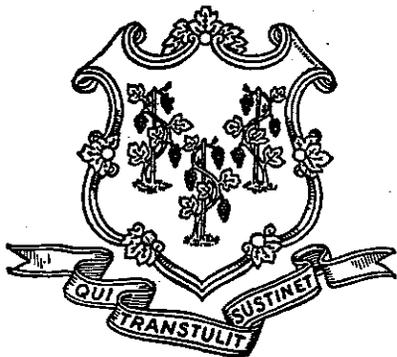


# **TRANSPORTATION INFRASTRUCTURE RENEWAL PROGRAM**

**Connecticut**

**General Assembly**



LEGISLATIVE  
PROGRAM REVIEW  
AND  
INVESTIGATIONS  
COMMITTEE

**December 1997**

**CONNECTICUT GENERAL ASSEMBLY  
LEGISLATIVE PROGRAM REVIEW AND INVESTIGATIONS COMMITTEE**

The Legislative Program Review and Investigations Committee is a joint, bipartisan, statutory committee of the Connecticut General Assembly. It was established in 1972 to evaluate the efficiency, effectiveness, and statutory compliance of selected state agencies and programs, recommending remedies where needed. In 1975, the General Assembly expanded the committee's function to include investigations, and during the 1977 session added responsibility for "sunset" (automatic program termination) performance reviews. The committee was given authority to raise and report bills in 1985.

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LEGISLATIVE PROGRAM REVIEW  
& INVESTIGATIONS COMMITTEE

**TRANSPORTATION INFRASTRUCTURE  
RENEWAL PROGRAM**

DECEMBER 1997

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# Executive Summary

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## Transportation Infrastructure Renewal Program

The Legislative Program Review and Investigations Committee authorized a study in February 1997 of the state's transportation infrastructure renewal program. The scope of the study called for an assessment of the: statutorily mandated reports required of the Department of Transportation (DOT) under the infrastructure renewal program; planning and priority setting processes followed by DOT including ensuring compliance with environmental laws, developing material specifications, and considering community input; outcomes achieved under the program since its inception; changes in the state's Special Transportation Fund related to funding sources, uses, and capacity; and DOT's compliance with recommendations made in the program review committee's 1995 Contract Management Study.

Excluded from the study were aspects of the infrastructure renewal program and activities of the department that are not related to the state's highway system. Among the noteworthy exclusions were mass transportation and state-owned airports.

The state has spent \$9.4 billion over the last 13 years on improving the transportation infrastructure. The majority of this funding (88 percent) has been directed toward the two principal infrastructure components -- roadways and bridges. Given this level of investment, the central concern of the committee's inquiry was on the accomplishments of the renewal program.

Overall, DOT has done a reasonably good job in administering the program. By all measures used by the program review committee, the condition of the state's roads and bridges have improved since 1984. However, the committee has noted several areas where DOT's performance can be enhanced. Specifically, improvements are recommended in the pavement management area as well as congestion management. In addition, a number of committee recommendations are aimed at improving access to information and the types of data DOT provides through the development of various performance measures and comparative statistics. The basic findings of the program review committee are outlined below, followed by the committee's specific recommendations.

### *Overview*

- Concern over the transportation infrastructure surfaced in 1980, when the General Assembly required DOT to conduct a study of the state's roads and bridges.
- The 1980 DOT study found 62 percent of the state's roads and 61 percent of the bridges were in fair or poor condition. It proposed a 10-year, \$1.5 billion plan to repair the system.

## Executive Summary

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- The tragic collapse of the Mianus River Bridge on I-95 in June 1983 accelerated the state's infrastructure renewal efforts.

### *Transportation Finances*

- The Special Transportation Fund (STF) was created on July 1, 1983, and expanded July 1, 1984, to finance the infrastructure renewal program. It also supports the operating expenses of the Department of Transportation, Department of Motor Vehicles, and highway patrol function of the Department of Public Safety.
- Since the creation of the infrastructure renewal program in 1984, \$9.4 billion has been spent on improving transportation facilities.
- Funding for the infrastructure program includes: federal funds (\$5.1 billion); STO bonding (\$3.7 billion); STF funds (\$416.3 million); and other (\$89.4 million).
- From 1991 through 1997, the average amount spent on the capital program was \$575 million, while over the next 10 years the average is projected to be \$570 million.
- Debt service has exceeded the amount of new investment by the state in the capital program since 1993 and this trend will continue for foreseeable future.
- Connecticut's reliance on debt to finance road and bridge improvements has out-paced the region and the nation.
- In some instances, Connecticut borrows money for improvements that have a pay-back period longer than the useful service life of the improvement.

### *Source of Projects*

- The planning process is highly structured and receives input from the state's 10 Metropolitan Planning Organizations and five Rural Regional Planning Organizations, as well as from five separate units within DOT -- Bridge Safety and Evaluation, Bridge Maintenance, Highway Maintenance, Pavement Management Unit, and Traffic Engineering.
- The planning process, which is coordinated and largely controlled by the Bureau of Policy and Planning within DOT, results in the development of four overlapping documents -- Long Range Plan, Master Transportation Plan, Transportation Improvement Program, and Statewide Transportation Improvement Program.

## Executive Summary

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- The overall condition of pavement under DOT's management has improved since the inception of the state's transportation infrastructure program.
- DOT could do a better job in targeting its paving resources (25 percent of a sample of pavement identified as in need surface treatment in 1993, was not resurfaced within the following three years, while 20 percent of the pavement identified as good or better was resurfaced).
- Congestion in Connecticut has worsened over the last several years and is projected to continue worsening.
- The condition of state bridges has improved to a considerable degree and these conditions are relatively stable.

### *Environmental Units*

- DOT assigns two units to ensure compliance with an array of federal and state environmental laws -- the Office of Environmental Planning and the Environmental Compliance Division.
- Public and private developers are subject to environmental oversight, though the scope and authority of that oversight differs depending on the type of property, location, and environmental impact.
- Relative to the number of complaints, DOT has had relatively few inland wetland violations issued against it recently.
- DOT has engaged in corrective actions in about one-third of the instances where complaints have been filed with DEP.
- DOT's environmental violations cannot be accurately determined due to inadequate enforcement activities at DEP.
- In early 1997, three DOT facilities were cited for violations of certain federal and state environmental laws and regulations. However, DOT claims it was not aware of the violations prior to EPA's enforcement action until the fall of 1997.

### *Products and Specifications*

- DOT's policy is to provide a fair and systematic evaluation of proprietary materials, products, and methods intended for use in construction projects and maintenance activities.

## Executive Summary

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- In FY 97, DOT considered requests to approve for use 107 products, approving 25, rejecting 25, continuing 34 for further study, and ordering trial installations for 12.
- DOT processes about 20 proposed changes in standards for roads, bridges, and incidental construction per year. Over the past two fiscal years it approved approximately 95 percent of the proposals it received -- 85 percent as proposed and 10 percent with modifications.
- There is no evidence of bias or arbitrary decision-making related to specific product types or vendors in the records of the two Department of Transportation committees responsible for reviewing new products and specifications.

### ***Mandated Reports***

- DOT is in compliance with report submission deadlines and content requirements specified in the state statutes.
- The reports produced by DOT do not provide a means whereby the department's performance outcomes can be readily measured over any specified time period.

### ***Compliance with 1995 PRI Study***

- DOT is in substantial compliance with five of the seven administrative recommendations made by the committee in its 1995 Contract Management Study.

#### **RECOMMENDATIONS**

1. *The Department of Transportation should change its pavement management goal from annually resurfacing a set number of lane miles (438) to keeping the amount of lane miles rated as less than good below 10 percent.*
2. *The Department of Transportation should adopt as performance indicators and make available through its web site:*
  - *percentage of lane miles rated less than good under the Pavement Serviceability Rating System and DOT's quantitative system;*

## Executive Summary

- *average age in months of the surface of all road segments prior to their being resurfaced or reconstructed; and*
  - *Connecticut's ranking compared to other northeastern states on the percentage of lane miles rated less than good on the Pavement Serviceability Rating and International Roughness Index scales.*
3. *When conducting a major transportation corridor study involving congestion issues, the Connecticut Department of Transportation shall explore and present a variety of supply (e.g., commuter lanes, bus, rail, etc.) and demand management (e.g., staggered work hours, parking fees, etc.) alternatives to the public and policy makers.*
  4. *The Connecticut Department of Transportation should continue to pursue an enhanced bridge management system. In addition, when the system becomes operational, the department shall identify and list the bridges that are deficient, how they are deficient, and the estimated cost to improve each bridge. This information shall be made available to the public in print and on the department's web site.*
  5. *The Connecticut Department of Transportation should re-examine its capital financing strategy with the goal of reducing the state's reliance on debt by paying for improvements that do not have a useful life longer than a bond repayment out of current revenue.*
  6. *A review of the Department of Environmental Protection be conducted focusing on the effectiveness of the department's oversight of public sector compliance with environmental laws and regulations.*
  7. *The Department of Transportation shall conduct, by the end of 1998, a comprehensive environmental audit of its own facilities throughout the state for compliance with all appropriate environmental laws and make that report available to the public indicating methodology and findings.*
  8. *The Department of Transportation shall ensure appropriate department personnel are adequately trained and familiar with policies and procedures that concern the proper handling, storage, and disposal of contaminated or hazardous materials.*

