REPORT TO THE GOVERNOR AND THE LEGISLATURE ON NEW JERSEY'S ROADWAY PAVEMENT SYSTEM FISCAL YEAR 2005

Prepared by:

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January 2006

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January 9, 2006

Dear New Jersey Resident:

I am pleased to submit the Department's fiscal year 2005 Report on New Jersey's Pavement Infrastructure. The state highway network is one of New Jersey's largest assets and preserving our pavement investment continues to be a high priority at the Department. The state highway system carries approximately two-thirds of the State's vehicular travel and is an essential element of New Jersey's economy.

The Department's Capital Investment Strategy is designed to maintain roadway infrastructure in a state of good repair and address the backlog of deficiencies. Funding for pavement projects is the major constraint to network improvement. The backlog of deficient pavements continues to increase over time and recent analysis has predicted that continuation of current funding levels will result in further decline in network performance. Considering road roughness alone, a dedicated program to eliminate the backlog of deficient pavements over the next ten years is estimated to cost $500 million per year. Moreover, it was estimated that approximately $1 billion per year over the next ten years would be required to bring the entire state highway system to a good condition with regards to road roughness, surface cracking, and structural strength. Improving the condition of the state highway network is a difficult task in a time of tough competition for limited financial resources.

The Department is utilizing a comprehensive Pavement Management Plan to make the most effective use of available resources. This strategy includes a mix of pavement treatments ranging from preventive maintenance to rehabilitation and reconstruction and takes advantage of the Department's expedited project pipeline delivery system. This plan minimizes the cost of managing our pavement assets by expending funds on the ***right treatment*** at the ***right time*** in the ***right place*** at the ***right cost***.

This report highlights work completed through the Plan in fiscal year 2005 and additional projects programmed for completion in fiscal year 2006.

Sincerely,

Jack Lettiere
Commissioner

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EXECUTIVE SUMMARY

New Jersey's Highway System

Preservation of New Jersey's investment in the state highway network is critical to New Jersey's transportation driven economy and remains one of the highest priorities at the New Jersey Department of Transportation (NJDOT). Safe and efficient travel on the state highway system is an indispensable element in the economic health of New Jersey and its residents. The enormous backlog of deficient pavements, restrained pavement budget, and heavy traffic volumes prevents this strategy from arresting the rate of pavement decline.

The age of the state highway system has reached a point where a large percentage of pavements are overdue for resurfacing, rehabilitation or reconstruction. With the highest population density of the fifty states, New Jersey experiences traffic volumes that are 2.5 times the national average. This onslaught of heavy traffic coupled with a severe freeze-thaw environment accelerates pavement deterioration.

Maintaining the structural integrity and ride quality of the State's 2344 centerline miles of heavily traveled, mature pavements is a major task. While the NJDOT has jurisdiction over only 6 percent of the entire New Jersey roadway network (counties, municipalities, and toll and bridge authorities own the other 94 percent), about two-thirds of total travel within New Jersey takes place on state-owned roads.

The need to improve the structural integrity and smoothness of the state highway network continues to be a challenge. Efforts to reduce the rate of pavement deterioration have been made by implementing numerous reconstruction and rehabilitation, resurfacing and preventive maintenance projects. However, the heavy traffic volume and harsh environment, coupled with competing needs for transportation dollars, have allowed the backlog to increase over time. Despite efforts to make best use of available resources, investment in pavement repair and maintenance activities has not been enough to offset deterioration.

Current Status of the Roadway System

A recent evaluation of the nation's transportation infrastructure by the American Society of Civil Engineers (ASCE) has rated New Jersey's highways among the worst in the country. It is estimated that New Jersey motorists will pay approximately $3.2 billion in extra vehicle repairs and operating costs due to poor road conditions in 2005. The extra vehicle repairs break down to approximately $554 dollars per New Jersey motorist. This is almost double the amount per motorist in neighboring states. ASCE estimates that approximately 71% of the major roads in New Jersey are in either poor or mediocre condition, generally twice the amount in surrounding states.

NJDOT's evaluation of the state roadway network is based on data collected and compiled within the Pavement Management System. Assessment of pavement conditions is divided into the following categories:

- **Pavement Structural Adequacy:** Based on pavement structural adequacy, it was estimated that ***53% of the state roadway system is deficient*** to carry the design traffic loads and is in danger of quickly deteriorating and becoming most costly to rehabilitate.

- **Pavement Functional Adequacy:** Based upon **functional adequacy** as measured by the International Roughness Index (IRI) for ride quality and the Surface Distress Index (SDI) for surface condition, current Pavement Management System data indicates that ***49% of the system is deficient and overdue for rehabilitation (20% is deficient based on roughness alone, 19% is deficient based on distress alone, and 10% is deficient based on roughness and distress combined). At the same time, 29% of the system is in mediocre condition and 11% is in fair condition. The mediocre/ fair portion of the roadway network currently requires less costly treatments to retard deterioration and restore a good condition, but will slip into the poor category within the next few years if action is not taken. Only 11% of the system is considered in good condition.***

The NJDOT Pavement Management System was utilized to compile a list of critical pavement projects. Appendix C of this report ranks these projects by the number of deficient lane miles corrected by each project.

New Jersey's Pavement Preservation Effort

NJDOT has responded to this challenge by initiating a comprehensive pavement preservation program. Data collection efforts have been expanded to obtain accurate pavement condition data with which informed decisions can be made. State-of-the-art data collection, data analysis, design practices, and materials engineering have been developed and are now routinely used in New Jersey.

The Pavement Technology Unit, which oversees the programs for pavement preservation and rehabilitation and reconstruction of the roadway infrastructure, has developed an innovative Pavement Management Plan that utilizes sophisticated engineering data collection and analysis along with economic analyses that consider pavement performance, costs/benefits, vehicle use, and long-range system optimization under limited funding scenarios. However, the effectiveness of such a strategy has been severely limited by the severe backlog of deficient roadway segments due in large part to under funding of pavement repair and maintenance work over the last decade. If significantly increased funding is provided for pavement restoration, the Pavement Technology Unit plans to focus on reducing the deficient backlog while at the same time utilizing elements of the multi-year prioritization approach to preserve our "good" pavement infrastructure. A proactive approach that maintains good pavements in good condition is designed to free up funding for pavement backlog reduction because preventive maintenance treatments are a fraction of the cost of rehabilitation or reconstruction. Initiatives have been made to assure the highest quality of materials and construction practices in roadway restoration. A new incentive/disincentive ride quality specification based upon IRI (International Roughness Index) has been implemented to insure optimum ride quality from new pavement surfaces. Ride quality is a primary index by which pavements are rated, and initially smooth pavements have been shown to last longer. The ability to selectively fast track projects through project delivery pipelines will play a significant role in implementing this plan. This strategy will result in expending funds on the ***right treatment*** at the ***right time*** at the ***right place*** at the ***right cost.***

Capital Investment Strategy

In order to eliminate the backlog of deficient pavement conditions on state highways over the next decade, NJDOT has developed and implemented a Capital Investment Strategy (CIS) that provides strategic direction on how to achieve the goal of putting New Jersey's transportation system in a state of good repair and keeping it there. However, funding availability for resurfacing, rehabilitation and reconstruction, and preventive maintenance programs continues to be the major constraint to this work. Estimated pavement improvement amounts funded in FY 2005 are presented in Table 3 of this report, and amounts for FY 2006 are detailed in Section 1 of Appendix B.

Considering road roughness alone, without regards to surface distress (cracking) or structural adequacy, recent studies have indicated that continued annual funding of approximately $150 million for the main pavement programs of resurfacing and highway rehabilitation and reconstruction is projected to result in a serious decline in the overall network condition over the next 10 years. It was also determined that a funding level of $290 million per year would be required to reduce one-half the current backlog of deficient pavements and approximately $500 million per year would be required to entirely eliminate the backlog in ten years. Moreover, considering road roughness, surface cracking and structural strength, it was estimated that approximately $1 billion per year over the next ten years would be required to bring the entire state highway system to a good condition.

Based on current funding levels, efforts to reduce the rate of pavement deterioration have been made by implementing numerous reconstruction and rehabilitation, resurfacing, and preventive maintenance projects. In spite of these efforts, the mileage of deteriorated pavement segments has increased over time. Funding allocations for more expansive pavement improvements are constrained by the necessity to balance the capital program to fund other competing needs such as high cost bridges, safety improvements, congestion management and strategic mobility projects. In addition, due to budget constraints, investment in repair and maintenance activities has not been enough to offset accruing deterioration, which increases the backlog. The need to improve the structural integrity and smoothness of the state highway network continues to be a challenging endeavor.

Work Completed in Fiscal Year 2005

In compliance with the requirements of the "Congestion Relief and Transportation Trust Fund Renewal Act" (Trust Fund Renewal Act or the Act) enacted on July 20, 2000, this report documents the projects completed in fiscal year 2005. These projects are organized into four major areas and represent the following expenditures for pavement maintenance and repair:

- **Highway Capital Maintenance Projects** totaling approximately $11 million.

- **Rehabilitation and Reconstruction (Capital Program Management) Projects** with a significant roadway resurfacing or reconstruction component that have reached substantial completion during fiscal year 2005, with a total project cost of $325 million and an estimated pavement cost of $95 million.

- **Highway Resurfacing Projects** consisting of 26 contracts initiated through the Department's Division of Operations Support valued at $65 million.

- **Local Aid Pavement Activities** with funding for counties and municipalities in the amount of $145 million which was made available through the Transportation Trust Fund Renewal Act. Of the $145 million, $67.5 million was used for local county aid and $67.5 million was used for local municipal aid. The remaining $10 million is available as local aid – discretionary to both counties and municipalities. About 60 to 75 percent of the completed projects funded through the local county aid program and 90 percent of completed projects funded through the local municipal aid program involve some form of pavement resurfacing.

Work Programmed For Fiscal Year 2006

Work programmed for fiscal year 2006 is also included in this report and a detailed listing of planned projects is presented in Appendix B.

STATUTORY MANDATE

The "Congestion Relief and Transportation Trust Fund Renewal Act" (Trust Fund Renewal Act or the Act) enacted on July 20, 2000 contains two sections of law that concern pavement evaluation and management.

> **N.J.S.A. 27:1B-21.23 Evaluation of road pavements**
> *"The commissioner shall continue to evaluate roadway pavements on the State highway system and assign numerical ratings to roads for maintenance and repair similar to any nationally recognized method."*

> **N.J.S.A. 27:1B-21.24 Report; numerical rankings of pavements**
> *"The commissioner shall issue a report to the Governor and the Legislature at the end of each fiscal year containing the numerical ranking of pavements for roads needing maintenance and repair in accordance with the method developed in section 10 of this act. The report shall also identify the repair and maintenance projects that were completed during the fiscal year, including an estimate of the cost impact to the department for each maintenance and repair project that utilized road surface material or treatment."*

Pursuant to the sections of law cited above, the New Jersey Department of Transportation issues this report.

NJDOT PAVEMENT MANAGEMENT SYSTEM

Background and History

The development of the current NJDOT Pavement Management System has been an evolution over many years. Initially, NJDOT established a Pavement Skid Resistance Testing Unit in 1974 to measure frictional characteristics of pavements in response to the Federal Highway Administration (FHWA) requirement that each state have a "Highway Safety Program". One goal of the FHWA program was to reduce wet weather accidents. The skid resistance data was merged with accident records and then analyzed to identify pavement resurfacing needs based on wet weather crashes.

In December 1980, NJDOT formally established a Pavement Management Unit. This unit began evaluating roadway surface conditions in order to identify pavement resurfacing needs. A combined pavement index based on ride quality and surface distress was developed as a way to prioritize resurfacing projects. In addition, the Pavement Management Unit continued to perform pavement skid resistance testing.

Subsequently, the federal "Intermodal Surface Transportation Efficiency Act of 1991" (ISTEA) required that each state establish a pavement management program for roads on the National Highway System (NHS) and the Non-NHS Federal Aid System. To comply with the FHWA requirement, the Department's Pavement Management Unit collected data on the National Highway System roads. A consultant was hired to collect data on the Non-NHS Federal Aid System roads and to enhance NJDOT's Pavement Management System. Even though the federal

"National Highway System Designation Act of 1995" lifted the ISTEA pavement management mandates, the Department continued its pavement management system since it was considered a good business tool. The system provided NJDOT management with data necessary to choose cost-effective strategies and maintain roadways in serviceable condition.

The federal "Transportation Equity Act for the 21st Century" (TEA-21), enacted in June 1998, encouraged states to develop, implement and maintain systems for managing pavement on Federal Aid highways. In addition, the FHWA required the Department to prepare pavement life-cycle cost analyses for major federally funded projects.

NJDOT has continued to expand and enhance its Pavement Management System. In order to maximize effectiveness and efficiency, the Pavement Management Unit was consolidated with the Pavement Technology Unit within the Bureau of Civil Engineering in January 2004.

Current Pavement Management System

In compliance with the Trust Fund Renewal Act, NJDOT assesses the condition of the pavement on the state highway system. In past years, pavement data for the entire system was collected on a two-year cycle. Beginning in calendar year 2004, the entire system is being assessed on an annual cycle to better monitor conditions and plan needed activities.

The Pavement Management System (PMS) collects pavement condition data to measure performance indicators for ride quality (smoothness), surface distress (cracking and structural deterioration), rutting (grooves in wheel paths) and skid resistance (surface friction) using automated equipment. In addition to collecting these traditional pavement surface condition indices, the Department has implemented Falling Weight Deflectometer testing which assesses the structural condition of the entire pavement structure throughout its multiple layers. The information gathered from this device allows engineers to better determine pavement structural adequacy, estimate remaining pavement service life, and identify limits of homogeneous sections of roadway that should receive the same rehabilitation treatment. This information is an important management tool in the selection of appropriate pavement treatments and the determination of major rehabilitation/reconstruction projects.

