – Overview and Next Steps
- Best Practices in Pavement Management – Texas A&M Transportation Institute
- Funding Options for Street Repairs



# Street Reconstruction Projects



# 2012 Street CIP

## History

June 26, 2012

- City Council authorized \$210 million for Street Improvements

March 8, 2016

- City Council approved the revised Street CIP



# Street Reconstruction Projects

## Completed

Project	District
BARKER from Polo Inn to Balsam	3
MANOR from Alameda to Barker	3
PEBBLE HILLS from Tierra Mina to Zaragoza	5
KERNEL from Betel to Betel	6
PENDALE from Gateway East to Yermoland	7



# Street Reconstruction Projects

## In Construction

Project	District
ROBINSON from Piedmont to Scenic	1
LITTLE FLOWER from Alameda to Stiles	3
RAMOS from Flicker to terminus	3
FLOWER from Encino to terminus	8
ALICIA from Barcelona to Flower	3, 8



# Street Reconstruction Projects

## In Bidding

Project	District
CARDIS from Malaga to terminus	3
GEIGER from Tangier to Malaga	3
MALAGA from Alameda to terminus	3



# Street Reconstruction Projects

## In Design

Project	District	Est. Construction Start
ANNIE from Ethel to terminus	1	Spring 2019
ETHEL from Montoya to Edgar	1	Spring 2019
ROBINSON from Ochoa to Piedmont	1	Winter 2018/9
DE VARGAS from Paisano to Delta	3	Fall 2018
GLENWOOD from El Paso to Delta	3	Fall 2018
MARY JEANNE from Toni to Yvonne	3	Fall 2018
MIMOSA from Midway to Teakwood	3	Spring 2019
TONI from Ben Swain to Mary Jeanne	3	Fall 2018
YVONNE from Mary Jeanne to George Orr	3	Fall 2018
DAVIS from Roseway to Winchester	6	Spring 2019
NEW HAVEN from Wells to Sargent	6	Winter 2018/9



# Street Reconstruction Projects

## In Design

Project	District	Est. Construction Start
PADILLA from Rose Kennedy to Zaragoza	6	Spring 2019
PHILLIPY from Old Country to Alameda	6	Spring 2019
SNELSON from Padres to Ventura	6	Spring 2019
HOLLY from Montecito to Mauer	7	Winter 2018/9
JAMES from Mansfield to Craddock	7	Fall 2018
LOMALAND from North Loop to San Jose	7	Winter 2018/9
LOWD from Cinecue to Yarbrough	7	Spring 2019
MCCUNE from Milton to San Jose	7	Winter 2018/9
PADDLEFOOT from Prado to Prado	7	Winter 2018/9
PRINCETON from Greggerson to Tulane	7	Summer 2018



# Street Reconstruction Projects

## In Design

Project	District	Est. Construction Start
TULANE from Greggerson to Fresno	7	Summer 2018
VALLEY VIEW from Yarbrough to Greggerson	7	Summer 2018
CHICO from Cedar to Maple	8	Spring 2019
DOLAN from Flower to terminus	8	Fall 2018
EDNA from Delta to Huerta	8	Fall 2018
ELENA from Encino to Huerta	8	Winter 2018/9
FELIZ from Enda to Encino	8	Winter 2018/9
TERAMAR from Doniphan to Osborne	8	Spring 2018
CORTEZ from Alameda to Flower	3, 8	Fall 2018
ENCINO from Cortez to Flower	3, 8	Fall 2018



# Street Resurfacing Program



# Street Resurfacing Program

- 1. Overview of the Street and Maintenance paving contracts**
- 2. Recap of the Major Arterial streets that will be paved over the next two years**
- 3. Recap of all streets in the 2012 Street CIP for Resurfacing by District**
- 4. Overview of Street Resurfacing Public Outreach**



# Street Resurfacing Program

## Streets and Maintenance is currently managing three active street paving contracts

1. **Street Resurfacing 2017-18** - Solicitation 2016-1035, ZTEX Construction, Inc., approved Sept. 6, 2016, \$16,155,560 award, two year initial term (CIP funded)
2. **Street Resurfacing 2018-19** - Solicitation 2018-615, JAR Construction, Inc., approved Jan. 23, 2018, \$31,902,137 award, two year initial term (CIP funded)
3. **Roadway Structures 2017** - Solicitation 2017-589, JAR Construction, Inc., approved Feb. 28, 2017, \$983,050, two year term (General Fund/Env Fee)



# 1) Street Resurfacing 2017-18 – ZTEX Construction

## **Contract currently in progress with 108 streets programmed**

- All street locations approved in the 2012 Street CIP program
- \$5,798,943 expended as of March 27 (36% of award)
- 37 streets completed to date (March 27)
- 11 currently under notice to proceed; most are in concrete elements phase
- Since beginning of 2018 paved 20 streets
- In February of 2018, completed \$1.1 million of contract work (largest monthly invoice on record)
- Estimated contract completion April 2019



## 2) Street Resurfacing 2018-19 – JAR Construction

### **Contract Notice to Proceed Issued for April 9, 2018**

- Contract includes 113 residential streets; this will complete the 2012 Street CIP list for Resurfacing
- Includes segments of City maintained Major Arterial streets that are among the 25 most travelled street in the City
- Along these arterials on-street bike facilities will be incorporated as identified in the City Bike Plan



### 3) Roadway Structures 2017 – JAR Construction

**Contract currently in progress and locations are not pre-determined in the Street resurfacing program; maintenance tool for immediate work**

- Used for major repairs to streets with failed pavement conditions that are not programmed in the Street CIP and can not wait for future programs
  - Special paving projects
- Responsive tool for streets that get damaged or washed out during weather events
- Tool used in partnership with El Paso Water to address pavement repairs over water, sewer, and stormwater sewer breaks; reimbursed by El Paso Water
  - Allows for complete curb to curb street re-pavement opposed to patch-paving work
  - City contracts have favorable unit prices for paving



# Major Arterial Street Segments to be Resurfaced in 2018 -19

Dates subject to change based on mobilization requirements of contractor

DISTRICT	STREET	FROM	TO	ESTIMATED COMPLETION
4	MCCOMBS	DYER	RAILROAD	Summer 2018
2	RAILROAD	HONDO PASS	US 54	Summer 2018
4	RAILROAD	TRANSMOUNTAIN	HONDO PASS	Summer 2018
1	RESLER	HIGH RIDGE	BELVIDERE	Fall 2018
8	RESLER	BELVIDERE	WHITE CLIFFS	Fall 2018
3	YARBROUGH	MONTANA	PEBBLE HILLS	Fall/Winter 2018
7	YARBROUGH	GATEWAY EAST	NORTH LOOP	Fall/Winter 2018
7	YARBROUGH	TRAWOOD	GW	Fall/Winter 2018
7	YARBROUGH	ALAMEDA	CESAR CHAVEZ	Fall/Winter 2018
3	HAWKINS	MERCHANT	NORTH LOOP	Spring 2019
3	HAWKINS	GAZELLE	GW	Spring 2019
3	VISCOUNT	AIRWAY	HAWKINS	Spring 2019
3	GEORGE DIETER	EDGEMERE	PEBBLE HILLS	Summer 2019
3	GEORGE DIETER	PEBBLE HILLS	MONTWOOD	Summer 2019
5	GEORGE DIETER	MONTANA	EDGEMERE	Summer 2019
5	GEORGE DIETER	EDGEMERE	PEBBLE HILLS	Summer 2019
6	ROJAS	ZARAGOZA	DON HASKINS	Fall 2019
7	ROJAS	GEORGE DIETER	ZARAGOZA	Fall 2019



# District 1 Programmed Streets

Future dates subject to change based on mobilization requirements of contractor

STREETNAME	From	To	Status	STREETNAME	From	To	Status
DEDE	Rim	Cul-de-Sac	Completed	SINGING HILLS	Thunderbird	Thunderbird	Summer 2018
OSAPLE	Rio Mira	Dead End	Completed	CLAYTON	Galloway	Robinson	Winter 2018/19
RIO MIRA	Butterfield	Territory	Completed	GALLOWAY	Stanton	Piedmont	Winter 2018/19
BUTTERFIELD	Territory	Rio Mira	Completed	KELLY	Kern	Whitaker	Winter 2018/19
TERRITORY	Butterfield	Rio Mira	Completed	NEW YORK	St. Vrain	Dead End	Winter 2018/19
BOX ELDER	Gomez	Rollins	Completed	WELLESLEY	Kern	Campbell	Winter 2018/19
RHAELYNNE	Cory	Upper Valley	Completed	LA CRUZ	Okeefe	Piedmont	Winter 2018/19
COSTA BLANCA	Pinar del Rio	Redd	Completed	MESITA A	Peidmont	Stanton	Winter 2018/19
NAVARIE	Pinar del Rio	Redd	Completed	MOORE	Piedmont	Stockwell	Winter 2018/19
CALLE OLASO	Equestre	Dead End	Completed	OKEEFE A	Mesita	Alethea Park	Winter 2018/19
SOLEDAD	Mulberry	La Mirada	Completed	SAN MATEO	La Cruz	Peidmont	Winter 2018/19
OCTAVIA	Kerbey	Dead End	Completed	FLAMINGO B	Okeefe	Stanton	Winter 2018/19
LOS NIETOS	La Mirada	La Mirada	Completed	HILLCREST	Bancroft	Dead End	Winter 2018/19
IRONDALE	Lawndale	Stanton	Fall 2018	PARK HILL	Ridgecrest	Ridgecrest	Winter 2018/19
ONEIDA	Medano	Redd	Spring 2018	SANTA RITA	Las Vegas	Okeefe	Winter 2018/19
PAWNEE	Iroquis	Dead End	Spring 2018	PEBBLE BEACH	Shadow Mountain	Burning Tree	Summer 2019
ROXANNA	Ridge	Marietta	Spring 2018	INDIAN BLUFF	Crown Point	Caprock	Summer 2019
KRUPP	Waymore	Ridgecrest	Spring 2019	MESA HILLS	Mesa	Acacia	Summer 2019
LARCHMONT	Krupp	Waymore	Spring 2019	BRENTWOOD	Stanton	Krupp	Summer 2019
WALLINGTON	Krupp	Brentwood	Spring 2019	CINCINNATI	Piedmont	Cincinnati	Summer 2019
ALTACUMBRE	Camino Fuente	Tarasas	Summer 2018	MADELINE	Piedmont	Park	Summer 2019
AMPOSTA B	Cresta Alta	Westwind	Summer 2018	CINCINNATI	Kansas	Coffin	Summer 2019
CHERRY HILL	Broadmoor	Thunderbird	Summer 2018	RESLER	High Ridge	White Cliffs	Fall 2019