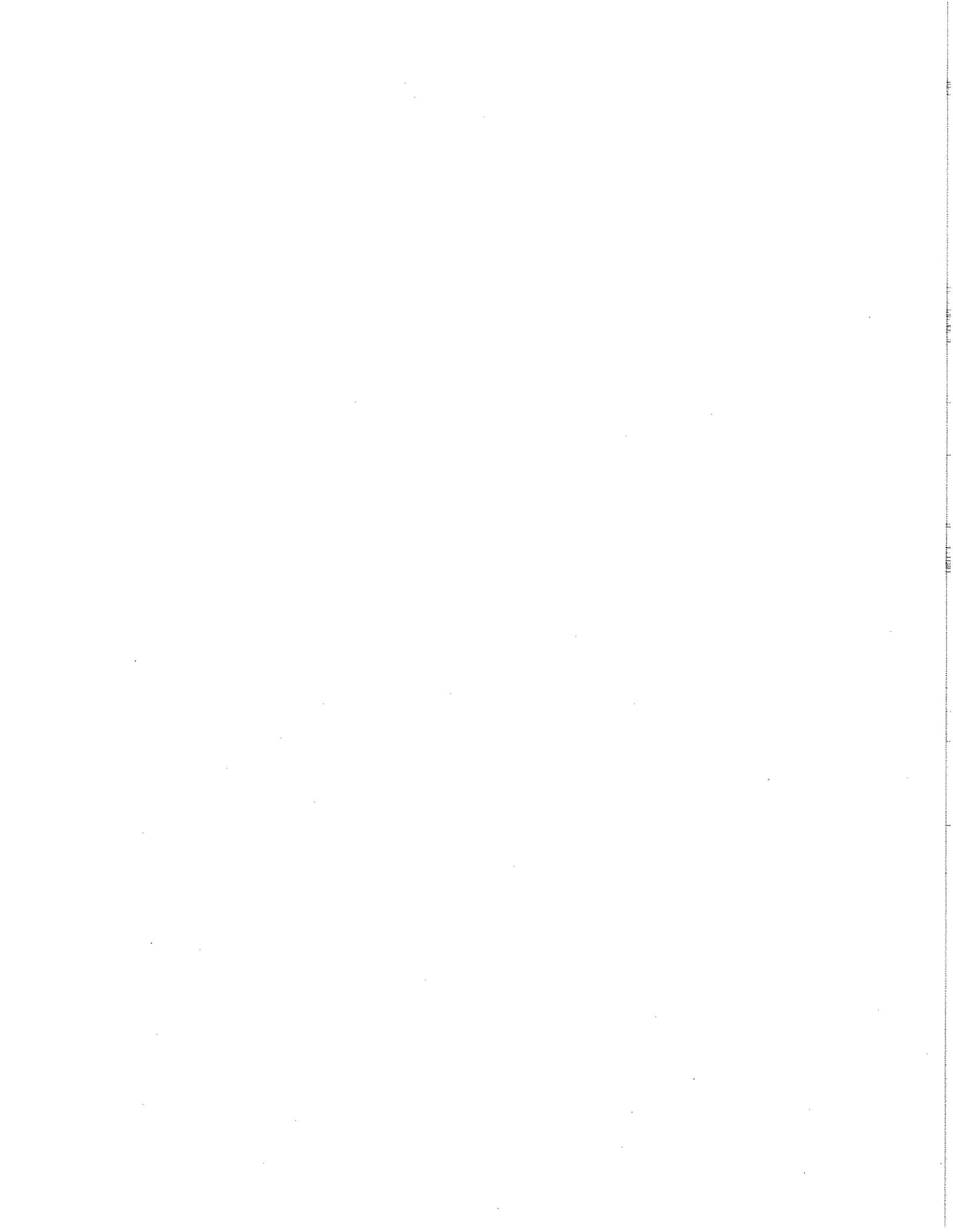
## Executive Summary

9. *The Department of Transportation shall review, evaluate, and implement internal communication procedures that would enhance reporting capabilities to allow DOT's environmental compliance division to become aware of and respond to environmental violations in an expedited manner.*
10. *The Department of Transportation should notify legislators and others of the availability of all its reports, but distribution should be limited to those who specifically request a copy; further, those requesting copies should be given the option of receiving the report in either paper or diskette form.*
11. *The reports required under C.G.S. Sections 13b-15; 13b-79a; 13b-79b; 13b-26; 14-298; 13-11a(e); and 13b-11(b) should be made available for review through DOT's web site.*
12. *The Department of Transportation in consultation with members of the Transportation Committee and the subcommittee of the Appropriations Committee having jurisdiction over the department shall develop by January 1, 1999, a set of performance measures that at a minimum report and track changes in:*
  - *bridge conditions in the aggregate and for each state bridge;*
  - *road conditions in the aggregate and for all measured road segments;*
  - *traffic congestion in the aggregate and for all identifiable road segments; and*
  - *safety conditions in the aggregate and for all identifiable locations.*
13. *The data supporting the performance measures developed by DOT shall be made available through online means to members and staff of the Transportation Committee and the appropriations subcommittee having jurisdiction over the department.*
14. *If the dollar value of change orders on an individual project is greater than 10 percent of the original value of the contract, then the Departments of Transportation and Public Works shall perform a cost overrun analysis of the*

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project within 10 days of the approval of the change order that triggers the review.

15. *C.G.S. Section 49-41b shall be amended to permit the state to retain up to 10 percent of any periodic or final payment to a contractor. DPW and DOT should include as a standard provision in their construction contracts the requirement that contractors must complete identified corrective work and supply all required documentation to the agency within 90 days of the project's substantial completion date.*
16. *The Department of Transportation central office shall periodically evaluate district office operations with respect to the management of construction projects to determine the areas of difference between each. The central office should then determine whether any of the practices that are successful in one region could be applied in the other districts to improve the department's construction management practices.*
17. *The Department of Transportation shall review all projects that have been idle for one month to determine the cause of the work stoppage and the steps needed to resume work.*
18. *At the end of each construction season, the transportation department shall compile and review all available data on work area safety incidents as another way to identify possible improvements.*



# Introduction

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## Transportation Infrastructure Renewal Program

The Legislative Program Review and Investigations Committee authorized a study in February 1997 of the Department of Transportation's (DOT) infrastructure renewal program. The scope of the study approved by the committee called for an assessment of the:

- statutorily mandated reports required of the department under the infrastructure renewal program;
- planning and priority setting processes followed by the department including ensuring compliance with environmental laws, developing material specifications, and considering community input;
- outcomes achieved by the department since the inception of the program;
- changes in the state's Special Transportation Fund related to funding sources, uses, and capacity; and
- department's compliance with recommendations made in the program review committee's 1995 Contract Management Study.

Excluded from the study were aspects of the infrastructure renewal program and activities of the department that are not related to the state's highway system. Among the noteworthy exclusions were mass transportation and state-owned airports.

In preparing this report the committee and its staff reviewed numerous state and national studies and reports dealing with highway infrastructure renewal programs. Data were obtained from a variety of state and national publications and internal DOT reports. The staff interviewed DOT personnel with primary responsibility for various aspects of the infrastructure renewal program, especially in the areas of construction, materials review, and finance. In addition, officials from the U. S. Environmental Protection Agency, Department of Environmental Protection, Office of Policy and Management, and DOT personnel involved with environment issues were interviewed regarding

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DOT's environmental compliance record. Legislators and legislative staff involved in transportation issues were also consulted.

During the course of the review the committee held several meetings to receive reports from its staff. The meeting ranged from short updates to a full two hour briefing. A public hearing was held in September. In December, the committee met to discuss the staff's findings and adopt a set of administrative and legislative recommendations.

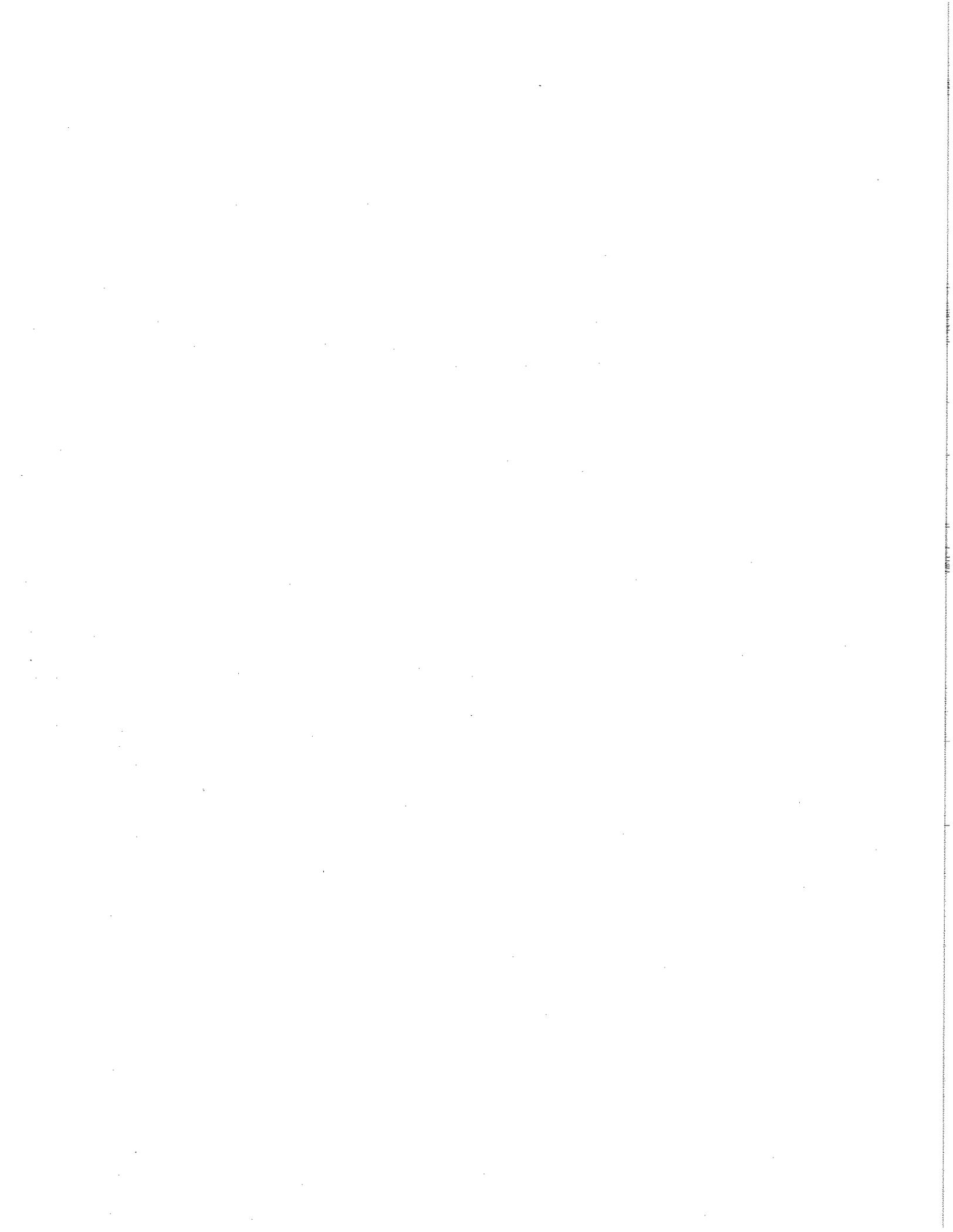
The report is divided into six chapters. The first five chapters focus on describing the background, organization, financing, and operation of the state's transportation infrastructure renewal program. Chapter Six presents the findings and recommendations adopted by the committee.

## Key Points

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### *Chapter One: Overview*

- The Department of Transportation is responsible for planning and implementing the state's transportation infrastructure renewal program.
  - Concern over the transportation infrastructure surfaced in 1980, when the General Assembly required DOT to conduct a study of the state's roads and bridges.
  - The 1980 DOT study found 62 percent of the state's roads and 61 percent of the bridges were in fair or poor condition. It proposed a 10-year, \$1.5 billion plan to repair the system.
  - The tragic collapse of the Mianus River Bridge on I-95 in June 1983 accelerated the state's infrastructure renewal efforts. The initial state response included:
    - establishing a special transportation fund financed primarily by a tax on motor fuels; and
    - increasing the appropriations and bond authorizations for transportation expenses.
  - In 1984, the General Assembly adopted a new 10-year, \$5.5 billion Transportation Infrastructure Renewal Program
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## OVERVIEW

### Department of Transportation

The DOT is responsible for all aspects of the state's transportation system including the highway infrastructure renewal program that is the subject of this study. The department's declared mission is to provide a safe, efficient, and cost-effective transportation system that meets the mobility needs of its users. Its strategic goals are to: ensure safety; maintain the existing system; increase system productivity; promote economic development; and provide required capacity.

In FY 97, DOT had approximately 4,000 full-time employees and an estimated operating budget of \$288.4 million. The department's estimated FY 97 capital budget was \$645.3 million. Structurally, DOT is organized into five major bureaus, each consisting of multiple offices designed to meet specific responsibilities. The five bureaus and their primary duties are:

*Bureau of Finance and Administration* - provides fiscal and support services including budgeting, personnel, and accounting;

*Bureau of Policy and Planning* - forecasts transportation needs, assesses environmental impact, and plans and prioritizes projects;

*Bureau of Engineering and Highway Operations* - manages the design and construction of capital projects;

*Bureau of Public Transportation* - provides a network of bus, rail, rideshare services, and regulates truck, bus, taxi, and livery services; and

*Bureau of Aviation and Planning* - operates all state-owned airports, operates ferry services, and promotes the use of the state's navigable waters.

Figure I-1 is the current table of organization for the department and highlights the offices directly involved in maintaining and improving the state's highways and bridges. As Figure I-1 shows, Engineering and Highway Operations and Policy and Planning are the bureaus most involved in the high-

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way infrastructure program. The role played in the renewal program by each of the highlighted offices will be discussed in Chapter III.

### **Infrastructure Renewal Program**

An early sign of concern over the condition of the state's transportation infrastructure is evidenced by the adoption of Special Act 80-79 in 1980. The act required the Department of Transportation to rate the condition of the state's roads and bridges and report the results to the General Assembly by January 1981. Special Act 80-79 also directed the department to develop and submit by July 1981, a 10-year plan for road resurfacing and bridge repairs.

