

# BARRIERS TO IN-PLACE RECYCLING

State Agency Discussions on why in-place recycling is not utilized more in your states.



# IN-PLACE RECYCLING IN SOUTH CAROLINA

Jim Garling, PE

Pavement & Technology Engineer

FHWA, South Carolina Division Office

Melissa Campbell, PE

State Materials Engineer

SCDOT Office of Materials & Research



# SCDOT Facts

- ▣ 41,459 Centerline Miles of Roads
- ▣ 89,976 Lane Miles of Roads
- ▣ 8,344 Bridges
- ▣ 4<sup>th</sup> Largest Highway in US
- ▣ 4<sup>th</sup> from Lowest Gas Tax
- ▣ Gas Tax Last Increased in 1987
- ▣ Approximately \$1.05 Billion in Funding
- ▣ About 4,500 employees

# State Animal?

▣ ...a Tiger ???



▣ ...a Gamecock ???



▣ ...a Nittany Lion ???



▣ NO, none of the above..... it's actually ---->



# SC State Animal Whitetail Deer





# SCDOT Facts

- ▣ 2010 Projects:
  - 278 Regular Letting
  - 45 ARRA Projects
- ▣ \$680 Million



# SCDOT's Experiences with In-Place Recycling

- ▣ Very limited experience using Cold-in-Place Recycling with asphalt emulsion
- ▣ Extensive experience with Full Depth Reclamation using Portland Cement





# SCDOT's Experience with In-Place Recycling

- ▣ First section of full depth reclamation with Portland cement constructed in 1997
- ▣ FDR with cement now done in 37 of 46 counties
- ▣ One district has done about 300 miles with FDR



# Full Depth Reclamation with Cement

## ■ For Calendar Years 2009-2011

■ Non-Federal Aid	104 CL Miles	\$28 M
■ Federal Aid	155 CL Miles	\$50M
■ ARRA	27 CL Miles	\$10 M

# Why We Chose In-Place Recycling

## ■ FDR with Cement

- Allows us to reclaim our investment
- Creates a uniform base material
- More cost effective than full depth patching and overlay





# Why In-Place Recycling is Not Utilized More in SC

- \$\$\$\$\$\$\$\$\$

- For Cold In-Place and Hot In-Place

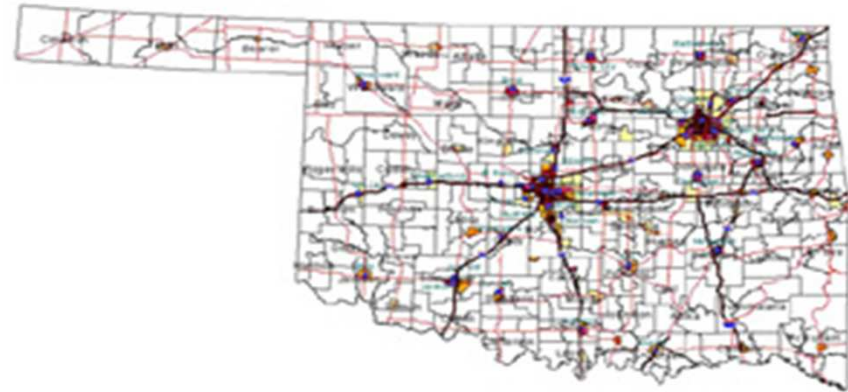
- Lack of experience
- Concerns with process suitability on our roads
- Success of FDR with Cement



▣ Questions?



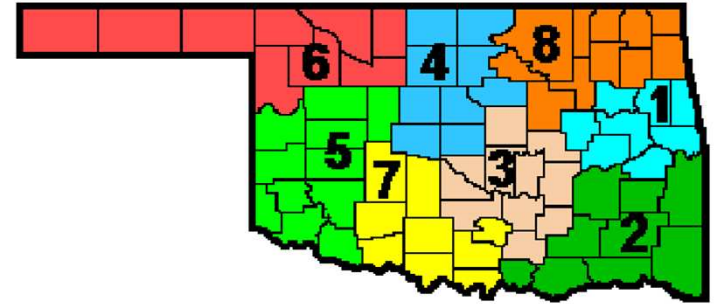
# In- Place Recycling Oklahoma



Taylor Henderson, P.E. (Oklahoma Department of Transportation)

Waseem Fazal, P.E. (FHWA- Oklahoma Division)

# Oklahoma- Facts



- Area-69,919 square miles –Ranked 20<sup>th</sup>
- Population 3,642,361 -Ranked 28<sup>th</sup>
- Oklahoma has 13,000 centerline miles (31,500 lanes miles) State highway system – 17<sup>th</sup> in Nation-miles maintained by SHA
- Interstates/ other NHS: 930/3,344 center line miles
- 77 Counties; ODOT has 8- Divisions- 25 Residencies

# Transportation Budget

- State Transportation Budget FY-2011: 1.46 billion (State \$737 million & Federal \$730 million)
- ARRA FY-2009: 464.75 million obligated
- State Maintenance Budget: \$150 million
- Pavement Preservation Program: Started in 2004, funding about \$30 million annually

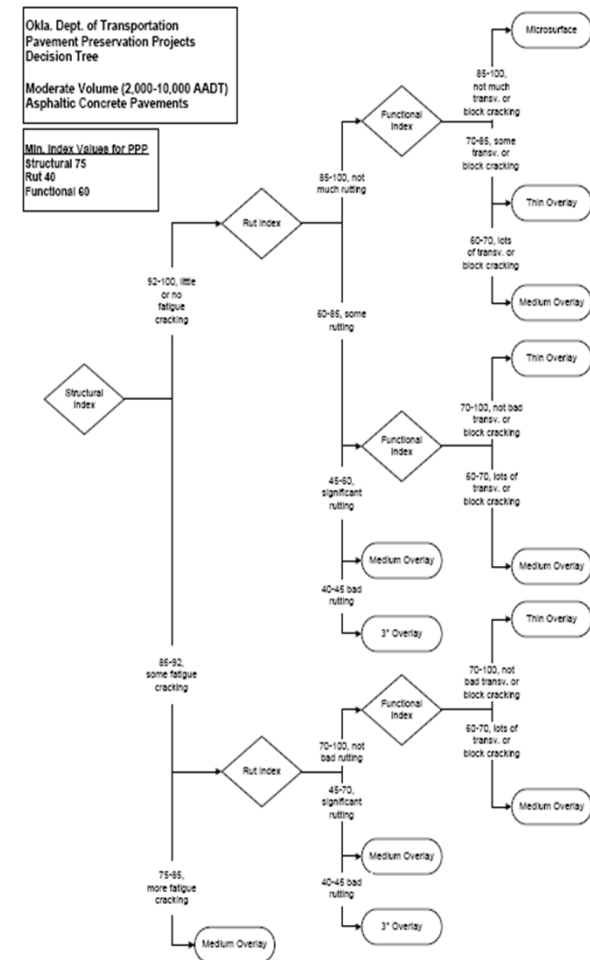


# In- Place Recycling- Options Projects- CIR

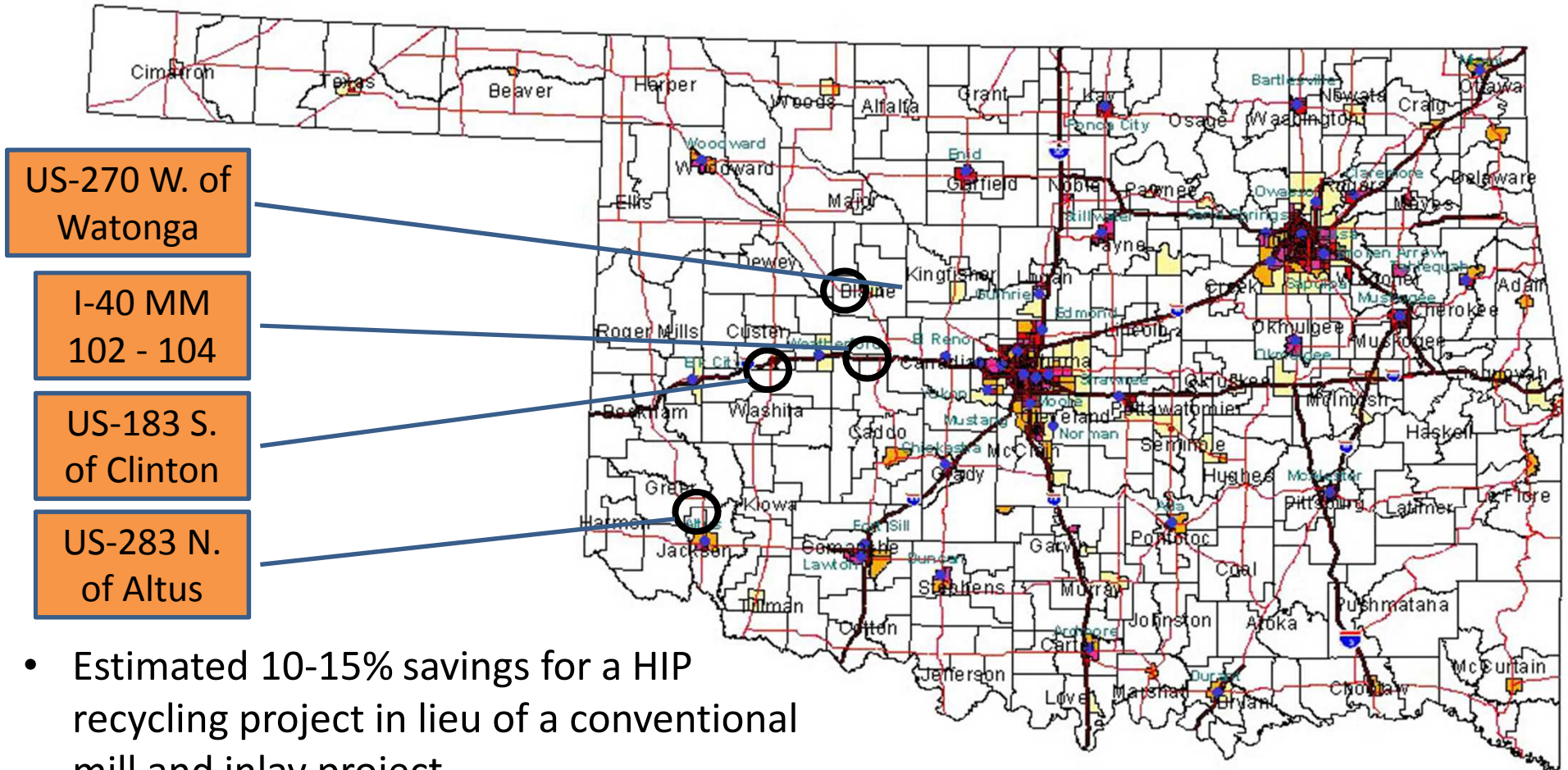
- US-412 Beaver & Harper counties (NW part of Oklahoma in pan handle)
- Major issue- Transverse cracking
- OSU(studied & evaluated CIR project with control - a typical rehab treatment of ODOT mill& overlay)
- Design: CIR+2"overlay **vs.** milled surface asphaltic fabric over crack+3" HMA overlay
- After 3 years- CIR performed better in mitigating transverse cracks but with fatigue top down cracking
- Top down cracking was not failure a mechanism for this CIR rehab pavement in MEPDG analysis.
- Reason- may be a difference in binder grade PG 76-28 overlay to PG 58-28 for base asphalt of CSS emulsion

# Pavement Preservation Program(3P) & HIR

- Concept- Keeping Good road in good conditions
- Based on Pavement Management Data: Condition & structural indices, traffic data and local conditions
- Different options includes Hot In Place recycling (in lieu of medium overlay)



# Past HIR Projects Div. 5 Projects



- Estimated 10-15% savings for a HIP recycling project in lieu of a conventional mill and inlay project
- Most Division 5 projects are within a 50 mile radius of a rock quarry.

# Concerns & Issues

- Non -availability of local contractor & technical expertise
- Local support from asphalt industry
- Cost effective- LCCA options
- Comfort level of engineers
- Oklahoma – Conservative state in recycling
- Some failure in the past- premature failure of designed pavement- QC issues
- Good quality of aggregates available locally
- ODOT maintenance likes to use RAP- milled materials

*THANK YOU*



# Southeastern States In-Place Recycling Conference



Atlanta, Georgia  
August 30 - September 1, 2011

Jim Phillips, PE  
FHWA - North Carolina Division

Todd Whittington, PE  
NCDOT



# NC Demographics



## ➤ 2010 Census

- Population ~ 9,535,483 (10<sup>th</sup> in the nation)

## ➤ Largest City: CHARLOTTE

- Population ~ 731,500 (17<sup>th</sup> in the nation)

## ➤ Smallest Town: DELLVIEW

- Population of 11 and regularly vies for the honor of smallest incorporated town in the U.S.

