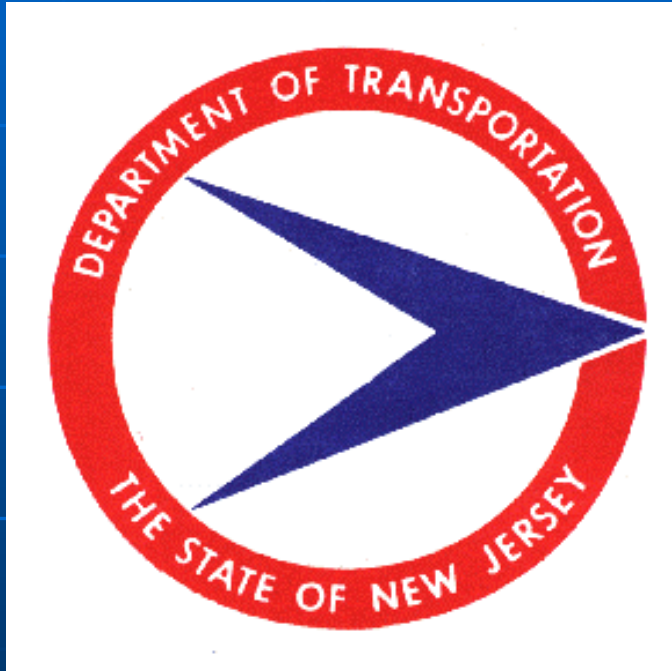


NJDOT Pavement Preservation Technical Appraisal



By

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For

Northeast Pavement
Preservation Partnership
January 12, 2006

Pavement Technology Unit

NJ Facts and Figures

- Highest Population Density: 1134/Sq Mi
- 47th State in Size / 9th in Population
- Highest Urban Population: 90%
- Most Dense Highway & Rail System in US
- Highest median household and family income among the 50 states
- Home to 2nd Largest US Port Facility