The department's evaluation, completed in December 1980, found that 62 percent of the 4,350 miles of state roads were in fair or poor condition with respect to their riding quality and physical properties (cracking, distortion, disintegration, and drainage capability). The review also found that 61 percent of the 3,425 bridges in the state system were in fair or poor condition.

The 10-year plan produced by DOT in July 1981 noted the state faced serious problems in the restoration of its transportation system. The report indicated DOT's road and bridge maintenance efforts had been limited in prior years by a lack of federal and state funds, and deterioration in the transportation system had reached the point where it was becoming visible.

The department's 10-year plan proposed resurfacing and reconstructing the 4,350 miles of state roads, and repairing or replacing 289 bridges. The plan called for cumulative spending over the 10 years of \$1.5 billion including \$894 million for road work and \$658 million for bridges. The latter did not include an estimated \$40 million for bridge painting and a projected cost of \$400 million for repairing or replacing 11 bridges that were to be handled as part of larger projects dealing with basic alterations of the state highway system.

Acknowledging the financial realities of the early 1980s, funding was to begin modestly and increase annually over the life of the 10-year plan. Despite this approach, according to a report issued by the Governor's 1984 Task Force on Infrastructure, the initial stage of the plan was not fully funded.

The June 1983 collapse of the Mianus River Bridge on I-95, resulting in the loss of three lives, accelerated the state's efforts to address its road and bridge infrastructure problems. The General Assembly, which was meeting in special session when this tragedy occurred, immediately moved to establish a special transportation fund to be financed by a one cent a gallon tax on motor fuels (P.A. 83-30 of the June 1983 Special Session). The fund was subject to appropriation by the General Assembly and disbursement by the governor. It was limited to purposes that extended the useful life of the state's roadways and bridges and the purchase of related equipment.



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In September 1983, the Department of Transportation issued a revised plan that increased the number of bridges classified as in need of immediate repair. In October of that year the General Assembly met in a special session called primarily to increase funding for road and bridge repairs. The session's purpose was accomplished with the passage of three special acts, one that increased appropriations for transportation expenses (S.A. 83-1) and two that dealt with bond authorizations (S.A. 83-2 and S.A. 83-3).

Early in the 1984 session of the General Assembly, the governor proposed and the legislature adopted a new 10-year, \$5.5 billion Transportation Infrastructure Renewal Program (P.A. 84-254 and S.A. 84-52). The program's major components included:

- resurfacing and reconstructing of roadways;
- improving, rehabilitating, and replacing state and local bridges;
- designing and constructing interstate and intrastate highway projects;
- repairing, improving, and purchasing or constructing maintenance facilities;
- developing and improving general aviation airport facilities;  
and
- purchasing and constructing bus and rail facilities and equipment.

The list of the program's components demonstrates the agenda that ultimately emerged from the collapse of the Mianus River Bridge was really much more than an infrastructure renewal plan. Compared to the 1981 plan, the new program was broader in scope and nearly five times as costly. Indeed, in recent years the Department of Transportation has taken to using the term "capital program" in referring to what was formerly called the infrastructure renewal program.

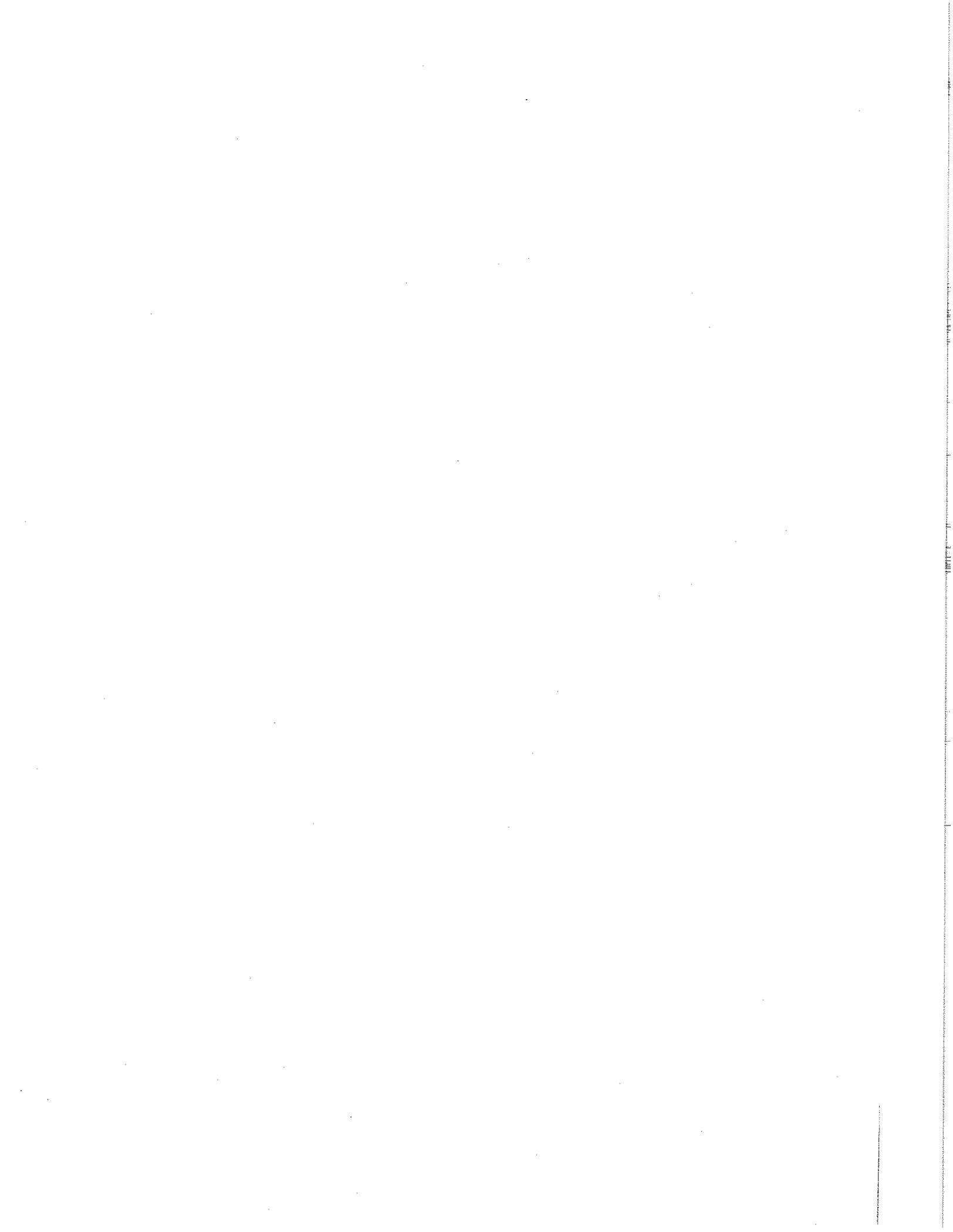
As previously noted, the program review committee's study focuses on road and bridge work performed under the Transportation Infrastructure Renewal Program and its successor the capital program. Thus, excluded from the study are the final three components of the 1984 renewal program listed above - maintenance facilities, airports, and bus and rail facilities.

# Key Points

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## *Chapter Two: Transportation Finances*

- The Special Transportation Fund (STF), created in 1983 and expanded in 1984 to finance the infrastructure renewal program, also supports the operating expenses of the Departments of Transportation and Motor Vehicles, and the highway patrol function in Public Safety.
  - Sources of revenue for the STF include (percent of total for FY 96): taxes on motor fuels (62%); various motor vehicle fees (21%); license, permit, and other fee revenue (11%); interest income (5%); Federal Transit Authority grants (1%); and occasionally other state funds (0%).
  - Total revenue for the fund more than doubled from \$362 million in FY 85 to \$802 million in FY 96.
  - STF expenditures include (percent of total for FY 96): Special Tax Obligation debt (37%); General Obligation debt (7%); DOT operations (36%); pay-as-you-go projects (1%); highway patrol (5%); DMV (5%); and pension and fringe (9%).
  - Total fund expenditures have increased by 120 percent over the last 12 years from \$360 million in FY 85 to \$791 million in FY 96 for a total of \$9.4 billion since 1984.
  - STF supports the infrastructure program through debt service on Special Tax Obligation bonds.
  - Funding for the infrastructure program includes: federal funds (\$5.1 billion); STO bonding (\$3.7 billion); STF funds (\$416.3 million); and other (\$89.4 million).
  - From 1991 through 1997, the average amount spent on the capital program was \$575 million, while over the next 10 years the average is projected to be \$570 million.
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### INFRASTRUCTURE RENEWAL FINANCES

The State of Connecticut created the Special Transportation Fund (STF) to plan, budget, and account for all transportation related activities. The fund, which is financed through various motor vehicle related taxes and fees, currently supports operating expenses of the Department of Transportation (DOT), the Department of Motor Vehicles (DMV), and the highway patrol function of the Department of Public Safety (DPS). It also provides the essential financial foundation for the infrastructure renewal program.

Public attention focused on the fund recently as Connecticut became the state with the highest gasoline taxes in the country. Policy makers responded to the motor fuel tax controversy by enacting a phased reduction of six cents per gallon over the next two years, and a plan to move certain STF expenses to the General Fund (P.A. 97-309). This section highlights the history and purpose of the STF and its relationship to the infrastructure renewal program. Revenue and expenditure components of both the fund and the infrastructure program are also examined.

#### **History and Purpose of the Special Transportation Fund<sup>1</sup>**

**History.** The state's first fund dedicated to transportation purposes, including highway and mass transit costs, was established in July 1974, pursuant to Public Act 73-675. However, an analysis, in that year, revealed the revenues dedicated to all transportation programs were inadequate and consequently, the highway program would have to be cut back. Subsequently, in July 1975, the General Assembly abolished the Transportation Fund. As a result, funding for routine maintenance and rehabilitation of transportation facilities had to compete with other demands on the General Fund. It is widely acknowledged that the state, during the mid- to late-1970s, underfunded highway and bridge maintenance. A Governor's Task Force Report on Infrastructure in 1984 found, "the elimination of the dedicated highway fund, coupled with increasing emphasis on other priorities, and a decline in bonding for highway purposes caused a substantial under investment in our highway facilities."

<sup>1</sup> Several sources have been used in developing this section on the history of the fund including Connecticut DOT 100 Year History 7/95; Governor's Task Force on Infrastructure, 1984; DOT's Master Transportation Plans 1986 -1997; Task Force on the Future of the STF 1/96; Task Force on Rising Gasoline Prices 1/97.

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Due to concern over the effect of years of deferred highway maintenance, the 1980 session of the General Assembly, as noted in the previous section, instructed DOT to evaluate all of the state's bridges and highways (S.A. 80-79) and submit a 10-year road and bridge improvement plan. The 10-year plan, published in July 1981, noted that without the necessary funding to address the deteriorating facilities, "the prospect of serious disruptions and emergency closures of the state's highways, caused by bridge failures, could grow to intolerable proportions with possible loss of life and severe impairment of the state's economy."

**Creation of the Special Transportation Fund.** Unfortunately, as noted previously, on June 28, 1983, a portion of I-95 fell into the Mianus River in Greenwich, resulting in the death of three people and injuring three others. In response, the General Assembly, in special session during this time, enacted Public Act 83-30 establishing the STF on July 1, 1983. Revenue for the fund was generated from a one cent per gallon tax on motor fuel (out of 14 cents collected for each gallon of gasoline and 13 cents for gasohol). The legislature directed that this set-aside revenue could only be used for highway and bridge rehabilitation and restoration, and for highway related equipment purchases.