46 Program Streets

13 Completed



# District 2 Programmed Streets

Future dates subject to change based on mobilization requirements of contractor

STREETNAME	From	To	Status	STREETNAME	From	To	Status
MAXWELL B	Dyer	Diana	Completed	HOMER	Gateway South	Joyce	Spring 2019
ECHO B	Hercules	Moonlight	Completed	SHEPPARD	Alabama	Lackland	Spring 2019
STEVENS	Harrison	McKinley	Completed	FRANKFORT C	Stevens	Partello	Spring 2019
BYRON	Van Buren	Monroe	Completed	MEMPHIS C	Stevens	Sparkman	Spring 2019
LACKLAND	Van Buren	Monroe	Completed	POLLARD C	Jefferson	Gateway South	Spring 2019
SATURN	Edgar Park	Hercules	Completed	JUSTUS	Jefferson	Tyler	Spring 2019
SOLAR	Edgar Park	Hercules	Completed	TAYLOR	Piedras	Terminus	Spring 2019
ROBERT A	Maxwell	Arlen	Completed	FRANKFORT D	Dyer	Gateway South	Spring 2019
JADE	Zircon	Echo	Completed	HAPPER	Leeds	Cambridge	Spring 2019
MAXWELL	Gateway North	Dyer	Completed	MEMPHIS D	Dyer	Gateway South	Spring 2019
HASTINGS C	Happer	Gateway South	Completed	WILSON	Pershing	Dead End	Spring 2019
MOBILE A	Piedras	Dead End	Completed	HASTINGS	Happer	Pershing	Spring 2019
CUMBERLAND	Pershing	Gateway South	Completed	CLIFTON A	Hueco	Gateway South	Summer 2019
LAMAR	Bliss	Hueco	Completed	GRANT C	Piedras	Copper	Summer 2019
MEMPHIS A	Red Rock Canyon	Piedras	Completed	FRANKFORT E	Gateway North	Dead End	Summer 2019
NEBRASKA	Nations	Morehead	Completed	MADERA	Radford	Dead End	Summer 2019
LOUISIANA	Mobile	Richmond	Completed	MARR B	Altura	Trowbridge	Summer 2019
Alley	Piedras	Raynor	Completed	MEMPHIS E	Pershing	Dead End	Summer 2019
NASHVILLE A	Piedras	Dead End	Completed	MOBILE D	Radford	Dead End	Summer 2019
ELM	Mobile	Richmond	Completed	CROSSON	CDS	CDS	Winter 2018/19
POLK	Byron	Elm	Completed	MCGREGOR	Maxwell	Diana	Winter 2018/19
CHELSEA A	Timberwolf	Dead End	Completed	STRAND	McGregor	Maxwell	Winter 2018/19
CHELSEA B	Timberwolf	Trowbridge	Completed	BRITTON	Dyer	Sierra Vista	Winter 2018/19
MATTERHORN	Rutherford	Glacier Peak	Fall 2018	CAPITAN	Mt Latona	Hercules	Winter 2018/19
MOUNT ETNA	Rutherford	Glacier Peak	Fall 2018	MOUNT DELANO	Hondo Pass	Blue Ridge	Winter 2018/19
MOUNT OLYMPUS	Joe Herrera	Glacier Peak	Fall 2018	MOUNT HAGEN	Pikes Peak	Blue Ridge	Winter 2018/19
FORREST	Hunt	Trowbridge	Fall 2019	MOUNT WHITNEY B	Tetons	Knox	Winter 2018/19
GRISSOM	Martin	Mathias	Fall 2019	STATLER	Tetons	Adolphus	Winter 2018/19
HUNT	Peinado	Glenwood	Fall 2019	DIAMOND	Westline	Echo	Winter 2018/19
PEINADO	Wagner	Hunt	Fall 2019	BERYL	Dolomite	Echo	Winter 2018/19
WAGNER	Chelsea	Trowbridge	Fall 2019	DEVORE	Eclipse	Comet	Winter 2018/19
WEIGHTMAN	Timberwolf	Edwards	Fall 2019	DOLOMITE	Magnetic	Zircon	Winter 2018/19
OLYMPIC A	Magnetic	Leo	Spring 2019	TRADEWIND	Mercury	Neptune	Winter 2018/19
OLYMPIC B	Leo	Gateway South	Spring 2019	VEGA	Polaris	Comet	Winter 2018/19
BROADDUS A	Alabama	Stevens	Spring 2019	RAILROAD	Railroad	US 54	Summer 2018

70 Program Streets

23 Completed



# District 3 Programmed Streets

Future dates subject to change based on mobilization requirements of contractor

STREETNAME	From	To	Status	STREETNAME	From	To	Status
MCCARTHY A	Hockney	Alameda	Completed	FIRESTONE	Montana	Darin	Completed
CHIP CHIP	Alameda	Dead End	Completed	MERIL	Cardigan	Darin	Completed
VOCATIONAL	Mimosa	Alameda	Completed	ALASKA	Yuma	Phoenix	Completed
MIDWAY B	Knights	Hockney	Completed	HAWAII	Yuma	Phoenix	Completed
GREEN VALLEY	Carolina	Dead End	Completed	COCONUT TREE	Granite	Coconut Tree	Completed
MARY JEANNE	Toni	Becky	Completed	EDITH A	Little Flower	Lettie	Completed
ARAPAHO	Geronimo	Marlow	Completed	EDITH B	Lettie	Ben Swain	Completed
STEPHENSON	Gateway East	Frederick	Completed	FLINT	Polo Inn	Polo Inn	Completed
HARDY	Tampa	Dulaney	Completed	J C CRAMER	Barker	Coronado	Completed
CIBOLA	Clark	Marlow	Completed	JOSHUA	Durrill	Dead End	Completed
HOLIDAY	Tampa	Welch	Completed	LETTIE	Ben Swain	Edith	Completed
PAPAGO	Clark	Marlow	Completed	PEAR TREE	George Orr	C R Croom	Completed
UTE	Clark	Marlow	Completed	PEARL	Amethyst	Dead End	Completed
ASH	Dempsey	W H Burges	Completed	GRANITE	George Orr	Polo Inn	Completed
AVALON	Sunglow	Dead End	Completed	PEACH TREE	George Orr	C R Croom	Completed
TRINITY	Rusk	Simpia	Completed	SHETLAND	Edgemere	Ballymote	Completed
CLEVELAND A	Paisano	Atoka	Completed	ABRAHAM	Alameda	Canary	Completed
CLEVELAND B	Atoka	Marlow	Completed	BEN SWAIN C	Toni	Edith	Summer 2018
CESSNA A	Sunglow	Edgemere	Completed	INTERNATIONAL	Robert E Lee	Airway	Fall 2019
VIOLET	W H Burges	Cessna	Completed	DERICK	Carnegie	Montana	Fall 2019
HILLER	Airport	Boeing	Completed	BALSAM A	Barker	Papaya	Fall 2019
LEAR	Boeing	Lockheed	Completed	BALSAM B	Papaya	Mimosa	Fall 2019
SURETY	Gateway East	Clark	Completed	CESSNA B	Edgemere	W H Burges	Fall 2019
NAVAJO B	Apache	Cheyenne Trail	Completed	MONTROSE	Mc Crae	Dead End	Fall 2019
ALGONQUIN	Geronimo	Marlow	Completed	RED ROBIN	Canary	George Orr	Fall 2019
AQUARIUS	Turrentine	Backus	Completed	Downum	McCabe	Darlina	Fall 2019
TURRENTINE C	Glengarry	Daugherty	Completed	HAWKINS	Merchant/Gazelle	North Loop/Gateway	Spring 2019
WADE	Cosmos	Lait	Completed	VISCOUNT	Airway	Gateway	Spring 2019
GOURD	Album	Bellis	Completed	CORNWALL	Castletown	Blackwood	Winter 2019/20
HAWICK	Dunoon	Mcintosh	Completed	LARRY MAHAN	Gateway West	Viscount	Winter 2019/20
PRESTWICK	Cosmos	Kilmaltie	Completed	ANISE A	Lee Trevino	Montwood	Winter 2019/20
SHELL	Montana	Dead End	Completed	EAST GLEN B	Pebble Hills	Sam Snead	Winter 2019/20
BRANDWOOD	Blackwood	Suewood	Completed	FRANK BEARD	Sam Snead	Anise	Winter 2019/20
KAYWOOD	Parkwood	Saigon	Completed	GEORGE DIETER	Montana	Montwood	Summer 2019
WOODALL	Blackwood	Suewood	Completed	YARBROUGH	Various	Various	Winter 2019/20

70 Program Streets

52 Completed



# District 4 Programmed Streets

Future dates subject to change based on mobilization requirements of contractor

STREETNAME	From	To	Status	STREETNAME	From	To	Status
JUNCTION A	Kenworthy	Gateway South	Completed	SARAH ANNE	McCombs	Terminus	Spring 2018
JUNCTION B	Kenworthy	Kellogg	Completed	JOHN CUNNINGHAM	MLK	Terminus	Spring 2018
UVALDE	Sun Valley	Junction	Completed	DOWNNS	Fairfax	Raleigh	Fall 2018
CURLEW	Debeers	Tropicana	Completed	FAIRFAX	Threadgill	Dalton	Fall 2018
DEBEERS A	Ambassador	Shenandoah	Completed	HOLLINGS A	Wren	Dalton	Fall 2018
DEBEERS B	Shenandoah	Mackinaw	Completed	MIDDLESBORO	Waverly	McCombs	Fall 2018
KISKA	Prince Edward	Edmonton	Completed	OLAN	Fairfax	Roanoak	Fall 2018
PEACOCK	Rushing	Saxon	Completed	SANDERS A	Pistacio	Dyer	Fall 2018
MENZIES	Winthrop	Sun Valley	Completed	VICKSBURG A	Threadgill	Sanders	Fall 2018
SHENANDOAH A	Thor	Debeers	Completed	DECATUR	Vicksburg	Railroad	Fall 2018
SIGMA	Sagittarius	Dead End	Completed	DUVAL	Marie Tobin	Hondo Pass	Fall 2018
ABILENE	Cermac	Shenandoah	Completed	GULFPORT	Salisbury	Raleigh	Fall 2018
KELLOGG A	Winthrop	Tropicana	Completed	HOLLINGS B	Joe Herrera	Hondo Pass	Fall 2018
DEARBORNE B	Mackinaw	Alcan	Completed	PERSIMMON	Marie Tobin	Hondo Pass	Fall 2018
DEARBORNE C	Alcan	Palomino	Completed	ROANOKE D	Joe Herrera	Hondo Pass	Fall 2018
PONDEROSA	Palomino	Dead End	Completed	MOUNT SAN BERDU	Joe Herrera	Alps	Fall 2018
VICEROY	Dearborne	Dead End	Completed	RAYMOND TELLES A	Alps	Joe Herrera	Fall 2018
TRIUMPH	Salem	Dearborne	Completed	DALTON	Salisbury	Raleigh	Fall 2018
WALDORF	McCombs	Alcan	Completed	YELLOWSTONE	Tropicana	Blythe	Spring 2018
PARADISE	Alcan	Tropicana	Completed	WINTHROP	Kenworthy	Thor	Spring 2018
TROPICANA D	Alcan	McCombs	Completed	MURPHY	Salem	Sean Haggerty	Spring 2018
MC COMBS SERVICE A	Sarah Anne	Dead End	Completed	SAGITTARIUS	Rushing	Kenworthy	Spring 2018
MC COMBS SERVICE B	Sun Valley	Dead End	Completed	TIGER EYE	Dyer	Jadestone	Spring 2018
WOODBERRY	Mc Combs	Dead End	Completed	HUECO VISTA	Alabama	Dead End	Spring 2019
SALEM B	Rushing	McCombs	Completed	BIG BEND	Devils Tower	CDS	Spring 2019
KETCHIKAN	Prince Edward	Newcastle	Completed	YOSEMITE	Zion	Old Spanish Trail	Spring 2019
FERTELL	Sun Valley	Grouse	Completed	REGULUS A	Mc Combs	Bomarc	Summer 2018
BOBCAT	Bomarc	Dead End	Completed	AJAX	Crenshaw	Tropicana	Summer 2018
RAVEN	Bomarc	Dead End	Completed	DEER	McCombs	Cross	Summer 2018
WOODCHUCK	Bomarc	Dead End	Completed	SINCLAIR	Tivoli	Terminus	Summer 2018
TROUT	Wolverine	Dead End	Completed	MCCOMBS	Dyer	Railroad	Summer 2018
ALCAN B	Prince Edward	Fairbanks	Completed	MACKEREL	Will Ruth	Dead End	Summer 2018
ALCAN C	Sun Valley	Prince Edward	Completed	NIKE	Sidewinder	Dead End	Summer 2018
LEVELLAND	Sweetwater	Port Arthur	Completed	PICKEREL B	Marlin	McCombs	Summer 2018
PORT ARTHUR	Sweetwater	Murphy	Completed	VANGUARD	Pickerel	Dead End	Summer 2018
POTOMAC	Pheasant	Quail	Completed	ZEUS	Nike	Snark	Summer 2018
TIVOLI	Deer	Quail	Completed	FALCON	Mc Combs	Railroad	Summer 2018
ALCAN D	Warren	Sun Valley	Completed	MACAW	McCombs	Blue Wing	Summer 2018
GRAND CANYON	Zion	Old Spanish	Completed	THREADGILL A	Dyer	Roanoak	Summer 2018
OLD SPANISH TRAIL	Zion	Dead End	Completed	THREADGILL B	Roanoak	McCombs	Summer 2018
ZION B	Alabama	Gran Quivera	Completed	VERBENA	Threadgill	McCombs	Summer 2018
CRENSHAW	Yellowstone	Tropicana	Spring 2018	MAUREEN A	Stahala	Gabriel	Winter 2018/19
BLYTHE	Yellowstone	Winthrop	Spring 2018	RUTHERFORD B	Stahala	Dyer	Winter 2018/19
THOR	Crenshaw	Winthrop	Spring 2018	RAILROAD	Railroad	US 54	Summer 2018