# North Carolina



Gray Squirrel



Cardinal



Plott Hound





# NCDOT

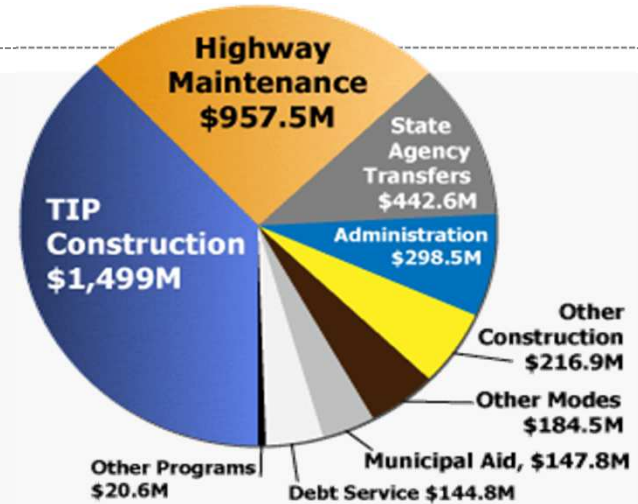


- NCDOT has one of largest state maintained systems in the U.S.
- ~ 79,466 center line miles
- ~ 13,500 permanent positions
- ~ \$1.5B Centrally-let construction projects in 2010

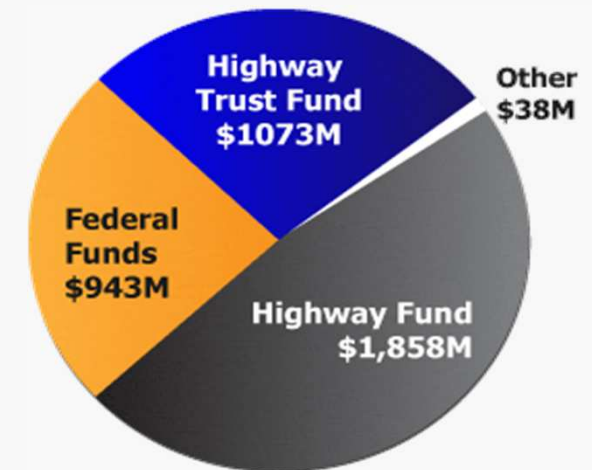
# NCDOT



➤ Annual Budget ~ \$ 3.9 billion

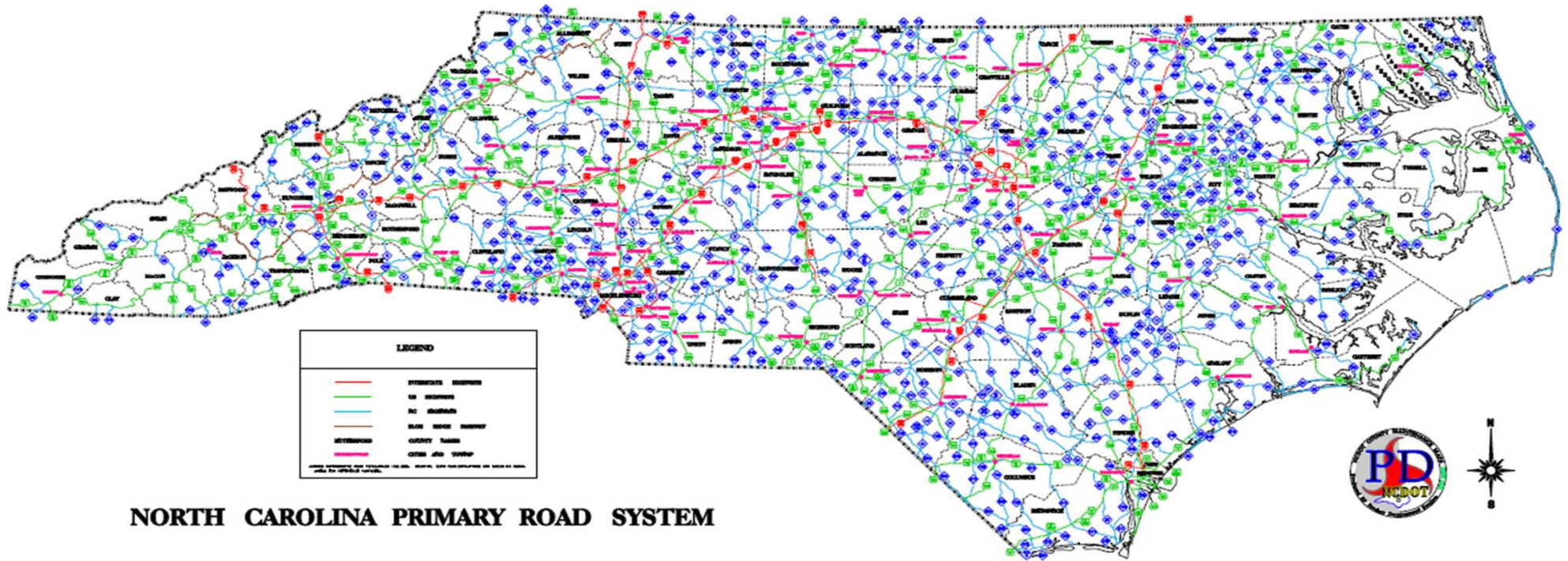


➤ Funds ~ 76% State & 24% Federal



➤ Combined gas tax 54.6¢/gallon  
13<sup>th</sup> highest in nation as of July 2011

# NC Primary Road System



# Hot-In-Place Recycling



# Hot-In-Place Recycling



- First Project let in 1997.
- Last HIPR Project let in 2008.
- Placed approximately 1.4 million square yards.
- “Mixed” success with HIPR.
  - Issues with Proper Project Selection
  - Issues with Final Mix Type/Size
  - Issues with Conformance with Opacity Tests
  - Only Contractor Left the State
- Still part of New Specifications Book for 2012.

# Cold-In-Place Recycling



- Have only completed a couple of small Subdivision projects.

# Full-Depth Reclamation



- Been Using for about the Last 5 Years.
- Continue to Place Projects with Good Success.
  - Every one of our 14 Highway Divisions have had investigations done for Candidate Projects.
  - Will continue to locate new candidates.
- NC is a Cement state... so far...
  - Have had inquiries about use of Asphalt-based FDR

# Full-Depth Reclamation



- Do have a current Project Special Provision for use by our Divisions

**SECTION 541  
FLEXIBLE PAVEMENT RECLAMATION USING PORTLAND CEMENT**

**541-1 DESCRIPTION**

Perform the work covered by this section, including but not limited to, reclamation of roadway by pulverizing, treating with Portland Cement, mixing, and compacting the existing asphalt pavement, base, subbase, and subgrade materials to a specified depth to produce a uniform mixture which meets density requirements.

**541-2 MATERIALS**

Refer to Division 10:  
Portland Cement, Type I, II, 1S.....Article 1024-1  
Water.....Article 1024-4

Use asphalt, base, subbase and subgrade material existing in the area, or other materials proportioned by the Engineer, that is free from vegetation, roots, or other objectionable matter, and does not contain asphalt, aggregate or stone larger than 2 inches (50.8 mm).



# Other Preservation Modes

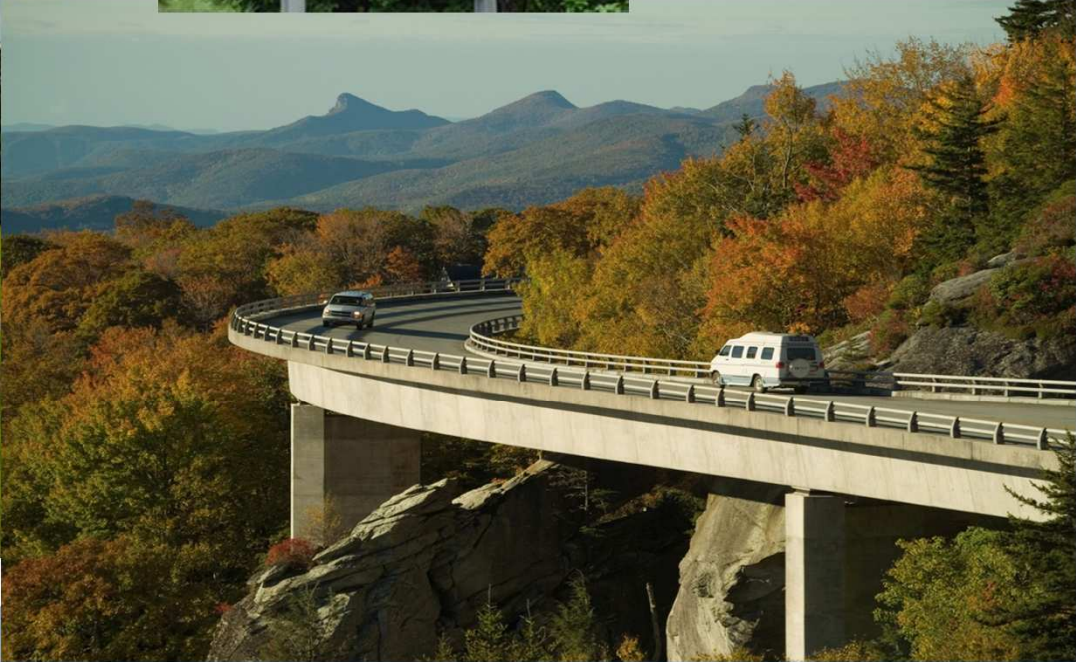


- Recent Annual Data
  - \$277 million to Resurface 1,062 road miles with HMA.
  - \$65.6 million to Surface Treat 2,769 road miles.
  - \$6.4 million to Crack Seal 18,887 lane miles.
- Investigating use of Fog Seals
- Developing Specification for new Thin-Lift mix type
- Latest Budget pours more funds into:
  - Resurfacing: \$300 - \$310M per year for next 3 years
  - Bridge Replace/Rehab: \$400M over next 2 years