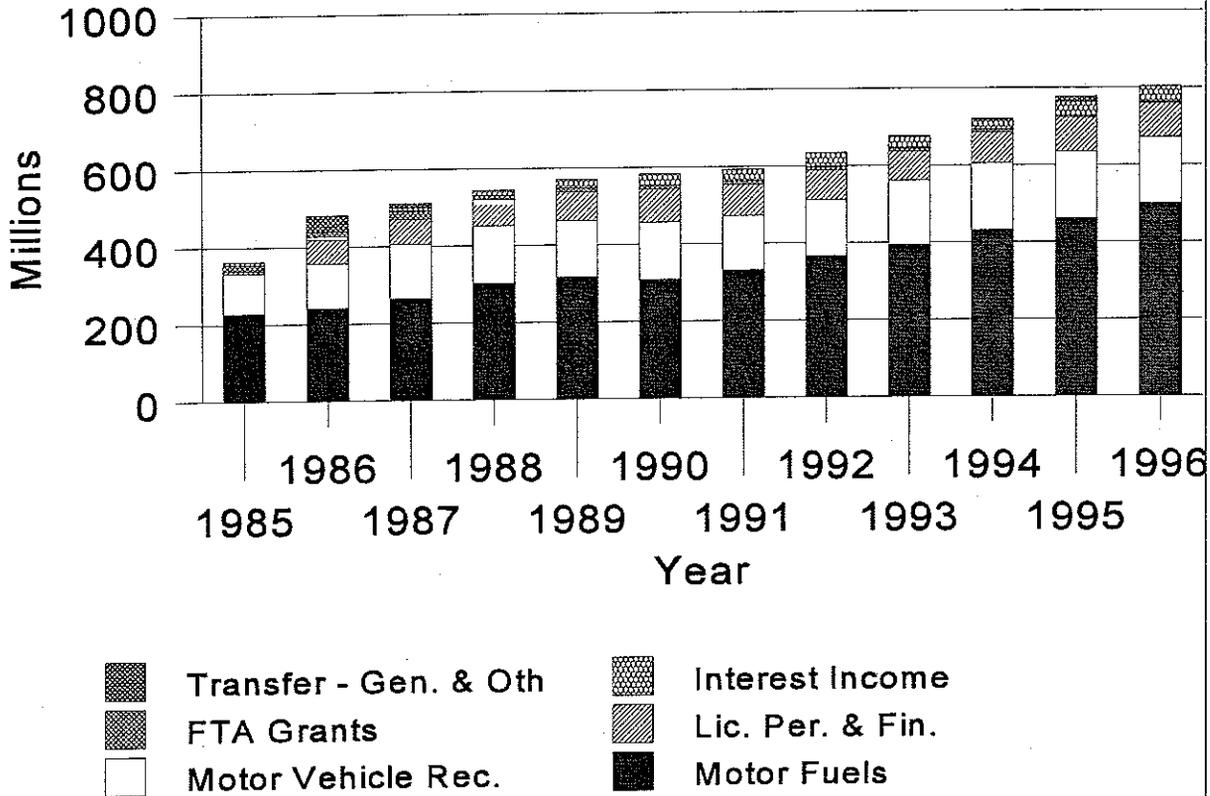
In February 1984, Governor O'Neill proposed a comprehensive Transportation Infrastructure Renewal Program based on the recommendations from a task force appointed in April 1983 (three months before the Mianus incident). At about the same time, the General Assembly considered and passed Public Act 84-254 which served to expand the existing STF. Now the STF could be used not only to finance an expanded infrastructure rehabilitation program, but could also support the operating expenses of the department and the state's transportation system.

The legislation expanding the STF also provided for a series of incremental tax and fee increases that allowed for a predictable revenue base for the initial 10 years of the infrastructure renewal program. This approach served to define the scope of the infrastructure program and provided a stable stream of revenue to support the improvements.

The principal financing instrument of the infrastructure renewal program, established by the act, was the Special Tax Obligation (STO) bond. As special obligations of the state, STO bonds are not chargeable against any other revenue of the state except those specifically identified in the act. There are some unique features of STO bonds by which the state is bound. By law, the first obligation of the STF is the payment of debt for STO bonds. In addition, bond covenants to which the state has entered require that pledged revenues in each fiscal year equal two times the aggregate principal and interest payments on debt. In FY 96, the pledged revenue to debt service coverage ratio equaled 2.8; the ratio is expected to decline by the year 2000 to 2.3.

## Figure II-1. STF Revenues

FY85-FY96



Source: Official Statements of STO Bonds dated 10/1/96 & 12/7/90

### Sources of STF Revenue

The STF has several sources of revenue specified by statute. There are three categories of transportation related revenues that include: taxes on motor fuels; various motor vehicle fees; and license, permit, and other fee revenue. In addition, the fund receives grants from the Federal Transit Authority (FTA), interest income, and has on occasion received money from other state funds. Not included in the fund are the revenues and expenditures related to the operation of Bradley International Airport, two fees levied by the Department of Motor Vehicles related to the emissions program and clean air initiatives, and sales tax revenue derived from automobile purchases or motor vehicle related products. Figure II-1 shows the actual revenues of the STF collected from FY 85 through FY 96.

*Revenue trends.* As the Figure II-1 illustrates, total STF revenues have more than doubled (121 percent) from \$362 million in FY 85 to \$802 million in FY 96. However, this is somewhat

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misleading because the first year collections for License, Permit, and Fee (LPF) revenues were not fully credited to the STF. If all first year LPF revenues were accounted for in the fund, the overall increase would be 96 percent. The largest percentage revenue increase occurred in interest income, which went from \$7.4 million to \$41 million (450 percent), followed by motor fuels -- \$227 million to \$598 million (120 percent). The only decrease to occur is in the Federal Transit Administration Grant category, which dropped by 74 percent from \$15.7 million to \$4.1 million. The major revenue categories are described below.

**Motor fuels tax.** The motor fuels tax consists of three taxes: the gasoline tax, the special fuels tax (e.g., diesel and gasohol), and the motor carrier road tax. The gasoline tax has received much attention recently as it reached a high of 39 cents per gallon as of January 1, 1997, and was reduced for the first time to 36 cents on July 1, 1997. It is scheduled to be reduced to 33 cents per gallon by FY 98. The tax on gasohol has remained one cent less than the gasoline tax since the fund's inception and will be reduced at the same rate as gasoline. Diesel fuel taxes have remained at 18 cents per gallon since 1991.

The motor carrier road tax is the third motor fuels tax. This tax is imposed on business that operate certain vehicles in the state. These vehicles include: passenger vehicles seating more than nine persons; road tractors or tractor trailers; and trucks having a gross weight greater than 18,000 pounds. The number of gallons of fuel subject to the tax is determined by a formula based on total number of miles traveled within the state.

Motor fuel taxes are the most significant revenue component of the STF. In FY 1996, \$505 million was collected through the tax on motor fuels, 62 percent of STF's total resources after rebates for certain exempt entities (e.g., sales to U.S., state, and local governments).

**Motor vehicle receipts.** Motor vehicle receipts are the second category of transportation related revenues. These revenues are collected by the Department of Motor Vehicles and comprise 48 sections of the General Statutes that involve the levy of transportation related charges for licenses and services provided by the department. They include amounts collected for motor vehicle operator's licenses, registrations, and late fees. In FY 96, motor vehicle receipts provided 22 percent (\$173 million) of the income for the STF. Fees collected for vehicle registrations account for 81 percent of the revenue for this category.

**License, permit, and fee revenue.** The third category of funding assigned to the STF is license, permit, and fee revenue which accounted for 11 percent (\$86.5 million) of STF revenue in FY 96. This income is derived from several sources and includes charges for: certain permits issued and services provided by the department; the use of state property under DOT control; and traffic fines. The largest source of revenue in this category for FY 96 was the motor vehicle fines and penalties, which brought in approximately \$26 million or 30 percent of LPF revenue.

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**Other revenue.** The remaining revenue sources contribute about 6 percent of the overall revenue to the STF. These include operating assistance grants from the Federal Transit Authority, interest earnings, and transfers from other funds.

The state received just over \$4 million in FY 96 from FTA grants, which are treated as reimbursement for mass transit operating expenses. Interest earnings credited to the STF amounted to \$41 million in FY 96 and represented about 5 percent of STF's total resources.

There have been six transfers from various funds to the STF over the past 12 years to support transportation related projects. These transfers included funding for General Assembly initiated projects which could not be supported by the STF in its early years and to finance the removal of tolls and associated highway work. Also, in FY 95, a one-time credit of \$14.2 million was posted to the fund due to bond defeasance for bonds issued in 1984. There is an annual transfer of \$250,000 from the STF to the Conservation Fund on an annual basis, pursuant to Section 50 of PA 95-160 .

### **Expenditures of the STF**

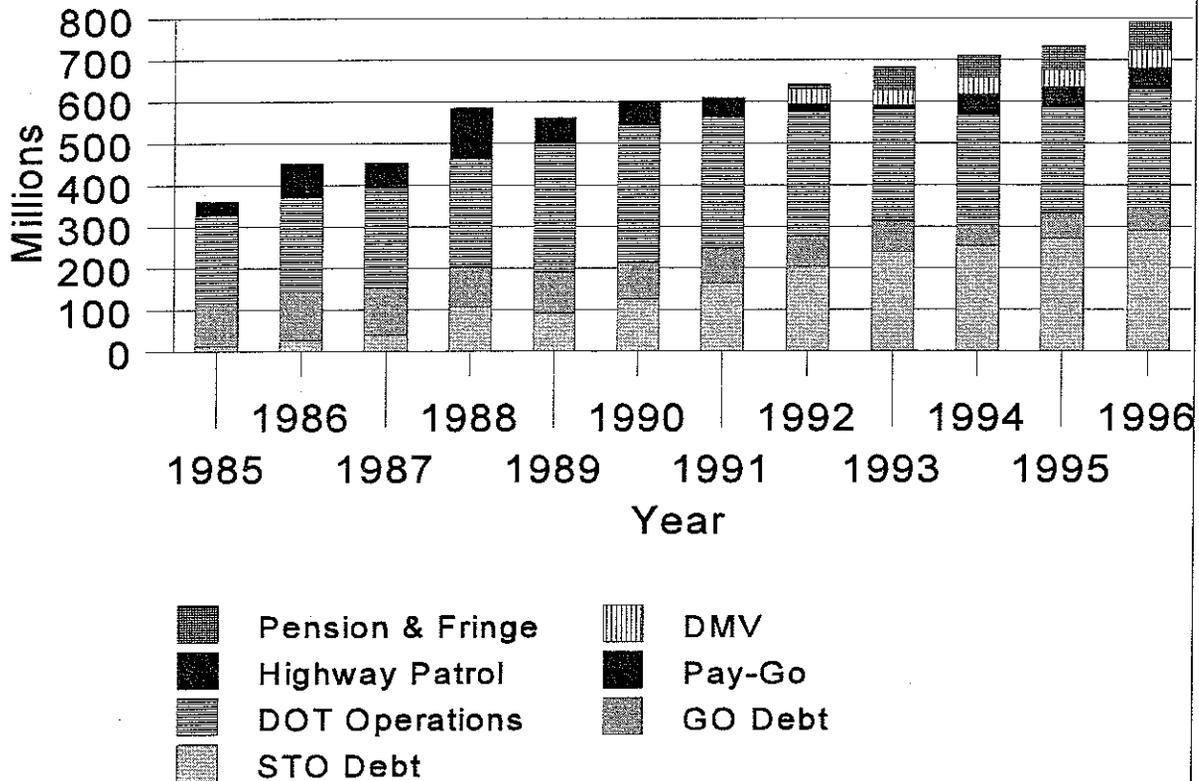
By statute, STF funds may only be used for specific activities. The first call on the fund is for the payment of debt service for Special Tax Obligation bonds that support the infrastructure renewal program. The other obligations of the STF are payment for: principle and interest on previously issued general obligation bonds used for transportation purposes; the operating expenses of the Department of Transportation including "pay-as-you-go" infrastructure improvements; and payment of budget appropriations for the Department of Motor Vehicles and for the Department of Public Safety's highway patrol expenses. Figure II-2 shows the actual expenditures of the STF from FY 85 through FY 96.