88 Program Streets

41 Completed



## District 5 Programmed Streets

Future dates subject to change based on mobilization requirements of contractor

STREETNAME	From	To	Status
LEE	Montwood	Pebble Hills	Completed
GEORGE DIETER	Montana	Montwood	Summer 2019

Original 2012 Street Resurfacing program had 15 locations from District 5; most were moved to other districts when new District boundaries were established after the 2012 Street CIP was approved



## District 6 Programmed Streets

Future dates subject to change based on mobilization requirements of contractor

STREETNAME	From	To	Status
GOLONDRINA	Buena Park	Buena Park	Completed
GUADALAJARA	Singh	Reno	Completed
SANTA ROSALIA	Southside	Guadalajara	Completed
DORSET	Coventry	Dead End	Completed
ONATE	Candelaria	Dead End	Completed
RENO	Southside	Guadalajara	Completed
LONE STAR	Socorro	Padilla	Completed
NEVAREZ A	Inglewood	Skylight	Completed
PULLMAN D	Henry Brennan	Rojas	Completed
ROJAS	George Dieter	Don Haskins	Fall 2019

Original 2012 Street Resurfacing program had 12 locations from District 6; some moved to other districts when new District boundaries were established after the 2012 Street CIP was approved



# District 7 Programmed Streets

Future dates subject to change based on mobilization requirements of contractor

STREETNAME	From	To	Status	STREETNAME	From	To	Status
ARAQUAIA	Arboleda	Dead End	Completed	GUAYMAS	Taxco	Corozal	Completed
AMUR	Danube	Arboleda	Completed	MAZATLAN A	Hunter	Ladera	Completed
LA GENTE	Morelia	Dead End	Completed	LADERA B	Monterrey	Carolina	Completed
RIO ARRIBA	Pedernales	Link	Completed	LILAC A	Carolina	Montecito	Completed
BORRETT	Wells	Dead End	Completed	GALLAGHER A	Heid	Mauer	Completed
FINITA	Whittier	Alameda	Completed	EMERSON A	Heid	North Loop	Completed
POLVO	Ron Quillo	Dead End	Completed	HACIENDA A	Hunter	Ameca	Completed
VAN HASELEN	Lasso	Pendale	Completed	WENDA C	Franklin	Rosedale	Completed
NEW HAVEN A	Lasso	Roseway	Completed	WENDA B	San Jose	Rosedale	Completed
TRANQUILO A	Yarbrough	Dead End	Completed	HALF MOON	North Loop	North Loop	Completed
ALGERITA	Riverside	Hickory	Completed	ATKINSON	North Loop	Half Moon	Completed
BURGESS B	Yermoland	Courtland	Completed	ROSEMARY	San Jose	Wenda	Completed
LA PALOMA	Valley View	Valley View	Completed	SANTA MONICA	Giles	Venado	Completed
NEWLAND	Stanley	Atwood	Completed	LA PAZ A	Corozal	Santa Maria	Completed
CAPELLO	Blacks	McCamey	Completed	LA PAZ B	Santa Maria	Dead End	Completed
CHRISTY	Williamette	Yermoland	Completed	SANTA BARBARA	Mazatlan	Hacienda	Completed
FRANCINE	Williamette	Yermoland	Completed	SUMATRA	Ceylon	Album	Completed
RALPHEENE	Williamette	Yermoland	Completed	LEE TREVINO	i-10	Pellicano	Completed
BURNHAM A	Stanley	Lomaland	Completed	ALGIERS	Fir	Album	Completed
HAROLD	Starr	Dead End	Completed	COSMOS C	McRae	Debbie	Completed
FRAY	Williamette	Dead End	Completed	TAHITI	Heather	Bermuda	Completed
ESCADRILLE	Fray	Lafayette	Completed	HONOLULU A	Montwood	Wedgewood	Completed
SAN PAULO A	La Paz	Yarbrough	Completed	HONOLULU B	Wedgewood	Leewood	Completed
MONTERREY C	Giles	Yarbrough	Completed	INDEPENDENCE	Yarbrough	Whittier	Completed
YARBROUGH K	Alameda	North Loop	Completed	ROJAS K	Pendale	George Dieter	Fall 2019
VENADO B	Ranchland	Hermosillo	Completed	CORK B	Album	Zanzibar	Winter 2019/20
VENADO C	Hermosillo	San Paulo	Completed	MONACO	Montwood	Woodside	Winter 2019/20
LEE TREVINO J	Gateway East	Yermoland	Completed	TOMWOOD A	Sumac	Trawood	Winter 2019/20
LEE TREVINO K	Yermoland	Castner	Completed	DALE DOUGLAS C	Bob Mitchell	Vista del Sol	Winter 2019/20
LEE TREVINO L	Castner	North Loop	Completed	ALCAZAR	Lomaland	Dead End	Winter 2019/20
HERMOSILLO A	La Paz	Yarbrough	Completed	VISTA REAL A	Trawood	Janway	Winter 2019/20
HERMOSILLO B	Ameca	Santa Barbara	Completed	ALLEN BRADLEY	James Watt	Wilkenson	Winter 2019/20
HERMOSILLO C	Hunter	Ameca	Completed	LOMALAND D	Pellicano	Gateway East	Winter 2019/20
SANTA MARIA	Giles	Dead End	Completed	VISTA LOMAS B	Vista De Oro	Vista del Sol	Winter 2019/20
SONORA	Veracruz	Dead End	Completed	YARBROUGH	Various	Various	Winter 2019/20
VERACRUZ	Ladera	Giles	Completed	ROJAS	George Dieter	Don Haskins	Fall 2019

72 Program Streets

60 Completed



# District 8 Programmed Streets

Future dates subject to change based on mobilization requirements of contractor

STREETNAME	From	To	Status	STREETNAME	From	To	Status
FRANKLIN	I-10	Durango	Completed	COEUR D ALENE	Olmos	Coeur D Alene	Spring 2018
SANTA FE	I-10	Main	Completed	OVERLAND B	Cotton	Campbell	Spring 2018
POPLAR	Grant	School gates	Completed	CHARL ANN C	Shorty	Sunset	Spring 2018
DETROIT	Murchison	Arizona	Completed	CORVENA	Swan	Fair Lawn	Spring 2018
POPLAR A	Pershing	Missouri	Completed	LESLIE WARD	Boy Scout	Dead End	Spring 2018
ROSEWOOD	Arizona	Missouri	Completed	MONTOYA F	Country Club	Medowlark	Spring 2018
OCTAVIA A	Cliff	Arizona	Completed	OLEANDER	Love	Dead End	Spring 2018
OCTAVIA C	Magoffin	Dead End	Completed	THRUSH	Warbler	Crane	Spring 2018
SILVERBELL	Kingswood	Dead End	Completed	WESTCITY	Executive Center	Waymore	Spring 2019
COLUMBINE	Country Club	Camino Real	Completed	COLINA ALTA	Fountain	Dead End	Summer 2018
KINGSWOOD	Silverbell	Dead End	Completed	BLACKSTONE	Roxbury	Frontera	Summer 2018
VISTA GRANDE	Country Club	Country Club	Completed	J C MACHUCA	Sunland Park	Dead End	Summer 2018
AVILA	Lombardy	Avila	Completed	PACIFIC	Hidden	Doniphan	Summer 2018
BALLERINA	Sunset	Dead End	Completed	PALO VERDE	Maguey	Rio Flor	Summer 2018
BELTON B	Fiesta	De Leon	Fall 2018	BELTON A	Monarch	Fiesta	Summer 2018
BENEDICT	Perth	Hookheath	Fall 2018	CASTILE A	Belton	Marcena	Summer 2018
HOOKHEATH	Roxbury	Benedict	Fall 2018	WESTVIEW	Heath	Belton	Summer 2018
MEADOWLARK A	Vist Del Monte	Rosinante	Fall 2018	MARDI GRAS	Carousel	Dad End	Summer 2018
PERTH	Riverbend	Benedict	Fall 2018	RUBIN A	Suncrest	Corousel	Summer 2018
RIVER BEND	Frontera	Sunset	Fall 2018	BEL MAR	Fiesta	Cabrillo	Summer 2018
BIRCH	Grant	Wyoming	Fall 2018	CIRCUS	Mardi Gras	Dead End	Summer 2018
EIGHTH A	Oregon	Ochoa	Fall 2018	DALLAS B	San Antonio	Dead End	Summer 2018
FOURTH B	Park	Coles	Fall 2018	COMANCHE	Tobin	Cortez	Fall 2019
NINTH	Park	Campbell	Fall 2018	DOLAN A	Paisano	Sagrado	Fall 2019
SAINT VRAIN D	Olive	Dead End	Fall 2018	LAREDO	Boone	Dead End	Fall 2019
BROWN D	Arizona	Mossouri	Fall 2018	MARTINEZ	Delta	Laredo	Fall 2019
CALIFORNIA A	Mesa	Los Angeles	Fall 2018	DUNNE	Washington	Dead End	Fall 2019
CORTO	Yandell	Prospect	Fall 2018	FINDLEY B	San Antonio	Dead End	Fall 2019
HEISIG	Prospect	Sun Bowl	Fall 2018	LINDEN	Alameda	Dunne	Fall 2019
UPSON A	Heisig	Fewel	Fall 2018	FRANCIS	Flower	Terminus	Fall 2019
UPSON B	Fewel	Prospect	Fall 2018	FOUNTAIN B	Snow Heights	Mesa	Summer 2019
GEORGIA	Cliff	Dead End	Spring 2018	RESLER	High Ridge	White Cliffs	Fall 2019
BRIARWOOD	Coeur D Alene	Sunset	Spring 2018				

65 Program Streets

14 Completed



# Street Resurfacing Public Outreach

## Citizen Notification

- **Arterial Streets** – 30 days prior to commencing work – every business along an arterial street to be paved will be visited by staff to explain the resurfacing and concrete work to be done, general timelines, contact information for project questions and a written general scope of the project.
  - Where required message boards will be placed for advance notice to travelling public
  - A City staff inspector is always onsite while contractors are working to handle public concerns and oversee contract work
- **Residential Streets** – Distribution of fliers on doors no less than 48 hours in advance to notify residents of impending concrete/paving work; barrels set up no less than 48 hours in advance to identify where parking restrictions will be in effect (people can park in front of their houses outside of working hours but intent is to not block work crews for concrete/paving work)
  - A City staff inspector is always onsite while contractors are working to handle public concerns and oversee contract work



# Street Resurfacing Public Outreach

## Weekly Construction Report

- **Streets and Maintenance Weekly Construction Report** – Department sends a weekly report to PIO Office, CID management, and DCM Public Works identifying the locations where work will be done the next week and a four week look ahead of expected street work locations pending.