The Pavement Management System also supplies vital information to a multitude of users inside and outside NJDOT, including federal, state, county, and municipal agencies, consultants, contractors, and suppliers. Utilizing data from the PMS, engineers at NJDOT have developed innovative programs to make the New Jersey roadway system safer and more efficient. An example is a project where roadway sections with an abnormally high incidence of wet weather accidents were analyzed using PMS frictional skid resistance data. Areas with poor pavement skid resistance will receive special traction enhancing treatments to save lives and reduce a tremendous economic burden to drivers.

PMS data is continually updated, analyzed, and reported to a myriad of users inside NJDOT in order to make engineering and management decisions. Capital investment strategists rely on PMS data analyses to optimize resources and develop the Department's five-year capital program. In addition, the Department's Pavement Technology Unit, which oversees the programs for the preservation, rehabilitation and reconstruction of pavements, utilizes PMS data

to develop pavement projects that are implemented through Capital Program Management and the Operations divisions of the Department.

The Pavement Technology Unit has implemented several significant initiatives over the last few years. One accomplishment was the development of an innovative Pavement Management Plan that emphasizes preventive maintenance and moves the Department from a reactive ***"fix the worst first"*** strategy towards a ***"multi-year prioritization"*** mode of operation. This new approach utilizes sophisticated engineering and economic analyses that consider pavement performance, costs/benefits, user delay, and long-range system optimization under limited funding scenarios. However, the effectiveness of such a strategy has been limited by the severe backlog of deficient roadway segments, due in large part to under funding of repair and maintenance work over the last decade. If significantly increased funding is provided for pavement restoration, the Pavement Technology Unit can focus on reducing the deficient backlog while at the same time implementing elements of the multi-year prioritization approach to preserve the pavement infrastructure. Activities in the Plan include the following "mix of fixes":

- Diamond Grinding
- Ultra Thin Overlays
- Longitudinal Joint Repair
- Crack and Joint Sealing
- Slab Jacking
  (Lifting concrete pavements)

} Preventive maintenance: A wide range of lower-cost and often innovative repair techniques

- Milling and Resurfacing: Moderately expensive projects that extend pavement life and improve smoothness
- Reconstruction and Rehabilitation: Relatively expensive projects for serious problems

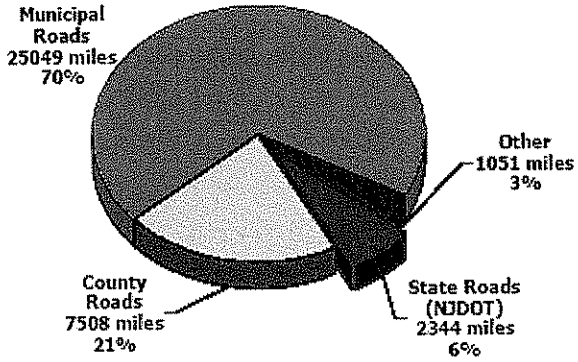
A second major accomplishment of the unit was the purchase and utilization of new state-of-the-art roadway analysis equipment. This new equipment collects more accurate and useful pavement data at highway speeds, thereby avoiding the need for lane closures and resulting traffic delays. Allied with this upgrade, the computerized pavement data management system was enhanced by developing databases and supporting computer software to make pavement data more accessible to users and to process large quantities of more sophisticated data.

A third major accomplishment of the Pavement Technology Unit was the development of a ride quality specification based on laser-measured smoothness criteria to assure that new pavement construction conforms to the highest standards.

CURRENT STATUS OF THE STATE ROADWAY SYSTEM

There are approximately 36,000 centerline miles of roadways in New Jersey. NJDOT maintains slightly more than 2,300 centerline miles of state-owned roads. Most of the remaining mileage is under the jurisdiction of county and municipal governments (see Figure 1 below).

FIGURE 1
New Jersey Roadway System
Breakdown By Centerline Miles



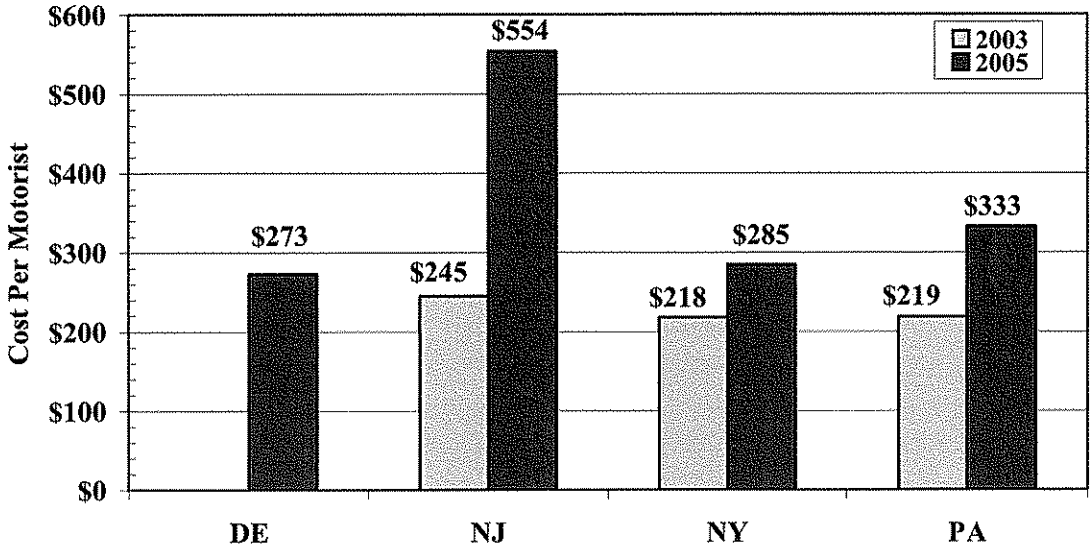
"Other" includes toll roads and bridge authorities

Although NJDOT jurisdiction represents only about 6% of the total statewide mileage, approximately two-thirds of all traffic, including a high percentage of heavy trucks, is carried on state-owned roads. Heavy traffic volumes have a significant impact on pavement deterioration and over the past several decades axle load repetitions have doubled every ten years. New Jersey's older pavements are not structurally adequate to handle this increase in axle loading. In addition, pavement repair and maintenance work have been under funded over the last decade. The result is a large backlog of roadway segments in poor or mediocre condition. In fact, a recent evaluation of the nation's transportation infrastructure by the American Society of Civil Engineers (ASCE) rated New Jersey's highways among the worst in the country. Some staggering statistics from the study show that:

- New Jersey motorists will pay a total of $3.2 billion dollars in extra vehicle repairs and operating costs due to poor road conditions in 2005. This is up from $1.4 billion dollars in 2003. This is the largest total and largest 2-year increase in the nation. The extra vehicle repairs break down to approximately $554 dollars per New Jersey motorist. This is almost double the amount per motorist for the states surrounding New Jersey (see Figure 2 below).

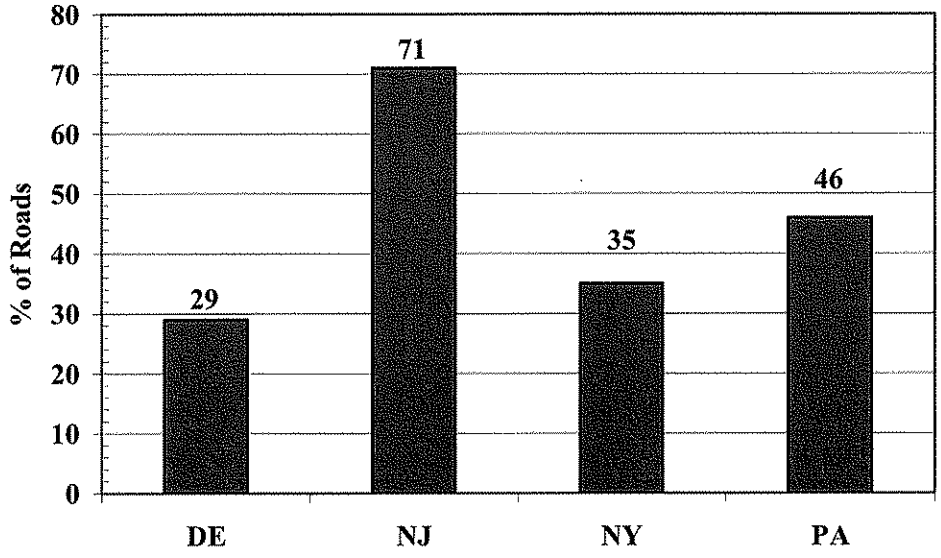
- Approximately 71% of the major roads in New Jersey were determined to be in either poor or mediocre condition in 2005. This is an extreme increase in the percentage of poor pavements in New Jersey and illustrates how the neglect of pavement preservation can cause an immediate impact on New Jersey's highways. When compared to surrounding states, New Jersey has almost twice the amount of poor to mediocre condition highways (see Figure 3 below).

FIGURE 2
ASCE's Costs Per Motorist in Extra Vehicle Repairs and Operating Costs Due to Poor Road Conditions



Source: ASCE, 2005 Report Card for America's Infrastructre

FIGURE 3
ASCE's % of Major Roads in Poor or Mediocre Condition



Source: ASCE, 2005 Report Card for America's Infrastructre

NJDOT's evaluation of the New Jersey state highway system is based upon data collected on state roads and stored in the Pavement Management System. The Pavement Technology Unit analyzes this data to assess current pavement conditions. Pavement evaluation can be divided into the following categories:

Pavement Structural Adequacy

The Falling Weight Deflectometer (FWD) testing assesses the structural condition of the in-situ pavement structure throughout its multiple layers. The information gathered from this device allows engineers to determine whether pavement sections have sufficient strength to sustain design traffic conditions. This data is difficult to collect on a network basis because lanes must be closed and traffic is impacted with this type of testing. The time and cost involved are substantial. However, a recent needs analysis using FWD technology was conducted on New Jersey's interstate highway system. Results of this study were then extrapolated for the non-interstate portion of the system using statistical methodologies. The study estimated that approximately **53% of the current state roadway system is not structurally adequate** to sustain the current traffic load. Also, at existing funding levels, the deficient percentage will increase steadily to 90% deficient by fiscal year 2013. This is an alarming statistic since structural deficiency leads to accelerated pavement deterioration requiring extensive and costly rehabilitation or reconstruction to correct.

Pavement Functional Adequacy

Attributes related to functional adequacy primarily deal with pavement surface conditions. The Pavement Management System contains the following functional adequacy indices:

- **RQI (Ride Quality Index)** estimates ride quality by relating measured vertical accelerations inside a vehicle to passenger comfort levels.
- **IRI (International Roughness Index)** estimates roughness by using lasers to determine the actual variations in the pavement surface from a perfectly flat condition, measured in inches per mile.
- **SDI (Surface Distress Index)** assesses surface distress and visible deterioration by evaluating cracking, patching, faulting, shoulder drop, and joint deterioration. SDI is reported on a scale of 0 to 5 (5 is a perfect pavement free of any distress).
- **Rut Depth** measures depths of grooves primarily in vehicle wheel paths.
- **Skid Number** measures the pavement surface frictional characteristics.

While all of the indices listed above are considered in selecting locations and types of pavement rehabilitations, IRI and SDI are most indicative of functional adequacy and are used here to evaluate the system status. IRI is a national standard supported by the Federal Highway Administration and SDI is a New Jersey standard used for many years in roadway assessment.

The current analysis utilized 2004 data from the NJDOT Pavement Management System (PMS) database to evaluate the state highway system consisting of approximately 2300 centerline miles (4600 two-way miles) of roadway that are state-owned and maintained. This amounts to approximately 8300 lane miles of mainline roadway. In this analysis, the criteria shown in Table

1 below were used to evaluate the system condition. The database was queried using these condition limits to calculate lane miles falling into each category.

TABLE 1
Condition Criteria

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 restore 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. A proactive preventive maintenance strategy is necessary to keep roads in this category as long as possible.

Ref: The Road Information Program, Washington, D.C.

After the system was broken down into deficient, mediocre, fair and good categories, further analysis was performed on the deficient portion. The database was queried for the following 3 conditions:

1. **Rough Only:** Road segments with excessive roughness (IRI > 170) but without severe distress (SDI > 2.5).
2. **Distressed Only:** Road segments with severe distress (SDI ≤ 2.5) but without excessive roughness (IRI ≤ 170).
3. **Rough and Distressed:** Road segments with excessive roughness (IRI > 170) and severe distress (SDI ≤ 2.5).