*Expenditure trends.* As Figure II-2 shows, total fund expenditures increased by \$431 million (120 percent) over the last 12 years. Debt service increased the most from \$118 million in FY 85 to \$346 million in FY 96 (193 percent). DOT operating costs had the second largest increase in the 12-year period going from \$209 million to \$283 million (35 percent).

"Pay-as-you-go" funding is the only category that decreased since the fund's inception. This funding has been reduced by \$23.3 million. Highway patrol, DMV, and pension and fringe costs were not supported by the fund in FY 85, but all have increased in cost since they were added and now represent 19 percent of the fund's expenditures. The major expenditure categories are described below.

## Figure II-2. STF Expenditures

FY85-FY96



Source: Official Statements of STO Bonds Dated 10/1/96 & 12/7/90

**Debt payments.** As previously noted, the STF supports debt payments for both Special Tax Obligation bonds and general obligation bonds issued for transportation purposes. The combined payments for these two debt categories represented 44 percent of the STF's expenditures for FY 96.

*Special Tax Obligation (STO) debt payments.* Principal and interest payments on STO debt have increased from \$12.6 million in FY 85 to \$291 million in FY 96. STO debt payments represent the largest single expenditure of the fund (37 percent). The payments for debt service are expected to grow, even if no new authorizations are provided, until all authorized bonds are issued.

In the last legislative session, two changes were enacted that effect the way debt payments are handled. One change involved the establishment of an \$80 million escrow account to pre-pay debt payments over a six-year period. The second modification served to limit the cumulative surplus of the fund to a maximum of \$20 million. Any amount over that would be directed to debt

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service. These changes assist in reducing the revenue to debt service ratio, as noted earlier, and assist in balancing the fund.

*General Obligation (GO) debt payments.* The STF pays for all debt service on outstanding GO bonds issued for transportation purposes prior to the establishment of the fund. The GO debt service has declined from \$105.3 million in FY 85 to \$57.8 million for FY 96, which represents 7 percent of STF expenditures. While the debt service for GO bonds will continue to decline, it is estimated it will take an additional 20 years for the debt to be paid off.

**DOT operations.** The second largest expenditure of the fund (\$283.1 million in FY 96 or 36 percent of STF expenditures) goes to support the operations of DOT. The three largest expenses in this category include: personnel services for nearly 4,000 employees (\$97 million); bus operations for 15 urban and five rural systems (\$57.9 million); and rail operations for the New Haven Line and Shoreline East (\$51.2 million).

In addition, the DOT operations category contains a program that impacts infrastructure renewal activities. The Highway and Bridge Renewal account (or "pay-go") provides funding, on a pay-as-you-go basis, for various highway and bridge maintenance, safety, and resurfacing projects. (Pay-go funding is normally included in DOT operations appropriations but has been separated here for analysis purposes). Pay-go projects are focused on those maintenance and infrastructure renewal activities that generally have a useful life of less than 20 years. Funding on a pay-as-you-go basis also saves money by not incurring bond interest and issuance costs. As other expenses in the STF have increased, the pay-go program has been reduced by \$23.3 million (70 percent) between FY 85 (\$33.5 million) and FY 96 (\$10.2 million). The FY 96 expenditure also represented a 92 percent reduction from the FY 88 disbursement of \$122.9 million, a historical high for pay-go.

**Highway patrol, Department of Motor Vehicles, and pension and fringe.** The final three categories of STF expenses -- highway patrol, DMV, and pension and fringe costs -- were not originally assigned to the fund when it was established. In FY 96, these combined expenses were \$152 million or 19 percent of fund obligations. The highway patrol expenses are scheduled to phased out, pursuant to P.A. 97-309, by FY 99.

### **Modifications to the STF**

Significant modifications have been made to the STF over the past 12 years that have limited its scheduled revenue increases and increased its expenditures. As noted above, one of the unique features of the STF was the built-in revenue increases for the first 10 years of its existence that would allow DOT to plan for an ongoing infrastructure program due to a stable revenue base. The original act establishing the STF and various subsequent actions served to revise the STF's revenue structure. The changes to STF revenues are summarized below.

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- *Motor Fuels Tax.* The motor fuels tax rate rose a total of nine cents from 14 cents per gallon in FY 84 to 23 cents on July 1, 1991, as outlined in the original act. The tax on diesel fuel was originally on the same schedule as gasoline; however, on September 1, 1991, the rate on diesel dropped to 18 cents and has remained there. Transfers of other agency expenses from the General Fund to the STF necessitated further increases in the tax on gasoline. For example, on September 1, 1991, the gas tax rose to 25 cents to accommodate the DMV transfer. Twelve additional increases totaling 14 cents would follow over the next five years. At 39 cents per gallon on January 1, 1997, Connecticut's tax rate had the distinction of being the highest in the nation. In response to this situation the Governor and the General Assembly, enacted for the first time in its history, a phased-in gas tax reduction totaling six cents by FY 99. The tax on gasohol has remained, throughout STF's history, one cent lower than the gasoline tax. In addition, to offset the loss of revenue caused by the gas tax reduction, the General Assembly transferred a portion of the gross earnings tax on petroleum products to the STF. This adds \$20 million to the fund in FY99 and \$36 million each year thereafter.
  - *Motor Vehicle Receipts.* There were four scheduled increases in the motor vehicle fees that would have resulted in the doubling of most fees by FY 93. However, significant surpluses in the STF prompted policy makers to defer an increase scheduled for FY 89 and eliminate the increase scheduled in FY 93. In the last legislative session, other DMV fees were transferred to the STF along with miscellaneous charges assessed on gasoline retailers to assist in offsetting the reduction in the gas tax. This will add about \$16 million to the fund beginning in FY 98.
  - *License, Permit, and Fee Revenues.* Various charges for licenses, permits and fees, including motor vehicle fines, rose by approximately 250 percent by FY 94 as contemplated in the original act. However, Public Act 85-413 repealed a surcharge on motor vehicle fines scheduled to go into effect July 1, 1985, and reduced other surcharges scheduled to become effective in FY 89 through FY 94.

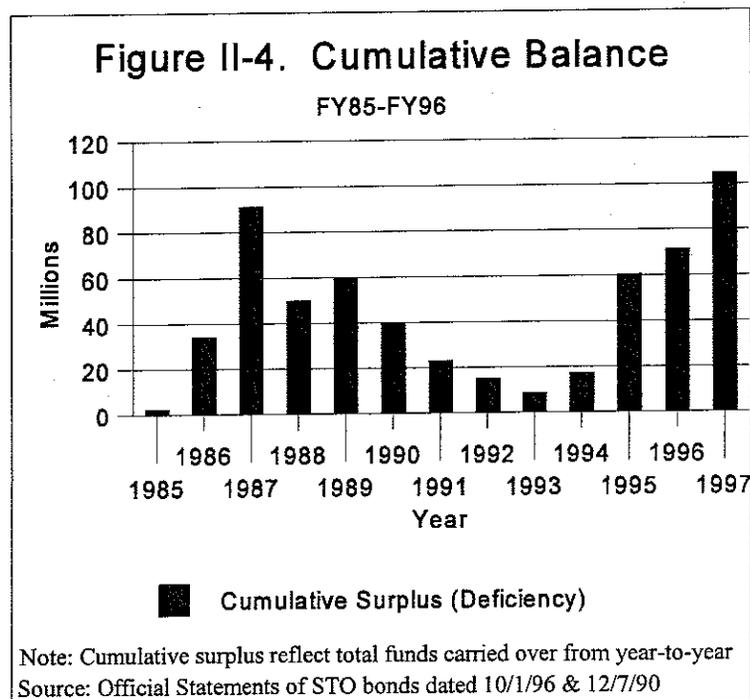
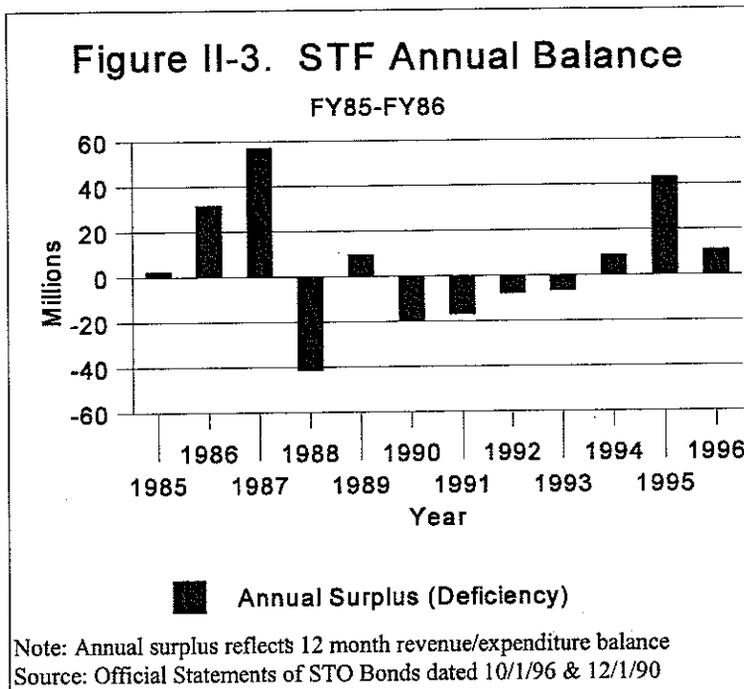
In addition to the revenue changes, three significant expenditures were added to the STF that were not part of the original act establishing the fund. Beginning in FY 89, the state began transferring certain General Fund expenses to the STF. The rationale for this was that these agency costs were transportation related and, therefore, should be supported by transportation revenues. The first transfer involved the shifting of employee and fringe benefit costs of DOT to the fund in FY 89. The operating costs of the DMV, including pension and fringe benefits, were transferred in FY 92, and the costs for the Department of Public Safety's (DPS) highway patrol activities were shifted in FY 94. The cost for these expenses for FY 96 was approximately \$152 million.

## Fund Balance

Changes in the revenue sources and expenditures of the STF often dictated by the state's overall financial picture have a direct effect on the annual condition of the Special Transportation Fund. This is reflected in Figure II-3 which indicates the annual surplus or deficiency for each year of the fund since FY 85.

Since FY 88, fund expenditures have exceeded revenues five times. Despite this the cumulative fund balance has remained positive. Figure II-4 shows cumulative fund balance for the history of the fund. The highest cumulative surplus posted to the fund was \$91.4 million in FY 87, and the lowest was \$2.5 million in its first year. It should be noted that cumulative surpluses in the early years were expected as the infrastructure program got underway. But as these early surpluses accumulated they became an attractive resource for dealing with the state's other budgetary needs.

Table II-1 shows the projected cumulative surplus of the STF for the period FY 98- FY 02. Overall, both revenues and expenditures are projected to grow slowly, 1.5 percent for revenues and 2.5 percent for expenditures. The revenues are expected to exceed expenditures each year until FY 02, when a small deficit of \$4.7 million is predicted. Beginning FY 97, the fund's cumulative surplus is by law limited to \$20 million. Any surplus in excess of that amount is to be transferred to pay for debt service, as depicted in the chart.