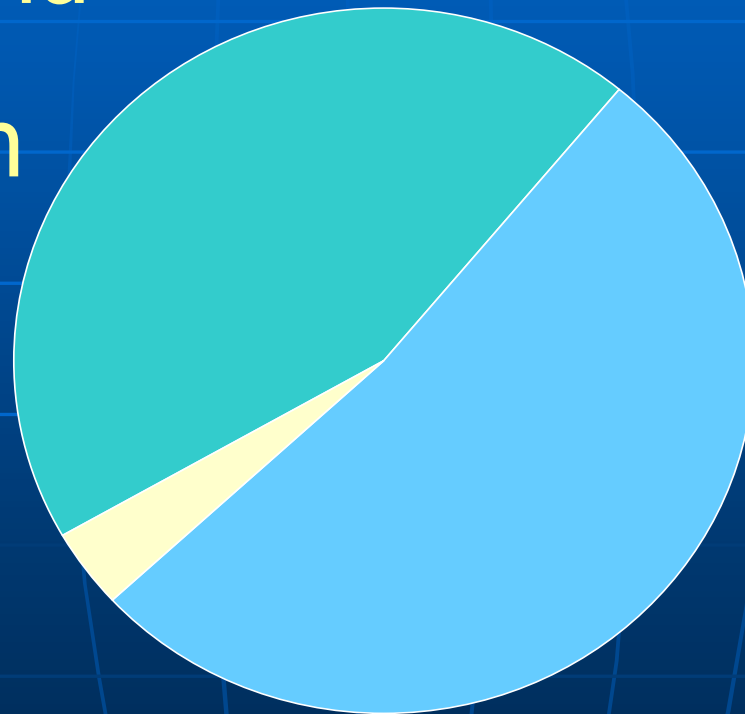
NJ FY06 Program

NJ Trust Fund

\$1.2 billion

Other

\$120 million



Federal

\$1.5 billion

Total = \$2.7 billion

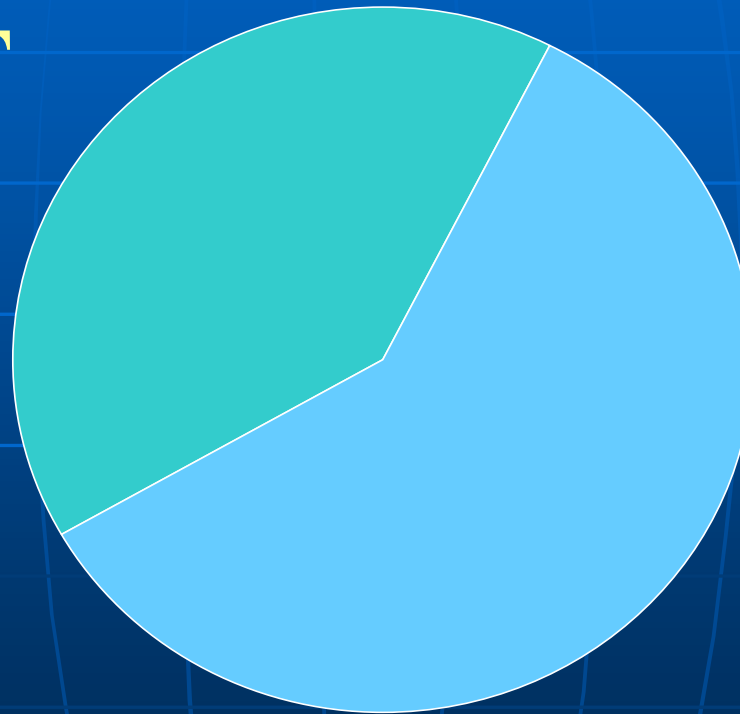
NJ FY06 program

NJ TRANSIT

\$1.1 billion

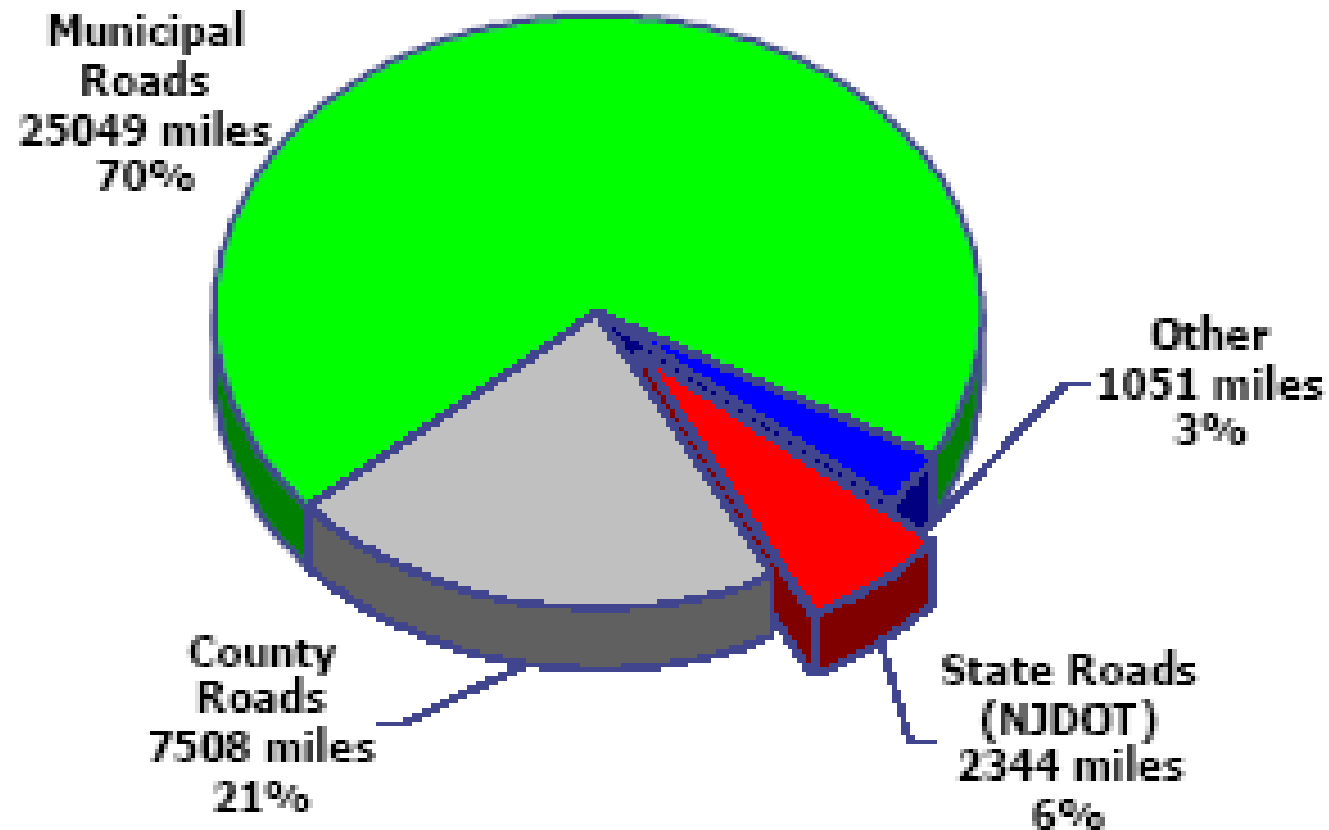
NJDOT

\$1.6 billion