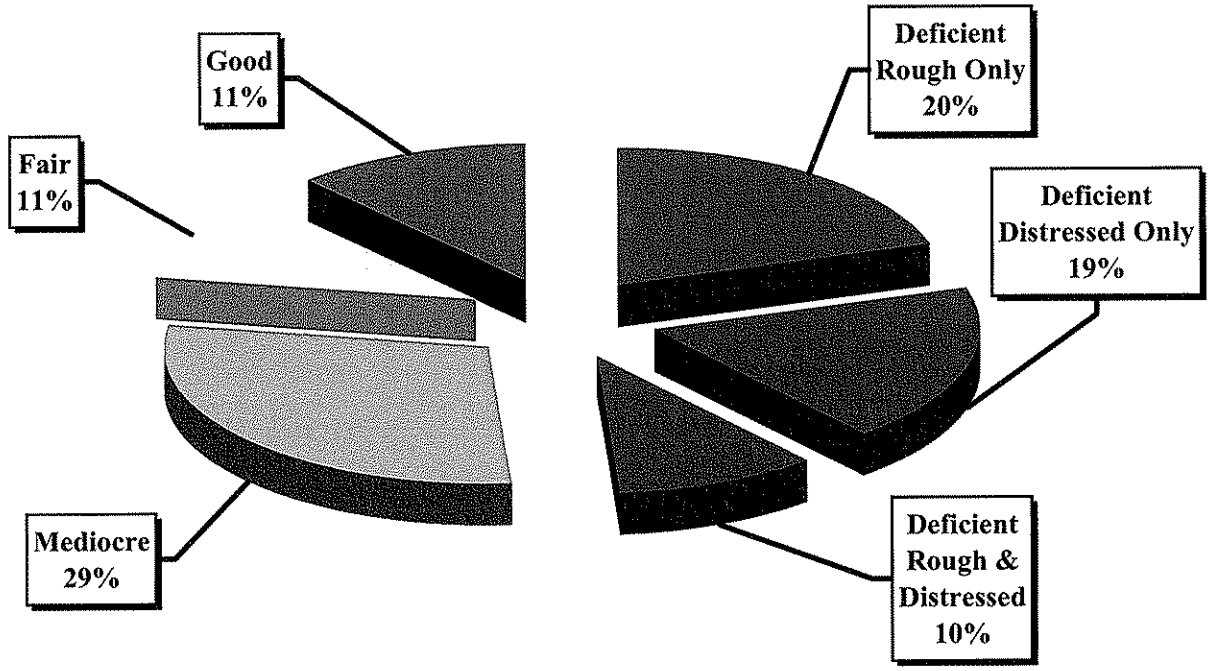
Results of the analysis for smoothness and surface distress are presented in tabular form in Table 2 and graphically in Figure 4 below.

TABLE 2
Current 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 Roughness & 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

FIGURE 4
Current Functional Adequacy of NJ State Highway System
(Based on Roughness and Distress)



Source: NJDOT Pavement Management System, 2004 Data

Overall Status

- Based on pavement **structural adequacy**, results of a recent needs analysis utilizing Falling Weight Deflectometer testing for New Jersey's interstate highway system and then extrapolated for the entire state highway system indicated that ***53% of the state roadway system is deficient*** to carry future traffic loads and is in danger of quickly deteriorating and becoming most costly to rehabilitate.

- Based on **functional adequacy** as measured by the International Roughness Index (IRI) for ride quality and the Surface Distress Index (SDI) for surface deterioration, current Pavement Management System data indicates the following:

49% of the system is deficient

- **20% deficient by roughness alone**
- **19% deficient by distress alone**
- **10% deficient by roughness and distress**

29% of the system is mediocre

11% of the system is fair

11% of the system is good

PAVEMENT TREATMENTS & RELATED RESEARCH

Research and testing of new pavement treatments is a regular practice at the Department. Various units within NJDOT, along with university research partners, are working together to implement new pavement materials and develop tools to evaluate materials in both the laboratory and the field. Ongoing studies are being conducted to evaluate high performance concrete materials that can be used to extend the life of concrete pavement and fast track concrete that can reduce lane closure durations from days to hours, expediting pavement repairs. Computerized models are utilized to estimate and predict traffic loading and to develop design procedures that optimize pavement durability and performance. The Department is currently working with industry to implement more stringent standards for the pavement smoothness achieved during construction. The use of recycled materials to extend the availability of New Jersey's natural resources, while reducing waste and costs, is also constantly being investigated.

Some notable research and technology advancements are listed below:

- **Mechanistic Design Procedure** - Substantial research is currently underway to prepare the Department for the implementation of a new mechanistic-empirical pavement design procedure that will more accurately model pavement responses and improve the design of New Jersey's pavements. New Jersey is deemed a lead state in the implementation of the new pavement design procedures.

- **Pavement Noise Study** - Selected pavements in New Jersey were studied using sophisticated instrumentation to evaluate tire noise for various pavement types. It is anticipated that research of this type will allow engineers to design quieter pavements to reduce the need for large sound barrier walls that are costly and environmentally undesirable.

- **Bridge Approach Slabs** - In an effort to eliminate a widespread problem with structural cracking in bridge approach slabs, a major study was undertaken to develop, construct, and monitor new designs. Approach slabs provide a transitional roadway link between the roadway pavement and the bridge structure. The transition is crucial in reducing dynamic impact loads on the bridge by bouncing vehicles. Finite-element models were used to develop an innovative design that was constructed with embedded instrumentation to monitor traffic loading and strains. The effort developed a new design standard that is considerably stronger for approximately the same cost.

- **Pavement Management System for Local Agencies** - A research project included education, development, and implementation of pilot Pavement Management Systems for one county and one municipality in each Metropolitan Planning Organization (MPO) throughout the State. This will be followed up by a statewide conference to introduce Pavement Management Systems to all counties and municipalities in New Jersey.

- **Superpave Asphalt for Low Volume Roads** - A research effort investigated and substantiated that the traditional Marshall asphalt mixture design system could be replaced with the state-of-the-art Superpave mix design system on county and local roadways. Subsequently, the Department's Division of Local Aid and the Bureau of Materials are

conducting workshops in each MPO to introduce and facilitate the transition to this new design system. The result will be better performing asphalt pavements throughout the State.

Utilizing cutting edge technology spawned by research efforts like these, NJDOT employs a myriad of pavement treatments for preventive maintenance, resurfacing, rehabilitation, and reconstruction activities. Descriptions of many of these treatments are contained in Appendix A of this report.

CAPITAL INVESTMENT STRATEGY

Investment in the pavement quality on New Jersey's highway network is critical. The State highway system plays a major role in stabilizing and enhancing the economic vitality of New Jersey and is an indispensable element in providing mobility for people and goods moving to, from and within New Jersey. Investment in maintaining and upgrading the structural integrity and surface condition of the state's highway network is mandatory.

The deterioration of the roadway infrastructure continues to be a serious problem on the state's 2344 centerline miles. Severe pavement deterioration has continued as age, the effects of freeze-thaw cycling, and the constant bombardment by heavy traffic takes its toll. A significant backlog of deficient pavements has resulted. Preserving the roadway infrastructure in a state of good repair and correcting deficiencies is a top priority.

Accruing deterioration has continued in spite of the fact that NJDOT capital programs have addressed pavement deficiencies as much as possible with available funding, project schedules, and the necessity to accommodate other competing needs. Funding availability for resurfacing, rehabilitation, reconstruction, and particularly preventive maintenance programs remain the major constraint to pavement quality improvement.

With regards to pavement management, NJDOT's **Capital Investment Strategy (CIS)** is a performance-based decision-making methodology that links a "Fix It First" policy to the need for more significant investment in pavement preservation programs. The CIS provides strategic direction on how to achieve this goal. It provides assistance in answering practical questions: Where are we now and where would we like to be? How well is our pavement infrastructure performing over time? What level of funding is required to rebuild and preserve our infrastructure investments? What is our return on investment? Within its overall "Fix It First" goal, NJDOT is committed to a long-term program to shrink the backlog of deficient highway segments and to identify and implement state-of-the-art engineering techniques and cost-effective management practices.

Fiscal Year 2005 Funding

The FY 2005 Transportation Capital Program allocated funds for pavement preservation activities as described in Table 3 below:

TABLE 3
FY 2005 Pavement Preservation Funding

Program Category	Comments	Funding Amount (Millions)	Pavement Improvement Amount (See Note)
Highway Capital Maintenance (State Funding)	Roadway betterments (minor repairs)	$8	$8
Highway Capital Maintenance (Federal Funding)	Interstate preventive maintenance	$3	$3
Highway Resurfacing (State Funding)	Resurfacing and minor safety improvements	$60	$60
Highway Resurfacing (Federal Funding)		$2	$2
Rehabilitation and Reconstruction (Federal and State Funding)	Larger scale projects	$131	$95
Total		**$204**	**$168**

Note: *Rehabilitation and reconstruction projects administered through Capital Program Management are large-scale projects with many activities (e.g. bridge rehabilitation, traffic signals, safety improvements, sidewalks and curbs, etc.). The pavement improvement amount is an estimate of the actual costs to restore roadway pavement which directly improves the pavement system infrastructure.*

Some significant projects included in this funding plan are highlighted below. Refer to the section of this report entitled **"WORK COMPLETED IN FISCAL YEAR 2005"** for a more complete listing of projects.

- **Route 1&9, Secaucus Rd. to Broad Ave.: rehabilitation and reconstruction -**
  $33.6 million total construction cost:
  - $14.2 million in FY05
  - $19.4 million programmed in later years

- **I-295, I-195 to Route 1: rehabilitation -**
  $13 million total construction cost
  - $7.0 million in FY05
  - $6 million programmed in later years

- **I-78, Truck Weigh Stations, Mileposts 4.1 – 7.0: rehabilitation and reconstruction -**
  $57.8 million total construction cost
  - $12.1 million in FY05
  - $45.7 million programmed in previous years

- **I-195 West of Richardson Road to Exit 8: rehabilitation -**
  $3.5 million total construction cost in FY05

Fiscal Year 2006 Funding

For FY 2006, the Transportation Capital Program allocates funds for pavement preservation activities as described in Appendix B, Section 1 of this report.

Some significant projects included in this funding plan are highlighted below. Refer to Appendix B of this report for detailed listings of planned projects.

- **I-78, Union/Essex Rehabilitation, Springfield Avenue to Rte. 1&9: reconstruction -** $42 million total construction cost
  - $23 million in FY06
  - $19 million programmed in later years.

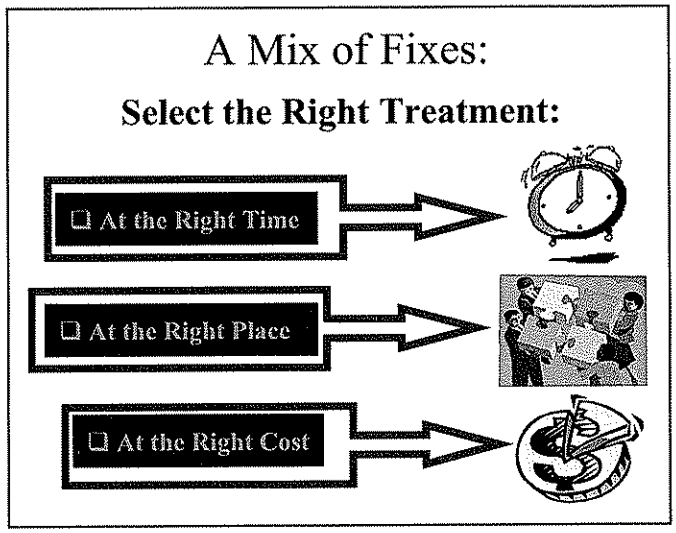
- **I-78, Rte. 31 Interchange to Pottertown Oldwick Road, MP 18-23.1: rehabilitation -** $9.0 million total construction cost in FY06

- **I-287 N, North of Burnt Mills Road to Passaic River, MP 21.5-30.2: rehabilitation -** $6.0 million total construction cost in FY06

- **I-287, Littleton Road to Rte. 202, MP 42.2-47.1: rehabilitation -** $8.0 million total construction cost in FY06

Capital Investment Strategy and Future Projections

As an asset management tool, the Capital Investment Strategy (CIS) provides strategic direction to the capital program in implementing NJDOT's "Fix It First" policy. This exemplifies the high priority given to achieving and maintaining a state of good repair for the state transportation system. The CIS for pavement preservation is simply based on a commitment to renew and sustain our transportation infrastructure. However, this financial plan will not be successful without increased funding allocations necessary to shrink the backlog of pavement deficiencies projected in the future.



The CIS continues to pursue a more cost-effective, optimization approach to pavement management. Life cycle cost analysis is used to map out a strategy for implementing: "The Right Treatment, At the Right Time, At the Right Place, At the Right Cost". This course of action promotes the most efficient use of available funding based on timing, treatment selection, and priority locations as opposed to the more traditional "worst first" program. The Department's ability to selectively fast track projects through a

more streamlined project development pipeline will play a significant role in implementing this investment strategy.

Efforts to reduce pavement deterioration have been made by implementing numerous reconstruction and rehabilitation, resurfacing, and preventive maintenance projects. In spite of these efforts, the mileage of deteriorated pavement segments has increased over time. Funding allocations for more expansive pavement improvements are constrained by the necessity to balance the capital program to also fund other competing needs such as high cost bridges, safety improvements, congestion management and strategic mobility projects. In addition, due to the reality of budget constraints, investment in repair and maintenance activities has not been enough to offset accruing deterioration to eliminate the backlog. The need to improve the structural integrity and smoothness of the state's highway network continues to be a challenging endeavor.