# NC 12 Outer Banks



# Come Visit Us!!



# *In-Place Recycling*

## *State of Texas*

Southeastern States In-Place Recycling Conference

August 30 – September 1, 2011

Atlanta, Georgia

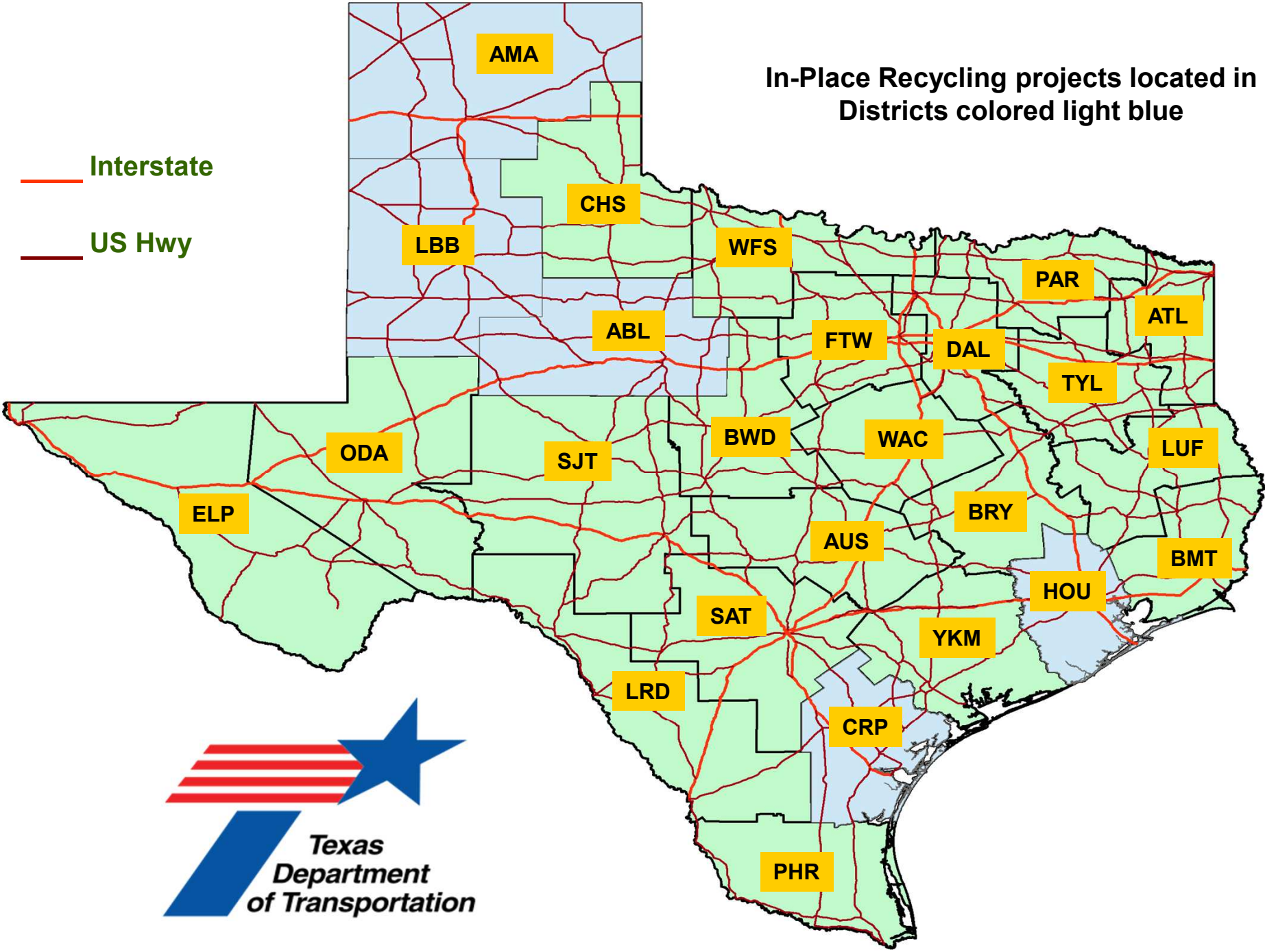
Jim Travis

Asset Management Engineer

FHWA - Texas

**In-Place Recycling projects located in Districts colored light blue**

 Interstate  
 US Hwy



# Lone Star State of Texas

## *FY 2010 Pocket Facts*

*~ 196,300 Lane Miles*

*~ 12,000 TxDOT Employees*

*1,064 Construction Contracts Let*

*~ \$3.3 Billion Dollars*

*~ 6.8 Million Tons of HMA Placed*

# Types of Hot In-Place Recycling used in Texas

- Recycling
- Remixing
- Repaving

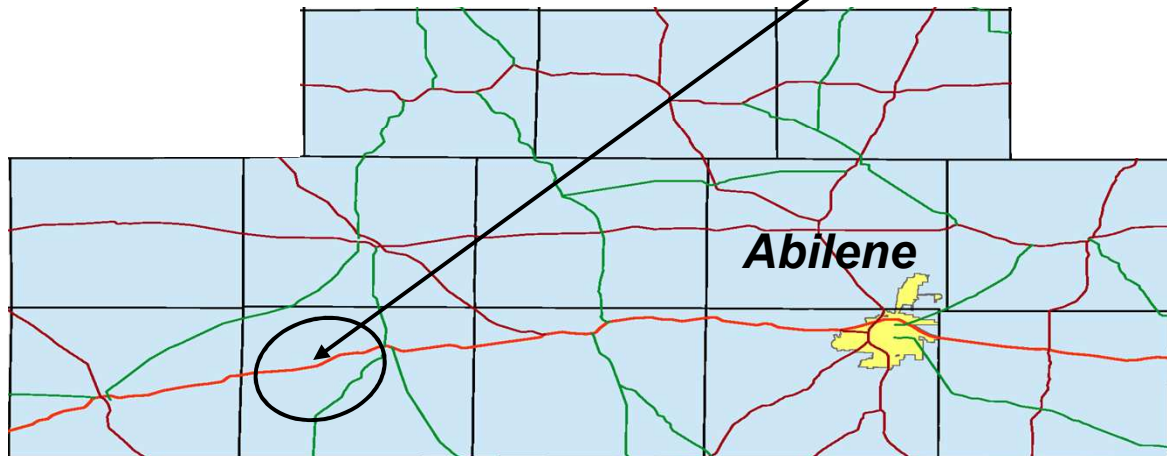


# Abilene District

***HIR – Recycling***

***IH 20***

***9.263 Miles***

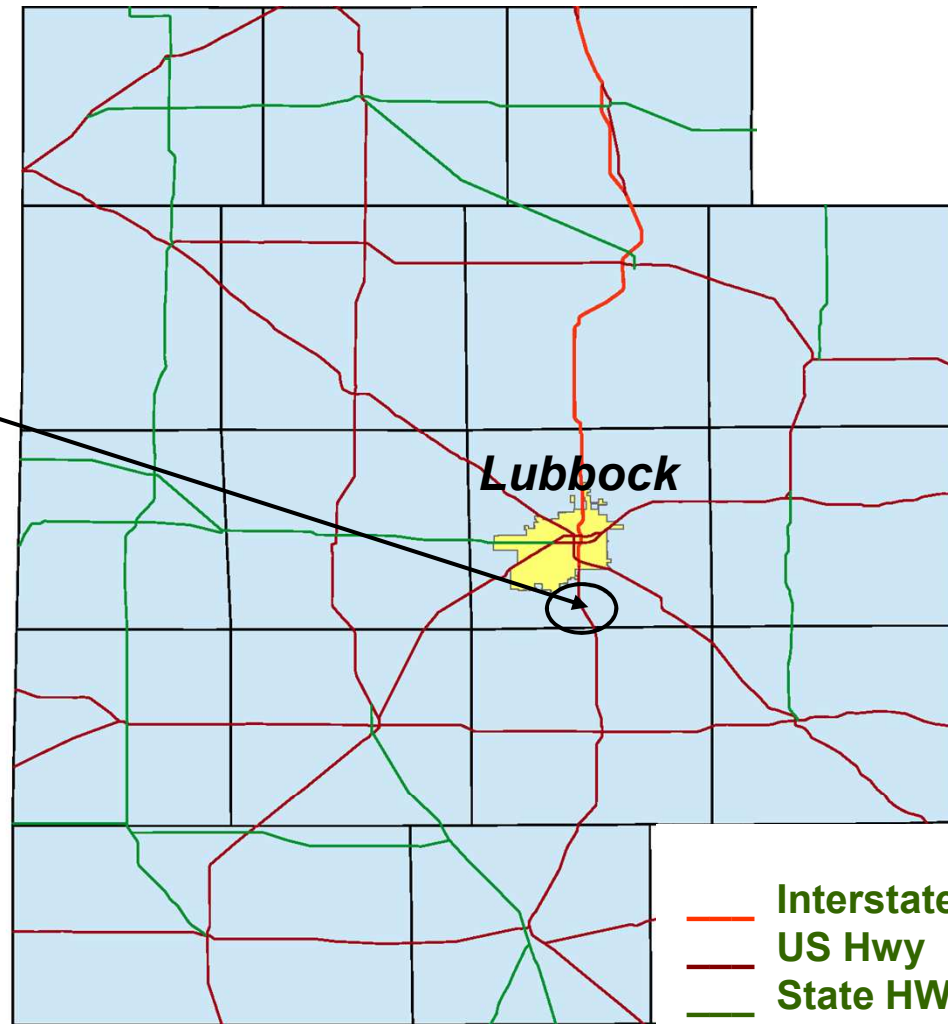


- Interstate**
- US Hwy**
- State HWY**
- County Boundary**



# Lubbock District

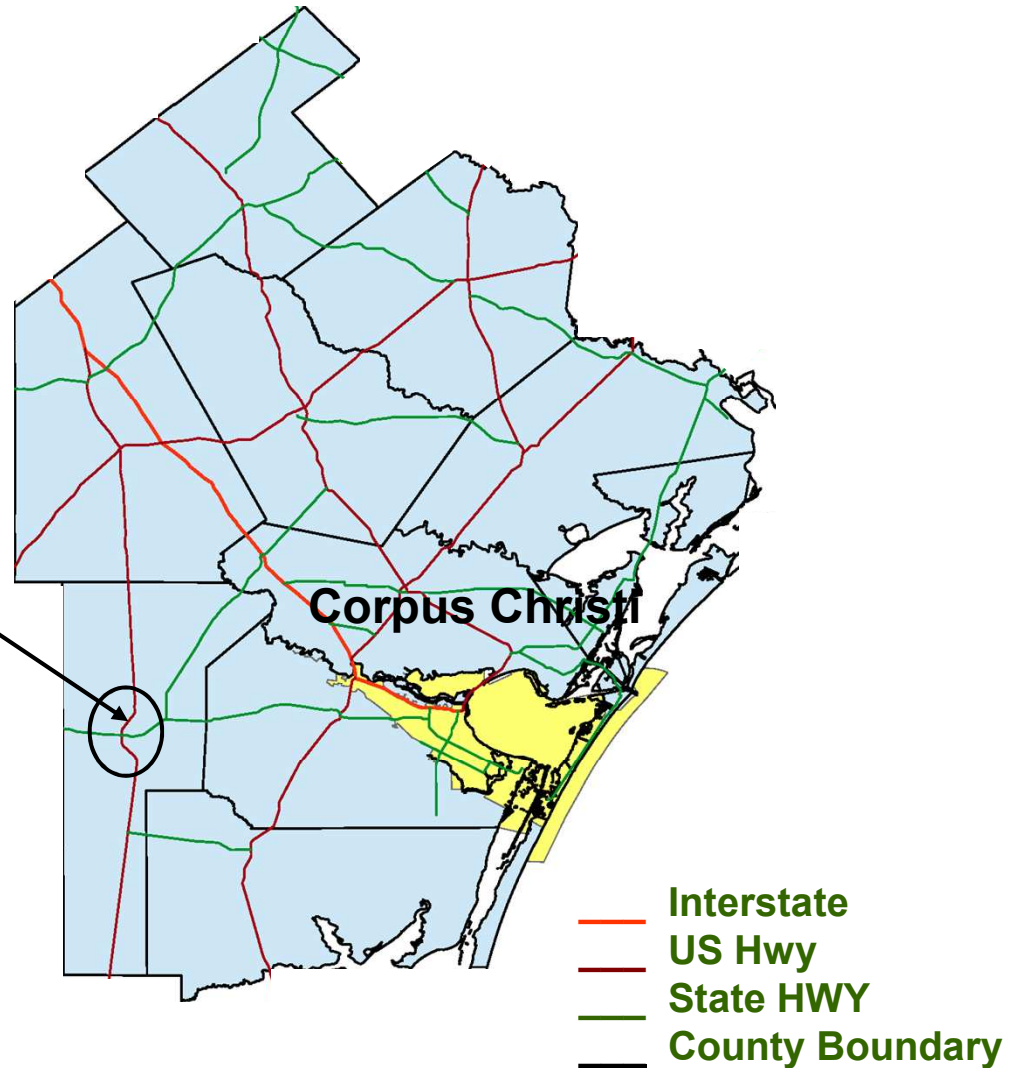
**HIR – Recycling**  
**US 87**  
**6.177 Miles**



- Interstate
- US Hwy
- State HWY
- County Boundary

# Corpus Christi District

**HIR – Remixing  
US 281  
12.429 Miles**



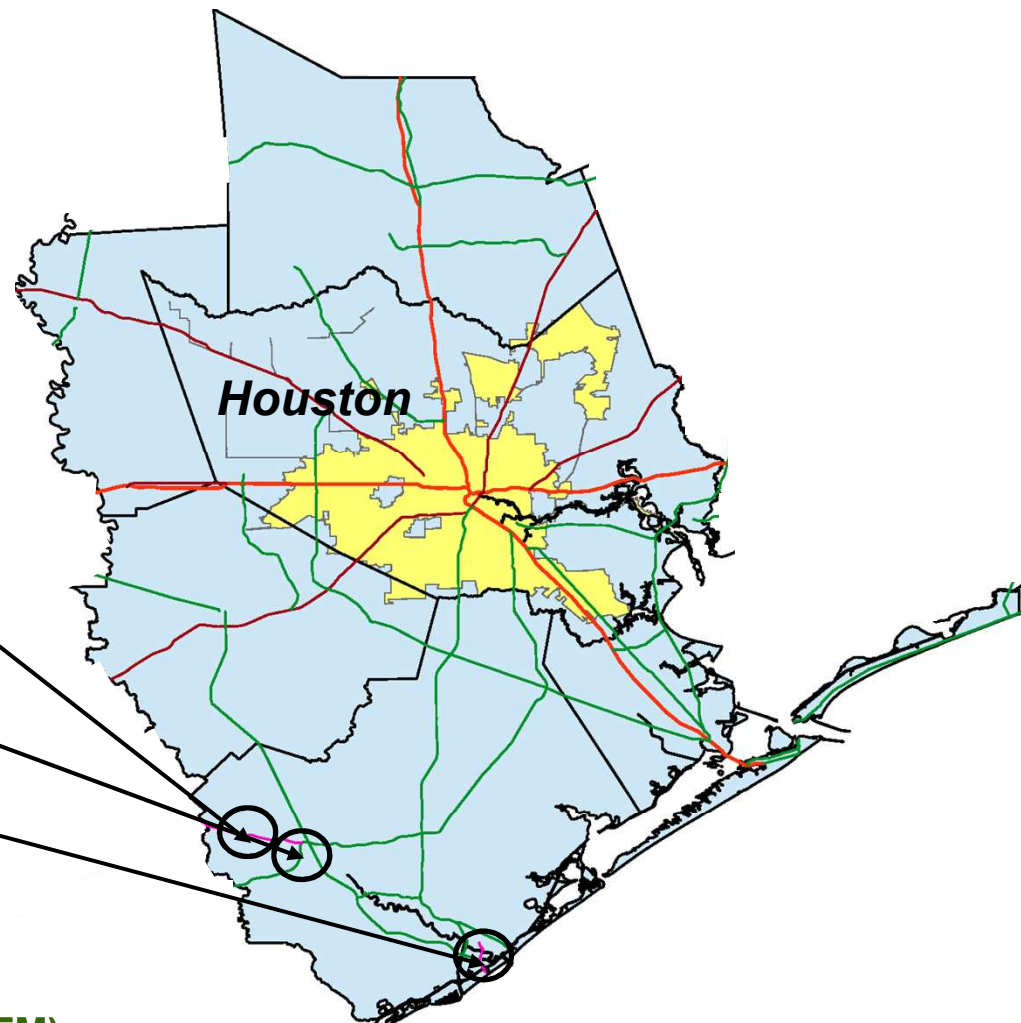
# Houston District

**HIR – Repaving  
FM 1310  
4.997 Miles**

**HIR – Repaving  
SH 35  
1.939 Miles**

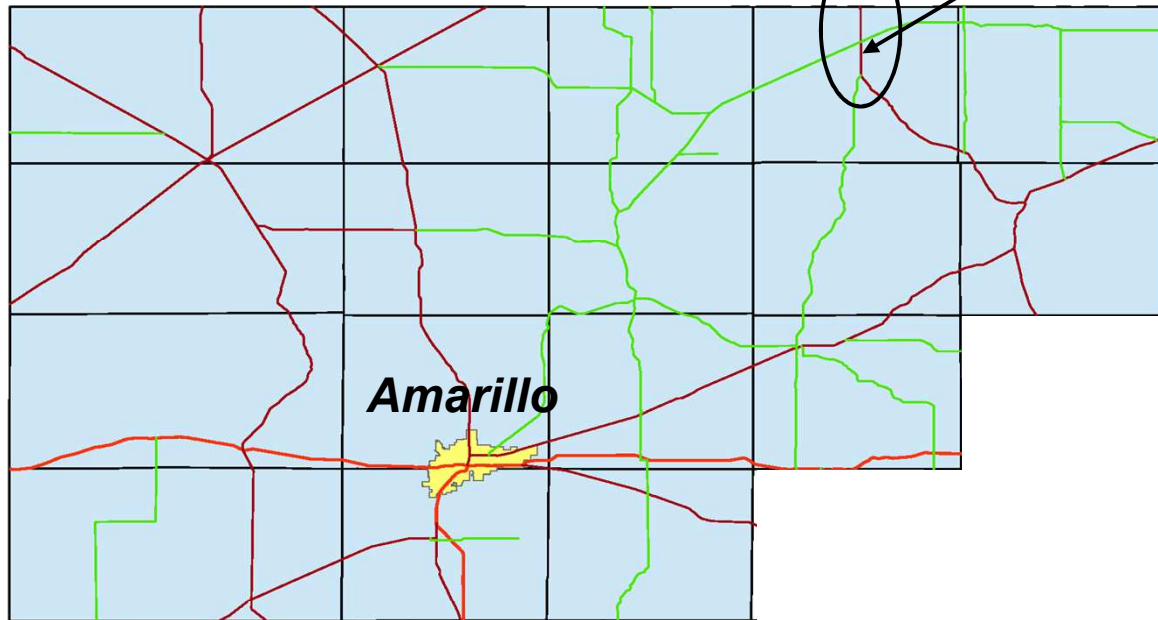
**HIR – Recycling  
FM 523  
1.646 Miles**

Legend:  
— Interstate  
— US Hwy  
— State HWY  
— Farm to Market (FM)  
— County Boundary



# Amarillo District

**CIR**  
**US 83**  
**6.916 Miles**



- Interstate
- US Hwy
- State HWY
- County Boundary

# Advantages of Using In-Place Recycling

- 1. Multi-Step Single Pass Process*
- 2. Conservation of Materials/Resources*
- 3. Smaller Carbon Footprint*



# Challenges of Using In-Place Recycling

1. Structural Capacity of existing pavement structure
2. Multiple Seal Coats & other materials in existing pavement
3. Cost Competitiveness



# State Animal of Texas



Armadillo

***Thank You***





# Tennessee Department of Transportation

Barriers to In-Place Recycling  
Mark E. Woods, P.E.  
State Bituminous Engineer

- TDOT has spent the last year or so researching fellow state specifications and self educating on in-place processes.
- One barrier is a variation between peer-state specifications in terms of process details, i.e. which process is best for state roads.
- In addition, cost concerns have deterred resurfacing coordinators from trying trial projects. Having to pay for HIP that must still be covered by a different treatment doesn't always seem cost-effective.