Street Resurfacing				
Dist	STREET NAME	FROM	TO	Status
4	Crenshaw	Yellowstone	Tropicana	Milling / Paving
4	Thor	Crenshaw	Winthrop	Milling / Paving
4	Blythe	Yellowstone	Winthrop	Milling / Paving
4	Sara Anne	McCombs	Terminus	Milling / Paving
4	John Cunningham	Martin Luther King	Andrew Barcena	Milling / Paving
8	Georgia	Cliff	Murchison CDS	Concrete
8	Overland	Cotton	Campbell	Substantially Complete
8	Coeur d Alene	Olmos	Coeur d Alene	NTP Issued
8	Briarwood	Sunset	Coeur d Alene	NTP Issued
1	Oneida	Medano	Redd	NTP Issued
1	Pawnee	Iroquis	Dead End	NTP Issued
1	Roxanna	Ridge	Marietta	NTP Issued
Roadway Structures				
3	Marlow	Clark	Trowbridge	Milling / Paving

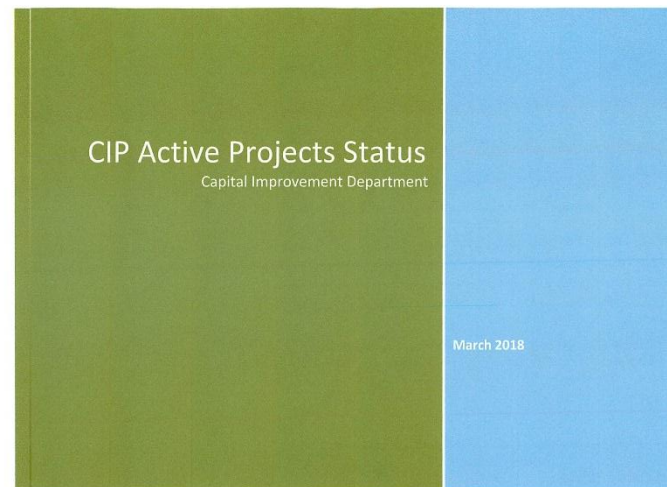
Example of the work site locations identified for week of March 26 to 30; these are sent Thursday afternoons weekly



# Street Resurfacing Public Outreach

## Monthly Report

- **CIP Active Project Status Report** – Department sends CID information on resurfacing projects to be included in the CID monthly report; there is a standing section of the capital projects report for the resurfacing program.
- Working with PIO to explore other outreach options; social media and other outlets





# Pavement Condition Index Assessment

## City Council Work Session

### PCI Assessment

- Establish Pavement Management Program based on best practices
- Data collection, including field data and image capture for all roadways
- Pavement condition evaluation with new rating for each roadway
- Develop new database and viewer
- Combine data with best practices
- Final report and City Council presentation
- ADA ramp inventory
- Schedule – completion in August 2018



# Pavement Condition Index Assessment

## City Council Work Session

### Next Steps

- Data Analysis (snapshot of our current conditions)
- PCI Assessment Final Report
- City Ordinance Revisions
- Funding – Street Maintenance



# Pavement Management

Texas A&M Transportation Institute

# **Pavement Management Concepts and Precepts**



**Mr. Tom Freeman**

**Texas A&M Transportation Institute**

**Texas A&M University**



# Outline

- ⌘ What Pavement Management Can Do For You
  - ⌘ Pavement Management Concepts
  - ⌘ Requirements of PSMS to Support Decision Making
  - ⌘ Close
- 
- ⌘ First, a Little Introduction

# Good Roads Cost Less than Bad Roads



⌘ Over the long term

# Good Roads Cost Less than Bad Roads

⌘ Over the long term

⌘ If a reasonable level of service is provided

# Good Roads Cost Less than Bad Roads



- ⌘ Over the long term
- ⌘ If a reasonable level of service is provided
- ⌘ If the pavement will respond to PM

# Pavements Must be Designed



- ⌘ Many older pavements not designed
- ⌘ Many agencies have large backlogs of work

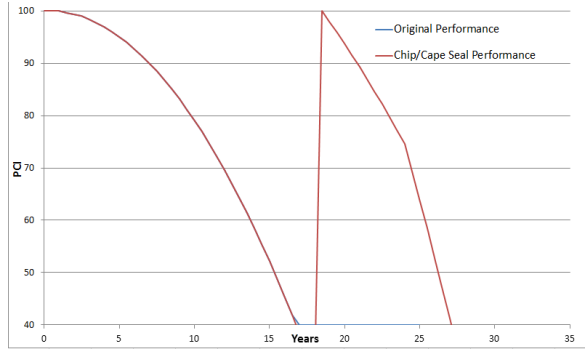
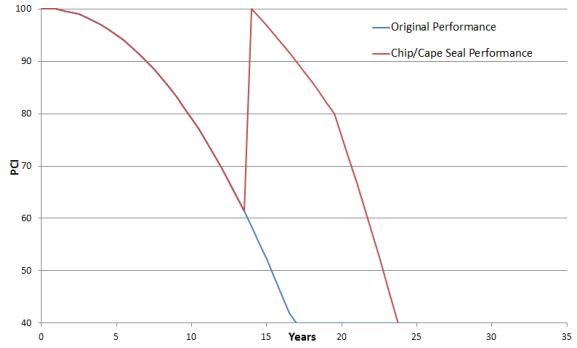
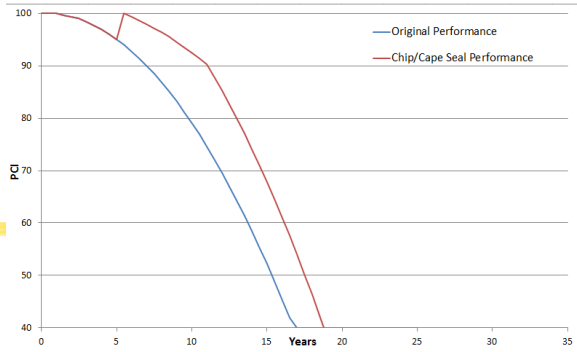
# Pavement Management is a Decision Making Process



⌘ Find cost-effective treatments

# Pavement Management is a Decision Making Process

- ⌘ Find cost-effective treatments
- ⌘ At designated times



# Pavement Management is a Decision Making Process

- ⌘ Find cost-effective treatments
- ⌘ At designated times
- ⌘ Give a desired level of service

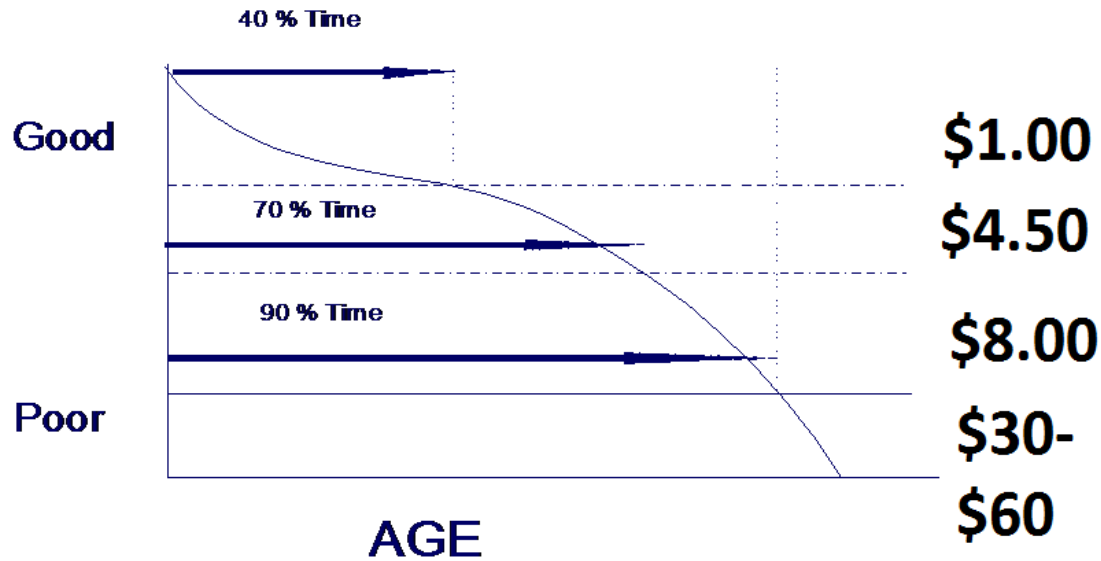
# Must Address Two Issues



- ⌘ Must Maintain Good Roads
- ⌘ While Repairing Poor Roads

# Condition versus Cost

## Pay me now or pay me later



# We Need Your Help and Guidance

⌘ Most cost-effective plan

☑ Fix “Best Roads First”

# We Need Your Help and Guidance

⌘ Most cost-effective plan

☑ Fix “Best Roads First”

⌘ Result

☑ Overall condition goes up

☑ Grief

# We Need Your Help and Guidance

⌘ Least cost-effective plan

☑ Fix "Worst Roads First"

⌘ Result

☑ Scores go down

☑ No Grief

# Things PMS Can Support

- ⌘ Determine work category and funds needed
- ⌘ Prioritize work
- ⌘ Show impact of different strategies
- ⌘ Identify projects for funding

# End of Overview



# Network-Level Elements



- ⌘ Inventory
- ⌘ Condition Assessment
- ⌘ Determination of needed work & funds
- ⌘ Identification of candidate projects
- ⌘ Determine impacts of funding alternatives
- ⌘ Feedback

# Inventory



⌘ What agency is responsible for

⌘ Where it is located

⌘ Basic information

# Condition Assessment

⌘ Health of individual segments

☑ Engineering

☑ Functional

☑ Safety

⌘ Collectively define health of network

# Determination of Needs

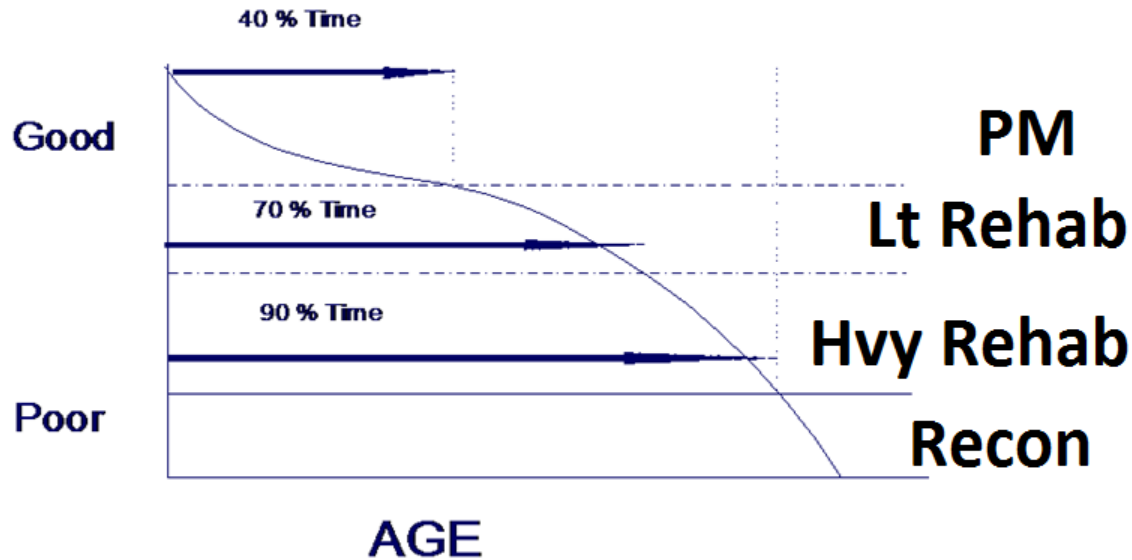
- ⌘ Projects condition without treatments
- ⌘ Identifies sections needing work
- ⌘ Projects condition with treatments
- ⌘ Estimates funds needed to provide desired service

# Needs Analysis

- ⌘ Identify sections needing work
- ⌘ Estimate funds needed
- ⌘ Rehabilitation - Condition driven
- ⌘ Preventive Maintenance
  - ⊞ Minimum condition &
  - ⊞ Time interval