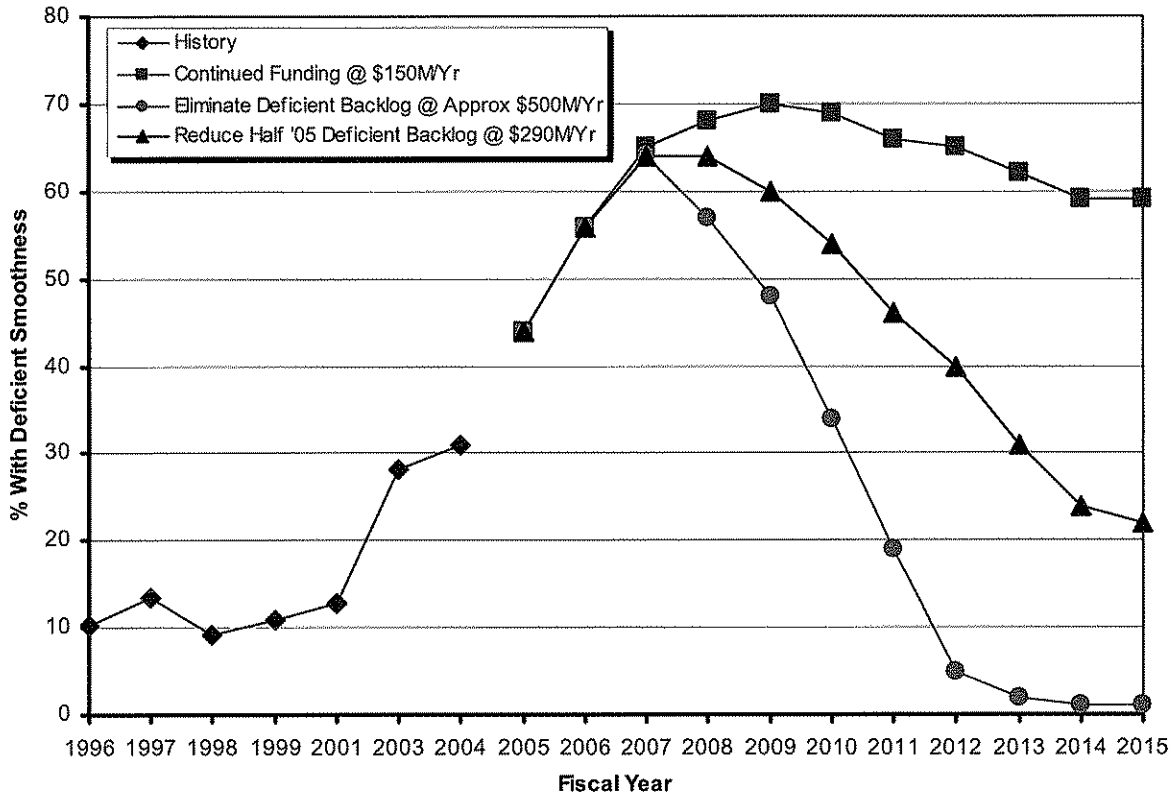
As shown in Figure 4, an analysis of deficient pavement backlog based on latest compiled data collected in 2004 indicates that approximately **30% of the system is deficient based on roughness considerations and an additional 19% is deficient based on pavement distress (cracking)**. As part of the Fiscal Year 2006-2010 Capital Investment Strategy, several scenarios were developed in order to evaluate pavement performance over time in response to different investment levels. Using computer modeling software which was limited to evaluating percent deficiencies based on roughness considerations alone without considering surface distress (cracking) or structural adequacy (total system deficiencies will be greater), the results shown in Figure 5 below were generated. It was determined that continued annual funding at the current level of approximately $150 million for the main pavement programs of resurfacing and highway rehabilitation and reconstruction is projected to result in a serious decline in the overall network condition over the next 10 years. In other words, roadway performance, including structural integrity and ride quality, will further deteriorate creating an accruing backlog that becomes financially overwhelming to eliminate. Obviously, this investment level does not renew and sustain our infrastructure investments to achieve a state of good repair.

This same analysis considered the amount of funding required to entirely eliminate the backlog of deficient pavement and to eliminate one-half the current backlog of deficient pavement in ten years, as specified in New Jersey's Transportation Trust Fund Renewal Act (N.J.S.A. 27:1B-22). Considering roughness only, it was determined that **a funding level of $290 million per year (a minimum increase of approximately $140 million per year over current funding levels) would be required to reduce one-half the backlog and approximately $500 million per year would be required to entirely eliminate the backlog of deficient pavements in ten years (see Figure 5 below). Moreover, considering road roughness, surface cracking and structural strength, it was estimated that approximately $1 billion per year over the next ten years would be required to bring the entire state highway system to a good condition.**

In terms of pavement performance, there is a significant difference in "where we are now" and "where we would like to be." Our ability to invest in pavement preservation at the levels needed to shrink the current and projected backlog and significantly enhance performance can not be realized due to a lack of adequate funding. The inability to provide funding to properly reconstruct, rehabilitate, maintain, and preserve our roadway infrastructure can prove to be an extremely expensive situation in the future.

FIGURE 5
Multi-Year Performance Analysis
Percent of System Deficient Based on Roughness*

Figure 5 below demonstrates trends over time based on roughness only. As shown in Figure 4, total system deficiency based on roughness and distress would yield even greater percentages than those shown below.



In order to prevent this downward trend, the NJDOT Fiscal Year 2005-2009 Capital Investment Strategy identifies performance-based capital programming alternatives that link broad transportation goals and policies to specific investment choices. The proposed five-year capital program funds a comprehensive pavement program consisting of various treatments for highway problems. These treatments include relatively expensive rehabilitation and reconstruction projects for significant problems, less expensive resurfacing projects that extend service life and improve smoothness, and a wide range of lower-cost and often innovative preventive maintenance repair techniques.

Due to the growth of competing transportation needs and limited state and federal funding, the Department's CIS is focusing on producing "better" system-wide pavement quality as opposed to the "best" pavement conditions. This means achieving acceptable condition levels in the most productive and manageable fashion. The incorporation of a "budget sensitive" shorter-term design-life policy allows for the implementation of more small-scale projects such as resurfacing and minor rehabilitation improvements statewide. In order to "fit within our means," NJDOT is

budgeting for a diverse pavement preservation program that is balanced with a variety of projects designed to protect New Jersey's infrastructure investments.

The following steps will be taken to implement the NJDOT capital investment strategy for roadway preservation:

1. Continue to demonstrate the need for higher funding levels.
2. Program all eligible, affordable roadway preservation projects in fiscal year 2006 and fiscal 2007.
3. Continue to advance future roadway preservation projects through the study and development stages so that they will be ready for future funding.
4. Operate a pavement management system that provides a balanced mix of fixes with a proactive approach in selecting and implementing pavement preservation activities.

Capital Investment Conclusions

The CIS sets out the overall *strategy* that the NJDOT follows for investing capital transportation dollars for pavement preservation in the future. In a time of multiple competing needs and limited capital, the CIS seeks a cost-effective return on public investments. It tells us how we can get more "bang for our bucks". It enables NJDOT, the Metropolitan Planning Organizations, and the Legislature to make informed decisions about which projects and programs receive funding. The result is a cost-effective approach to improving the overall quality of New Jersey's transportation system.

WORK COMPLETED IN FISCAL YEAR 2005

FY '05 Highway Capital Maintenance Projects

Approximately $11 million is spent each year on maintenance work. In-house NJDOT maintenance crews regularly perform a variety of preventive maintenance tasks to extend the life of pavements. Sweeping and drain cleaning keep water away from travel lanes. Patching small potholes keeps the riding surface intact and keeps moisture out of the pavement layers. Quick-set concrete is used to patch and repair bridge decks. When numerous patches accumulate in a given area, the Department has the ability to mill (remove) the top layer of pavement and resurface to restore functionality. Crack sealing and joint repairs are other types of preventive treatment performed by NJDOT maintenance crews.

In addition, specialized maintenance work is performed through contracts. Crack sealing and longitudinal joint patching prolong pavement life. Ultra-thin overlays, including Microsurfacing, NovaChip, and Open Graded Friction Course restore the pavement surface and improve ride quality. Slab jacking is utilized on concrete pavements to restore road profile at localized depressions and to fill voids beneath the slabs. Diamond grinding of concrete pavement improves ride quality, macro texture (friction), wet weather visibility and reduces tire noise. A brief description of these treatments is given in Appendix A of this report.

FY '05 Rehabilitation and Reconstruction Projects

Table 4 shown below lists Capital Program Management projects with a significant roadway rehabilitation or reconstruction component that have reached substantial completion during fiscal year 2005.

TABLE 4
FY 2005 Rehabilitation and Reconstruction Projects
Through Capital Program Management

Project Description	Start Mile-Post	End Mile-Post	Total Lane Miles	County	Fix	FY '05 Costs (Millions)	
						Total	Estim Pvmt
Route 1, Sect 7L, South of Pierson Avenue to North of Garden State Parkway	31.86	34.78	14.5	Middlesex	Rehab	$12.02	$4.80
Route 1 & 9, Sect 1K & 3M, Production Way to East Lincoln Avenue	37.99	39.74	9.5	Middlesex	Rehab	$8.30	$3.50
Route 1 & 9, Sect 28, Secaucus Road to Broad Avenue	56.80	63.00	23.9	Hudson, Bergen	Rehab	$14.20	$8.00
Route 1 & 9/Route 35 Interchange, South of Interchange to Tappan Street	35.80	36.80	5.4	Middlesex	Rehab	$16.40	$2.00
Route 18, Sect 2F, 7E, 11H, Route 1 to Northeast Corridor Amtrack Line North of Rte 27	40.60	42.52	10.0	Middlesex	Rehab	$58.00	$10.00
Route 21, TSM 6, Contract 1, Raymond Boulevard to I-280	2.50	3.40	3.6	Essex	Recon	$2.00	$1.00
Route 21, TSM 6, Contract 3, I-280 to Passaic Street	3.40	4.20	3.3	Essex	Recon	$18.00	$3.00
Route 30/73, Berlin Circle Improvements	16.20	16.60	1.4	Camden	Recon	$24.19	$12.00
	16.00	18.00	8.0				
Route 30/130, Collingswood Circle (Phase A) Elimination, Comly Avenue to PATCO Bridge	4.10	4.20	0.4	Camden	Recon	$9.32	$2.00
	29.10	29.46	2.1				
Route 33 Bus, Halls Mill Road/Kozloski Road	4.66	5.47	0.6	Monmouth	Recon	$11.47	$1.00
Route 35, Sect 12T, Victory Bridge Over Raritan River	51.10	52.48	5.6	Middlesex	Rehab	$25.00	$5.00
Route 46, Sect 43, Route 23 & I-80 Interchange Improvements	55.80	56.70	4.1	Passaic	Recon	$20.00	$2.40

TABLE 4 FY'05 Rehab/Reconstruct Projects - Continued

Project Description	Start Mile-Post	End Mile-Post	Total Lane Miles	County	Fix	FY '05 Costs (Millions)	
						Total	Estim Pvmt
Route 46/County Road 614/623, Sect 47, Van Houten Avenue/Grove Street Interchange	60.57	61.06	2.0	Passaic	Recon	$13.18	$2.50
Route 46/62/County Road 646, Sect 12K, 13E, 1E, Union Boulevard, Interchange Improvements	57.50	57.80	1.8	Passaic	Rehab	$9.00	$1.50
Route 47, Sect 4D, 5E, Dennis Creek Bridge, Replacement and Intersection Improvement	17.80	18.80	2.0	Cape May	Rehab	$4.15	$1.00
Route47/322, High Street to Greentree Road (Sites 2 & 7)	62.20	63.20	1.2	Gloucestrer	Rehab	$7.38	$3.00
Route 47, Operational Improvements, Sharp Street to Sherman Avenue	41.60	43.70	5.9	Cumberland	Rehab	$12.50	$2.24
I-78, Sect 5CD, West Peddie Street	56.30	56.50	0.8	Essex	Rehab	$8.40	$1.00
I-78, Sect 6J, 6K, Truck Weigh Stations (Eastbound and Westbound)	4.10	7.00	17.4	Warren	Rehab	$12.10	$5.60
I-80/95, Sect E & J, Palisades Avenue to I-95	67.00	68.00	4.7	Bergen	Recon	$5.34	$4.00
Route 130, Kinkora Branch Bridges, Removal	52.00	52.40	1.6	Burlington	Rehab	$5.89	$2.40
Route 173, Clinton, Bridge Over South Branch of Raritan River to Lingert Avenue	12.80	13.60	1.6	Hunterdon	Rehab	$2.03	$1.00
I-195, West of Richardson Road to Exit 8, Rehabilitation	5.25	9.00	14.8	Mercer	Rehab	$3.50	$3.00
Route 206, Cat Swamp Mountain	99.70	100.30	3.4	Sussex	Rehab	$8.83	$3.50
I-295, I-195 to Route 1	60.40	67.80	44.4	Mercer	Rehab	$7.00	$6.50
I-676, Martin Luther King Boulevard, Operational Improvements	2.65	3.39	4.2	Camden	Rehab	$7.30	$3.10
FY '05 Totals			**198.2**			**$325.50**	**$95.04**

FY '05 Highway Resurfacing Projects

Because of the backlog of needed work, most deficient pavements are beyond a condition where a preventive treatment would be appropriate when they are finally addressed. If the pavement deterioration is not severe enough to warrant a complete reconstruction, a viable option is to mill (remove) a depth of the distressed hot mix asphalt pavement and resurface with new material. Asphalt materials are preferred for resurfacing projects due to their availability, cost, constructability and shorter travel lane downtimes. The Department also uses rapid-setting concrete that will reach design strength in about six hours. Much preparatory work is needed, however, before the concrete can be placed on the road. These production constraints, combined with lane closure limitations, allow this product to be only used in relatively small quantities. In addition, the repair procedure is expensive and only recommended where the percentage of defective pavement is less than two percent of the total roadway surface.

The Department has completed implementation of the Superpave mix design system for hot mix asphalt. Superpave is an advanced mix design and specification for hot mix asphalt; it is more durable and rut resistant than traditional asphalt mixes. *The New Jersey Department of Transportation Standard Specifications for Road and Bridge Construction* published in 2001 lists Superpave as the preferred hot mix asphalt. It is used on all classes of paving projects sponsored by NJDOT.