## **Barriers to In-Place Programs**



**Bob Paty**

**b**



Questions?

# In-Place Recycling Activities in Alabama



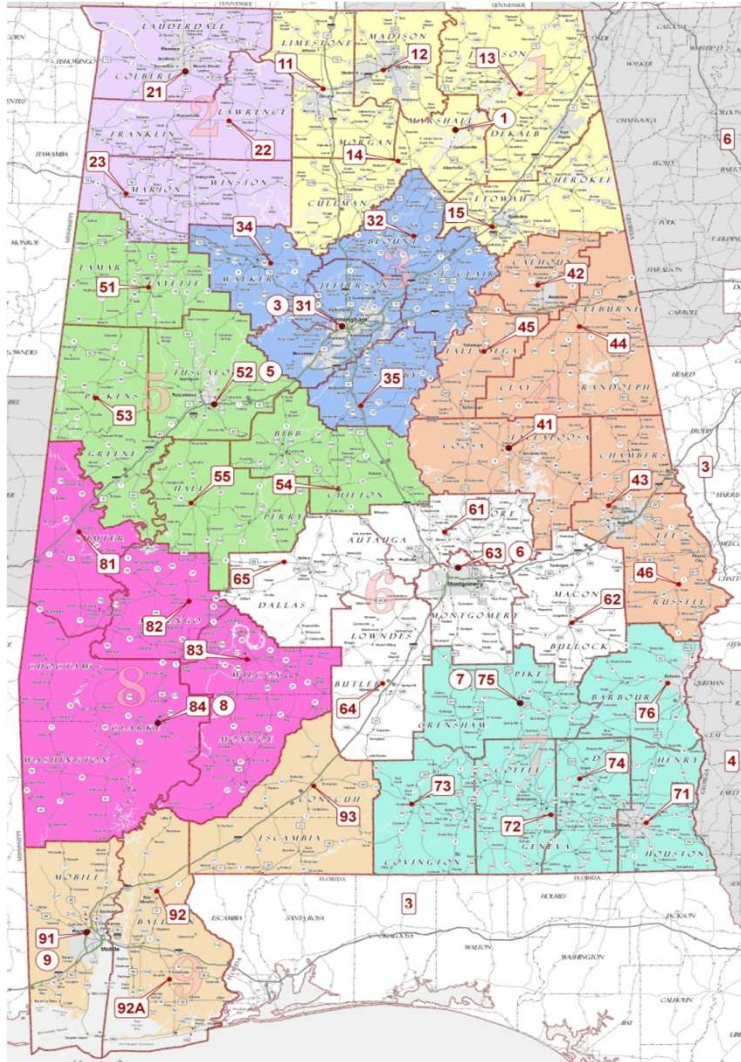
Southeastern States Regional In-Place Recycling  
Conference

August 30 – September 1, 2011

Atlanta, Georgia

Mike Harper, PE  
Assistant Chief Engineer - Operations  
Alabama Department of Transportation

# ALDOT Organization



- 67 Counties
- 41 Districts
- 9 Divisions

# ALDOT Statistics

---

- Approximately 11,000 miles
  - Interstate: approximately 1370 miles
  - Non-interstate: approximately 9600 miles
- 4,648 employees
- FY 2010 Construction
  - 322 projects awarded
  - \$683.7 million
- FY 2010
  - \$110 M for Interstate Pavement Preservation
  - \$230 M for Resurfacing Program (Minor Rehab and PM)
  - \$7.7 M for Pavement related routine maint treatments

# Alabama State Mammal

---

## ❑ Black Bear

- *Ursus americanus*
- Designated by Legislature in 1996

## ❑ Not always black

- Cinnamon (pictured)
- White
- Beige
- Slate gray ("blue")





# FDR (with cement stabilization)

---

- method of flexible pavement reconstruction that utilizes the existing *asphalt, base, and subgrade material* to produce a new stabilized base course for an asphalt, chip seal, or concrete wearing surface.

# Experience with In-Place Recycling

---

- In-place recycling projects (last 5 years)
  - Cold in-place: None
  - Hot in-place: None
  - Full Depth Reclamation: See later slide
- Number of Contractors
  - Cold in-place: None
  - Hot in-place: None
  - Full Depth Reclamation: 6 (4 primary)
- Cement-treated base – use local materials
- Process for letting projects - standard

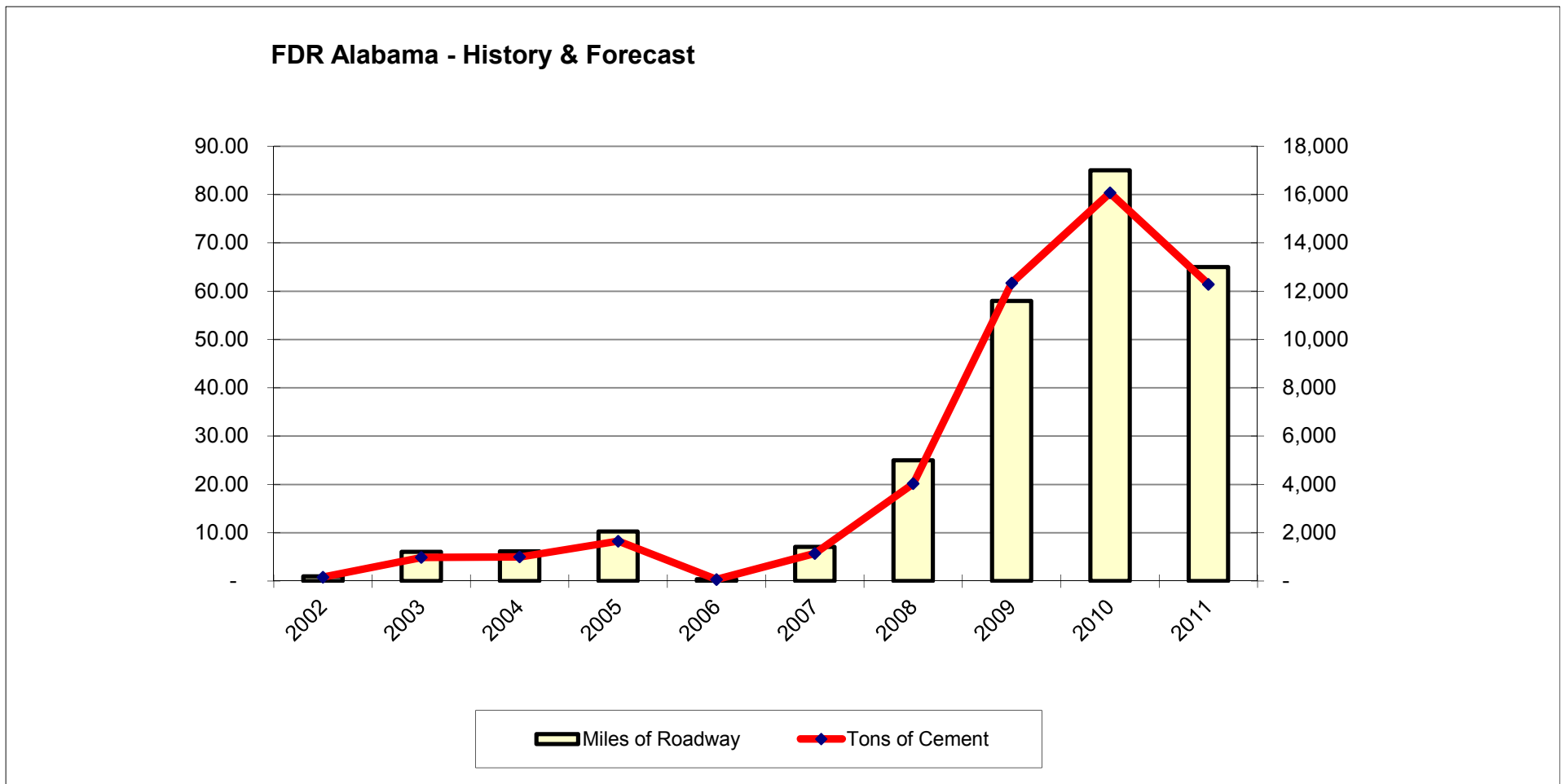
# Experience with In-Place Recycling

---



# FDR in Alabama

□ 4% to 8% cement content



# Recycling: RAP and RAS

---

- Considering raising RAP limits
  - Up to 40% in black base and binder layers
  - Dependent on volumetrics
  
- Considering changes to RAS (Recycled Asphalt Shingles) specifications
  - Currently allow up to 5% factory rejects and up to 3% tear offs
  - Considering allowing up to 5% tear offs (no change on factory rejects)

# Why We Use In-Place Recycling

---

- Availability of aggregates – poor in some locations
- FDR
  - Allows stabilization of base
  - Reduces additional structure needed
  - Limited to low volume roads where truck traffic can be diverted

# Why In-Place Recycling is Not Used More

---

- ❑ Availability of aggregates – excellent in many locations
- ❑ Lack of process control
- ❑ Lack of experience with recycling methods
- ❑ Concerns regarding consistently reaching target structural coefficients that can be incorporated into pavement designs
- ❑ Use on higher volume routes where truck traffic must be maintained

Thank You







# Recycling at MDOT

**2011 Southeastern States Regional In-Place  
Recycling Conference  
Atlanta, GA  
August 30, 2011**

Randy Battey  
Assistant Chief Engineer - Operations  
Mississippi Department of Transportation



# Pavement Recycling Not New at MDOT

- Utilized RAP for years
- Up to 30% in underlying lifts
- Up to 15% in surface
- Looking to increase
- Improve stockpile processing
- Lowest cost modifier





# MDOT by the Numbers

Employees: 3200

MDOT Maintains: 28,000 lane miles

Federal Aid Local Program (LPA): 7,000 lane miles

Calendar 2010 MDOT awarded 150 projects

150 projects were funded with 340M Federal/220M State

Calendar 2010 MDOT concurred in award of 120 LPA projects

120 LPA projects were funded with 70M Federal/6M Local



# MDOT by the Numbers

State Animal: Red Fox





# MDOT by the Numbers

But when I think of great recyclers, I think of another  
Redd Foxx!



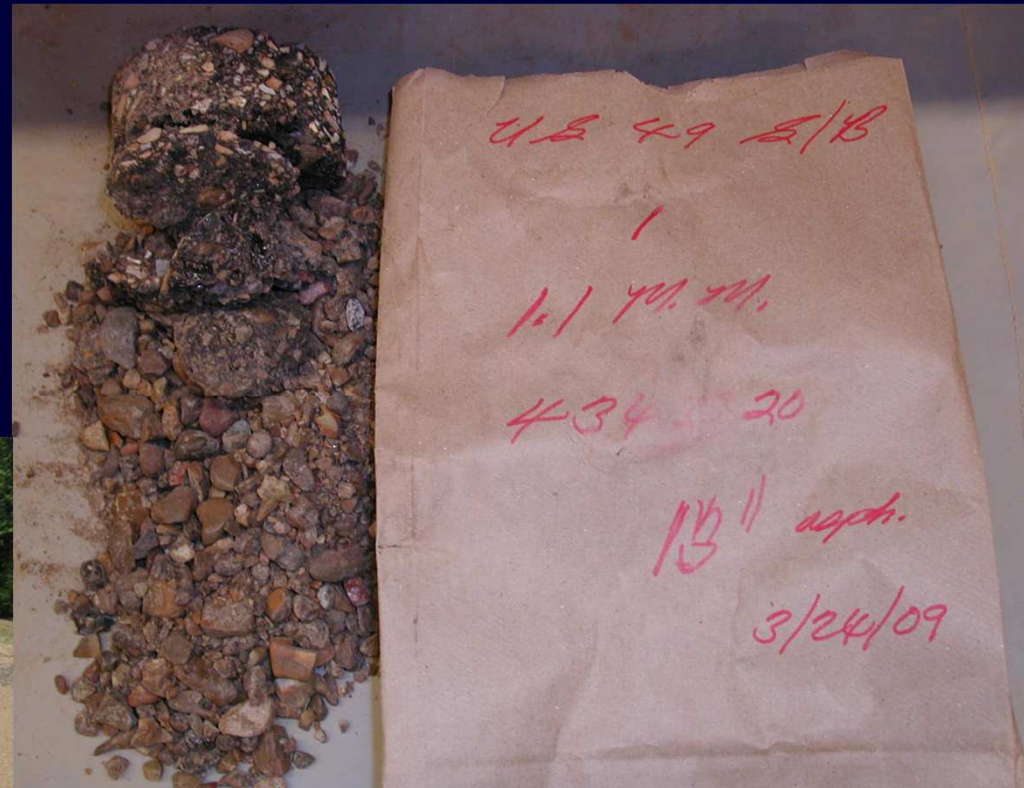


# History of In-Place Recycling in Mississippi

- Done some CIR & HIR 15+ years ago
- Not successful
- More recently tried FDR on two projects
- FDR about 50 lane miles some w/emulsion, some with cement
- A couple of LPAs have utilized some HIR recently on non participating projects