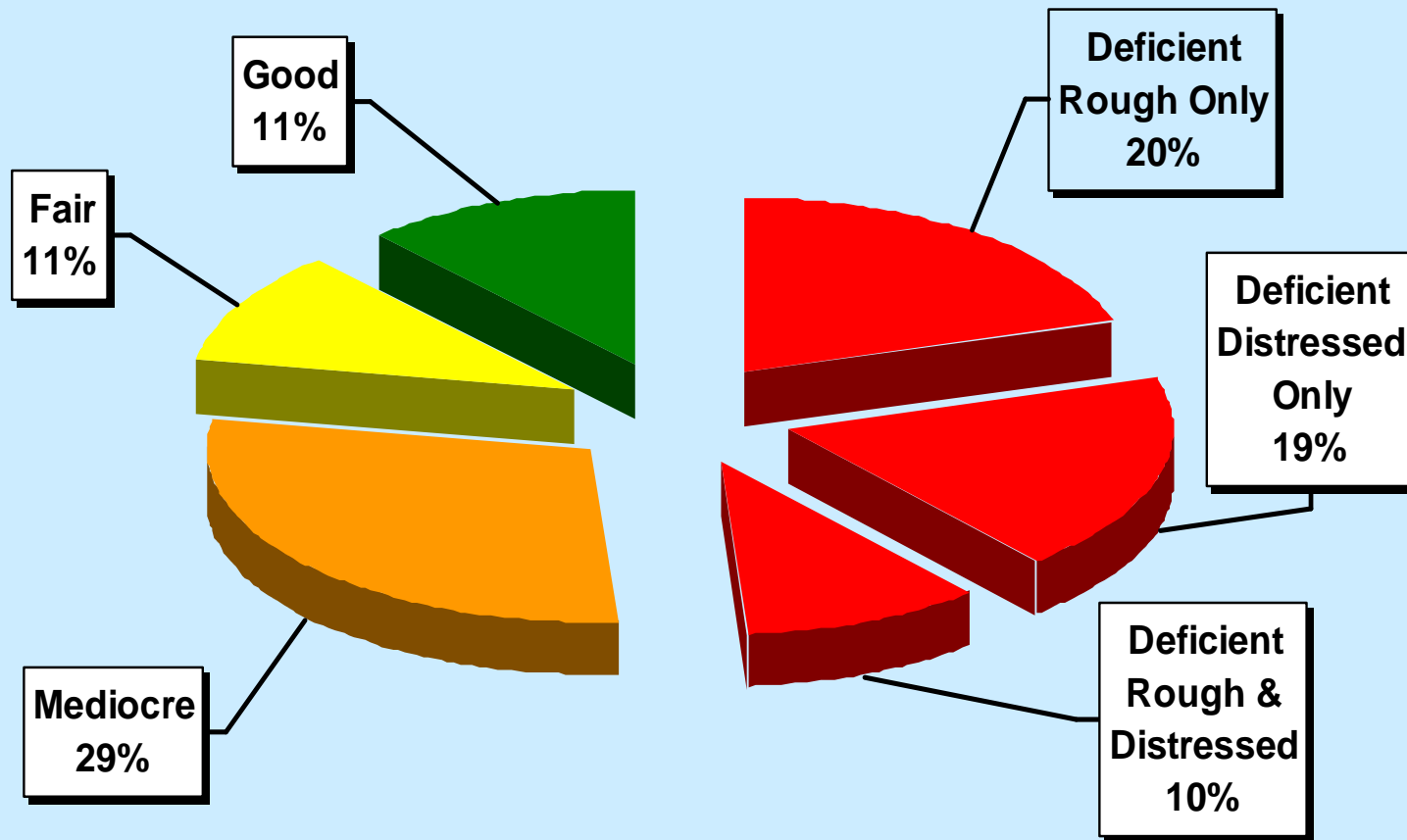
Total = \$2.7 billion

New Jersey Roadway System Breakdown By Centerline Miles



Two-thirds of all traffic is carried on state-owned roads

Functional Adequacy of NJ State Highway System (Based on Roughness and Distress)



Pavement Structural Adequacy:



53% of the state highway system is deficient to carry design traffic loads

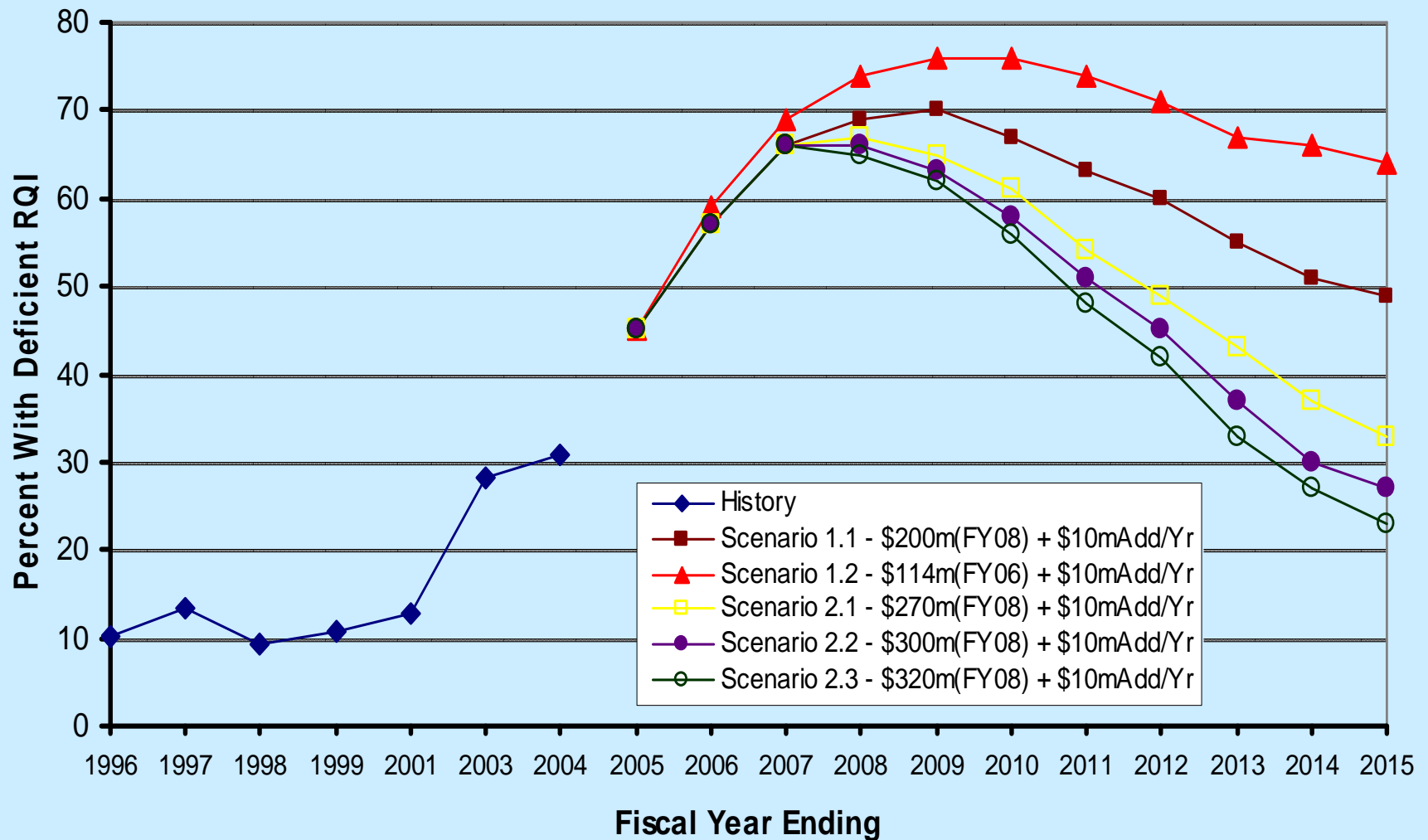
Condition Status	IRI (International Roughness Index, in/mi)	SDI (Surface Distress Index)	Engineering Significance
Deficient (Poor)	Above 170	0 - 2.5	These roads are overdue for treatment. Drivers on these roads are likely to notice that they are driving on a rough surface, which puts stress on their vehicles. These pavements may have deteriorated to such an extent that they affect the speed of free flow traffic. Flexible pavements may have large potholes and deep cracks. These roads often show significant signs of wear and deterioration, and may have significant distress in the underlying foundation. Roads in this condition will generally be most costly to rehabilitate.
Mediocre	120 - 170	2.6 - 3.0	These roads exhibit minimally acceptable ride quality that is noticeably inferior to those of new pavements and may be barely tolerable for high-speed traffic. These pavements may show some signs of deterioration such as rutting, map cracking and extensive patching. Most importantly, roads in this category are in jeopardy and should immediately be programmed for some cost-effective treatment that will improve them to a good condition and avoid costly rehabilitation in the near future.
Fair	95 - 119	3.1 - 3.4	
Good	0 - 94	3.5 - 5.0	These roads exhibit good ride quality with little or no signs of deterioration.