Table 5 shown below lists pavement resurfacing contract work completed in fiscal year 2005. A large percentage of the resurfacing projects were implemented through the Department's Division of Operations Support. Twenty-six contracts valued at $64.74 million were funded in FY 2005.

FY '05 Local Aid Pavement Activities

The Congestion Relief and Transportation Trust Fund Renewal Act provided $145 million in local aid funding for counties and municipalities in fiscal year 2005. Of the $145 million, $67.5 million was used for local county aid and $67.5 million was used for local municipal aid. The remaining $10 million was available as local aid-discretionary to both counties and municipalities.

- Approximately 100 projects annually are funded through the local county aid program. About 60 to 75 percent of the completed projects involve some form of pavement resurfacing.

- Approximately 400 projects are funded annually through the local municipal aid program. About 90 percent of the completed projects involve some form of pavement resurfacing.

- Counties and municipalities generally use traditional bituminous mixtures in their pavement resurfacing projects.

TABLE 5
FY 2005 Highway Resurfacing Contracts
Through Operations Division

Contract # (See note)	Route (B=Business)	Direction (B=Both)	Start Mile-Post	End Mile-Post	Total Lane Miles	County	Project Cost (Millions)
MRC # 140	23	N	22.90	25.60	5.4	Passaic	$2.66
	23	S	24.15	26.50	4.6	Passaic/Morris	
MRRC # 141	46	E	56.00	56.75	1.9	Passaic	$3.44
	46	W	55.35	56.70	2.9	Essex/Passaic	
	202	B	39.10	46.15	16.1	Morris	
	7	B	6.50	8.20	6.8	Essex	
	124	B	0.00	0.90	2.7	Morris	
MRRC # 143	23	B	43.00	46.70	7.4	Sussex	$3.75
	206	B	98.60	99.70	2.7	Sussex	
	206	B	100.30	104.50	9.2	Sussex	
	284	B	0.00	3.15	6.4	Sussex	
	31	B	46.15	48.10	4.8	Warren	
MRC # 144	206	B	104.44	107.67	6.6	Sussex	$2.46
MRRC # 147	94	B	28.20	32.80	9.2	Sussex	$1.25
	284	B	3.15	7.03	7.6	Sussex	
MRRC # 148	23	N	4.85	6.00	2.2	Passaic	$2.24
	23	S	4.85	5.45	1.2	Passaic	
	23	S	6.00	7.25	3.9	Passaic	
	23	S	10.00	13.80	11.7	Morris	
MRRC # 149	4	B	1.00	2.30	5.8	Bergen	$0.88
MRRC # 150	17	B	0.00	3.45	7.9	Bergen	$4.48
	17	N	16.00	23.45	22.5	Bergen	
MRRC # 151	15	N	1.90	2.70	1.1	Morris	$2.17
	15	S	2.00	6.70	11.0	Morris	
	15	B	14.20	14.55	0.8	Sussex	
	15	B	15.45	17.00	3.5	Sussex	
MRRC # 156	124	W	7.25	9.33	3.3	Morris/Essex	$1.53
	439	B	2.00	3.95	6.3	Union	
MRRC # 235	1	S	8.50	9.22	2.1	Mercer	$3.60
	1	S	9.55	10.75	3.6	Mercer	
	1	S	11.20	14.00	8.9	Mercer/Middlesex	
	1	N	8.60	9.20	1.8	Mercer	
	1	N	11.27	14.40	9.2	Mercer/Middlesex	
	1	N	15.85	16.96	2.5	Middlesex	

TABLE 5 FY '05 Resurfacing Contracts - CONTINUED

Contract # (See note)	Route (B=Business)	Direction (B=Both)	Start Mile-Post	End Mile-Post	Total Lane Miles	County	Project Cost (Millions)
MRRC # 238	156	B	0.00	1.18	2.4	Mercer	$2.20
	31	B	4.90	6.60	5.9	Mercer	
	206	B	53.90	54.60	2.0	Mercer	
	206	B	59.90	61.50	3.2	Somerset	
	206	B	79.20	80.90	3.8	Somerset	
MRC # 241	202	S	17.03	22.26	10.6	Hunterdon/Somerset	$6.29
MRC # 242	26	B	0.44	2.06	4.0	Middlesex	$1.08
MRC # 243	91	B	0.34	2.28	4.0	Middlesex	$1.73
MRC # 244	1B	B	0.15	1.52	5.5	Mercer	$2.92
MRC # 245	1	B	3.75	5.40	6.4	Mercer	$1.67
MRRC # 246	34	B	10.30	12.00	3.4	Monmouth	$1.41
	9	S	104.30	105.70	2.8	Monmouth	
	18	S	21.90	23.60	3.4	Monmouth	
MRRC # 248	1	B	36.80	37.70	5.4	Middlesex	$1.16
	18	B	42.30	43.50	4.8	Middlesex	
MRRC # 249	130	N	63.00	64.80	3.6	Mercer	$1.00
	130	S	62.30	64.80	5.0	Mercer	
MRRC # 251	35	B	32.90	34.20	3.2	Monmouth	$2.45
	35	N	34.50	38.80	8.9	Monmouth	
	35	S	34.50	35.60	2.2	Monmouth	
	35	S	36.31	39.00	5.4	Monmouth	
MRRC # 317	70	B	18.70	21.60	5.8	Burlington	$1.92
	70	B	26.40	30.50	8.2	Burlington	
MRRC # 318	47	B	12.00	14.00	4.0	Cape May	$3.10
	50	B	22.30	23.40	2.2	Atlantic	
	54	B	2.00	6.10	8.2	Atlantic	
	109	B	2.00	3.00	2.8	Cape May	
MRRC # 319	130	N	46.80	51.16	8.8	Burlington	$2.79
	130	S	46.50	51.18	9.4	Burlington	
MRRC # 320	38	B	6.64	9.56	12.1	Burlington	$3.42
	38	E	16.51	19.18	5.4	Burlington	
	38	W	16.76	19.18	4.8	Burlington	
MRC # 345	47	B	55.10	58.90	7.6	Gloucester	$3.14
Total					**379 Lane Mi**		**$64.74 Million**

Note: MRC = Maintenance Resurfacing Contract; MRRC = Maintenance Roadway Repair Contract

FISCAL YEAR 2006 PAVEMENT PLAN

The Fiscal Year 2006 Pavement Plan is attached to this report in Appendix B. The fixes in the Plan include: Crack Sealing, Longitudinal Joint Patching, Ultra Thin Overlays, Slab Jacking, Diamond Grinding, Resurfacing, and Heavy Rehabilitation/Reconstruction. The Pavement Plan is divided into six sections as follows:

Section 1 of the Plan shows the **primary funding sources** for pavement fixes that are identified in the proposed FY '06 Transportation Capital Program. While the plan contains fixes which are in line with the identified funds, the Department is prepared to implement additional fixes during the fiscal year if additional funds become available.

Section 2 discusses **preventive maintenance** fixes to be performed as part of the Highway Capital Maintenance program category.

Section 3 details **programmed rehabilitation/reconstruction projects** administered through Capital Program Management. Many of these projects were generated by management systems other than the Pavement Management System, but the projects contain a significant pavement element. These projects total approximately $292 million and include approximately $88 million of pavement benefit.

Section 4 lists **additional rehabilitation and reconstruction projects needed for pavement preservation**. These projects were identified by the Pavement Management System and are considered critical for system improvement.

Section 5 lists **programmed highway resurfacing projects** administered through the Operations Division. The total pavement cost for these projects is approximately $81 million.

Section 6 lists **additional highway resurfacing projects needed for pavement preservation**. These projects were identified by the Pavement Management System and are considered essential to correcting deficient roadway segments.

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APPENDIX A

PAVEMENT TREATMENTS

PAVEMENT TREATMENTS

The following pavement treatments are currently in some form of implementation on an as-needed basis:

- **Ultra-thin White Topping (UTW)** is a three or four inch thick Portland cement concrete placed over an existing asphalt pavement. It is planned for a new connector road between Rising Sun Road and Route 206 in Burlington County. The Department considers UTW for ramps and intersections with recurring asphalt rutting problems.

- **Reflective Crack Interlayer (RCI)** has been successfully used to reduce reflective cracking in overlays on concrete. The system consists of a fine-graded, high polymer asphalt mixture placed on a concrete pavement or bridge deck prior to a hot mix asphalt overlay. This highly flexible layer significantly retards reflective cracks of joints in underlying concrete slabs and seals the pavement. After a crack ultimately comes to the surface, the strata layer remains intact, thus preventing the intrusion of water, de-icing chemicals and debris that leads to further deterioration of the pavement. A generic specification for this material has been developed and implemented.

- **Diamond Grinding** of Portland cement concrete pavement improves ride quality, macro texture (friction), wet weather visibility and reduces tire noise. It has been successfully used on the Route 29 Tunnel in Trenton, a twenty-mile section of I-287 and on a Route 80 widening project for both new and existing Portland cement concrete pavements. The Department plans to use this method on rough or polished sections of Portland cement concrete pavement where structural integrity still exists, thus eliminating the need to place more expensive hot mix asphalt overlays. It is also a tool in the new preventive maintenance program. A standard specification has been written for this pavement treatment for publication in the 2006 *NJDOT Standard Specifications for Road and Bridge Construction*.

- **Perpetual Pavements** are being implemented on several construction projects, including Route 18 in New Brunswick and the recently completed Route I-295 in Camden County. These pavements are designed to provide infinite service life with only periodic maintenance of the surface layer. The user delay and cost of reconstruction is deferred for 40 to 50 years with this approach.

- **Stone Matrix Asphalt** is a durable, rut-resistant hot mix asphalt surface material developed in Europe for use on heavy traffic applications and currently included on several projects. The asphalt is reinforced with fiber and polymer and the mix provides stone-on-stone contact for strength and high binder content for durability. This material comprises the wearing surface for some perpetual pavements. Future plans include coupling this material with a RCI (Reflective Crack Interlayer) to provide a more durable overlay for concrete pavements. A standard specification has been developed and is planned for inclusion in the 2006 *NJDOT Standard Specifications for Road and Bridge Construction.*

- **High Density Polyurethane Slab Stabilization** has recently been demonstrated to stabilize weak road base materials and correct depressed concrete pavement slabs. The grout is a two component, closed-cell polyurethane that is pumped under low pressure through small holes

drilled in the pavement. Set time is approximately 15 seconds and cure is within 15 minutes, which allows rapid reopening to traffic. This new technology eliminates the need for costly full depth replacement and quickly repairs dips in the roadway profile. It is proposed for preventive maintenance as well as capital program projects. A specification has been developed for inclusion in the 2006 *NJDOT Standard Specifications for Road and Bridge Construction*.

- **Portland Cement Concrete Joint Details** have been modified to make concrete pavements more cost-effective and long lasting, with improved ride quality. Contraction-type joints are placed more frequently but cost only a fraction of the traditional Type "A" expansion joints previously specified by the Department. The new joint system is easier to fabricate and construct and results in improved performance.

- **PaveTrac** is a wire mesh reinforcement placed over a deteriorated concrete or asphalt pavement prior to asphalt overlay to avoid costly and time-consuming reconstruction. A pilot project is planned and future projects are being considered.

- **Rapid Setting Portland Cement Concrete** has been developed and used for full depth concrete pavement slab replacement overnight. These patches offer a substantial improvement in ride quality and service life compared to the hot-mix asphalt used in the past. Both capital improvement and maintenance projects are using this method. A specification is planned for publication in the 2006 *NJDOT Standard Specifications for Road and Bridge Construction*.

- **Rubblization** of Portland Cement Concrete Pavement was extremely successful for a section of Route 295 recently completed in Camden County. The process recycles the existing concrete pavement in place, substantially reducing material hauling, construction duration and overall project cost. A standard specification has developed for publication in the 2006 *NJDOT Standard Specifications for Road and Bridge Construction*.

- **Geosynthetic Subgrade Reinforcement** is being used in combination with recycled pavement materials in place of virgin soil aggregates (subbase) that are becoming increasingly scarce and costly. On the Route 295 project in Camden County, the utilization of geotextile and the elimination of a subbase saved approximately $3 million.

- **Crumb Rubber Modified Asphalt** is being evaluated to recycle a portion of the three million waste tires generated each year in New Jersey. Research is being conducted to evaluate performance and investigate health and environmental issues.

- **Open Graded Friction Course** is a thin, porous surface material that improves wet weather friction, reduces spray, and lowers tire noise when compared to conventional pavement surfaces. Currently, applications include highways with above average wet weather accidents and locations where highway noise is above thresholds for neighboring residents. De-icing problems reported by snow emergency crews have hindered wider application of this material. A possible solution to the winter maintenance problem by modifying existing de-icing chemicals and application methods is under investigation.

- **Microsurfacing** is a cold overlay process in which polymer-modified emulsified asphalt and cement are applied in a thin layer over existing pavements. Microsurfacing can extend service life three to five years and delay costly rehabilitation or reconstruction work. Like other preventive maintenance treatments, it must be applied to a pavement in good condition to be cost effective. Because the material is a thin, non-structural layer, it should not be applied if the pavement has even moderate severity cracking.

- **NovaChip** is a surface treatment that places a thin layer of gap-graded hot mix over a sprayed asphalt membrane. The NovaChip process utilizes a specially designed paver to rapidly place material that cures almost instantly for opening to traffic. A standard specification has been developed for publication in the 2006 *NJDOT Standard Specifications for Road and Bridge Construction.*

- **Flexible Concrete Repair** is a resin based material used to repair pop-outs, corner and edge breaks, and other partial depth distresses in concrete pavements. This process utilizes a hot applied synthetic polymer resin compound. This repair product has tensile, compressive and elastic properties that result in a performance advantage over rigid repair materials. The completed patch remains flexible and can be opened to traffic as soon as the material cools, typically in about an hour.