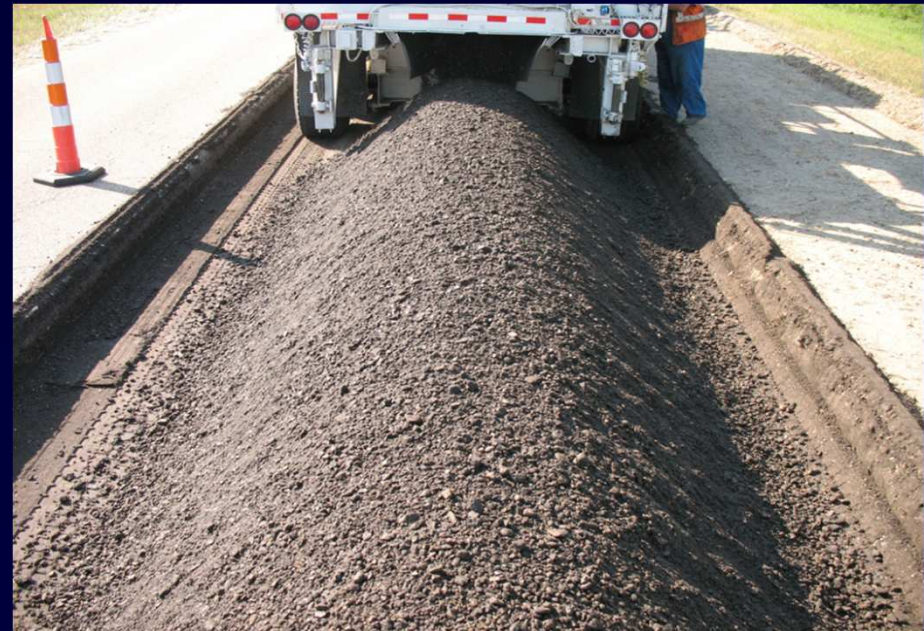
# Why Consider FDR?





# In-Place Recycling in MS

- # of MS Contractors doing CIR/HIR/FDR: 0
- Projects utilize conventional design-bid-build
- Research underway







## FDR Costs

6" depth at 5.5% cement - \$5.10 per sq. yd.

9" depth at 5.5% cement - \$5.70 per sq. yd.

16" depth at 6% cement - \$9.25 per sq. yd.

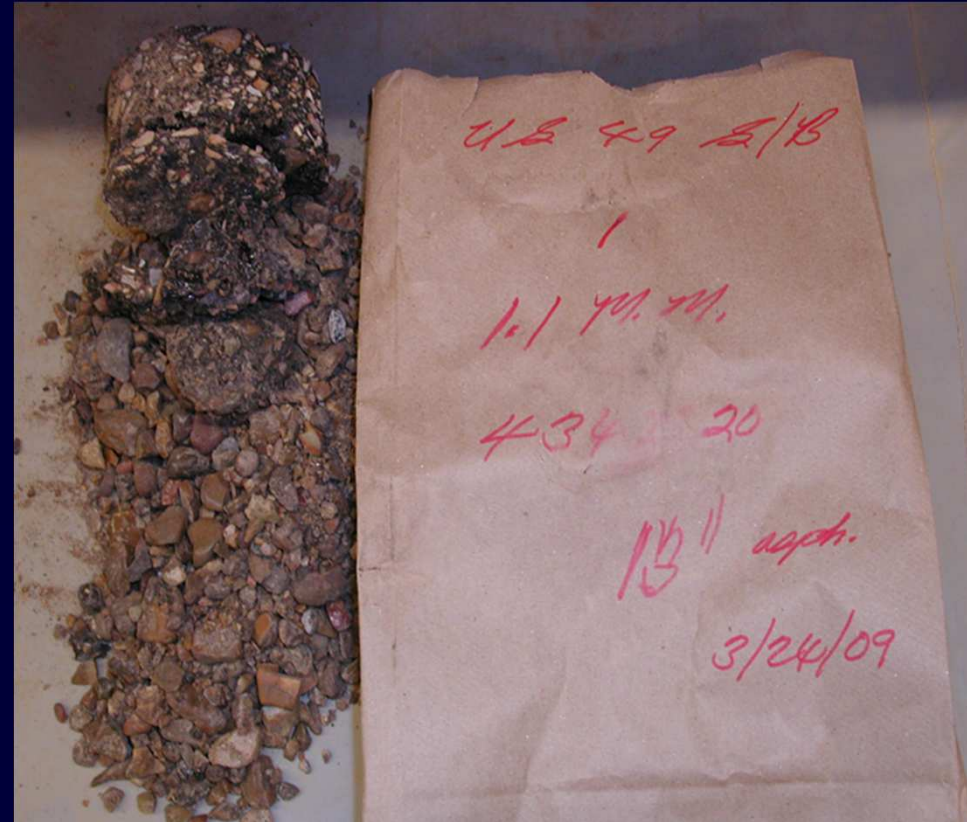
6" depth at 4% emulsion - \$11.30 per sq. yd.

9" depth at 4% emulsion - \$14.89 per sq. yd.

Cement % by volume; Emulsion % by weight

# Why MDOT chose FDR?

- Rebind existing materials
- Take care of the underlying problems



# Why is In-Place Recycling not used more in MS?

- Lack of local industry
- Inexperience with it
- In the case of HIR, had a bad experience about 15+ years ago





# Suggestion to the Industry Concerning In-Place Recycling



# Comments or Questions?



# In-Place Recycling Activities in Georgia

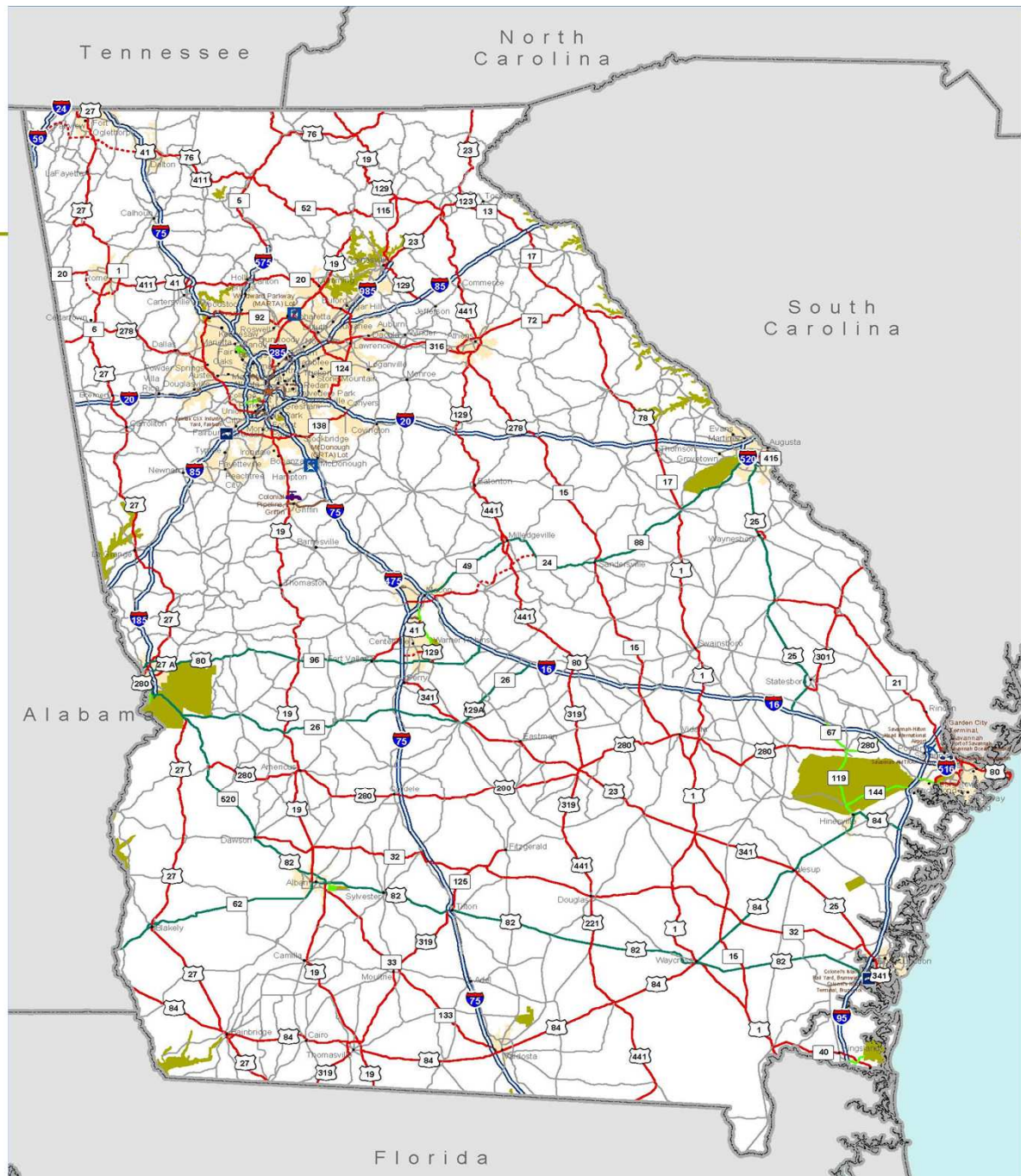
---

SouthEastern States Regional In-Place Recycling  
Conference

August 30, 2011

David Painter, P.E.  
Georgia Division, FHWA

Georgene M. Geary, P.E.  
State Materials and Research Engineer, GDOT



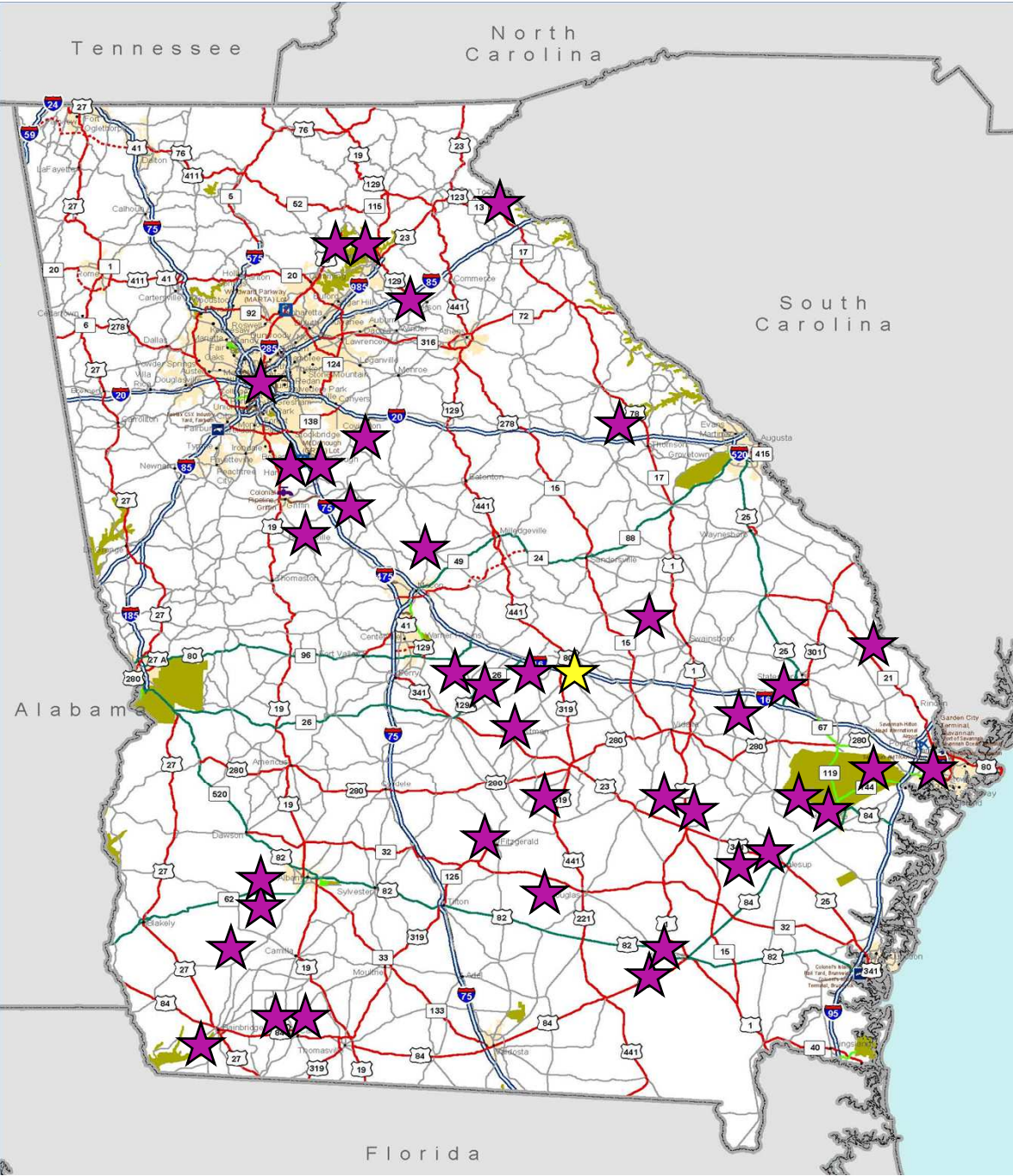
# GDOT Demographics

---

- ~ 18,000 centerline SR miles
- ~ 48,000 SR travel lane miles
- ~ 117,000 total centerline miles
  
- GDOT -capped at 4,900 FTE's
  
- FY 2010: ~1 billion dollars in capitol projects
  - 446 construction projects let
- FY 2011: ~700 million dollars in capitol projects
  - 277 construction projects let