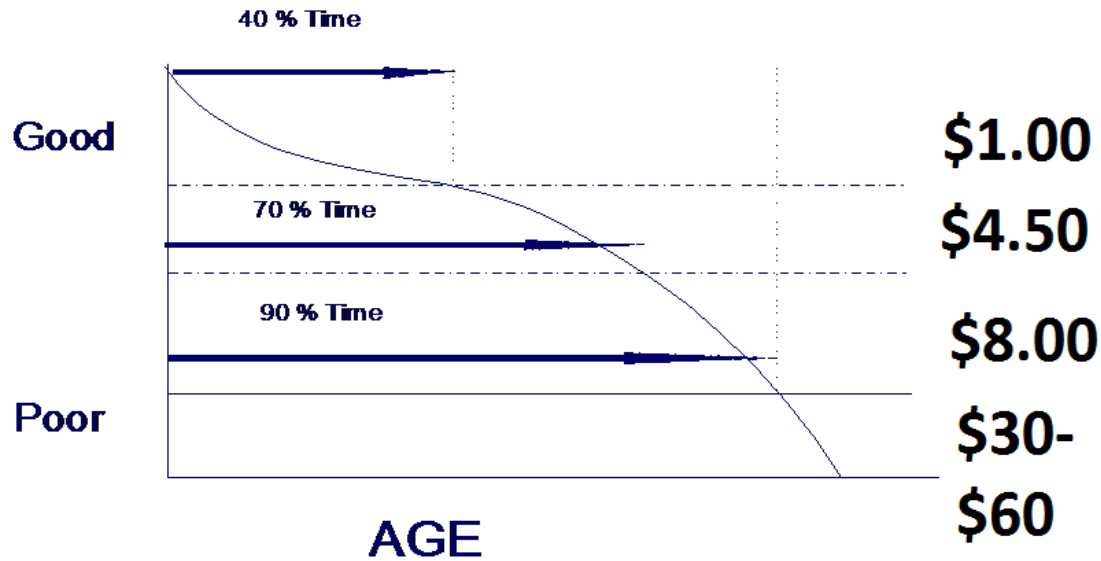
# Condition versus Cost

## Pay me now or pay me later



# Condition versus Cost

## Pay me now or pay me later



# AC Pavement Treatment Life

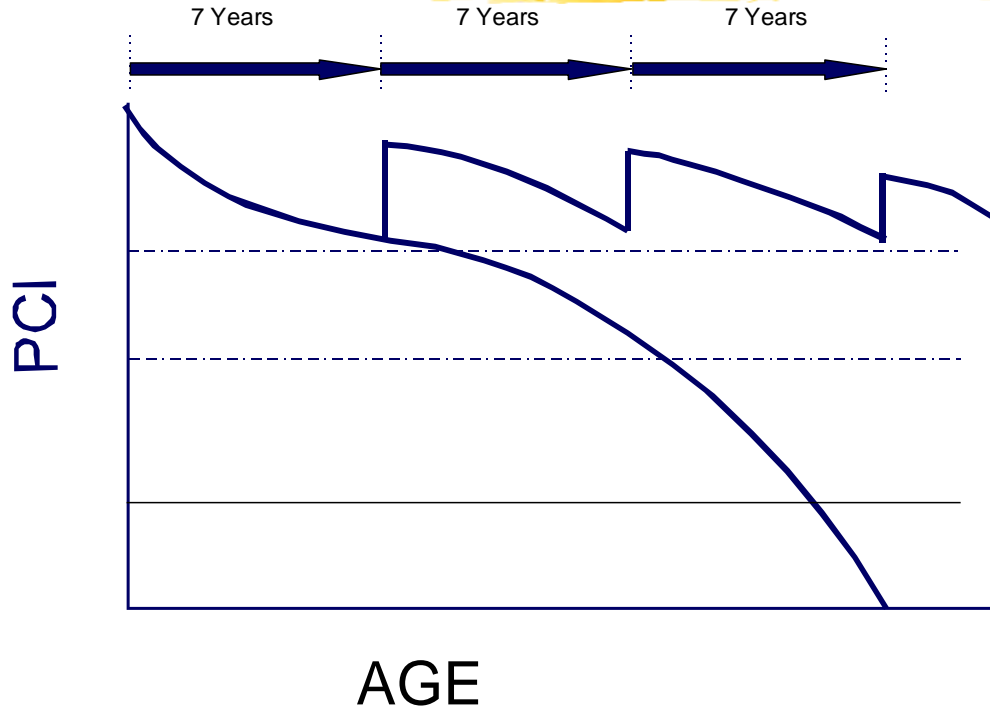
Treatment	Ave Life	Cost
Crack Fill (no routing) <sup>1</sup>	3	\$0.75/LF
Crack seal (with routing) <sup>1</sup>	4	
Slurry seal/micro <sup>1,2</sup>	5	\$2.50/SY
Chip seal <sup>1,2</sup>	6	\$2.50/SY
Cape Seal <sup>2</sup>	6	\$2.75/SY
Patching <sup>1</sup>	5	\$50/SF
Asphalt overlay <sup>3</sup>	11	\$4.00/SY
Mill+asphalt overlay <sup>3,4</sup>	15	\$7.50/SY
Reconstruction <sup>4</sup>	30	\$50/SY

1- PM, 2-Lt Rehab, 3 – Hvy Rehab, 4 - Reconstruction

# PCC Pavement Treatment Life

Treatment	Ave Life	Cost
Crack/joint seal	6	\$1.75/LF
Partial-depth repair with PCC	10	\$100/SY
Partial-depth repair with AC	7	\$100/SY
Full-depth repair	14	\$100/SY
Cross-stitching	7	\$30/dowel
Dowel bar retrofit	12	\$30/dowel
Slab stabilization	8	\$130/SY
Slab jacking	9	\$130/SY
Grind/Groove	15	\$3.50/SY
Reconstruction	30	\$100/SY

# Effect of Preventive Maintenance



# Needs Results



- ⌘ List of sections needing work
- ⌘ Approximate funds needed
- ⌘ Based on your goals

# Prioritizing Candidate Projects

- ⌘ Considers effect of available funds
- ⌘ Prioritized (Ranked) listings of projects needing work
- ⌘ Goal - best pavement network over time for available funds

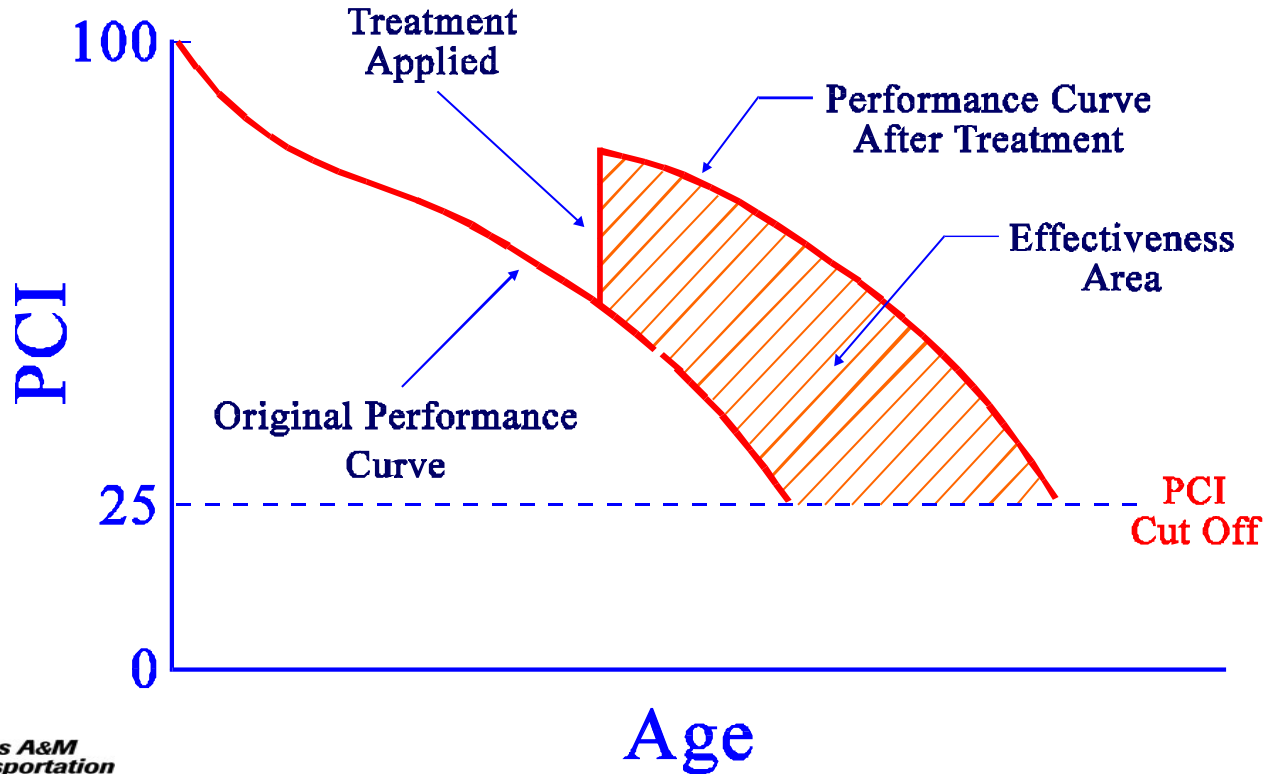
# Prioritizing Candidate Projects

- ⌘ Considers effect of available funds
- ⌘ Prioritized listings of projects needing work
- ⌘ Goal - best pavement network over time for available funds

# Prioritization Concepts

- ⌘ Worst first - weighted for traffic
- ⌘ Least life-cycle costs
- ⌘ Best benefit-cost ratio
- ⌘ Best effectiveness-cost ratio

# Effectiveness Explained



# Prioritization Results

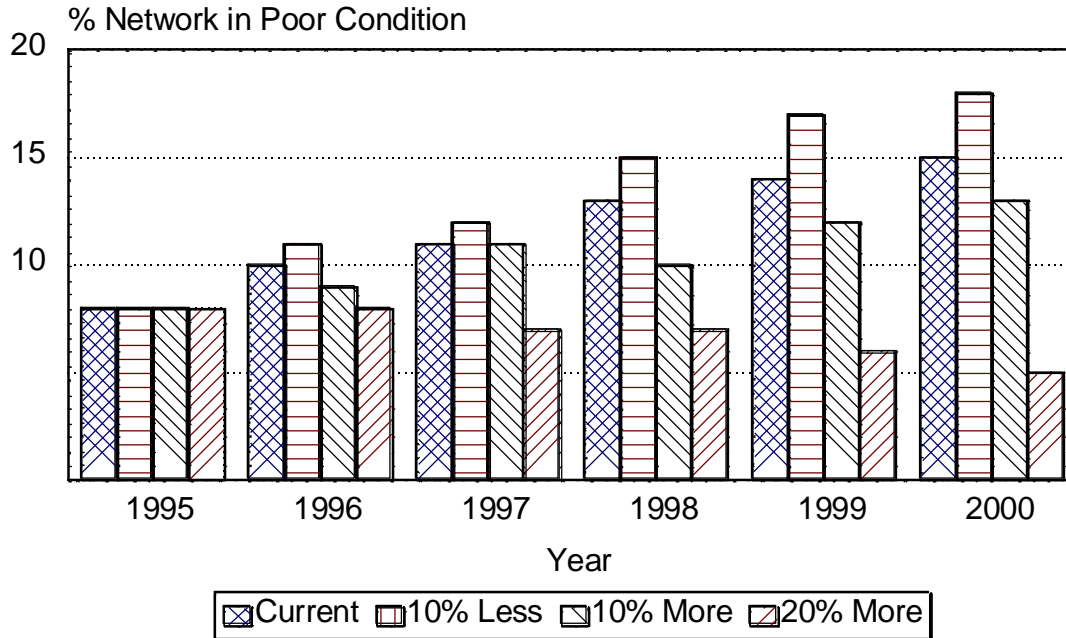


⌘ Ranked listings of candidates for funding

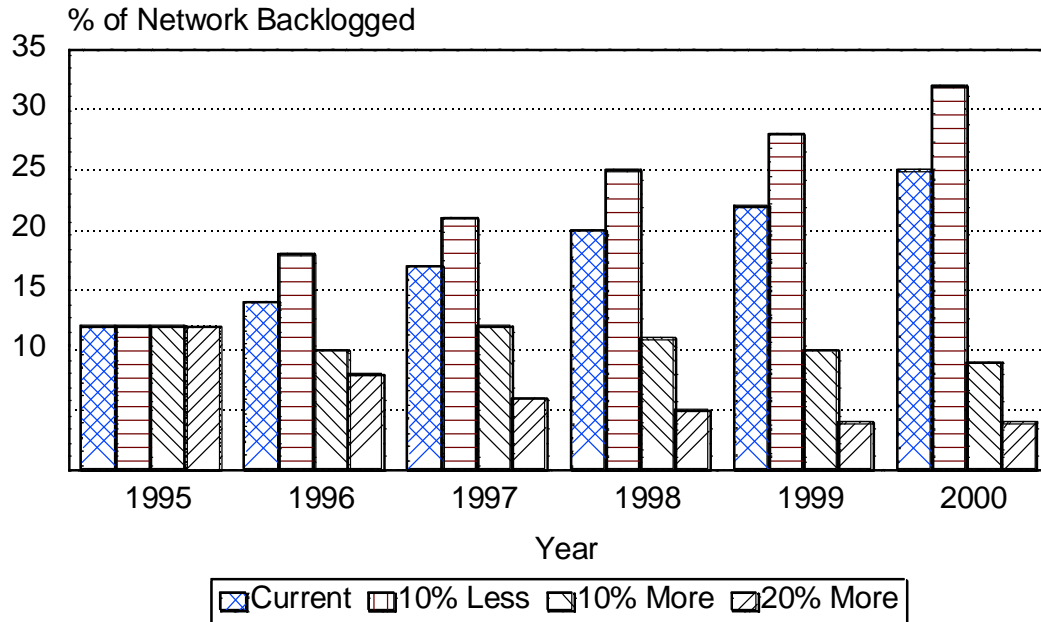
# Impact of Funding Alternatives

- ⌘ Connect PMS to funding decisions
- ⌘ Justify fund requests
- ⌘ Support of allocation decisions
  - ☑ Fix worst first
  - ☑ Apply PM