**Table II-1. STF Projected Cumulative Fund Balance FY 98-FY 02<sup>1</sup>**

	<i>FY98</i>	<i>FY99</i>	<i>FY00</i>	<i>FY01</i>	<i>FY02</i>
Total Revenues	826.9	812.0	831.7	835.7	839.6
Total Expenditures	824.1	805.0	812.4	821.1	844.3
Surplus/(Deficit)	2.8	7.0	19.3	14.6	(4.7)
Cumulative Surplus	22.8	27.0	39.3	34.6	15.3
Transfer to Pay Future Debt Service	(2.8)	(7.0)	(19.3)	(14.6)	0.0
Cumulative Balance	20.0	20.0	20.0	20.0	15.3

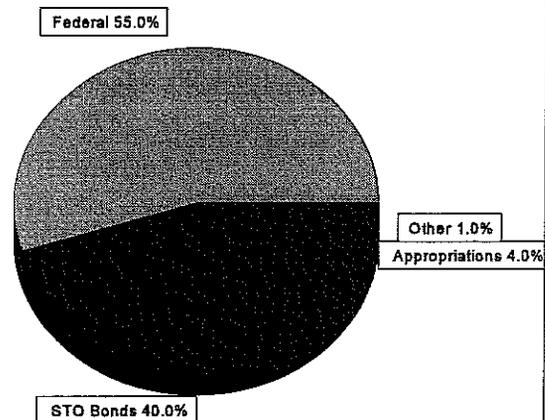
<sup>1</sup>Note: Figures are in millions  
 Source: Office of Fiscal Analysis, 8/97

### Capital Program

The infrastructure renewal program (or capital program, as it is now referred) is a financial entity distinct from the Special Transportation Fund. The infrastructure program, though, is supported in part by funds from the STF. Capital financing is also provided by the federal government, municipalities, and private developers. Since the creation of the infrastructure renewal program in 1984, \$9.4 billion has been dedicated to improving transportation facilities throughout the state. Figure II-5 shows the overall sources of funding for the infrastructure program for FY 84 through FY 97.

**Figure II-5. DOT Capital Program**

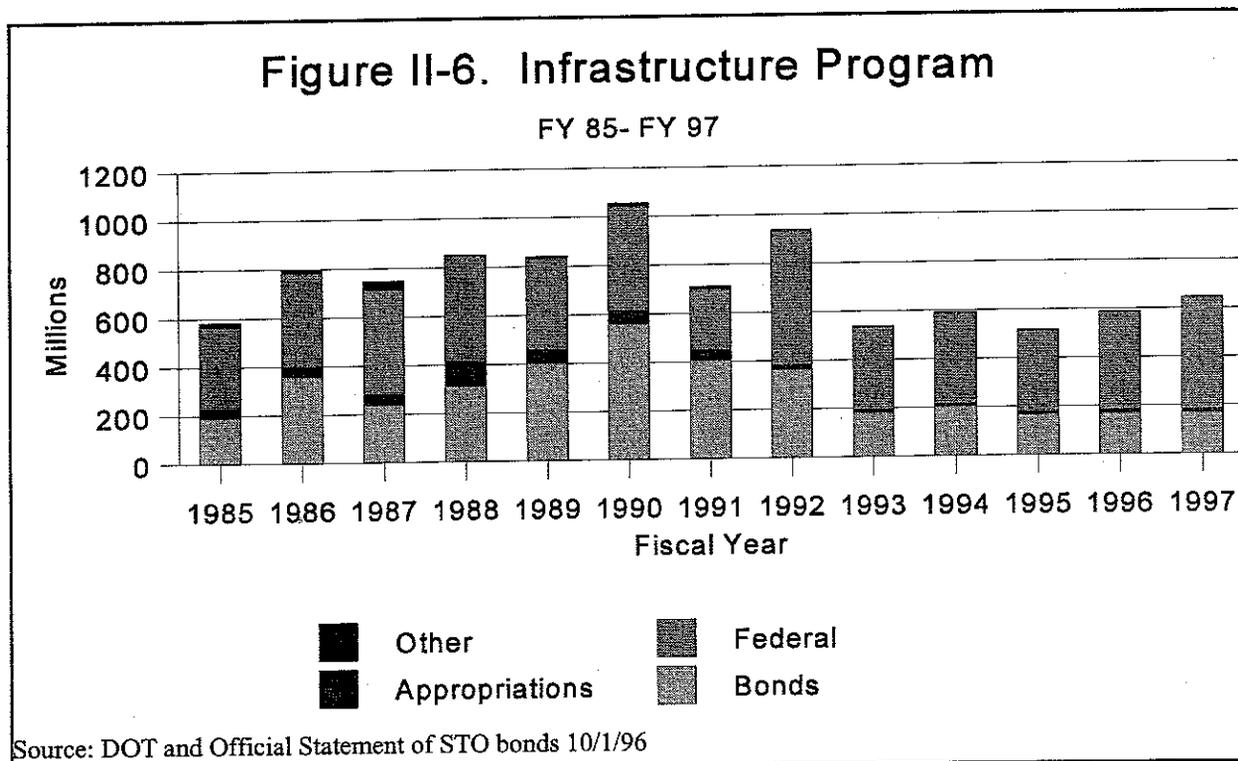
Source of \$9.4 Billion FY85-FY97



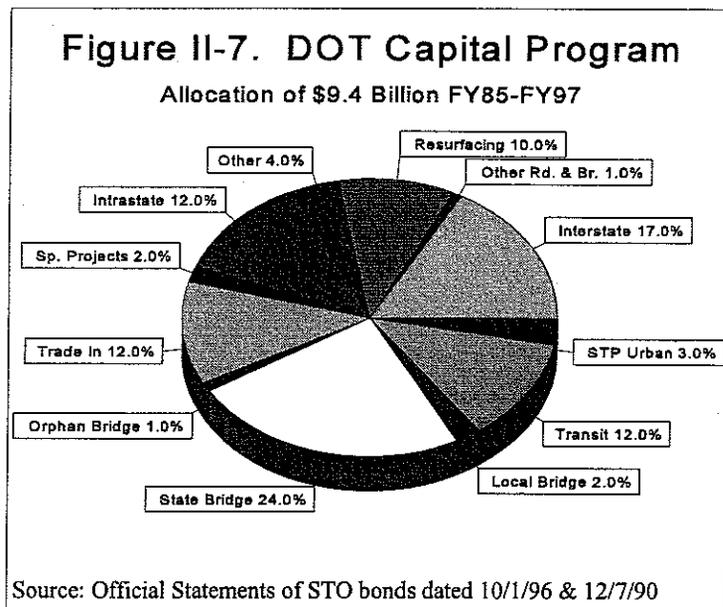
Source: Official Statements of STO bonds dated 10/1/96 & 12/7/90

**Revenues.** Federal and state sources have provided 95 percent of the funding for the infrastructure program. Federal contributions are determined through surface transportation authorizations. The current authorization, the Intermodal Surface Transportation and Efficiency Act (ISTEA), expires September 30, 1997. There are 19 different funding sources contained in ISTEA. Each source has its own eligibility requirements, funding ratios (most are 80 percent federal and 20 percent state), and other limitations. Federal funds provided the majority of resources (\$5.1 billion or 55 percent), while STO bonding contributed \$3.7 billion (40 percent), and appropriations were \$416.3 million (4 percent). Other matching funds provided by developers and municipalities equaled \$89.4 million (1 percent).

The total amount committed by year for all infrastructure program elements is depicted in Figure II-6. As the graph shows, the funding levels fluctuate from year to year. Total funding has increased from \$583 million in FY 85 to \$645 million in FY 97. Over the first six years, the trend was upward, hitting a high point in FY 90 when just over \$1 billion was spent. In recent years funding has fluctuated within a narrow range averaging \$575 million per year. State funding through STO bonds has decreased over the last several years. Federal funding in FY 97, accounted for 72 percent of total capital resources, while STO bonding provided 27 percent and STF funds amounted to 1 percent.



**Expenditures.** The funds for infrastructure renewal are disbursed among 17 capital program elements. Figure II-7 shows the allocation of the \$9.4 billion that has been authorized for the capital program among the 12 largest categories. The four largest components, in terms of spending, are the State Bridge program (24 percent), the Interstate program (17 percent), Interstate Trade-in (12 percent), and Transit (12 percent). A brief description of the major program components is listed below.



- **Interstate** -- includes the completion and maintenance of the state's portion of the nationwide system of interstate highways. Nearly \$1.6 billion has been spent to finish and maintain the National Interstate Highway system in Connecticut. Approximately \$1.4 billion has been paid from federal funds and \$200 million has been paid by the state. Examples of projects funded through this program include: upgrading of I-84 from Vernon to the Connecticut river; upgrading of I-91 from Hartford to Enfield; and construction of an operational lane on I-95 in Stamford and Darien.
- **Interstate Trade-in** -- consists of highway projects that were substituted for the withdrawal of certain highway segments from the interstate highway system. This program cost \$1.1 billion. The state has received \$800 million from the federal government, while the state's share has been \$300 million. This program has supported numerous projects throughout Connecticut including: construction of the Central Connecticut Expressway between Cromwell and Farmington; the Charter Oak Bridge between Hartford and East Hartford; and upgrading of the Route 2 interchange in Norwich. The federal funding for this program ended in Federal Fiscal Year 1996. The remaining funds in this category are being used for roadway improvements to Route 6 between Bolton and Willimantic.
- **Intrastate**-- includes improvements to the state's primary and secondary roads. The state spent \$500 million and the federal government \$660 million under this program.
- **State Bridges** -- involves the rehabilitation, reconstruction, repairing, or replacement of bridges on the state highway system. Over \$2.2 billion has been spent on the state bridge program, of which the federal government has provided \$1.3 billion and the state's share has been \$900 million. This funding has been used to rehabilitate or replace over 1,800 bridges.

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- **Local Bridges** -- involves assisting local governments in rehabilitating, restoring, replacing, and reconstructing local bridges. This program consists of a loan program and a grants-in-aid program that provides an incentive to municipalities to complete repairs to their bridges. Thus far \$213 million of federal, state, and local money has been committed to rehabilitating 540 local bridges.
  - **Transit**-- is composed of the replacement, renovation, and modernization of the state's bus and rail operations. Over \$1.1 billion has been invested in this program, with \$600 million provided by the federal government and \$500 million by the state.
  - **Aviation** -- includes capital improvements to the five state-owned airports, excluding Bradley International, and some municipal airports. A total of \$44 million has been spent under this program, the cost of which has been nearly evenly split between the state and federal government.
  - **Resurfacing** -- involves the resurfacing and restoration of the state highway system. The department has resurfaced an average of 475 miles of roadway per year since FY 85. The funding for this program includes \$329 million in federal funds, \$387 million in bond proceeds, and \$210 million in STF appropriations, for a total of over \$900 million.
  - **Department Facilities** -- includes the renovation, repairing, and expansion of the department's maintenance and administrative facilities. The entire \$125 million invested in this area has been paid with bond proceeds.
  - **Other**-- There are eight other components of the infrastructure program that comprise less than 10 percent of the entire program or \$882 million. These include the Safety Program, Orphan Bridges (bridges over railroads that support a municipal road), Noise Barriers, Urban Systems, Special Projects, Hazardous Waste, Waterways, and Other Road and Bridge projects.

**Projected capital expenditures.** DOT estimates over the next 10 years it will invest an additional \$5.7 billion into Connecticut's transportation infrastructure, as depicted in Table II-2. This includes an average annual bonding amount of about \$173 million over the period. To arrive at this figure, the department has determined it will expend about the same amount through bonding as it has over the last several years. Over the last five years, DOT has received bond authorizations in the range of \$170 million to \$200 million. Because the current federal funding authorization, ISTEA, is due to expire, the department has had to estimate federal funding levels. DOT assumes that federal programs will remain the same as those in ISTEA and the funds would continue at the FFY 97 levels. Thus, the annual federal participation in the capital program is estimated to be about \$385 million for the next ten years. Finally, the yearly contribution from the STF is set at about \$11 million. The average overall spending on the capital program remains essentially the same as the

last seven years. From 1991 through 1997, the average amount spent annually on the capital program was \$575 million, while over the next 10 years the average is projected to be \$570 million.