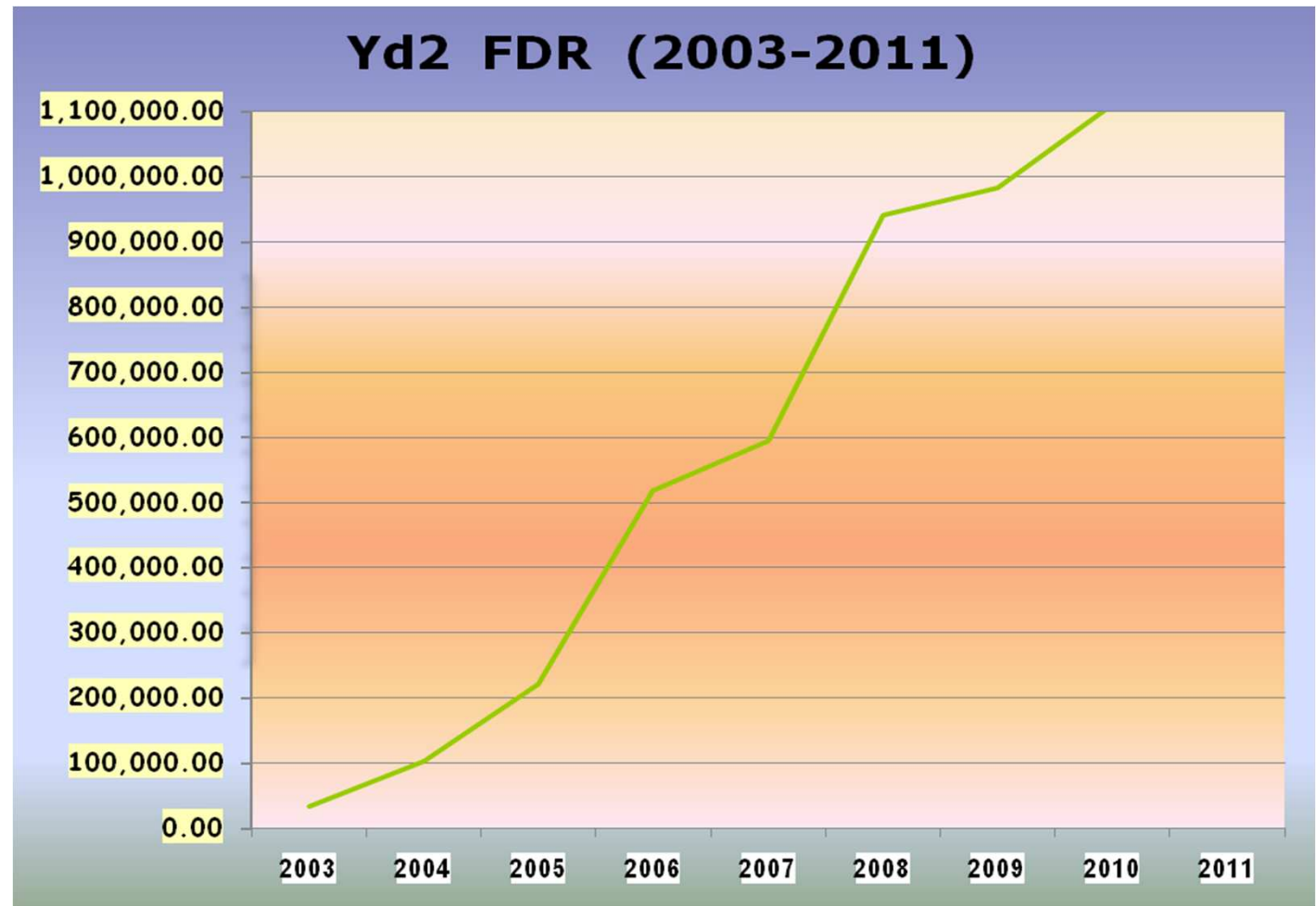


# Recent FDI Projects:

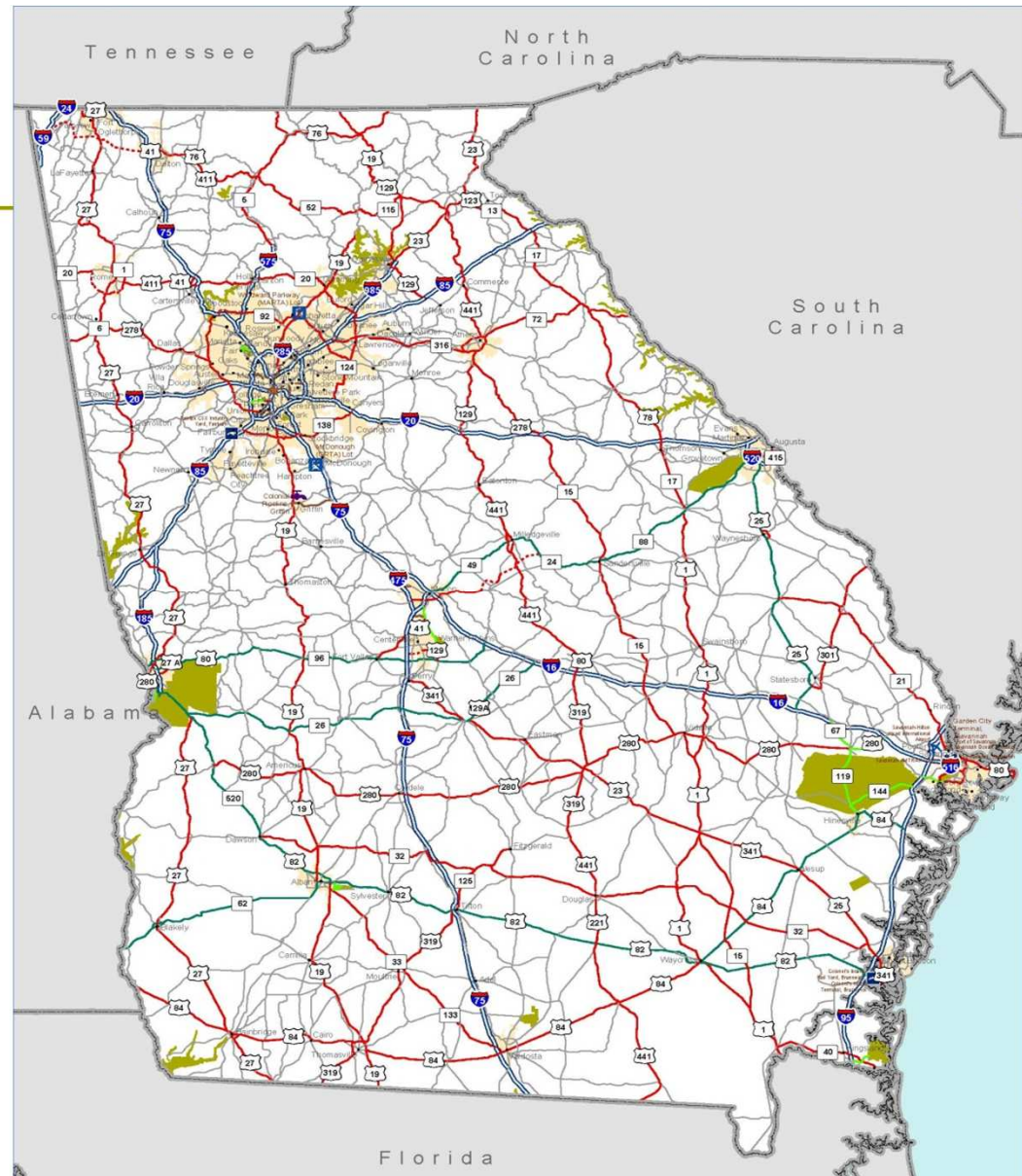


# In-Place Pavement Recycling in Georgia (cumulative yd<sup>2</sup>)

- FDR
- Mainly County Roads
- Cement or Lime



# Recent CIR or HIP Recycling Projects:



# Why We Are Interested in Using In-Place Recycling

---

- \$\$\$Save money\$\$\$
- Technology and Information has Improved
- \$\$\$No money\$\$\$

# Barriers to Utilizing More In-Place Recycling

---

- ❑ Clear guidelines on where/what to use
- ❑ Experience (GDOT and Contractors)
- ❑ Repeatable Specifications

# GEORGIA FACTS

---

- ▣ State Bird



- ▣ Brown Thrasher



Thank You

# In-Place Recycling Activities in Florida



Southeastern States Regional In-Place Recycling  
Conference

August 30 – September 1, 2011

Atlanta, GA

John S. Fowler, P.E.  
Pavement Management Engineer  
Florida Department of Transportation



# FDOT Demographics

---

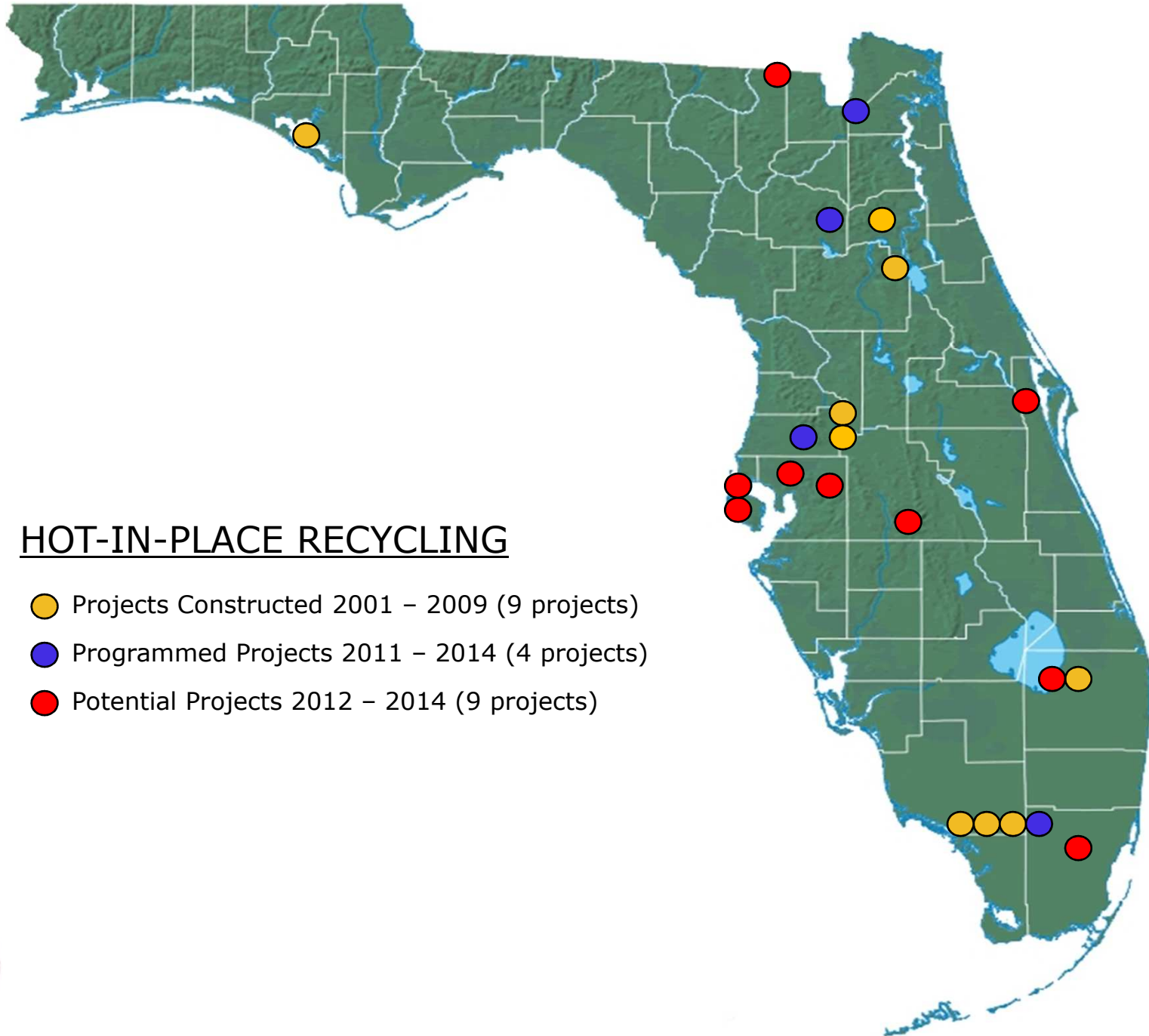
- ❑ FDOT: 7,426 employees
- ❑ 12,088 centerline miles
- ❑ 42,829 lane miles
- ❑ 97.6% flexible, 2.4% rigid
- ❑ FY 2010/11 429 construction projects let
- ❑ \$6.5 billion