Functional Adequacy of NJ State Highway System (Based on Roughness and Distress)

Condition	Road Miles (Two Directions)	Lane Miles (Two Directions)	% of Total System
Deficient by Roughness Alone	943	1673	20%
Deficient by Distress Alone	795	1544	19%
Deficient by Rough & Distress	490	843	10%
Total Deficient	2228	4060	49%
Total Mediocre	1419	2404	29%
Total Fair	513	876	11%
Total Good	484	959	11%
Total State System	4644	8299	100%

Source: NJDOT Pavement Management System, 2004 Data

Percent Of System With Deficient Ride Quality Using Various Funding Scenarios

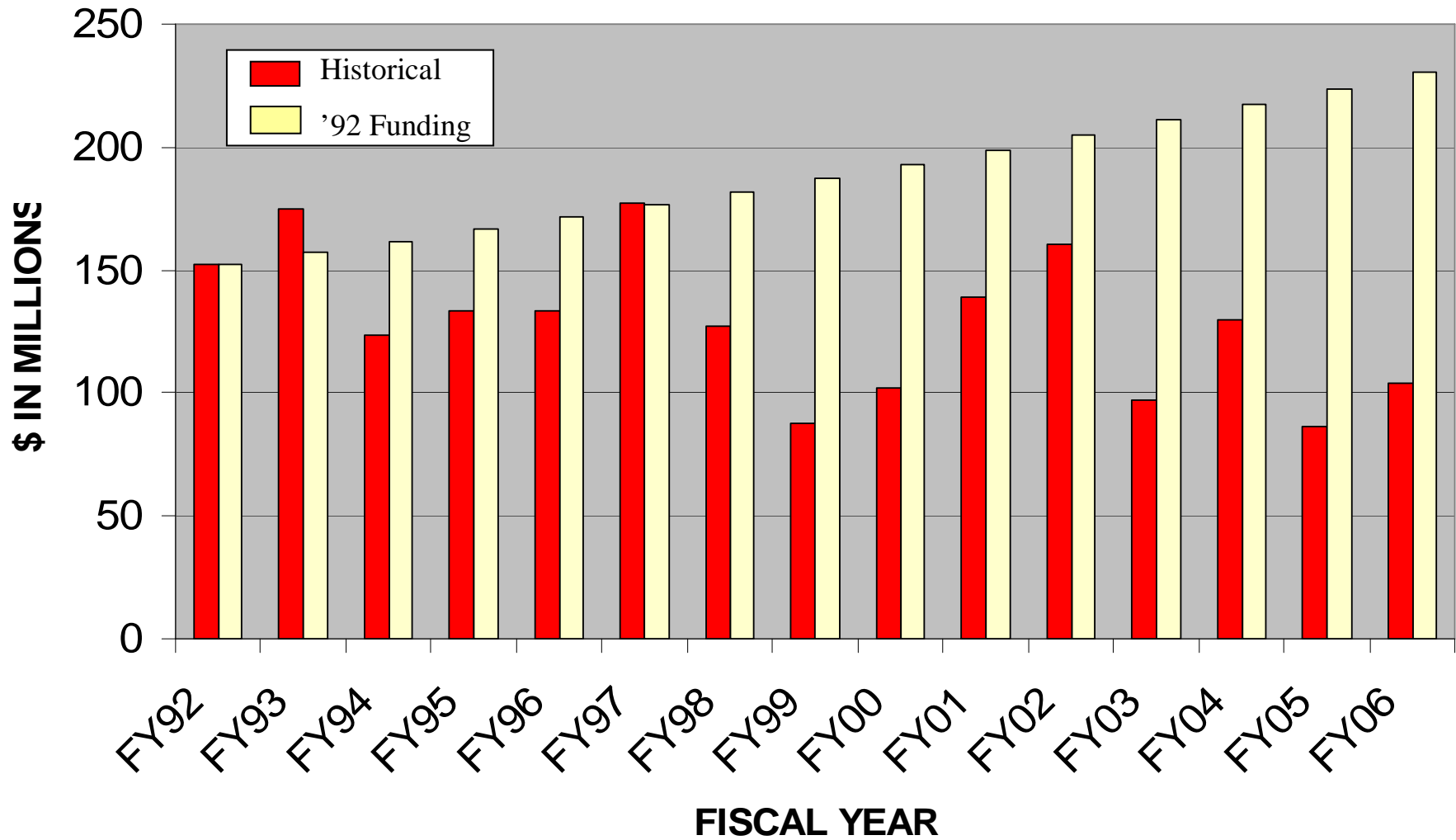


NJ STATE HIGHWAY SYSTEM

LANE MILES

Road Class	Pavement Type			Total
	BC Bituminous Concrete	CO Composite	PCC Portland Cement Concrete	
Interstate	895	477	584	1956
Non-Interstate	2744	3322	334	6400
Total	3639	3799	918	8356