- **Crack and Joint Sealants** extend pavement life by preventing water from entering the pavement structure. The Department has researched sealants based on the latest ASTM and industry standards and has specified the optimum materials for use on NJDOT highways.

APPENDIX B

FISCAL YEAR 2006 PAVEMENT PLAN

Section 1 – Primary funding sources for pavement treatments identified in the FY '06 Transportation Capital Program.

Section 2 – Preventive maintenance fixes planned as part of the Highway Capital Maintenance program category.

Section 3 – Programmed rehabilitation/reconstruction projects administered through Capital Program Management. Many of these projects were generated by management systems (e.g. congestion management, safety, bridge preservation, etc.) other than the Pavement Management System, but still contain a significant pavement portion.

Section 4 – Additional rehabilitation/reconstruction projects needed for pavement preservation identified by the Pavement Management System. These projects will be administered through Capital Program Management if approved.

Section 5 – Programmed highway resurfacing projects administered through Operations.

Section 6 – Additional highway resurfacing projects needed for pavement preservation identified by the Pavement Management System to correct deficient roadway segments. These projects will be administered through Operations if approved.

APPENDIX B – SECTION 1
FY '06 PAVEMENT PRESERVATION FUNDING

Program Category	Appendix B Reference	Total Funding Amount (Millions)	Pavement Improvement Amount (See note)
Roadway Preservation - **Highway Capital Maintenance** (State Funding)	Discretionary Funds For Roadway Betterment	$8	$8
Roadway Preservation - **Highway Capital Maintenance** (Federal Funding)	Section 2	$3	$3
Rehabilitation and Reconstruction (State and Federal Funding)	Section 3	$186	$87.50
Roadway Preservation - **Highway Resurfacing** (State Funding)	Section 5	$60	$60
Roadway Preservation - **Highway Resurfacing** (Federal Funding)	Section 5	$2	$2
Total		**$259**	**$160.50**

Note: *Rehabilitation and reconstruction projects administered through Capital Program Management are large-scale projects with many activities (e.g. bridge rehabilitation, traffic signals, safety improvements, sidewalks and curbs, etc.). The pavement improvement amount is an estimate of the project cost applied to restoring pavement and improving pavement network performance.*

APPENDIX B – SECTION 2
FY '06 HIGHWAY CAPITAL PREVENTIVE MAINTENANCE

Approximately $11 million is budgeted for Highway Capital Maintenance work in fiscal year 2006. In-house NJDOT maintenance crews perform a variety of preventive maintenance tasks to extend the life of pavements. Sweeping and culvert cleaning maintain water drainage from travel lanes. Pothole patching keeps the riding surface intact and prevents the intrusion of water and ice into the pavement layers. When numerous patches accumulate in a given area, the Department has the ability to mill (remove) the top layer of pavement and repave it to restore surface condition. Crack sealing and joint repairs are other preservation activities performed by NJDOT maintenance crews.

Of the $11 million budgeted, approximately $3 million is budgeted for specialized maintenance work performed through contracts. Treatments regularly used by the Department include the following:

- **Crack sealing and longitudinal joint patching** to seal out moisture and prolong pavement life.
- **Ultra-thin overlays**, including Microsurfacing, NovaChip, and Open Graded Friction Course seal and restore the pavement surface and improve ride quality.
- **Slab jacking** of concrete pavements restores the roadway profile at localized depressions and fills voids beneath concrete pavement slabs.
- **Diamond grinding** of concrete pavements improves ride quality, macro texture (friction), wet weather visibility and reduces tire noise.

To improve the effectiveness and efficiency of the preventive maintenance program, the Department has invited industry experts from the National Center for Pavement Preservation (NCPP) to conduct appraisals of the Department's pavement preservation efforts. This evaluation was completed in September 2005, with a final report forthcoming that will assist the Department in optimizing capital expenditures for pavements treatments.

APPENDIX B – SECTION 3
FY' 06 REHAB/RECONSTRUCTION THROUGH CAPITAL PROGRAM MGT.
PROGRAMMED PROJECTS

Program Category	Project Description	Start Mile-Post	End Mile-Post	Total Lane Miles	County	Treatment	FY '06 Total Cost (Millions)	FY '06 Estim Pvmt Cost (Millions)
Bridge & Roadway Preservation - Bridge & Roadway Rehabilitation	Route 1, Sect 7L, South of Pierson Avenue to North of Garden State Parkway	31.86	34.78	14.5	Middlesex	Rehab	$22.21	$6.80
Bridge & Roadway Preservation - Bridge & Roadway Rehabilitation	Route 1 & 9, Sect 1K & 3M, Production Way to East Lincoln Avenue	37.99	39.74	9.5	Middlesex	Rehab	$15.40	$2.10
Roadway Preservation - Highway Rehabilitation and Reconstruction	Route 1 & 9, Sect 28, Secaucus Road to Broad Avenue	56.80	63.00	23.9	Hudson, Bergen	Rehab	$18.00	$8.00
Bridge & Roadway Preservation - Bridge & Roadway Rehabilitation	Route 1 & 9/Route 35 Interchange, South of Interchange to Tappan Street	35.80	36.80	5.4	Middlesex	Rehab	$11.20	$5.00
Bridge & Roadway Preservation - Bridge & Roadway Rehabilitation	Route 18, Sect 2F, 7E, 11H, Route 1 to Northeast Corridor Amtrack Line North of Rte 27	40.60	42.52	10.0	Middlesex	Rehab	$41.00	$8.00
Congestion Management - Bottleneck Widening	Route 21, TSM 6, Contract 3, I-280 to Passaic Street	3.40	4.20	3.3	Essex	Reconstruct	$13.79	$3.00
Congestion Management - Highway Operational Improvement	Route 23, Sect 7D, & Route 94, Sect 8C, Linwood Avenue to Walkill Avenue	35.37	35.56	0.4	Sussex	Reconstruct	$3.10	$1.00
		35.51	35.71	0.4				

APPENDIX B – SECTION 3 (Continued)
FY '06 PROGRAMMED REHABILITATION / RECONSTRUCTION PROJECTS

Program Category	Project Description	Start Mile-Post	End Mile-Post	Total Lane Miles	County	Treatment	FY '06 Total Cost (Millions)	FY '06 Estim Pvmt Cost (Millions)
Roadway Preservation - Highway Rehabilitation and Reconstruction	Route 29, Main Street, Lambertville	18.60	19.50	2.1	Hunterdon	Reconstruct	$6.44	$2.00
Congestion Management - Highway Operational Improvement	Route 30/73, Berlin Circle Improvements	16.20	16.60	1.4	Camden	Reconstruct	$16.35	$8.00
		16.00	18.00	8.0				
Congestion Management - Highway Operational Improvement	Route 30/130, Collingswood Circle (Phase A) Elimination, Comly Avenue to PATCO Bridge	4.10	4.20	0.4	Camden	Reconstruct	$8.40	$2.00
		29.10	29.46	2.1				
Congestion Management - Highway Operational Improvement	Route 33 Bus, Halls Mill Road/Kozloski Road	4.66	5.47	0.6	Monmouth	Reconstruct	$8.47	$2.00
Bridge & Roadway Preservation - Bridge & Roadway Rehabilitation	Route 40, Sect 4, Route 77 to Elmer Lake	16.50	20.30	7.6	Salem	Reconstruct	$4.24	$4.00
Congestion Management - Highway Operational Improvement	Route 46/159, Sect 52, Plymouth Street/Clinton Road	52.12	53.10	4.0	Essex	Rehab	$5.92	$1.50
Bridge & Roadway Preservation - Bridge & Roadway Rehabilitation	Route 46, Sect 43, Route 23 & I-80 Interchange Improvements	55.80	56.70	4.1	Passaic	Reconstruct	$25.30	$5.60
Bridge & Roadway Preservation - Bridge & Roadway Rehabilitation	Route 46/62/County Road 646, Sect 12K, 13E, 1E, Union Blvd, Interchange Improvements	57.50	57.80	1.8	Passaic	Rehab	$4.85	$1.50

APPENDIX B – SECTION 3 (Continued)
FY '06 PROGRAMMED REHABILITATION / RECONSTRUCTION PROJECTS

Program Category	Project Description	Start Mile-Post	End Mile-Post	Total Lane Miles	County	Treatment	FY '06 Total Cost (Millions)	FY '06 Estim Pvmt Cost (Millions)
Bridge Preservation - Bridge Rehabilitation & Replacement	Route 70, Sect 4, Manasquan River Bridge	58.25	58.85	1.6	Monmouth, Ocean	Reconstruct	$37.82	$1.00
Congestion Management - Highway Operational Improvement	Route 70, County Road 637, Massachusetts Ave, Intersection Improvements	48.92	49.52	1.2	Ocean	Rehab	$3.91	$1.00
Roadway Preservation - Highway Rehabilitation and Reconstruction	I-78, Union/Essex Rehabilitation, Springfield Ave to Route 1 & 9	51.40	58.50	29.1	Union, Essex	Reconstruct	$23.00	$16.00
Roadway Preservation - Highway Rehabilitation and Reconstruction	I-295, I-195 to Route 1	60.40	67.80	44.4	Mercer	Rehab	$6.00	$5.50
Congestion Management - Highway Operational Improvement	I-295/Route 42, Missing Moves, Bellmawr	25.71	26.00	1.8	Camden	Reconstruct	$16.23	$3.50
Totals				**177.6**			**$291.63**	**$87.50**

APPENDIX B – SECTION 4
ADDITIONAL REHAB/RECONSTRUCTION PROJECTS
IDENTIFIED IN FY '06 PAVEMENT PLAN

Route	Dir	Start Mile-Post	End Mile-Post	Total Lane Miles	Poor Lane Miles	Treatment	County	Estim Cost (Millions)
24	E & W	0.00	6.80	27.5	13.3	Mill / Pave	Morris	$ 8.00
55	N & S	34.30	40.00	22.8	11.6	Mill / Pave	Cumberland	$ 10.00
55	N	51.24	60.07	17.6	14.8	Mill / Pave	Gloucester	$ 4.80
55	S	51.00	60.00	18.0	12.4	Mill / Pave	Gloucester	$ 10.00
70	E & W	44.30	46.70	5.7	4.8	Mill / Pave	Ocean	$ 2.00
73	S	29.50	32.18	6.4	4.4	Mill / Pave	Camden	$ 2.00
78	E & W	10.00	18.00	48.0	36.6	Mill / Pave	Hunterdon	$ 15.00
78	E & W	18.00	23.10	31.1	25.4	Mill / Pave	Hunterdon	$ 8.60
78	E & W	42.20	50.60	48.6	24.4	Mill / Pave	Somerset, Union, Essex	$ 20.70
80	E & W	0.20	8.00	42.5	41.1	Mill / Pave	Warren	$ 15.00
80	E	28.50	41.00	43.8	33.0	Mill / Pave	Morris	$ 12.00
80	W	28.50	43.25	53.3	32.2	Mill / Pave	Morris	$ 14.00
95	N & S	0.20	2.30	45.0	36.9	Mill / Pave	Mercer	$ 14.00
	N & S	3.35	8.77					
195	E	0.00	0.90	7.8	4.1	Mill / Pave	Mercer	$ 4.00
	W	0.00	2.00					
195	E & W	27.20	34.17	28.0	6.4	Mill / Pave	Monmouth	$ 6.50
280	E & W	6.20	13.20	46.0	26.3	Concrete Repair & Overlay	Essex	$ 13.00
280	E & W	15.30	16.80	8.4	4.5	Mill / Pave	Hudson	$ 3.00
287	N & S	0.00	5.90	39.0	21.3	Concrete Repair & Overlay	Middlesex	$ 16.00
287	N	21.50	30.20	20.8	20.8	Mill / Pave	Somerset	$ 10.00
287	N	30.20	35.00	14.4	10.8	Mill / Pave	Morris	$ 5.00
287	N & S	42.20	47.10	29.4	19.5	Mill / Pave	Morris	$ 10.00
295	N	40.80	45.20	31.8	6.2	Concrete Repair & Diamond Grinding	Burlington	$ 4.00
	S	40.80	46.50					
440	S	0.00	3.80	12.5	7.3	Mill / Pave & Diamond Grind	Middlesex	$ 5.00
			Lane Miles:	**Total**	**Poor**	**Total Estim Cost (Millions):**		**$212.60**
				648	**418**			

APPENDIX B – SECTION 5
FY '06 HIGHWAY RESURFACING THROUGH OPERATIONS DIVISION
PROGRAMMED PROJECTS

Note: MRC = Maintenance Resurfacing Contract; MRRC = Maintenance Roadway Repair Contract