# Experience with In-Place Recycling

---

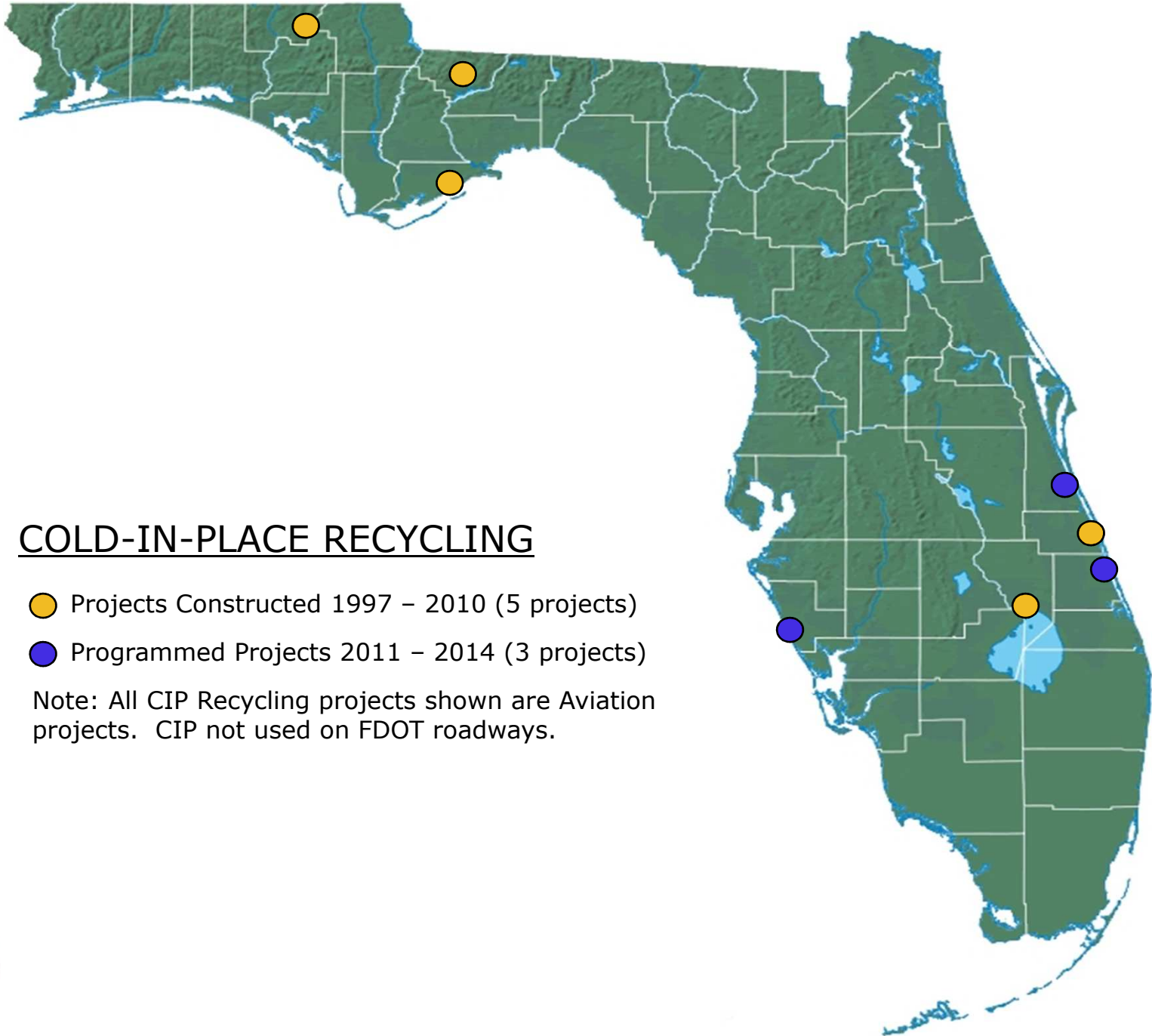




## HOT-IN-PLACE RECYCLING

- Projects Constructed 2001 - 2009 (9 projects)
- Programmed Projects 2011 - 2014 (4 projects)
- Potential Projects 2012 - 2014 (9 projects)



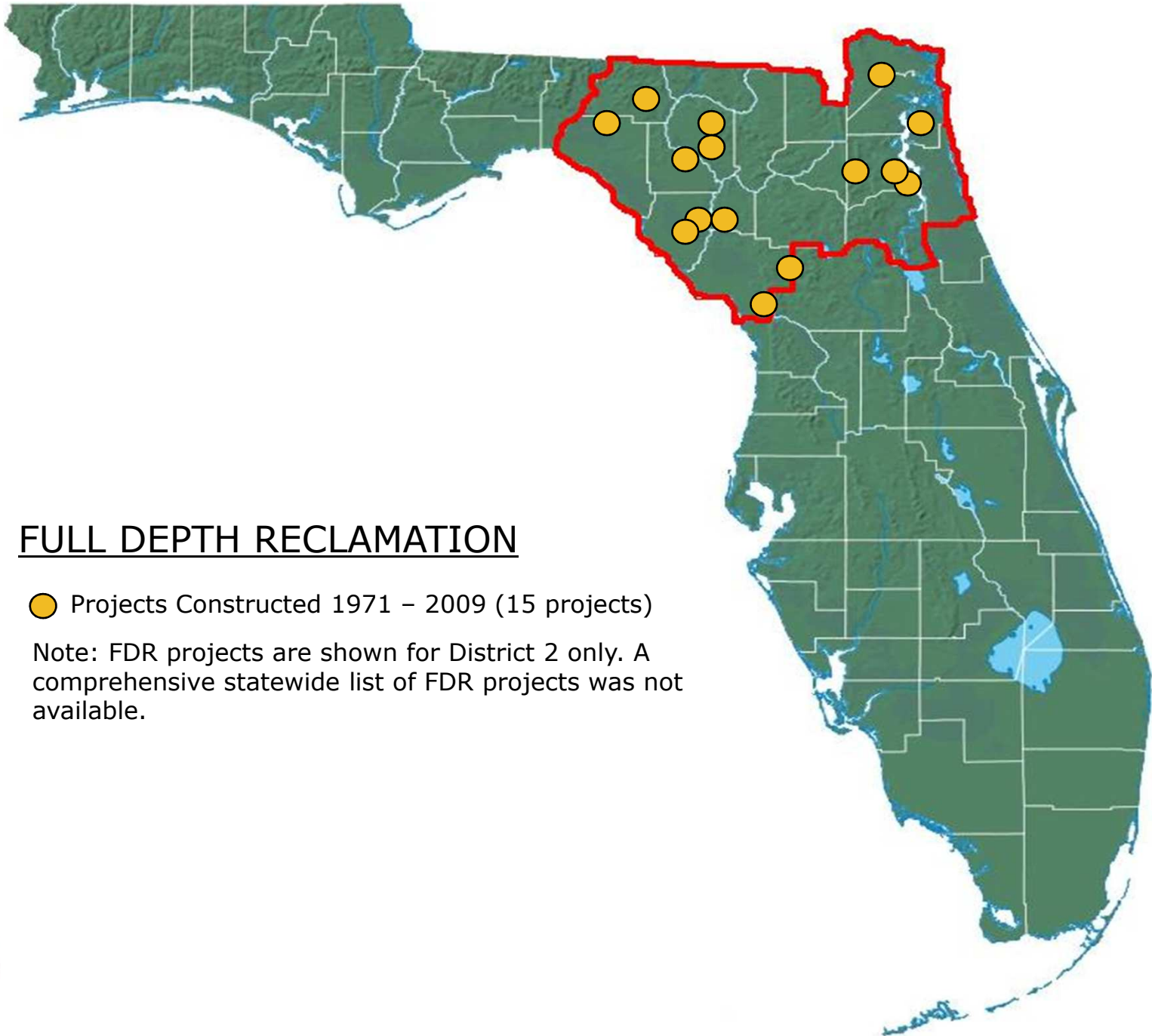


## COLD-IN-PLACE RECYCLING

- Projects Constructed 1997 – 2010 (5 projects)
- Programmed Projects 2011 – 2014 (3 projects)

Note: All CIP Recycling projects shown are Aviation projects. CIP not used on FDOT roadways.





## FULL DEPTH RECLAMATION

● Projects Constructed 1971 – 2009 (15 projects)

Note: FDR projects are shown for District 2 only. A comprehensive statewide list of FDR projects was not available.



# Where Are We Using In-Place Recycling

---

- ❑ Interim projects
- ❑ Design ESALs < 3 million
- ❑ Dense-graded mixes only
- ❑ Roadways with no structural issues or poor soils
- ❑ No history of rutting
- ❑ Friction course not required if Existing FN  $\geq$  40



# Utilizing More In-Place Recycling

---

- 2001 – 2010: About 1 project per year
- 2011 – 2014: About 3 projects per year
- Better specifications
- More competition
- Need to do more with less \$\$\$





# FLORIDA FACTS



▣ State Animal: Florida Panther



▣ State Reptile: American Alligator





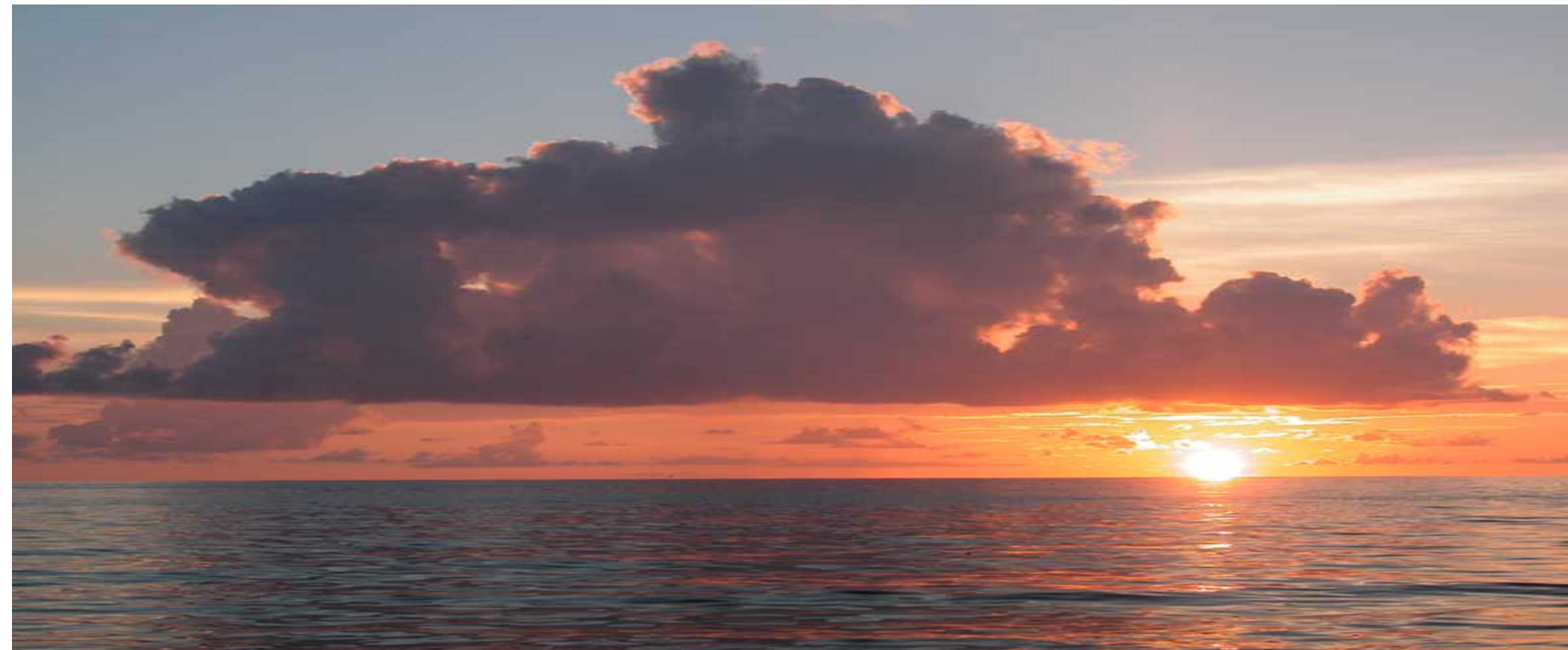


# FLORIDA FACTS



- State University: Florida Gators





Thank You



# PUERTO RICO HIGHWAY AND TRANSPORTATION AUTHORITY

Southeastern States In-Place Recycling Conference  
August 30 – September 1, 2011  
Atlanta, Georgia

**Alvin Gutierrez, PE, ME**  
Area & Materials Engineer – FHWA PR Division

**Andrés Alvarez-Ibáñez, PE, MECE**  
Acting Director, Materials Testing Office



# PUERTO RICO'S NATIONAL HIGHWAY SYSTEM (NHS)



**National Highway System  
Puerto Rico (72)**



Commonwealth of Puerto Rico  
Department of Transportation and Public Works  
Highway and Transportation Authority  
Programming and Special Studies Area  
**Office of Highway Systems**

Based on 2005 Data

Prepared: March 2007

## Legend

	PR Primary Route		Urbanized Area (50,000 or more population)
	PR Primary Urban Route		Small Urban Area (5,000 - 49,999 population)
	PR Secondary Route		Rural Area
	PR Tertiary Route		Municipality Urban Area
	Municipal Street		Airport
	Proposed PR Primary Route		Port Terminal
	Proposed PR Urban Primary Route		Ferry Terminal
			Military Facility

# PRHTA Demographics

- Number of state employees 1,835
- PR has 28,864 centerline km of roadway or 18,040 miles (4.5 times the road density of mainland USA)
- Annual dollar amount in construction projects \$200MM
- Number of annual construction projects 40
- Puerto Rico Area is about 9,100 sq km or 3,500 sq miles
- Population of 3.7MM
- Number of vehicles – 3.0MM



# Experience with In-place recycling

- None
- But a supplier from Wirtgen has been trying to introduce technology (Foamed Asphalt-Cold In Place Recycling) in Puerto Rico for some time.
- The company will sponsor a workshop in the next few months
  - Experience from other states
  - Benefits from this technology
  - Willing to bring small equipment for trial

# State Animal - Coqui



Questions?