<b>Table II-2. Capital Budget Projections FY 1998 - FY 2007</b>				
<i>Authorizations</i>	<i>FY98</i>	<i>FY99</i>	<i>FY2000- FY2007</i>	<i>FY98-FY2007 TOTAL</i>
Bonds	\$173	\$173	\$1,381	\$1,726
Appropriations	10	10	92	112
Federal	390	444	3,021	3,855
<b>Total</b>	<b>\$573</b>	<b>\$627</b>	<b>\$4,493</b>	<b>\$5,693</b>

Note: Figures in millions  
Source: 1997 DOT Master Transportation Plan 1998-2007

The strategic goals of Connecticut's transportation investment program for the next 10 years remain largely the same as in the early 1990's. These goals are to insure safety, maintain the existing system, increase system productivity, promote economic development, and provide required capacity. The first three goals -- safety, maintenance, and productivity-- are the focal point for the next 10 years. Some "targeted" economic development needs will be addressed and "limited" capacity improvements will be made.

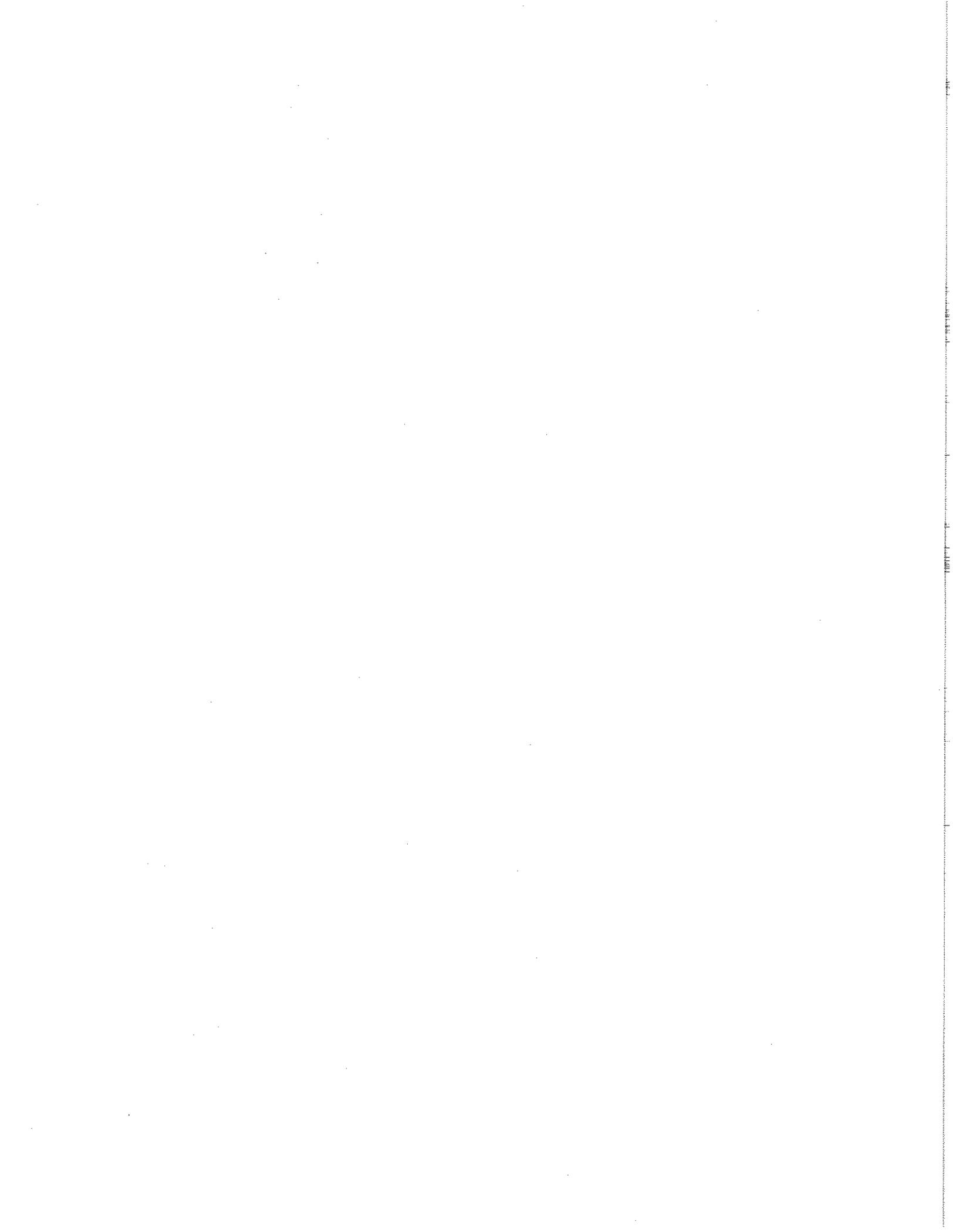
While the broad goals of the transportation program are essentially unchanged, there is a shift in spending priorities over the next 10 years as compared to the previous 13 years. Funding for bridge rehabilitation will dramatically decrease as the maintenance and rehabilitation of roadways receives more emphasis. The largest single program over the last 13 years was the State Bridge Program at a cost of \$2.2 billion. During the next 10 years the department projects to spend about \$540 million on state bridges. The spending has been reduced because the department believes that the overall bridge inventory is in fairly good condition, as most bridges have been rehabilitated, replaced or repaired. A new or rehabilitated bridge has a life expectancy of at least 50 years. The largest expenditure, in the next decade, will be in the Intrastate Program at \$1.3 billion or 23 percent of total expenditures. The Interstate Program is next at just over \$1 billion followed by road resurfacing (\$873 million) and improvements for mass transit (\$841 million).

### **Roads and Bridges**

As noted in Chapter One, the focus of this report is on the two principal transportation infrastructure components -- roadways and bridges throughout the state. The combined roadway

components (Interstate, Intrastate, Interstate Trade-in, etc.), total \$5.1 billion (54 percent) of the infrastructure program. Similarly, all bridge-related components (State Bridge, Local Bridge, etc.) total \$3.2 billion (34 percent). As one would expect, the majority of funding (88 percent) has been directed at these two elements.

Knowing how much has been spent is only one part of understanding the infrastructure renewal program. Discerning how projects are selected and the results of the investment are critical to complete the picture. The processes used to identify projects is discussed in the next chapter, and Chapter Six presents an analysis of some outcomes of the infrastructure renewal program.

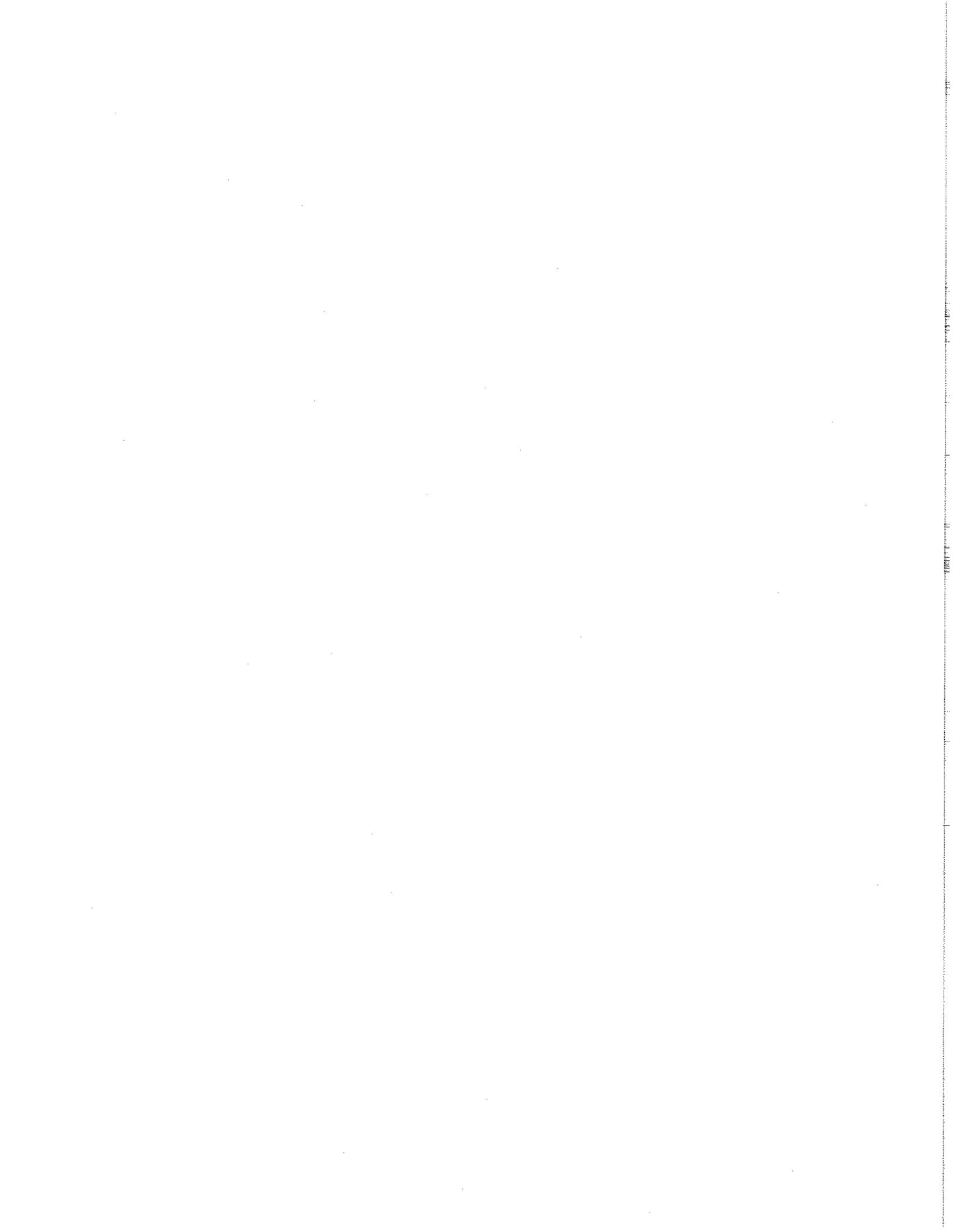


## Key Points

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### *Chapter Three: Source of Projects*

- Transportation projects are identified and prioritized from proposals generated internally and externally to DOT.
  - The planning process is highly structured and receives input from the state's 10 Metropolitan Planning Organizations and five Rural Regional Planning Organizations, as well as from five separate units within DOT -- Bridge Safety and Evaluation, Bridge Maintenance, Highway Maintenance, Pavement Management Unit, and Traffic Engineering.
  - The planning process, which is coordinated and largely controlled by the Bureau of Policy and Planning within DOT, results in the development of four overlapping documents -- Long Range Plan, Master Transportation Plan, Transportation Improvement Program, and Statewide Transportation Improvement Program.
  - The Bridge Safety and Evaluation section of DOT inspects 5,451 bridges throughout the state every two years and identifies structurally deficient and functionally obsolete bridges for rehabilitation or replacement.
  - The Bridge Maintenance section of DOT will perform repairs on 1,200 bridges annually and also identifies bridges in need of rehabilitation or replacement.
  - The Highway Maintenance Division performs an annual visual inspection of the state's roads and develops a list of projects for road resurfacing.
  - The Pavement Management Unit gathers data about road distress and roughness in specially equipped, high tech vans driven over the roadways to identify road segments requiring major rehabilitation or complete reconstruction.
  - Traffic Engineering screens 40,000 locations throughout the state, investigates 50 to 100 sites each year, and proposes corrective actions to be taken.
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## Chapter Three

### SOURCE OF PROJECTS

The Department of Transportation's plans and priorities are identified in the Master Transportation Plan (MTP), which, beginning in 1997, changed from an annual to a biennial publication. Required by state statute (C.G.S. Sec. 13b-15), the MTP evolves out of a comprehensive planning process that is heavily influenced by the federal government.

In general, projects listed in the MTP are identified and prioritized through a dynamic planning process involving proposals generated externally and internally to the DOT. Overseeing and coordinating the entire planning and priority setting process is DOT's Bureau of Policy and Planning.