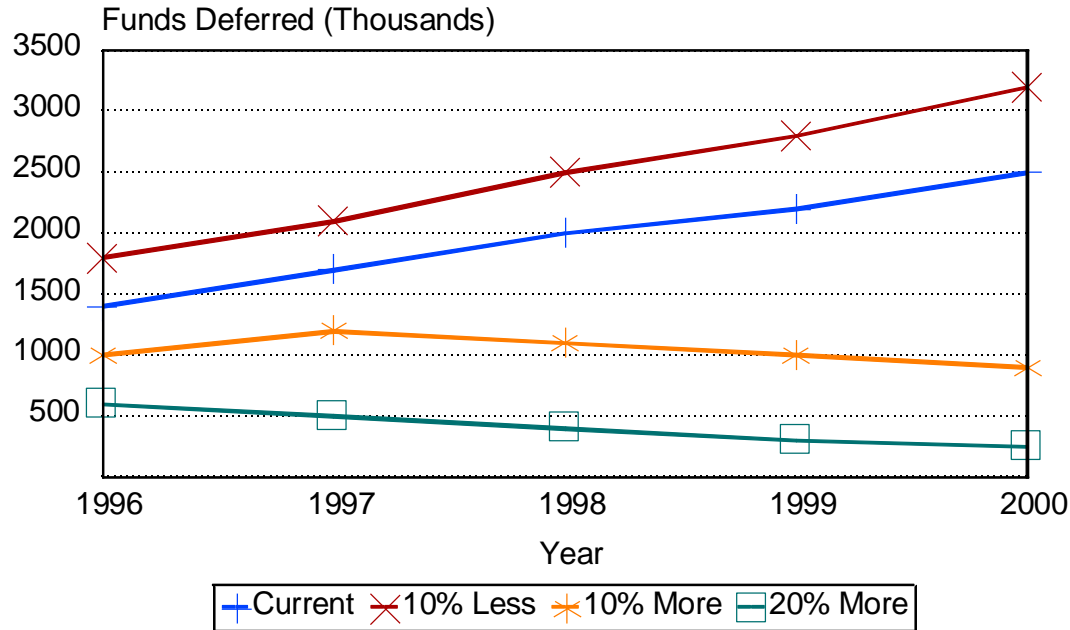
# Example Impact Analysis - Condition



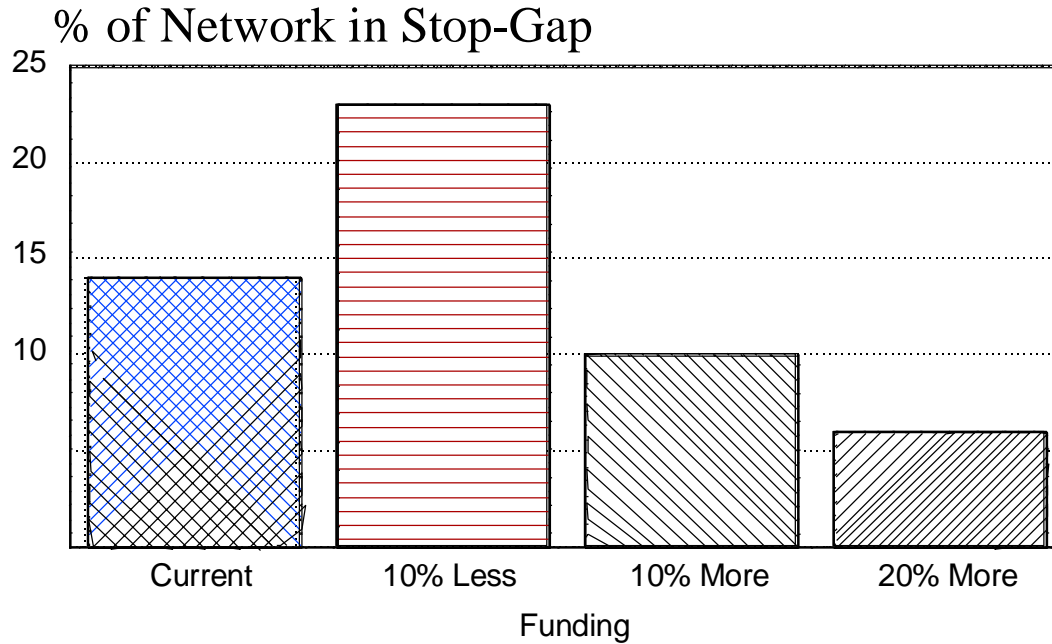
# Example Impact Analysis - Backlog



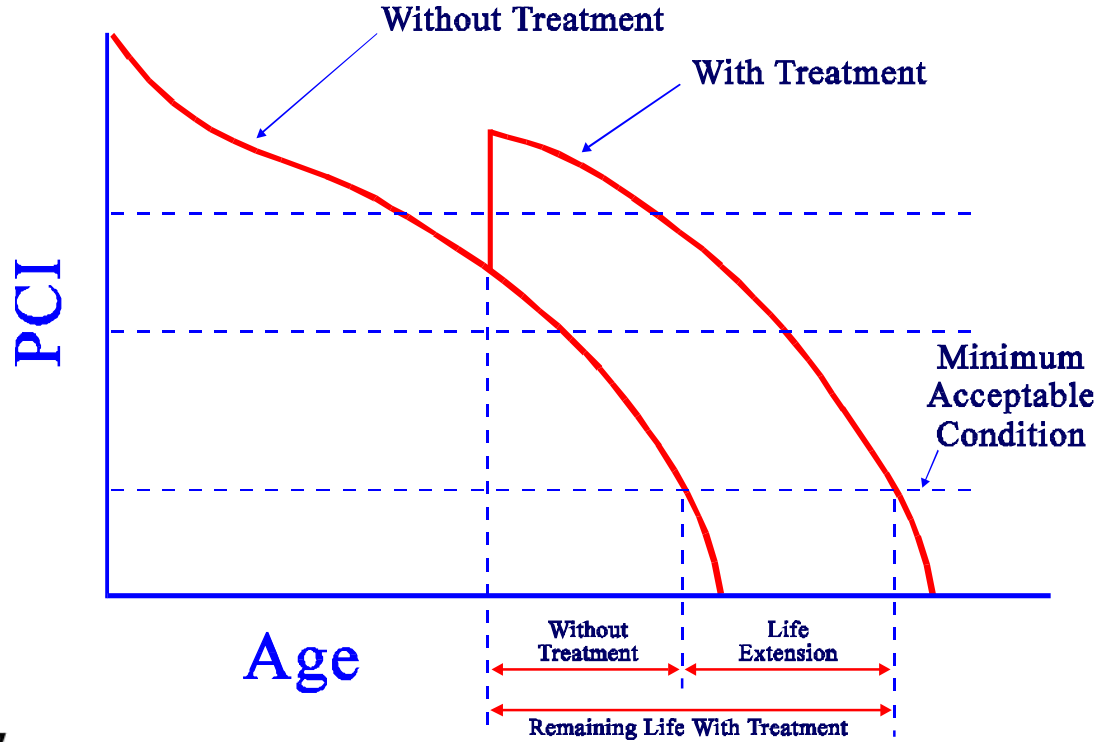
# Example Impact Analysis – Deferred Funding



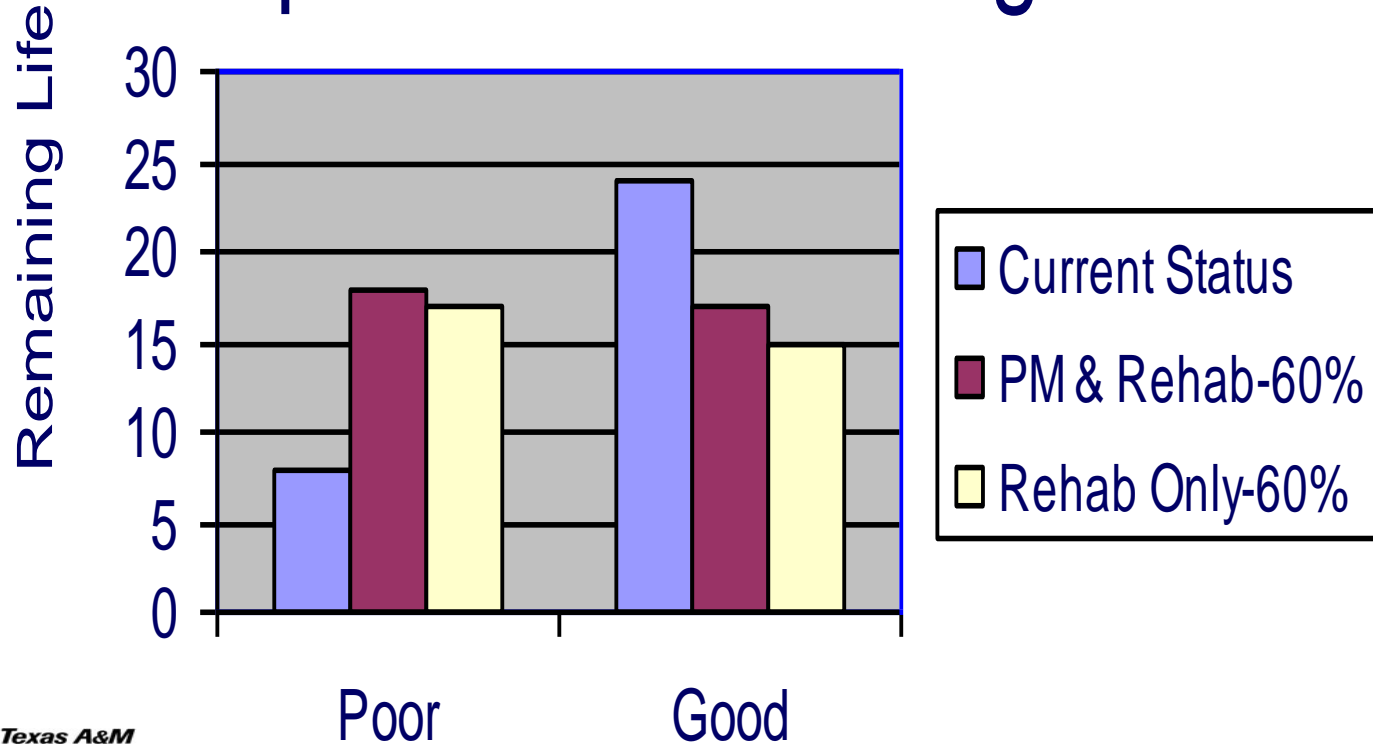
# Example Impact Analysis – Stop Gap



# Remaining Life



# Impact on Remaining Life



# Results of Impact Analysis

⌘ Ability to look at different funding scenarios

☑ Different funding levels

☑ Different allocation approaches

☑ Different approaches to treatment

⌘ Answer “what if?”