Historical Funding vs. Maintaining 1992 Funding Levels



Treatments

Rigid Pavements

- **Full Depth Concrete Pavement Repair**
- **Concrete Joint Resealing**
- **Concrete Spall Repair**
- **Diamond Grinding**
- **Dowel Bar Retrofit**
- **Slab Stabilization & Slab Jacking**
- **Bituminous Shoulder Treatments**
- **Underdrain Maintenance**

Treatments

Flexible and Composite Pavements

- HMA Milling & Overlay (Nonstructural)
- Micro-Surfacing
- Longitudinal Joint Repair
- Crack Sealing
- HMA Shoulder Chip Seals
- Ultra-Thin Overlays
- Drainage Maintenance

Issues and Barriers

1. **Institutional Change within the Highway Agency**
2. **Marketplace Pressures by Industry Groups to Disturb the Status Quo**
3. **Convincing the Public of the Benefits**

Pavement Preservation

- Focus shift from pavement rehabilitation to pavement preservation
- Perpetual Pavements (50+ year design)
 - Confine distresses to upper pavement layers
 - Periodic removal and replacement of surface layer
- Project Selection- timing is critical
 - Best for pavements with slow rates of deterioration
- More frequent, less expensive treatments
- Minimal increase to pavement structure

Concrete Pavement Treatments

- Stabilization/Undersealing
 - High Density Polyurethane foam
 - Fly Ash/Cement grout
- Diamond Grinding
 - Improved ride quality & texture, less tire noise
- Fast Track Concrete
 - Full Depth Patching
 - Partial Depth Patching
- Load Transfer Restoration
 - Retrofit Dowel Bars & Crack Stitching
- Joint Resealing & Crack Sealing
 - Hot Poured Rubberized Asphalt

Thin Overlays

- Dense-graded systems
 - Superpave
- Open-graded systems
 - OGFC, MOGFC
- Gap-graded systems
 - SMA
 - Novachip
- Ultra-thin systems < 25 mm
 - Microsurfacing

Types of Thin HMA Surfacing

- Dense-graded mixes
 - Continuously graded, Superpave
 - Sand mixes, SAF (Strata)
- Open-graded mixes
 - 15-20% voids, fibers and polymer
 - Used to reduce splash and spray, and improve high speed friction
- Gap-graded systems
 - SMA type mixes
 - Ultra-Thin systems
 - Novachip[®]

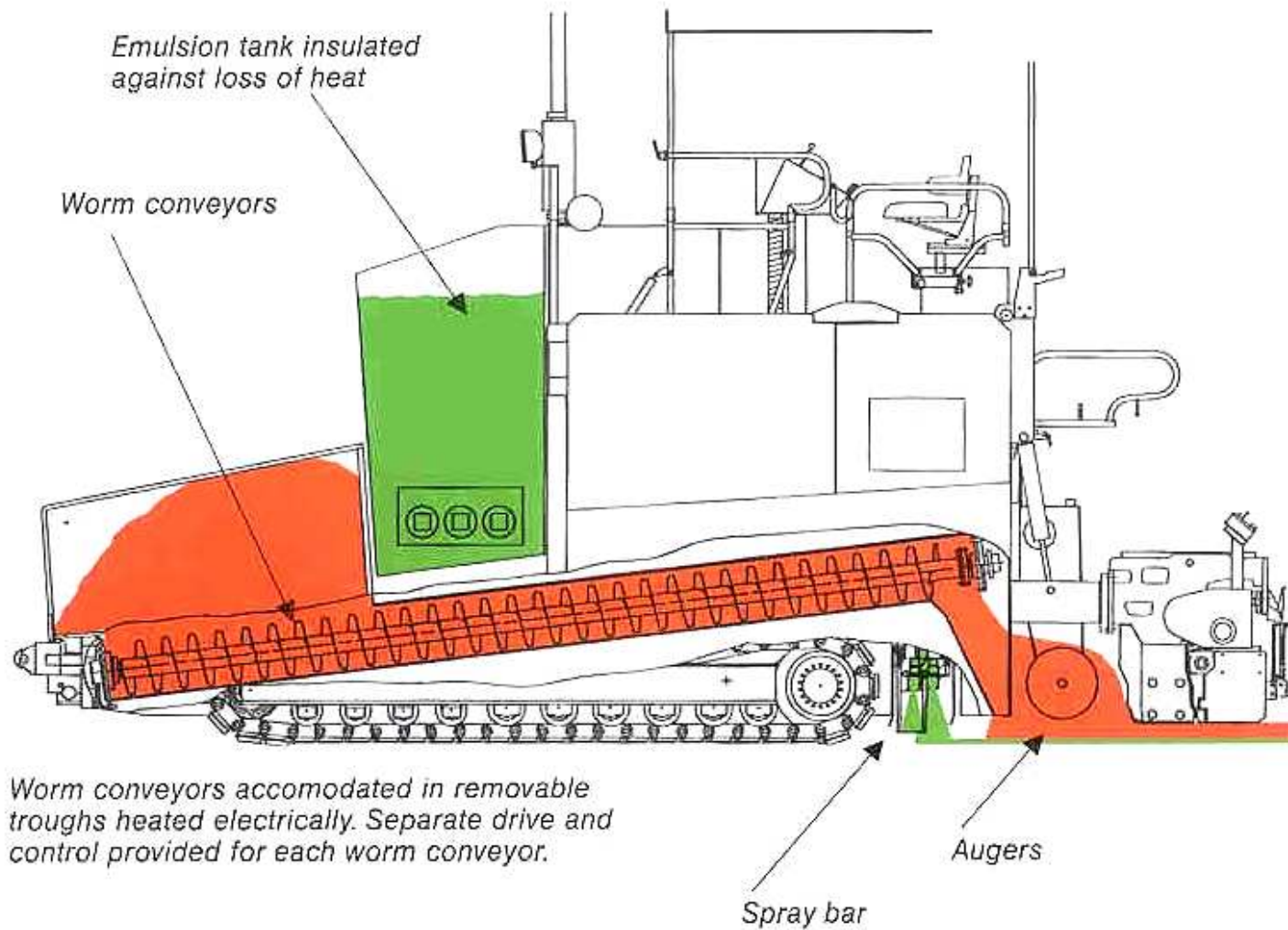
NOVACHIP[®]