Contract # (See note)	Route	Dir (B=Both)	Start Mile-Post	End Mile-Post	Total Lane Miles	County	Estim Cost (Millions)
MRC # 145	46	B	70.40	71.30	3.2	Bergen	$ 1.50
MRC # 146	10	B	18.90	21.80	9.0	Essex	$ 2.50
MRRC # 152	27	B	34.35	38.30	15.8	Essex/Union	$ 1.98
MRRC # 153	1 & 9	N	54.50	56.00	3.0	Hudson	$ 0.97
	21	S	4.20	5.40	3.6	Essex	
MRRC # 154	1 & 9	B	39.80	43.60	22.8	Union	$ 3.65
MRC # 155	206	B	117.68	120.65	6.0	Sussex	$ 5.00
	206	B	121.18	122.06	2.5	Sussex	
	206	B	124.60	127.90	6.6	Sussex	
MRRC # 157	31	B	41.00	43.30	6.4	Warren	$ 3.00
	57	B	3.90	6.60	5.4	Warren	
	57	B	8.40	11.00	5.2	Warren	
MRRC # 158	10	B	7.00	10.00	17.3	Morris	$ 2.30
MRRC # 247	22	E	19.25	20.90	2.9	Hunterdon	$ 1.50
	22	W	19.25	20.20	1.0	Hunterdon	
	22	W	21.50	23.80	4.6	Hunterdon	
MRRC # 250 Phase 2	29	B	4.30	6.10	7.2	Mercer	$ 1.80
MRRC # 252	27	B	0.00	1.44	2.8	Mercer	$ 2.40
	27	B	16.60	18.50	6.2	Middlesex	
	27	B	20.90	23.60	5.5	Middlesex	
	27	B	26.80	27.13	0.9	Middlesex	
MRRC # 253	1	N	19.74	21.40	3.6	Middlesex	$ 3.13
	1	S	23.05	24.15	3.3	Middlesex	
	1	S	25.00	27.40	6.8	Middlesex	
	1	S	28.35	29.60	3.6	Middlesex	
	18	N	39.20	40.60	4.2	Middlesex	
MRRC # 254	22	E	37.40	42.10	9.9	Somerset	$ 1.62
MRRC # 255	37	W	6.20	9.40	9.0	Ocean	$ 1.80
MRC # 257	34	N	0.30	7.60	15.0	Monmouth	$ 4.00
MRC # 258	202	N	20.30	22.20	3.8	Somerset	$ 2.00
	202	S	22.70	24.00	2.6	Somerset	

APPENDIX B – SECTION 5 (Continued)
FY '06 PROGRAMMED RESURFACING PROJECTS

Note: MRC = Maintenance Resurfacing Contract; MRRC = Maintenance Roadway Repair Contract

Contract # (See note)	Route	Dir (B=Both)	Start Mile-Post	End Mile-Post	Total Lane Miles	County	Estim Cost (Millions)
MRRC # 260	171	B	0.20	1.05	2.0	Middlesex	$ 3.50
MRRC # 261	79	B	2.20	9.90	16.3	Monmouth	$ 3.00
MRRC # 263	202	N	7.50	11.40	7.8	Hunterdon	$ 2.10
	202	S	7.00	10.40	6.8	Hunterdon	
MRRC # 264	31	B	1.20	4.30	12.3	Mercer	$ 2.30
	31	B	7.70	10.50	5.6	Mercer	
MRRC # 265	12	B	0.90	5.00	9.5	Hunterdon	$ 2.50
	12	B	9.80	11.40	3.2	Hunterdon	
MRRC # 266	29	B	9.50	12.00	5.0	Mercer	$ 2.20
	29	B	19.50	21.40	4.9	Hunterdon	
	175	B	2.10	3.00	1.8	Mercer	
	179	B	0.12	1.40	4.4	Hunterdon	
MRRC # 267	33	B	14.30	17.60	11.9	Mercer/Middlesex	$ 1.90
MRC # 268	202	S	13.40	17.00	7.2	Hunterdon	$ 2.00
MRRC # 269	9	B	55.00	59.90	9.8	Burlington	$ 1.90
MRRC # 270	31	B	29.70	32.50	11.2	Hunterdon	$ 1.60
MRRC # 321	130	B	25.10	29.40	23.0	Gloucester/Camden	$ 3.85
MRRC # 322	130	B	29.40	34.10	22.9	Camden	$ 3.80
MRRC # 324	73	N	28.30	34.10	13.4	Burlington/Camden	$ 1.70
MRRC # 325	73	S	24.50	29.50	11.7	Burlington	$ 1.50
MRRC # 326	38	B	9.50	16.00	33.0	Burlington	$ 3.40
MRRC # 327	70	B	8.60	9.80	5.3	Burlington	$ 1.60
	70	B	10.10	12.00	3.8	Burlington	
MRC # 346	47	B	47.70	48.60	1.8	Cumberland	$ 1.50
MRC # 347	130	S	56.70	59.70	6.0	Burlington/Mercer	$ 1.80
Total					**440**		**$ 81.30**

APPENDIX B – SECTION 6 (Continued)
ADDITIONAL RESURFACING PROJECTS IDENTIFIED IN FY '06 PAVEMENT PLAN

Route (T=Truck, B=Business)	Dir (B=Both)	Start Mile-Post	End Mile-Post	Total Lane Miles	Poor Lane Miles	Treatment	County	Estim Cost (Millions)
070	W	54.00	54.80	1.4	1.4	Mill / Pave	Ocean	$ 0.28
071	B	1.70	2.88	2.4	2.4	Mill / Pave	Monmouth	$ 0.48
071	B	6.70	9.00	7.3	7.3	Mill / Pave	Monmouth	$ 1.46
071	B	9.40	10.40	2.0	2.0	Mill / Pave	Monmouth	$ 0.40
071	B	11.60	14.60	6.0	6.0	Mill / Pave	Monmouth	$ 1.20
072	B	11.50	12.60	2.2	1.9	Mill / Pave	Ocean	$ 0.44
073	N	16.10	18.00	3.8	3.8	Mill / Pave	Camden	$ 0.76
073	N	22.60	23.30	1.4	1.4	Mill / Pave	Burlington	$ 0.28
073	S	15.60	16.50	1.8	1.8	Mill / Pave	Camden	$ 0.36
073	S	23.90	24.50	1.2	1.2	Mill / Pave	Burlington	$ 0.24
073	S	32.20	32.70	1.2	1.2	Mill / Pave	Camden	$ 0.24
080	E	44.20	44.90	2.1	2.1	Mill / Pave	Morris	$ 0.42
087	S	1.10	1.60	1.0	1.0	Mill / Pave	Atlantic	$ 0.20
088	B	0.40	1.60	2.4	2.4	Mill / Pave	Ocean	$ 0.48
088	B	2.00	3.00	2.4	2.3	Mill / Pave	Ocean	$ 0.48
088	B	4.90	7.00	5.1	5.1	Mill / Pave	Ocean	$ 1.02
088	B	7.20	9.80	6.1	6.1	Mill / Pave	Ocean	$ 1.22
091	B	0.00	0.60	1.2	1.2	Mill / Pave	Middlesex	$ 0.24
094	B	8.50	9.40	1.6	1.3	Mill / Pave	Warren	$ 0.32
124	B	0.30	0.90	2.1	2.1	Mill / Pave	Morris	$ 0.42
124	B	4.40	4.90	1.0	1.0	Mill / Pave	Morris	$ 0.20
124	B	6.60	7.30	1.4	1.4	Mill / Pave	Morris	$ 0.28
124	B	10.00	10.70	2.8	2.8	Mill / Pave	Essex	$ 0.56
124	E	7.30	7.90	0.9	0.9	Mill / Pave	Morris	$ 0.18
124	W	11.20	11.70	1.0	1.0	Mill / Pave	Union	$ 0.20
130	N	36.30	37.50	3.6	3.6	Mill / Pave	Burlington	$ 0.72
130	N	42.10	43.10	3.0	3.0	Mill / Pave	Burlington	$ 0.60
130	S	41.70	42.80	3.3	3.3	Mill / Pave	Burlington	$ 0.66
130	S	52.70	54.10	2.8	2.8	Mill / Pave	Burlington	$ 0.56
130	S	62.50	64.90	4.8	4.6	Mill / Pave	Mercer	$ 0.96
130	S	66.80	69.90	7.0	5.6	Mill / Pave	Mercer	$ 1.40
147	B	3.50	4.00	2.0	2.0	Mill / Pave	Cape May	$ 0.40
157	B	0.10	0.80	1.4	1.4	Mill / Pave	Atlantic	$ 0.28
166	B	1.90	2.80	1.8	1.6	Mill / Pave	Ocean	$ 0.36
185	N	0.10	0.70	1.2	1.2	Mill / Pave	Hudson	$ 0.24
185	S	0.00	0.60	1.2	1.2	Mill / Pave	Hudson	$ 0.24

APPENDIX B – SECTION 6 (Continued)
ADDITIONAL RESURFACING PROJECTS IDENTIFIED IN FY '06 PAVEMENT PLAN

Route (T=Truck, B=Business)	Dir (B=Both)	Start Mile-Post	End Mile-Post	Total Lane Miles	Poor Lane Miles	Treatment	County	Estim Cost (Millions)
202	S	24.00	24.60	1.5	1.5	Mill / Pave	Somerset	$ 0.30
202	S	29.90	31.10	2.0	2.0	Mill / Pave	Somerset	$ 0.40
206	B	12.10	13.70	3.5	2.8	Mill / Pave	Burlington	$ 0.70
206	B	50.10	50.80	1.4	1.3	Mill / Pave	Mercer	$ 0.28
206	B	57.90	58.40	1.0	0.9	Mill / Pave	Somerset	$ 0.20
206	B	65.60	66.10	1.3	1.1	Mill / Pave	Somerset	$ 0.26
206	B	67.90	68.50	1.3	1.3	Mill / Pave	Somerset	$ 0.26
206	N	34.30	35.40	2.2	2.2	Mill / Pave	Burlington	$ 0.44
206	N	38.40	38.90	1.0	1.0	Mill / Pave	Mercer	$ 0.20
206	S	44.60	45.10	0.8	0.8	Mill / Pave	Mercer	$ 0.16
322	B	3.00	3.70	1.6	0.9	Mill / Pave	Gloucester	$ 0.32
322	B	11.60	12.90	2.6	1.3	Mill / Pave	Gloucester	$ 0.52
440	N	18.80	19.70	1.8	1.8	Mill / Pave	Hudson	$ 0.36
440	S	18.80	19.90	2.2	2.2	Mill / Pave	Hudson	$ 0.44
495	W	1.10	1.60	1.0	1.0	Mill / Pave	Hudson	$ 0.20
			Lane Miles:	**Total 285**	**Poor 272**	**Total Estimated Cost (Millions):**		**$ 56.94**

APPENDIX C

RANKING BY DEFICIENT LANE MILES

ADDITIONAL PROJECTS IDENTIFIED IN FY '06 PAVEMENT PLAN

Section 1 – Additional Pavement Preservation Rehabilitation/Reconstruction Projects ranked by lane miles in deficient condition. These projects were identified by the Pavement Management System and would be administered through Capital Program Management if approved.

Section 2 – Additional Pavement Preservation Highway Resurfacing Projects ranked by lane miles in deficient condition. These projects were identified by the Pavement Management System and would be administered through Operations if approved.

APPENDIX C - SECTION 1
RANKING BY LANE MILES IN DEFICIENT CONDITION
ADD'L REHAB/RECONSTRUCTION PROJECTS IN FY '06 PAVEMENT PLAN

Route	Dir	Start Mile-Post	End Mile-Post	Total Lane Miles	Deficient Lane Miles	Treatment	County	Estim Cost (Millions)
80	E & W	0.20	8.00	42.5	41.1	Mill / Pave	Warren	$ 15.00
95	N & S	0.20	2.30	45.0	36.9	Mill / Pave	Mercer	$ 14.00
	N & S	3.35	8.77					
78	E & W	10.00	18.00	48.0	36.6	Mill / Pave	Hunterdon	$ 15.00
80	E	28.50	41.00	43.8	33.0	Mill / Pave	Morris	$ 12.00
80	W	28.50	43.25	53.3	32.2	Mill / Pave	Morris	$ 14.00
280	E & W	6.20	13.20	46.0	26.3	Concrete Repair & Overlay	Essex	$ 13.00
78	E & W	18.00	23.10	31.1	25.4	Mill / Pave	Hunterdon	$ 8.60
78	E & W	42.20	50.60	48.6	24.4	Mill / Pave	Somerset, Union, Essex	$ 20.70
287	N & S	0.00	5.90	39.0	21.3	Concrete Repair & Overlay	Middlesex	$ 16.00
287	N	21.50	30.20	20.8	20.8	Mill / Pave	Somerset	$ 10.00
287	N & S	42.20	47.10	29.4	19.5	Mill / Pave	Morris	$ 10.00
55	N	51.24	60.07	17.6	14.8	Mill / Pave	Gloucester	$ 4.80
24	E & W	0.00	6.80	27.5	13.3	Mill / Pave	Morris	$ 8.00
55	S	51.00	60.00	18.0	12.4	Mill / Pave	Gloucester	$ 10.00
55	N & S	34.30	40.00	22.8	11.6	Mill / Pave	Cumberland	$ 10.00
287	N	30.20	35.00	14.4	10.8	Mill / Pave	Morris	$ 5.00
440	S	0.00	3.80	12.5	7.3	Mill / Pave & Diamond Grind	Middlesex	$ 5.00
195	E & W	27.20	34.17	28.0	6.4	Mill / Pave	Monmouth	$ 6.50
295	N	40.80	45.20	31.8	6.2	Concrete Repair & Diamond Grinding	Burlington	$ 4.00
	S	40.80	46.50					
70	E & W	44.30	46.70	5.7	4.8	Mill / Pave	Ocean	$ 2.00
280	E & W	15.30	16.80	8.4	4.5	Mill / Pave	Hudson	$ 3.00
73	S	29.50	32.18	6.4	4.4	Mill / Pave	Camden	$ 2.00
195	E	0.00	0.90	7.8	4.1	Mill / Pave	Mercer	$ 4.00
	W	0.00	2.00					
			Lane Miles:	**Total** 648	**Deficient** 418	**Total Estim Cost (Millions):**		**$212.60**