# Feedback System

- ⌘ PMS learns from past
- ⌘ Improve reliability
- ⌘ Update cost estimates
- ⌘ Update projection procedures (performance curves)

# PMS Management Levels

- ⌘ Network - planning & programming for the entire set of pavements managed
- ⌘ Project Selection - programming a subset
- ⌘ Project - designing a specific section

# Purpose of Network-Level

- ⌘ Related to the budget process
- ⌘ Identify maintenance and rehabilitation needs
- ⌘ Show impact of funding options
- ⌘ Communicate with funding authorities

# Project-Selection Level

- ⌘ Finalize candidate project list
- ⌘ Add & Remove projects
- ⌘ Adjust limits
- ⌘ Adjust dates
- ⌘ Consider constraints

# Project-Selection Requires

- ⌘ Additional data
- ⌘ More analysis of alternative treatments and strategies
- ⌘ Additional work
- ⌘ Better cost estimates
- ⌘ Construction packages
- ⌘ Contract packages

# Purpose of Project-Level

⌘ Develop cost-effective strategy for:

☑ Original construction

☑ Maintenance

☑ Rehabilitation

☑ Reconstruction

⌘ Within imposed constraints

# Project-Level Requires

- ⌘ Design procedures
- ⌘ Detailed data
- ⌘ Cause of deterioration or Need
- ⌘ Alternative strategies
- ⌘ Cost & life estimates for each
- ⌘ Life-cycle costing
- ⌘ Consideration of constraints

# Differences in Data

## ⌘ Network-Level

- ☑ Enough to identify best group of candidate sections & funding impacts

## ⌘ Project-Selection Level

- ☑ Enough to compare preliminary alternatives for some sections

## ⌘ Project-Level

- ☑ Detailed data needed to complete design

# Benefits



- ⌘ More efficient use of resources
- ⌘ More accurate information
- ⌘ Improved communication
- ⌘ Improved credibility
- ⌘ Ability to justify & secure funding
- ⌘ Satisfaction

# Cautions



- ⌘ Data must be kept current
- ⌘ Agency personnel must operate PMS
- ⌘ PMS **must support the agency's decision making process**

# What Do You Need to Do This?

⌘ Pavement Management

⌘ Decision and commitment to carry through

# Pavement Management is a Decision Making Process

- ⌘ Find cost-effective treatments
- ⌘ At designated times
- ⌘ Give a desired level of service

# Pavement Management Systems or Software (PMS)

- ⌘ Decision support tools
- ⌘ Store data and provide information
- ⌘ Help make cost-effective decisions

# As Implemented, PMS Addresses

⌘ Programmed (Preventive) Maintenance

⌘ Rehabilitation

⌘ Reconstruction

***Of Existing Pavements & Road Surfaces***

# Summary



- ⌘ PMS can provide decision support information
- ⌘ PMS is a decision support tool needed for this process
- ⌘ PMS used must be selected that provides decision support needed

# Sealing and Filling Cracks in AC Pavement



Illustration of Crack Routing, Cleaning, and Sealing

Crack sealing is a maintenance technique that cleans cracks and seals them with a rubberized bituminous compound. The crack sealing typically includes routing of the crack to create a reservoir for the sealant at the top of the crack, as shown in the illustration above. Crack sealing without routing is called crack filling. Crack filling is not as cost-effective as crack sealing and is easily damaged by snow plows. This Fact Sheet concentrates only on crack sealing. The purpose of crack sealing is to prevent water from entering the pavement structure and damaging it. Crack sealing is most effective in a wet-freeze environment. It is applied to “working or active” cracks. These cracks change in width during the year because of temperature changes, and include both transverse cracks and longitudinal cracks. Infiltrated water, together with the effect of freeze-thaw cycles and pavement loads, leads to heaving of the cracks and to the deterioration of the pavement structure beneath the crack. The additional benefit of sealing is the prevention of spalling and raveling of unsealed crack edges. Crack sealing is typically done soon after transverse and longitudinal cracks develop, often when the pavement is 2 to 5 years old. At that time, the crack pattern would be well-developed and the crack would reach the width of 0.1 to 0.4 in. at moderate temperatures. T

# Sealing and Filling Cracks in AC Pavement

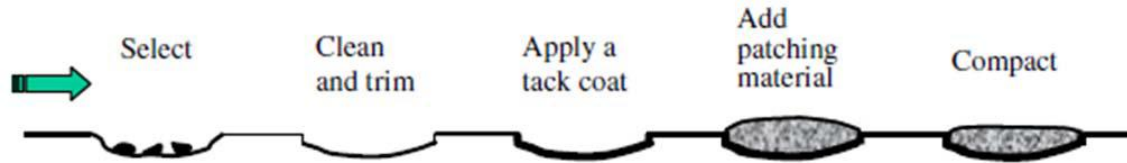
The initial crack sealing is typically followed by a second sealing carried out when new cracks appear or when the original sealant no longer works, often after another 3 to 5 years. Crack sealing is most cost-effective for thick AC pavements. It is typically not cost-effective for thin AC pavements with the total thickness of the AC layer less than 3 in. Thin pavements tend to develop many secondary cracks that cannot be effectively sealed or filled.

There are many AC sealants on the market and their performance can differ significantly. Hotpoured rubberized bituminous sealants are most often used. Some agencies are not satisfied with the existing specifications for sealants (e.g., ASTM D6690 or AASHTO T187-60) and have modified them.

The reservoir for the sealant at the top of the crack is created by a router. The opinions regarding the size and shape of the most effective reservoir differ. It is generally agreed that routs with greater width than depth and a rectangular shape are preferable. The routed crack is typically cleaned before sealing. The sealant is heated in a double-jacketed kettle to avoid exposure of the sealant to direct heat. It is important to avoid overheating or re-heating the sealant, and dispersing the sealant into the crack by a device (a pump wand) that maintains the sealant at a desired temperature. Because the sealant shrinks after the installation and cooling, the hot sealant is installed “proud” of the surface.

Until the sealant hardens and there is no danger that it will be picked up by passing tires, it is covered by a bond-breaking material such as sawdust or flour. The use of cement or mineral dust is typically avoided. Occasionally, it is necessary to seal cracks wider than 30 mm. These cracks can be temporarily repaired by fine aggregate hot mix or liquefied patching materials similar to a slurry material.

# Small-Area Patching



The Sequence of Operations for Small Patching Repairs

Small-area patching is a maintenance treatment that includes placing and spreading of bituminous mixtures, hot or cold, to repair potholes and other pavement distresses without the use of mechanical pavers or graders. The illustration shows the sequence of operations. The patching with hot mix or cold mix can be used for both bituminous pavements and PCC pavements; however, permanent repairs of PCC pavements are typically done using PCC material. If pavers or graders are used, the treatment is called machine patching and is described on a separate Fact Sheet.

Small-area patching is used to repair localized defects such as potholes, distortion resulting from utility cuts, and small areas with severe ravelling and/or alligator cracking. The repair of potholes such as the one shown in Figure B5 reduces pavement roughness and the rate of pavement deterioration by improving drainage and reducing dynamic traffic loads. The repairs may be permanent, semi-permanent, or temporary.

# Small-Area Patching

*Permanent repairs*—Permanent repairs are used on pavements that are in good condition to bring the life span of the repaired area in line with that of the rest of the pavement. Permanent repairs require the use of appropriate patching materials and techniques, with the goal of addressing the underlying cause of the defects being repaired. Unless the original cause for the pavement defects is corrected, the repairs are susceptible to early failure.

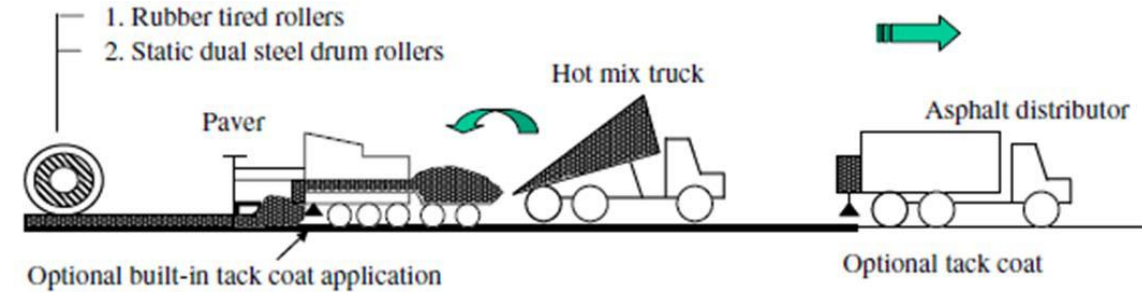
*Semi-permanent repairs*—Semi-permanent repairs have a typical life expectancy of one or two years. Usually, the area is not saw cut and may be repaired with cold mix.

*Temporary repair*—Temporary repairs are used to hold the pavement until it can be resurfaced or permanently repaired. They are also used as emergency repairs when the pavement condition may pose a hazard to airplane operations.

The main types of patching materials include hot mix, local or agency-specified cold mix, and proprietary cold mix. A tack coat, if used, is typically an emulsion diluted with additional water. Hot-mix AC patching material provides the most durable treatment. Some suppliers of proprietary cold patching mixes suggest that their products can achieve similar performance and that their products can be successfully applied to potholes containing water. Cold mixes with single-size aggregate may not perform well in relatively large repairs. The single-size aggregate mix has low stability and is susceptible to rutting and ravelling. Typically, small-area *permanent* patching repair includes the following steps:

- Removal of broken pavement material in the patch area by jack hammering, cold milling, and/or pavement sawing.
- Cleaning out loose material from the patch area by blowing or brushing.
- Applying a tack coat to provide a bond between the existing pavement and the patching material.
- Placing the bituminous mix into the patch area. If the patch area is deeper than 2 in., the mix is placed and compacted in lifts until the level of the surrounding pavement is reached.
- Compacting the mix with a steel or rubber-tire roller, a vibratory plate compactor, or a hand tamper. Depending on the size and depth of the repair, and the material used, the finished repair will have crown of 0.1 to 0.4 in.
- Sealing the joint between the patch and the original pavement with hot-poured crack sealant. Sealing is typically done for larger and deeper repair areas.

# Machine Patching of AC Pavement Using Bituminous Materials



Schematic of Machine Patching Operation

Machine patching of AC pavements is a maintenance technique that involves placing and spreading of premixed bituminous materials (hot or cold mix) using a mechanical paver or a grader on parts of a pavement section. As shown in the illustration, machine patching includes the application of tack coat, placement of the patching material, and compaction.

Typical applications of machine patching include repairs of localized areas of ravelling and segregation, alligator cracking, potholing, rutting, frost heaving, and subgrade settlement. The areas selected for patching are expected to be well-defined and separated by areas that are in good condition. If the areas requiring patching are closely spaced, it may be more cost-effective to resurface the entire section. Machine patching repairs can be divided into permanent and semi-permanent repairs:

# Machine Patching of AC Pavement Using Bituminous Materials

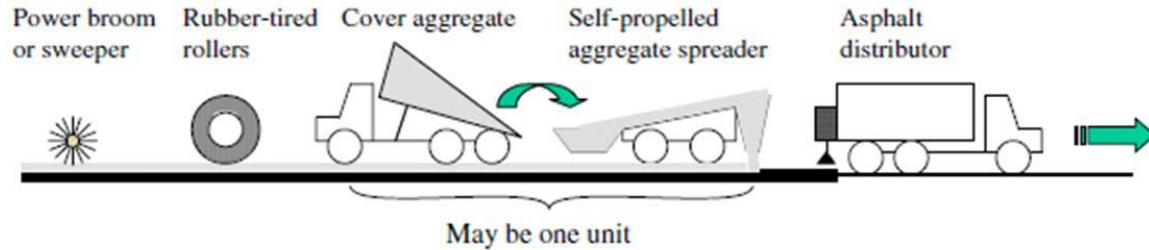
*Permanent repairs*—Permanent patching repairs can be used on pavements that are in good condition to bring the life span of the repaired area in line with that of the rest of the pavement. For example, if it is expected that the pavement being repaired will require resurfacing in 8 years, the patching repair could be done to also last approximately 8 years.

*Semi-permanent repairs*—Semi-permanent repairs have a limited life expectancy and are used typically when it is anticipated that the entire pavement will be resurfaced within a few years. To save costs, the extent of patching is limited and the patched area may not receive a tack coat. when it is anticipated that the entire pavement will be resurfaced within a few years. To save costs, the extent of patching is limited and the patched area may not receive a tack coat.