ULTRA-THIN FRICTION COURSE



NOVACHIP[®] Macro-Texture



The Self-Priming Paver

Concrete Pavement Restoration (CPR)

Purpose of CPR Techniques

- Repair particular distress
- Prevent recurrence of distress
- Improve pavement capacity
 - Structure
 - Traffic
 - Ride

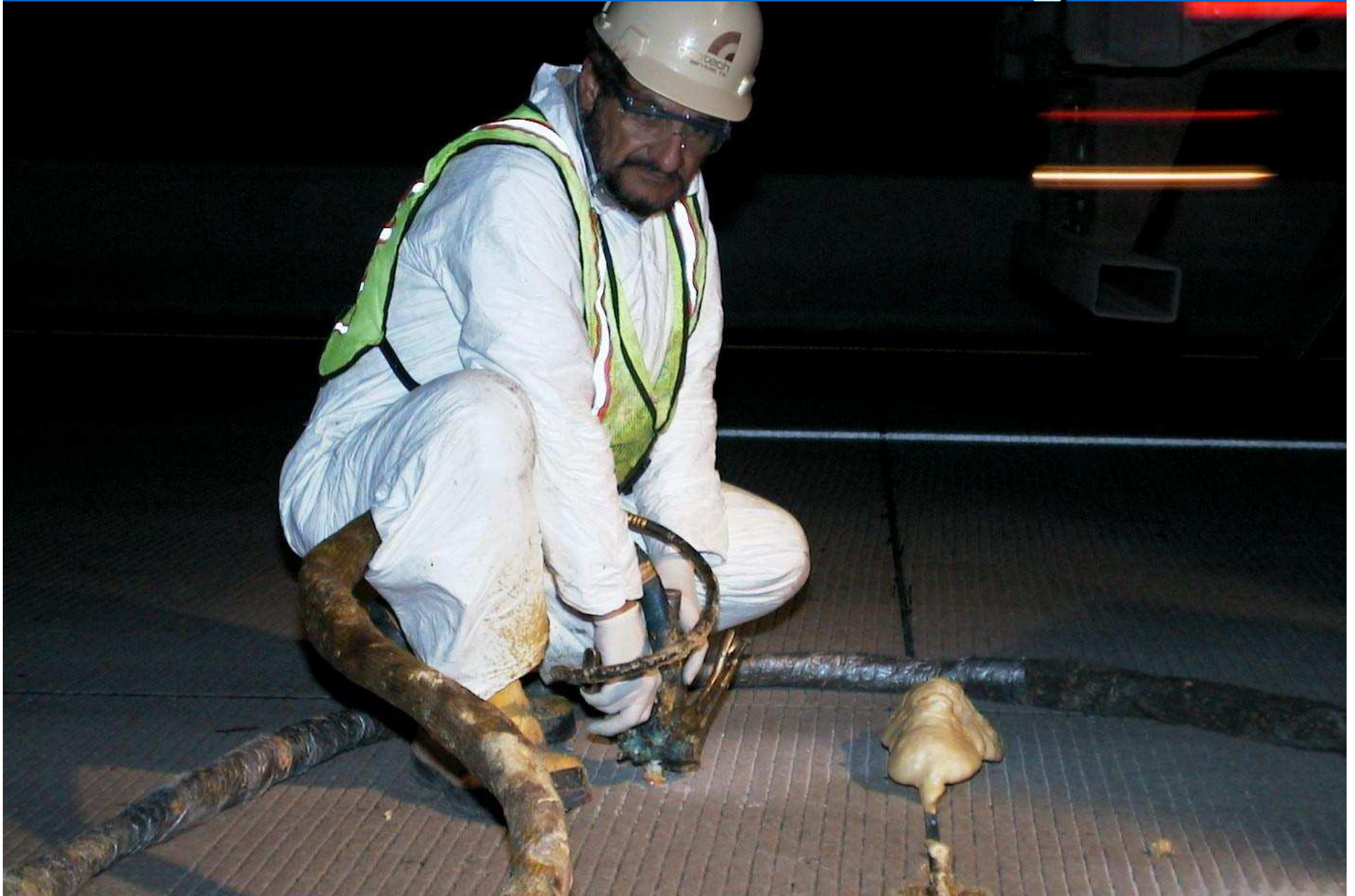
CPR Techniques

- Slab Stabilization/Undersealing
- Full-Depth Patching
- Partial-Depth Patching
- Retrofitting Dowel Bars
- Crack Stitching
- Diamond Grinding
- Seal Joints & Cracks

HDP Injection Equipment



Rt. I-287 Slab Jacking



Hot-Pour Joint Sealants

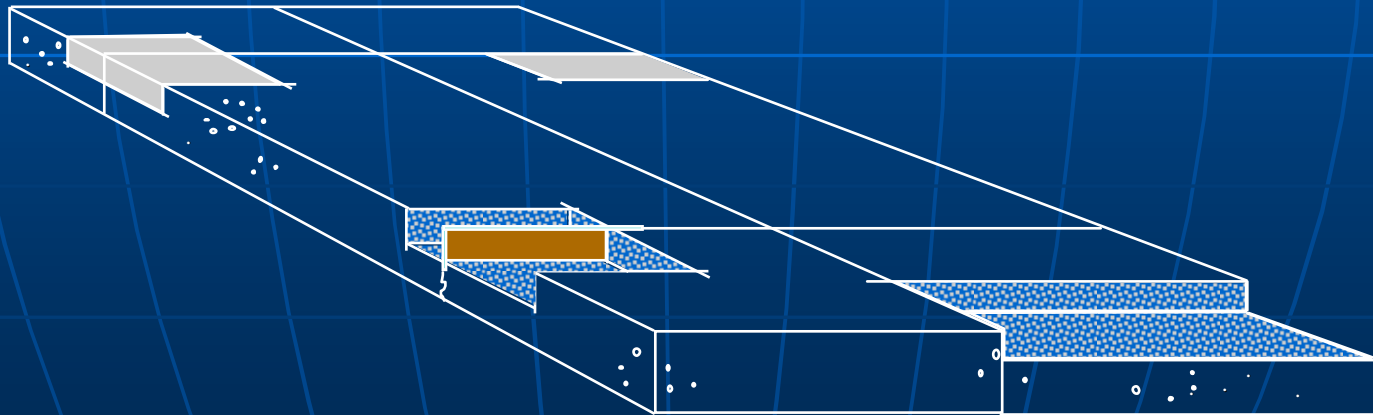
Key Factors

- Field control of heating
 - 175-200°C (350-400°F)
 - Double boiler
 - Agitation
 - Insulated hoses
- Shape factor (filler/sealant)
- Clean and dry sidewalls!!
Hot Air Lance



Partial Depth Repairs

- Repairs deterioration in the top 1/3 of the slab.
- Generally located at joints, but can be placed anywhere surface defects occur.



Load Transfer Restoration

- Diamond saw slot cutter
 - Cuts multiple slots in a single pass.
 - Cuts form the edges of the slots
 - Fins are removed later
 - Can cut 3 or 6 slots in a single pass
- Modified milling machine
 - Cuts multiple slots without fins
 - Scarifies edges of slots
 - May spall pavement surface





Diamond Grinding

- Improves ride by removing:
 - Faulting at joints
 - Slab warping
 - Surface deformations caused by studded tires
- Restores skid resistance
- Corrects cross-slope





Conclusions

- Diamond grinding results in a smooth pavement surface with desirable friction characteristics
- Significant increase in surface texture and corresponding improvement in skid resistance
- Results in dynamic noise reduction

Thank You...