APPENDIX C - SECTION 2
RANKING BY LANE MILES IN DEFICIENT CONDITION
ADD'L HWY RESURFACING PROJECTS IN FY '06 PAVEMENT PLAN

Route (T=Truck, B=Busi-ness)	Dir (B=Both)	Start Mile-Post	End Mile-Post	Total Lane Miles	Deficient Lane Miles	Treatment	County	Estim Cost (Millions)
030	B	12.50	16.30	15.2	15.2	Mill / Pave	Camden	$ 3.04
056	B	5.50	8.80	9.0	8.7	Mill / Pave	Salem	$ 1.80
071	B	6.70	9.00	7.3	7.3	Mill / Pave	Monmouth	$ 1.46
001	S	42.60	45.20	7.1	7.1	Mill / Pave	Union	$ 1.42
030	B	4.30	7.60	6.6	6.2	Mill / Pave	Camden	$ 1.32
088	B	7.20	9.80	6.1	6.1	Mill / Pave	Ocean	$ 1.22
071	B	11.60	14.60	6.0	6.0	Mill / Pave	Monmouth	$ 1.20
130	S	66.80	69.90	7.0	5.6	Mill / Pave	Mercer	$ 1.40
088	B	4.90	7.00	5.1	5.1	Mill / Pave	Ocean	$ 1.02
045	B	24.80	26.00	4.7	4.7	Mill / Pave	Gloucester	$ 0.94
130	S	62.50	64.90	4.8	4.6	Mill / Pave	Mercer	$ 0.96
067	B	0.50	1.60	4.4	4.4	Mill / Pave	Bergen	$ 0.88
028	B	2.20	4.30	4.2	4.2	Mill / Pave	Somerset	$ 0.84
030	E	1.60	2.80	4.2	4.2	Mill / Pave	Camden	$ 0.84
009	B	101.70	102.80	4.2	3.8	Mill / Pave	Ocean	$ 0.84
073	N	16.10	18.00	3.8	3.8	Mill / Pave	Camden	$ 0.76
130	N	36.30	37.50	3.6	3.6	Mill / Pave	Burlington	$ 0.72
130	S	41.70	42.80	3.3	3.3	Mill / Pave	Burlington	$ 0.66
030	B	16.90	17.90	3.7	3.2	Mill / Pave	Camden	$ 0.74
009	N	134.10	135.20	3.1	3.1	Mill / Pave	Middlesex	$ 0.62
046	B	39.10	39.90	3.2	3.0	Mill / Pave	Morris	$ 0.64
130	N	42.10	43.10	3.0	3.0	Mill / Pave	Burlington	$ 0.60
009	S	134.40	135.50	2.9	2.9	Mill / Pave	Middlesex	$ 0.58
036	S	16.90	18.30	2.8	2.8	Mill / Pave	Monmouth	$ 0.56
124	B	10.00	10.70	2.8	2.8	Mill / Pave	Essex	$ 0.56
130	S	52.70	54.10	2.8	2.8	Mill / Pave	Burlington	$ 0.56
206	B	12.10	13.70	3.5	2.8	Mill / Pave	Burlington	$ 0.70
027	B	24.80	25.70	2.7	2.7	Mill / Pave	Middlesex	$ 0.54
036	S	19.20	20.50	2.6	2.6	Mill / Pave	Monmouth	$ 0.52
009	B	78.20	79.60	2.8	2.5	Mill / Pave	Ocean	$ 0.56
001T	E	2.80	4.00	2.4	2.4	Mill / Pave	Hudson	$ 0.48
018	S	11.70	12.90	2.4	2.4	Mill / Pave	Monmouth	$ 0.48
030	B	30.00	30.80	3.2	2.4	Mill / Pave	Atlantic	$ 0.64
036	B	9.10	10.50	2.8	2.4	Mill / Pave	Monmouth	$ 0.56
071	B	1.70	2.88	2.4	2.4	Mill / Pave	Monmouth	$ 0.48

APPENDIX C – SECTION 2 (Continued)
RANKING BY LANE MILES IN DEFICIENT CONDITION
ADD'L HWY RESURFACING PROJECTS IN FY '06 PAVEMENT PLAN

Route (T=Truck, B=Business)	Dir (B=Both)	Start Mile-Post	End Mile-Post	Total Lane Miles	Deficient Lane Miles	Treatment	County	Estim Cost (Millions)
088	B	0.40	1.60	2.4	2.4	Mill / Pave	Ocean	$ 0.48
088	B	2.00	3.00	2.4	2.3	Mill / Pave	Ocean	$ 0.48
022	W	1.40	2.20	2.2	2.2	Mill / Pave	Warren	$ 0.44
206	N	34.30	35.40	2.2	2.2	Mill / Pave	Burlington	$ 0.44
440	S	18.80	19.90	2.2	2.2	Mill / Pave	Hudson	$ 0.44
022	W	46.30	47.00	2.1	2.1	Mill / Pave	Somerset	$ 0.42
028	B	6.70	7.50	2.1	2.1	Mill / Pave	Somerset	$ 0.42
046	W	45.70	46.40	2.1	2.1	Mill / Pave	Morris	$ 0.42
080	E	44.20	44.90	2.1	2.1	Mill / Pave	Morris	$ 0.42
124	B	0.30	0.90	2.1	2.1	Mill / Pave	Morris	$ 0.42
001T	W	0.20	1.20	2.0	2.0	Mill / Pave	Essex/Hudson	$ 0.40
001T	W	2.30	3.30	2.0	2.0	Mill / Pave	Hudson	$ 0.40
071	B	9.40	10.40	2.0	2.0	Mill / Pave	Monmouth	$ 0.40
147	B	3.50	4.00	2.0	2.0	Mill / Pave	Cape May	$ 0.40
202	S	29.90	31.10	2.0	2.0	Mill / Pave	Somerset	$ 0.40
034	B	16.30	17.40	3.0	1.9	Mill / Pave	Monmouth	$ 0.60
057	B	18.80	19.90	2.2	1.9	Mill / Pave	Warren	$ 0.44
072	B	11.50	12.60	2.2	1.9	Mill / Pave	Ocean	$ 0.44
009	B	98.40	99.40	2.0	1.8	Mill / Pave	Ocean	$ 0.40
033	B	37.20	37.70	2.0	1.8	Mill / Pave	Monmouth	$ 0.40
073	S	15.60	16.50	1.8	1.8	Mill / Pave	Camden	$ 0.36
440	N	18.80	19.70	1.8	1.8	Mill / Pave	Hudson	$ 0.36
001	S	14.00	14.80	1.6	1.6	Mill / Pave	Middlesex	$ 0.32
009	B	100.30	101.10	1.6	1.6	Mill / Pave	Ocean	$ 0.32
047	B	62.60	63.10	1.6	1.6	Mill / Pave	Gloucester	$ 0.32
048	B	0.00	0.80	1.6	1.6	Mill / Pave	Salem	$ 0.32
070	B	33.50	34.30	1.6	1.6	Mill / Pave	Ocean	$ 0.32
166	B	1.90	2.80	1.8	1.6	Mill / Pave	Ocean	$ 0.36
021	N	4.40	4.90	1.5	1.5	Mill / Pave	Essex	$ 0.30
021	S	5.40	5.90	1.5	1.5	Mill / Pave	Essex	$ 0.30
030	W	3.60	4.30	1.5	1.5	Mill / Pave	Camden	$ 0.30
033B	B	3.80	4.60	1.6	1.5	Mill / Pave	Monmouth	$ 0.32
037	E	12.60	13.10	1.5	1.5	Mill / Pave	Ocean	$ 0.30
040	B	46.70	47.50	1.6	1.5	Mill / Pave	Atlantic	$ 0.32
202	S	24.00	24.60	1.5	1.5	Mill / Pave	Somerset	$ 0.30

APPENDIX C – SECTION 2 (Continued)
RANKING BY LANE MILES IN DEFICIENT CONDITION
ADD'L HWY RESURFACING PROJECTS IN FY '06 PAVEMENT PLAN

Route (T=Truck, B=Business)	Dir (B=Both)	Start Mile-Post	End Mile-Post	Total Lane Miles	Deficient Lane Miles	Treatment	County	Estim Cost (Millions)
009	S	117.60	118.30	1.4	1.4	Mill / Pave	Monmouth	$ 0.28
009	S	129.70	130.40	1.4	1.4	Mill / Pave	Middlesex	$ 0.28
022	E	50.20	50.90	1.4	1.4	Mill / Pave	Union	$ 0.28
040	E	57.20	57.90	1.4	1.4	Mill / Pave	Atlantic	$ 0.28
040	W	57.20	57.90	1.4	1.4	Mill / Pave	Atlantic	$ 0.28
066	W	2.30	3.00	1.4	1.4	Mill / Pave	Monmouth	$ 0.28
070	W	54.00	54.80	1.4	1.4	Mill / Pave	Ocean	$ 0.28
073	N	22.60	23.30	1.4	1.4	Mill / Pave	Burlington	$ 0.28
124	B	6.60	7.30	1.4	1.4	Mill / Pave	Morris	$ 0.28
157	B	0.10	0.80	1.4	1.4	Mill / Pave	Atlantic	$ 0.28
028	B	19.90	20.40	1.5	1.3	Mill / Pave	Union	$ 0.30
045	B	26.20	26.90	1.6	1.3	Mill / Pave	Gloucester	$ 0.32
094	B	8.50	9.40	1.6	1.3	Mill / Pave	Warren	$ 0.32
206	B	50.10	50.80	1.4	1.3	Mill / Pave	Mercer	$ 0.28
206	B	67.90	68.50	1.3	1.3	Mill / Pave	Somerset	$ 0.26
322	B	11.60	12.90	2.6	1.3	Mill / Pave	Gloucester	$ 0.52
033	E	23.50	24.10	1.2	1.2	Mill / Pave	Monmouth	$ 0.24
035	N	14.20	14.80	1.2	1.2	Mill / Pave	Ocean/Monmouth	$ 0.24
035	S	14.00	14.60	1.2	1.2	Mill / Pave	Ocean/Monmouth	$ 0.24
070	B	47.60	48.40	1.6	1.2	Mill / Pave	Ocean	$ 0.32
073	S	23.90	24.50	1.2	1.2	Mill / Pave	Burlington	$ 0.24
073	S	32.20	32.70	1.2	1.2	Mill / Pave	Camden	$ 0.24
091	B	0.00	0.60	1.2	1.2	Mill / Pave	Middlesex	$ 0.24
185	N	0.10	0.70	1.2	1.2	Mill / Pave	Hudson	$ 0.24
185	S	0.00	0.60	1.2	1.2	Mill / Pave	Hudson	$ 0.24
009	B	95.40	96.00	1.2	1.1	Mill / Pave	Ocean	$ 0.24
036	B	4.00	4.70	1.4	1.1	Mill / Pave	Monmouth	$ 0.28
206	B	65.60	66.10	1.3	1.1	Mill / Pave	Somerset	$ 0.26
007	B	9.60	10.10	1.0	1.0	Mill / Pave	Essex	$ 0.20
022	W	44.80	45.30	1.0	1.0	Mill / Pave	Somerset	$ 0.20
029	N	6.10	6.60	1.0	1.0	Mill / Pave	Mercer	$ 0.20
030	E	3.70	4.30	1.2	1.0	Mill / Pave	Camden	$ 0.24
034	B	21.40	21.90	1.0	1.0	Mill / Pave	Monmouth	$ 0.20
035	S	43.30	43.80	1.0	1.0	Mill / Pave	Monmouth	$ 0.20
046	E	55.40	55.90	1.0	1.0	Mill / Pave	Passaic	$ 0.20

APPENDIX C – SECTION 2 (Continued)
RANKING BY LANE MILES IN DEFICIENT CONDITION
ADD'L HWY RESURFACING PROJECTS IN FY '06 PAVEMENT PLAN

Route (T=Truck, B=Business)	Dir (B=Both)	Start Mile-Post	End Mile-Post	Total Lane Miles	Deficient Lane Miles	Treatment	County	Estim Cost (Millions)
046	W	31.40	31.90	1.0	1.0	Mill / Pave	Morris	$ 0.20
087	S	1.10	1.60	1.0	1.0	Mill / Pave	Atlantic	$ 0.20
124	B	4.40	4.90	1.0	1.0	Mill / Pave	Morris	$ 0.20
124	W	11.20	11.70	1.0	1.0	Mill / Pave	Union	$ 0.20
206	N	38.40	38.90	1.0	1.0	Mill / Pave	Mercer	$ 0.20
495	W	1.10	1.60	1.0	1.0	Mill / Pave	Hudson	$ 0.20
009	B	97.00	97.50	1.0	0.9	Mill / Pave	Ocean	$ 0.20
124	E	7.30	7.90	0.9	0.9	Mill / Pave	Morris	$ 0.18
206	B	57.90	58.40	1.0	0.9	Mill / Pave	Somerset	$ 0.20
322	B	3.00	3.70	1.6	0.9	Mill / Pave	Gloucester	$ 0.32
001	S	8.10	8.50	0.8	0.8	Mill / Pave	Mercer	$ 0.16
028	E	22.80	23.40	1.0	0.8	Mill / Pave	Union	$ 0.20
040	E	25.50	26.00	0.8	0.8	Mill / Pave	Gloucester	$ 0.16
206	S	44.60	45.10	0.8	0.8	Mill / Pave	Mercer	$ 0.16
028	B	21.00	21.50	1.0	0.7	Mill / Pave	Union	$ 0.20
055	N	60.07	60.50	0.4	0.4	Mill / Pave	Gloucester	$ 0.08
			Lane Miles:	**Total 285**	**Deficient 272**	**Total Estimated Cost (Millions):**		**$ 56.94**