For permanent repairs, the same type of hot mix may be used for patching as that used for the surface of the existing asphalt pavement. Typically, permanent machine patching includes the following steps:

- *Structural repairs*—If the patch is over an area exhibiting structural weakness (e.g., alligator cracking, rutting, or depression and settlement) it may be necessary to remove some or all of the underlying base and subbase material. The granular base is restored and re-compacted. The additional pavement strength, if required, is achieved by replacing some part of the granular material with AC to avoid increasing the overall thickness of the pavement structure.
- *Removal of the deteriorated AC layer by milling*—Milling may be required to maintain pavement elevation or to provide a smooth transition between the original pavement and the patch. Figure B6 shows a construction detail for the start of a long patch.
- Application of a tack coat at the sides of the patch and over the entire patched area to improve the bond between the original pavement and the patch, and to minimize water infiltration.
- Placing of the mix. The placement is done by a paver. The material is placed in layers not exceeding 3 in. The minimum thickness of a permanent machine-placed patch is typically 1 1/4 in.
- Compaction of the patch area using rollers.
- Application of a sealant at the joint of the patch and the existing pavement. Resealing the joint if it opens in a few

# Surface Treatment (Chip Seal, Chip Seal Coat)



Schematic of Surface Treatment Construction Process

Surface treatment (also known as surface seal, seal, and chip seal) is the application of asphalt binder, immediately followed by an application of cover aggregate, to any type of pavement surface. A typical construction process is shown in the schematic. If the aggregate is of uniform size, the treatment is usually called chip seal. Typically, surface treatments are applied on top of a granular base producing surface-treated pavement. Surface treatments can be also applied to AC pavements as a preventive or corrective maintenance treatment.

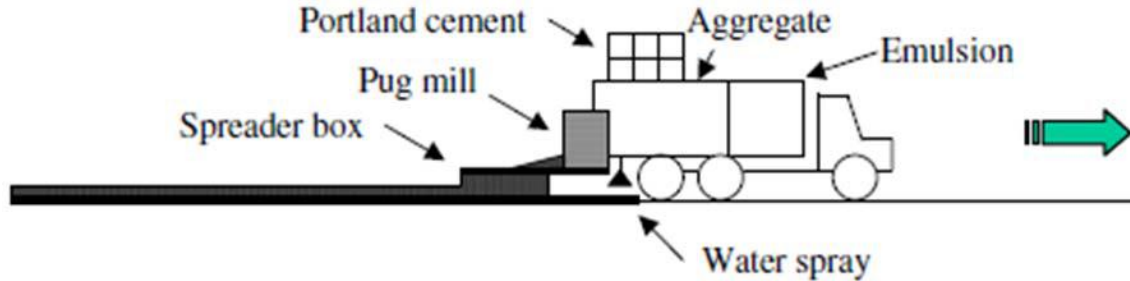
Surface treatments applied on top of AC pavements can be used as preventive or corrective treatments. As a preventive measure, surface treatment is primarily used to seal the surface showing non-traffic-load associated cracks and ravelling. As a corrective measure, surface treatment is used to restore frictional resistance and to maintain wearing surface on AC pavements. Surface treatments using polymer-modified emulsions have been used as crack relief layers between the existing AC surface and an AC overlay, or as stress relief layers between the existing PCC surface and an overlay.

# Surface Treatment (Chip Seal, Chip Seal Coat)

The surface on which surface treatment is applied is expected to have a uniform capacity to absorb emulsion. Active cracks, such as transverse and longitudinal cracks, can be sealed prior to application of the surface treatment. Typically, the asphalt binder used for surface treatment is asphalt emulsion applied at an elevated temperature (120°F to 180°F) using an asphalt distributor. The cover aggregate can be either chips (open-graded aggregate) or dense-graded. About 70% of the aggregate is typically imbedded or surrounded by the binder. The need for accurate application of the binder and aggregate cover is facilitated by modern asphalt distributors, which can automatically maintain selected application rates regardless of the distributor speed. Newly constructed surface treatments need to be protected from traffic for several hours after construction. Emulsion application rates for seal coats typically range from 0.2 to 0.4 gallon per square yard depending on the existing surface (granular, seal coat, or AC) and aircraft operations, and are further adjusted during construction according to weather conditions and other factors.



# Slurry Seal



Schematic of Slurry Seal Construction

Slurry seal is an unheated mixture of asphalt emulsion, graded fine aggregate, mineral filler, water, and other additives, mixed and uniformly spread over the pavement surface as slurry. The construction of slurry seal using a self-propelled truck-mounted mixing machine is illustrated by the above schematic. Slurry seal systems are formulated with the objective of creating a bitumen rich mortar.

They are similar to microsurfacing, but the mineral skeleton is typically not very strong and has limited interlocking of the aggregate particles. Consequently, slurry seals are applied in thin lifts to avoid permanent deformation by traffic. Slurry seals are used to correct surficial distresses such as raveling and coarse aggregate loss, seal slight cracking, and improve pavement friction. They are also used as a preventive maintenance treatment to seal pavement surfaces from intrusion of water and slow surface oxidation and ravelling. Slurry seals are best placed on structurally sound pavements that are in good condition with little or no cracking or rutting.

# Slurry Seal

Slurry seals perform best on surfaces with uniform characteristics. If defects such as moderate or severe ravelling, cracking, or rutting occur frequently, the section is probably not a good candidate for slurry sealing. Working cracks, such as transverse cracks, can be sealed either before or after the slurry seal application

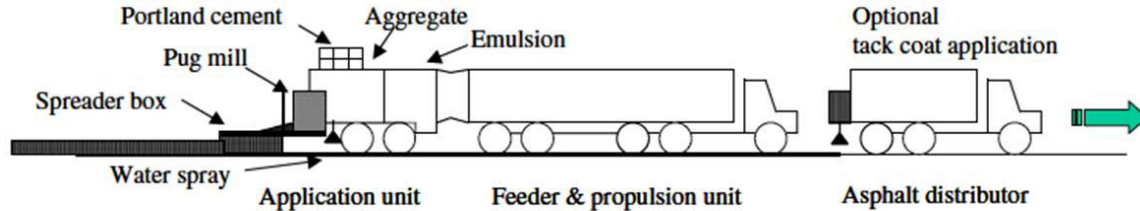
Asphalt emulsion used in slurry seals is typically cationic and contains about 60% to 65% of residual AC. The slurry mix contains 9% to 10% of AC. Coal tar-based emulsions that provide protection against fuel spills and oil leaks are also available in some markets.

Aggregate used for slurry seals is crushed high-quality dense-graded aggregate. Its gradation generally follows one of the three gradation types, Type I, II, or III, recommended by the ISSA. Type II gradation can be used for aprons and low-volume taxiways and Type III gradation for runways. Type III gradation has 70% to 90% of aggregate passing No. 4 sieve. Mineral filler, typically Portland cement or hydrated lime, is used to control curing time of the mix (break time of the emulsion). The amount of mineral filler is typically less than 1% of the total dry mix weight. The thickness of a slurry seal application is slightly more than the thickness of the largest aggregate particle in the mix, typically approximately 0.4 in. Some proprietary slurry seal mixes contain crushed aggregate particles and polymer-modified emulsion and may have strength and durability characteristics that are closer to a microsurfacing than to a traditional slurry seal.

The slurry seal mixture is supplied using a specialized equipment that carries all of the components of the mixture, accurately measures and mixes them in a pug mill, and spreads the mixture (by means of a spreader box linked to the mixing unit) in a strip 10 to 12 ft wide as a thin, homogeneous coat of slurry mix.

Slurry seals are typically carried out only during the warmer, dryer months. After the slurry seal application, traffic can use the pavement without restrictions (except 360 degree turns by aircraft) in approximately 45 to 120 min, depending on setting time of the asphalt emulsion, weather condition, and traffic conditions. Cooler temperatures and wetter conditions can result in long curing times during which the slurry seal can be damaged by traffic.

# Microsurfacing



Schematic of Microsurfacing Operation

Microsurfacing is an unheated mixture of polymer-modified asphalt emulsion, high-quality frictional aggregate, mineral filler, water, and other additives, mixed and spread over the pavement surface as a slurry. The construction of microsurfacing using a self-propelled truckmounted continuous-feed mixing machine is illustrated by the schematic above. The aggregate skeleton used for microsurfacing consists of high-quality interlocking crushed aggregate particles. Consequently, it is possible to place microsurfacing in layers thicker than the largest aggregate size, or in multiple layers, without the risk of permanent deformation.

Microsurfacing is used to correct surficial distresses such as slight block cracking, raveling and segregation, flushing, and loss of pavement friction. Because microsurfacing contains high quality crushed aggregate it is also used to fill in ruts and surface deformation to the depth of up to 1 3/4 in. Microsurfacing can also be used to extend the service life of the pavement until a more permanent restoration can be completed. As a preventive maintenance treatment it can be used to seal the surface of the pavement, protecting the pavement from water infiltration and greatly reducing the rate at which the existing AC surface oxidizes. Microsurfacing is also used on PCC pavements to improve or maintain frictional resistance and smoothness.

# Microsurfacing

Microsurfacing mix is always designed by a contractor or an emulsion supplier. Figure B2 shows a finished product a year after construction.

The ISSA recommends two types of gradations, Type II and Type III. The Type II gradation is finer, with 90% to 100% passing a 4.75 mm sieve. The Type III gradation is coarser with 70% to 90% of aggregate passing the No. 4 sieve size. A minimum thickness of microsurfacing mix using Type III gradation is 0.4 in. for a single course.

The surface on which microsurfacing is applied is expected to have uniform pavement condition. Areas that exhibit significantly more severe defects than the remainder of the section (e.g., raveling, cracking, or rutting) are repaired. The repairs can be made using an additional course of microsurfacing or by other means depending on the type, extent, and severity of the defects. On high traffic volume facilities, and/or when the surface of the pavement has minor distortions and/or has ruts exceeding approximately 1/4 in., two courses of microsurfacing are used. The first (scratch) course is intended to improve the profile of the pavement and the second course provides the wearing surface. Ruts exceeding 1/2 in. are typically filled with microsurfacing material using a rut-filling spreader box. After the microsurfacing application, traffic can use the pavement without restrictions in about 45 to 120 minutes, depending on setting time of the asphalt emulsion, weather, and traffic conditions. Microsurfacing is typically carried out only during the warmer, dryer months. Cooler temperatures and wetter conditions can result in longer curing times during which the microsurfacing can be damaged by traffic.



FIGURE B2 Microsurfacing texture one year after construction; diameter of the coin is 1 in.



# Funding Options for Street Repairs

# Funding Options for Street Repairs

- Large need
- Community priority
- Limited debt capacity (not sustainable)
- Critical need for dedicated source of funding

# Examples of Funding Options for Street Repairs

- Dedicate portion of local sales tax
- General Fund (“Pay-Go”)
- Street Maintenance Fee (also called Transportation User Fee)
- Generate additional revenue through current revenue sources

# Funding Options for Street Repairs

- Local sales tax
  - Must be approved by the voters
  - Expires every four years and requires voter approval for renewal
  - Examples include: Arlington, Grand Prairie, Haltom Park, Lake Worth, Pantego, and Samson Park

# Funding Options for Street Repairs

- General Fund (“Pay-Go”)
  - Council could increase property tax rate and dedicate to street repairs
  - Current and future obligations, primarily public safety and quality of life, will already result in future tax rate increases
  - Could potentially result in further negative impact if the State approves a property tax revenue cap

# Funding Options for Street Repairs

- **Street Maintenance Fee**

- Currently 9 Texas cities have a similar fee (Arlington previously)
- Multiple cities currently considering implementation
- Applies to residential and non-residential customers
- Typically is included on utility (water) bill
- Various fee structures being used (ex. flat fee, simple tiered, multiplier system)
- Exemptions for seniors and disabled

# Funding Options for Street Repairs

- Existing Revenue Sources
  - Staff to review existing revenue sources and present recommendation to City Council as part of budget process
  - Intent is to generate a dedicated source of revenue to begin addressing back log of repairs and maximize life cycle for current inventory
  - Priority is to minimize impact on homeowners