# In-Place Recycling in Louisiana

**Southeastern States Regional In-Place Recycling Conference**  
**August 30 – September 1, 2011**  
**Atlanta, Georgia**

**Joe Bloise**

Assistant Division Administrator, FHWA LA Division

**William “Bill” King**

Asphalt Research Manager, LADOTD

**Md Sharear Kabir**

Asphalt Research Engineer Intern, LADOTD

## LADOT Demographics

- LADOTD has approx 4,500 employees
- There are 16,700 center line miles of roadway owned by the LADOTD
- Number of annual construction projects:
  - FY10 = 447 projects
  - FY11 = 245 projects (so far)
- Annual \$\$ of Contracted work:
  - FY10 = \$800M (includes ARRA funding)
  - FY11 = \$245M (with \$170M left to obligate before Sept 30<sup>th</sup>)

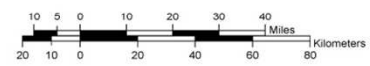
# Past In-Place Recycling Projects in Louisiana



**LOUISIANA**

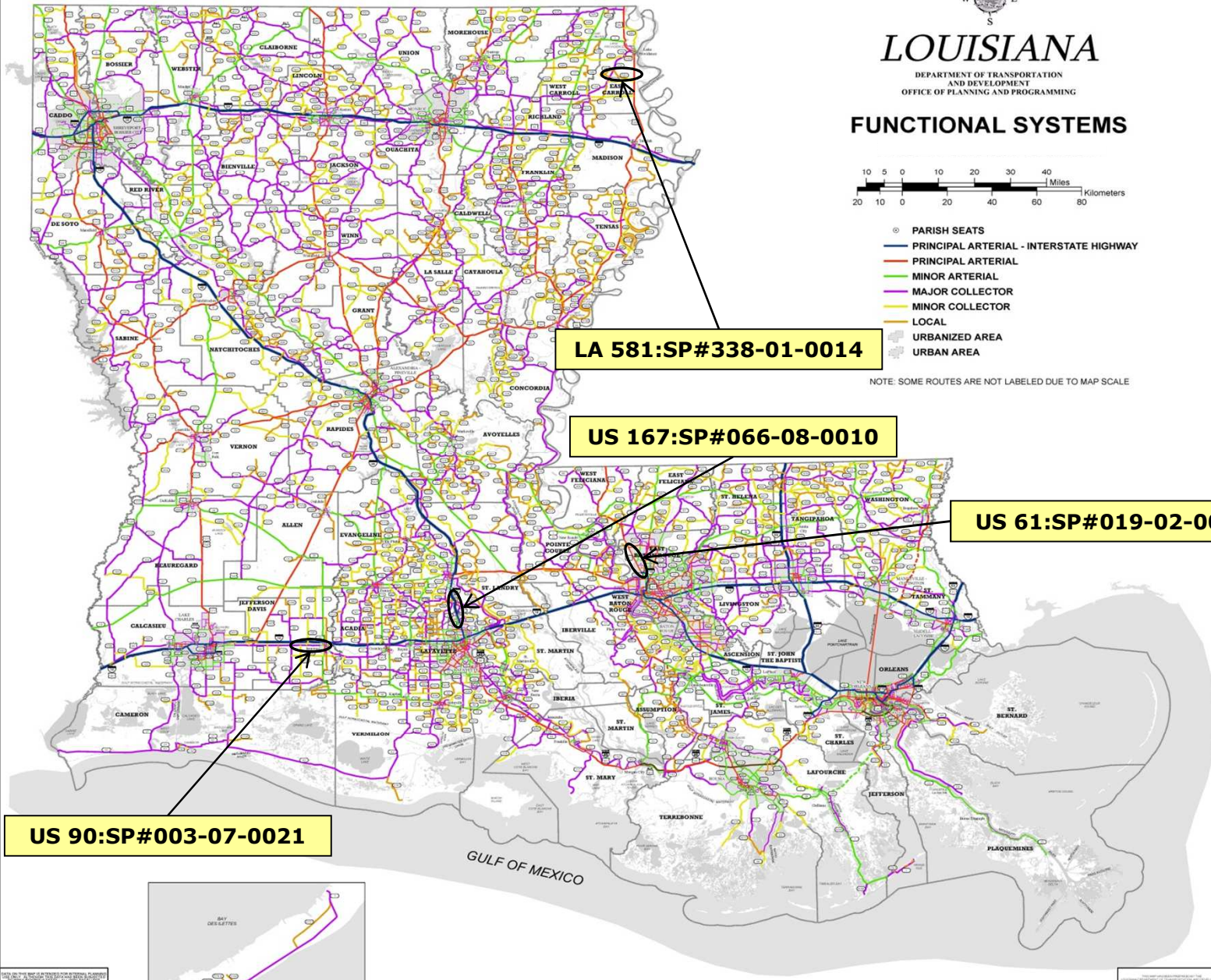
DEPARTMENT OF TRANSPORTATION  
AND DEVELOPMENT  
OFFICE OF PLANNING AND PROGRAMMING

## FUNCTIONAL SYSTEMS



- ⊙ PARISH SEATS
- PRINCIPAL ARTERIAL - INTERSTATE HIGHWAY
- PRINCIPAL ARTERIAL
- MINOR ARTERIAL
- MAJOR COLLECTOR
- MINOR COLLECTOR
- LOCAL
- URBANIZED AREA
- URBAN AREA

NOTE: SOME ROUTES ARE NOT LABELED DUE TO MAP SCALE



**LA 581:SP#338-01-0014**

**US 167:SP#066-08-0010**

**US 61:SP#019-02-0051**

**US 90:SP#003-07-0021**

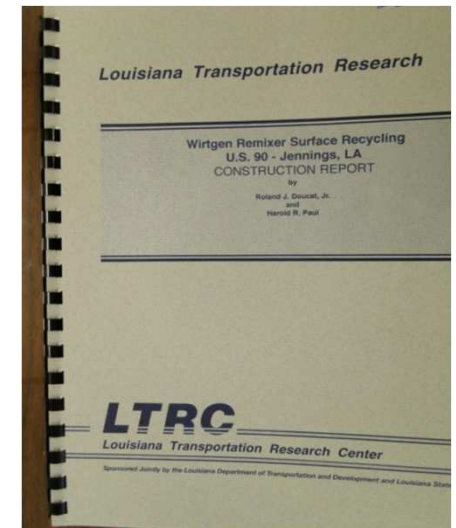
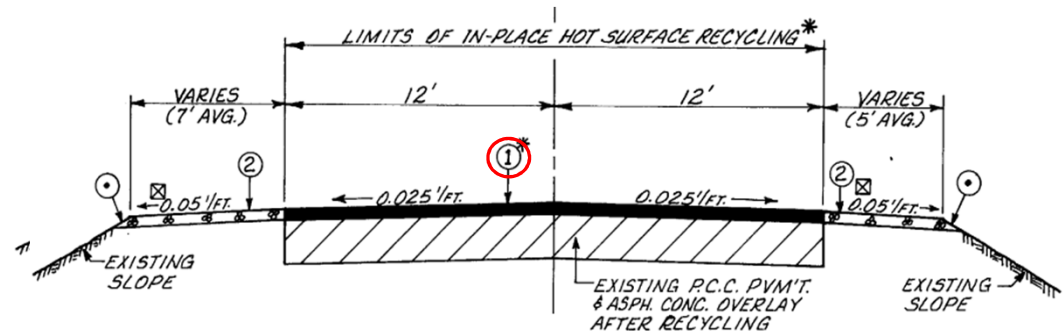


THIS MAP WAS PREPARED BY THE STATE OF LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT, OFFICE OF PLANNING AND PROGRAMMING. THE INFORMATION CONTAINED HEREIN IS FOR GENERAL INFORMATION ONLY AND DOES NOT CONSTITUTE A CONTRACT. THE STATE OF LOUISIANA ASSUMES NO LIABILITY FOR ANY ERRORS OR OMISSIONS. THE STATE OF LOUISIANA IS NOT RESPONSIBLE FOR ANY DAMAGE TO PERSONS OR PROPERTY ARISING FROM THE USE OF THIS MAP. THE STATE OF LOUISIANA IS NOT RESPONSIBLE FOR ANY DAMAGE TO PERSONS OR PROPERTY ARISING FROM THE USE OF THIS MAP. THE STATE OF LOUISIANA IS NOT RESPONSIBLE FOR ANY DAMAGE TO PERSONS OR PROPERTY ARISING FROM THE USE OF THIS MAP.

THIS MAP WAS PREPARED BY THE STATE OF LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT, OFFICE OF PLANNING AND PROGRAMMING. THE INFORMATION CONTAINED HEREIN IS FOR GENERAL INFORMATION ONLY AND DOES NOT CONSTITUTE A CONTRACT. THE STATE OF LOUISIANA ASSUMES NO LIABILITY FOR ANY ERRORS OR OMISSIONS. THE STATE OF LOUISIANA IS NOT RESPONSIBLE FOR ANY DAMAGE TO PERSONS OR PROPERTY ARISING FROM THE USE OF THIS MAP. THE STATE OF LOUISIANA IS NOT RESPONSIBLE FOR ANY DAMAGE TO PERSONS OR PROPERTY ARISING FROM THE USE OF THIS MAP. THE STATE OF LOUISIANA IS NOT RESPONSIBLE FOR ANY DAMAGE TO PERSONS OR PROPERTY ARISING FROM THE USE OF THIS MAP.

# US 90: SP# 003-07-0021

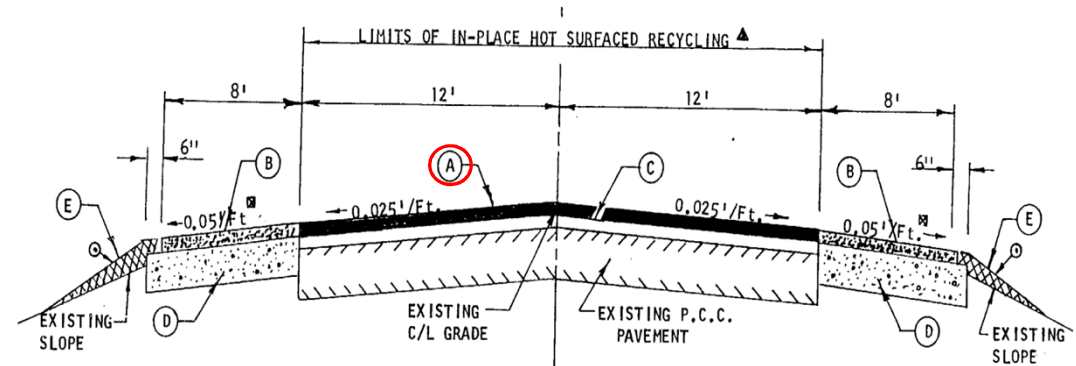
- Type of Recycling: **Hot In-Place Recycling AC**
- Construction Year: **1990**
- Total Cost: **\$ 0.7M**
- Length: **7.4 miles**
- Section lasted for 16 yrs.



[http://www.ltrc.lsu.edu/pdf/2005/report\\_235.pdf](http://www.ltrc.lsu.edu/pdf/2005/report_235.pdf)

# US 167: SP# 066-08-0010

- Type of Recycling:  
Hot In-Place Recycling AC
- Construction Year: 1994
- Total Cost: \$ 1.6M
- Length: 9.2 miles
- Section lasted for 16 yrs.



# LA 581: SP# 338-01-0014

- Type of Recycling:  
Full Depth Reclamation
- Construction Year: 2007
- Total Cost: \$ 3.09M
- Length: 4.83 miles



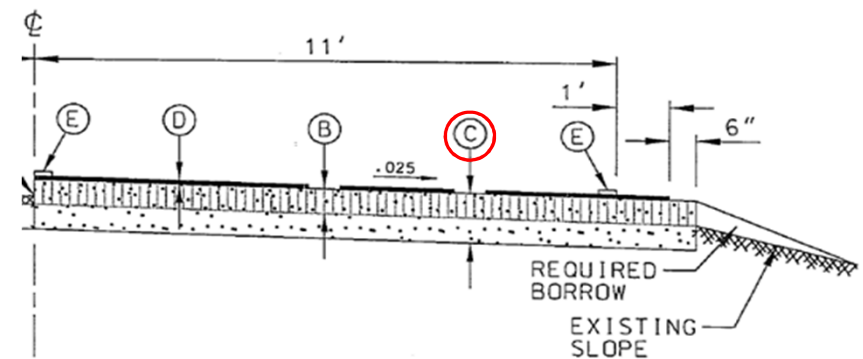
## Construction Cost Comparison

Soil Cement Stabilization

Full Depth Reclamation

\$26.13 per sq yd

\$ 31.43 per sq yd



TYPICAL HALF SECTION FOR PROPOSED ROADWAY

# US 61: SP# 019-02-0051

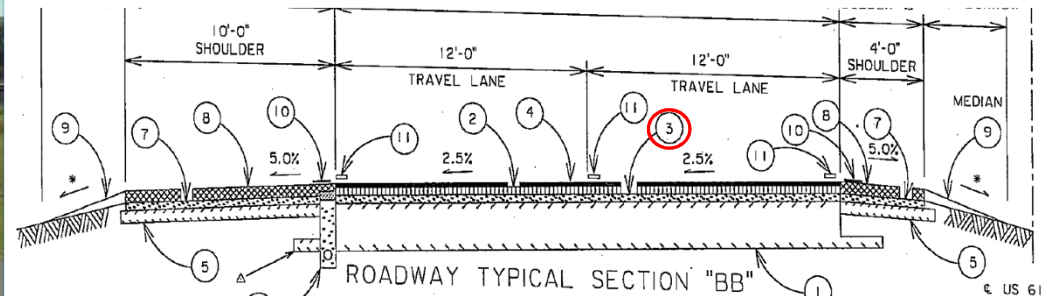
- Type of Recycling:  
Cold In-Place
- Construction Year: 2010
- Total Cost: \$ 9.6M (\$ 3M)
- Length: 3.1 miles (12.4 In mi)



Before



After



## Selection/Bidding Process

- So far Projects were selected for Demonstration/ Research only
- Once a project is selected, Special provision is needed as part of the contract
- Bidding follows the regular LADOTD bid process



## Status of In-Place Recycling in LA

- LADOTD is very inexperienced in Using In-Place Recycling
- Projects done so far have been for Research only
- Why In-Place Recycling is not commonly Utilized:
  - No Local Contractors
  - Local Contractors have not shown Interest
    - Need to purchase new equipment
  - In-Place Recycling becomes **MORE EXPENSIVE !!**

## Issues of Concern

- LADOTD would like to observe:
  - Performance Data for In-place Recycling
    - Long Term Effects
  - Cost/Benefits for Louisiana application.
  - Design Issues Using In-Place Recycling

# State Mascot



# Louisiana Facts



- State Bird: **Brown Pelican**



- Named after King Louis XIV, King of France 1643 – 1715 and Queen Ana
- 18<sup>th</sup> State of the Union
  - **April 30, 1812**
- State Crustacean – **Crawfish**
- State Tree – **Bald Cypress**
- Only State with **Parishes** (not Counties)

# Mike and Opening Day





**Thank You !!**