External sources include municipal officials and local transportation policy advocates. The state's 15 regional planning organizations are the conduit for local proposals.

Six separate DOT units are involved in the internal identification of projects. They are Bridge Safety and Evaluation, Bridge Maintenance, Highway Maintenance, Pavement Management, Traffic Engineering, and Public Transportation. (The latter is specifically excluded from the scope of this study and therefore is not included in the following discussion.)

This section describes the overall process for developing a transportation plan. It will note the documents in which proposals from sources external and internal to the DOT are identified and integrated. Special emphasis is given to the source and flow of proposals that deal with the state highway system.

#### **Transportation Planning**

Decisions about how billions of dollars of state and federal transportation funds are to be used on a variety of proposed rail, roadway, transit, waterway, bicycle, pedestrian, and airport transportation projects are made through a highly structured transportation planning process. This process corresponds to the demands of the federal government, receives input from regional entities and the public, and is coordinated and largely controlled by the Connecticut Department of Transportation. Described below are the elements

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and products of a planning process that is designed to take long-term transportation plans and turn them into specific improvement and maintenance projects.

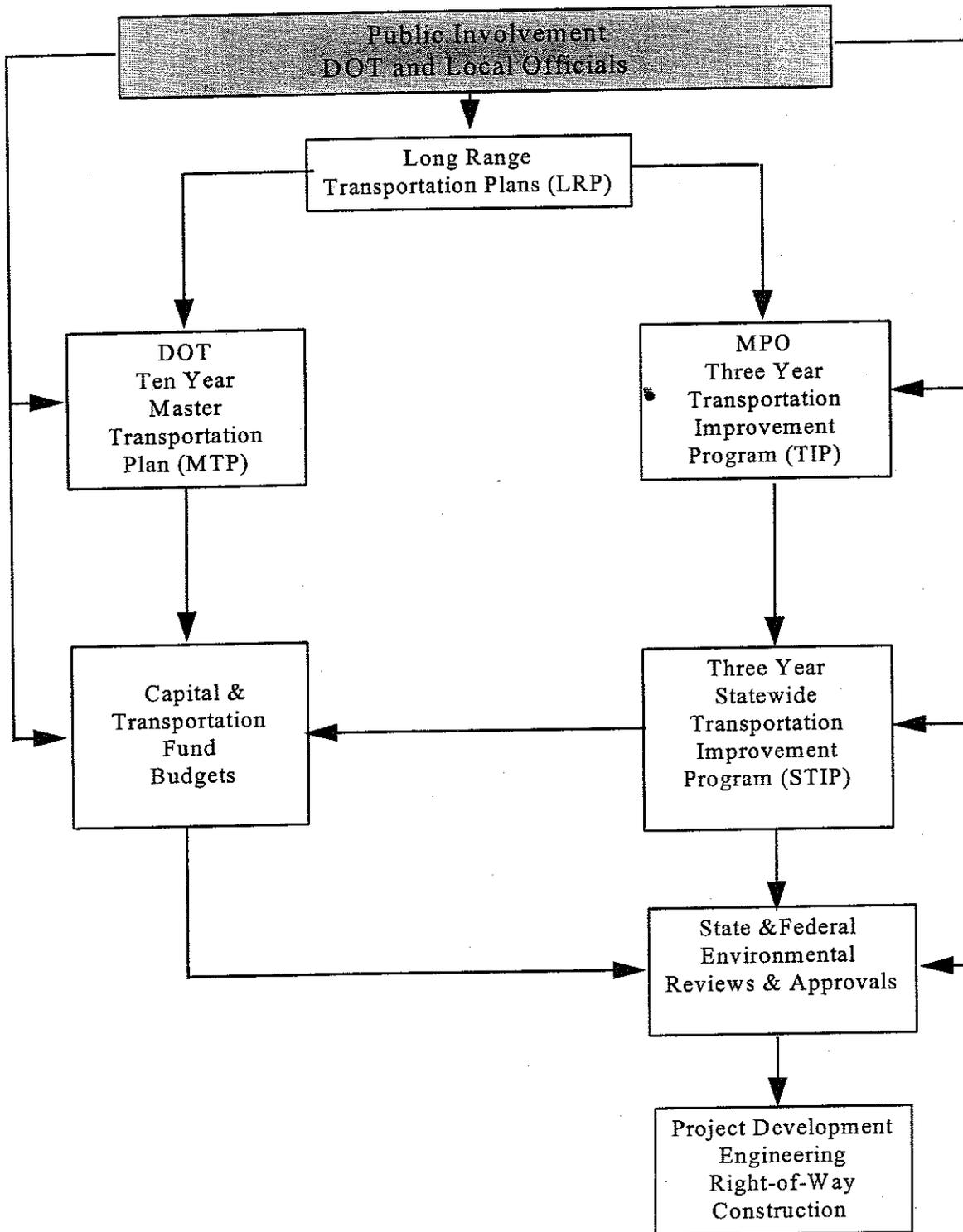
**Federal requirements.** Federal law and regulation dictate many facets of transportation planning including the players, the time frames, and the funding. Federal funding for transportation improvements, representing the majority of the department's source of capital, is dependent on periodic federal authorizations. The current authorization, the Intermodal Surface Transportation and Efficiency Act of 1991, expires September 30, 1997. ISTEA contains 19 different funding sources each having specific eligibility requirements, funding ratios, and other limitations. This program provides more than guidelines for funding. ISTEA is a comprehensive act that requires the state to develop and implement a continuing, comprehensive, and intermodal statewide planning process.

While regional involvement has been a feature of transportation planning in Connecticut since 1959, ISTEA served to formalize relationships and assign responsibilities among the state and Regional Planning Organizations (RPO). RPOs consist of a number of member municipalities and are responsible for conducting planning activities for specific geographic areas within the state. The State of Connecticut has 15 RPOs. There are 10 RPOs with a population greater than 50,000 that are designated by the Governor as Metropolitan Planning Organizations (MPO). MPOs have an explicit role in the conduct of regional planning and programming activities, as specified in ISTEA. The five other RPOs, called Rural RPOs, conduct similar planning activities in cooperation with the department.

In Connecticut, transportation planning results in at least four major types of overlapping documents created in response to different mandates. Figure III-1 illustrates this dynamic process from long-term planning to project development. The figure depicts the interaction between federal guidelines mandating regional input, state requirements for a long-term plan, the contribution of the state budget process, and the short-term implementation plan requiring federal approval. Of course, the figure does not fully capture the negotiation process that must occur for these plans to become reality. A brief description of the plans is provided below, followed by a discussion of the planning process.

- **Long Range Plans (LRP).** The LRP is required by ISTEA. In Connecticut, the regions and the state develop their own LRP. The statewide plan is intended to present a policy-oriented, long-term, intermodal vision of the state's transportation system over a 20-year period. This plan is developed by the department in cooperation with Metropolitan Planning Organizations, transit agencies, ports and airports, and others who have an impact on the transportation system. Each of the state's 10 MPOs must also submit a regional plan to the FHWA and FTA. These transportation plans are more project specific to the

Figure III-1. Transportation Planning and Programming Process



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particular regions. LRPs must be reviewed and updated at least every three years to confirm their validity and consistency with current and forecasted transportation land use conditions and trends, and to extend the forecast period.

- **Master Transportation Plan (MTP).** The MTP is required by state statute (C.G.S. Sec. 13b-15). This plan is intended to, "provide the Administration, General Assembly, local elected officials, and members of the general public with an understanding of the projects and programs that the Department will be pursuing over the next 10 years." It contains information on programmed and planned projects, significant accomplishments, and capital and operating financial data. The MTP must be submitted to the General Assembly every two years.
- **Transportation Improvement Program (TIP).** The TIP is required by ISTEA. This plan is a description of all transportation projects in a metropolitan area that receive federal funding over a three-year period. A TIP is developed by the MPOs in cooperation with the state and public transit operators. The metropolitan plans must be included in the STIP, without modification, following approval by the Governor.
- **Statewide Transportation Improvement Program (STIP).** The STIP is required by ISTEA. The STIP, developed by the department, is the statewide counterpart to the TIP. It is a complete list and description of all FHWA/FTA-funded projects that will be undertaken within the next three years for the entire state. STIPs must be submitted at least every two years to those federal agencies for joint approval, although amendments can be submitted at anytime.

In addition to the above plans, the department prepares a capital program as part of the normal state budget process involving the governor and the General Assembly. DOT's capital budget requests describe the department's immediate plan for the next two-year period.

**Planning process.** There are two primary transportation planning products the regional agencies are responsible for developing under ISTEA -- the regional Long Range Transportation Plan and the Transportation Improvement Program. The LRP must ensure the existing system is being appropriately operated, maintained, expanded, and improved over a 20-year horizon. This plan must also consider the full range of modal choices (e.g., highways, transit, rail) and be "financially constrained." This means the plan must be consistent with the amount of funding that can reasonably be expected to be available.

The department also develops its own LRP, which is intended to provide overall policy direction for the entire state. Regional LRPs are coordinated with the state's plan by the

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department's policy unit. Projects from the LRPs will be selected by DOT's Bureau of Policy and Planning for inclusion in the state-mandated Master Transportation Plan. The TIP is a subset of the long-term plans; it specifies the projects that will be advanced over a three-year time frame. All of the TIPs will be integrated into a Statewide Transportation Improvement Program (STIP), along with projects located in the rural areas of the state, by DOT's policy unit.

As Figure III-1 illustrates, the regional LRPs and the TIPs are developed by the regional organizations with input from DOT and the public. Some of the information the regional entities may consider include the condition of roads and bridges as assessed by DOT, congestion management reports generated by the Bureau of Policy and Planning, and Major Investment Studies.

When developing the STIP and TIPs, the Bureau of Policy and Planning will receive a list of suggested projects from the Bureaus of Engineering and Highway Operations, and Public Transportation for the next three years for each region. (The bureaus prepare the list based on processes outlined below for bridge safety, pavement management, and safety). The policy bureau will review the proposals and distribute the proposed projects to the RPOs. The regional agencies will review the projects, consider their own needs, and provide comments to the Bureau of Policy and Planning for the draft TIPs. Any disagreements are worked out between the bureau and the region before the draft TIPs and the statewide program are completed. Federal regulations provide that the metropolitan TIPs be included in the Statewide Transportation Improvement Program without modification. However, the TIPs must have received approval from the MPO and the governor prior to STIP inclusion. DOT reports that, since ISTEA was promulgated, no governor has had to veto a TIP. The five Rural RPOs do not have formal approval authority for their regions' TIP under federal law. DOT uses essentially the same process for the rural areas to identify transportation priorities.

Once the regions have reviewed the proposed projects, the draft STIP is assembled. The draft STIP is checked by the policy bureau for fiscal constraint, consistency with the long-range plans, and conformity to air quality plans. A conformity report is required by the federal Clean Air Act Amendments (1990). It essentially certifies to the federal government that the projects in the STIP (and LRP) will "conform" to the State Implementation Plan (SIP). The SIP, required for "non-attainment areas" where certain types of pollutants do not meet federal standards, is a plan to reduce the emissions of volatile organic compounds, nitrogen oxides, and carbon monoxide. Most of Fairfield County is classified as a "severe non-attainment area" and the rest of the state is a "serious non-attainment area."

Both the draft TIPs and the draft STIP are made available to the public for review and comment. The RPOs address all comments provided by the public concerning the draft TIP, while DOT handles comments on the draft STIP. The draft STIP is open to public comment for a minimum of 30 days. The 1997 draft STIP received 11 written comments that were addressed by the

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department. After consideration of the public comments, a final edition of the STIP is prepared and submitted to the FHWA and FTA for their approval.

As the above discussion makes clear, one of the significant goals of ISTEA is to involve the public and other stakeholders in transportation planning and in decision making. While each region of the state is guaranteed a role in the process through federal law, the ability of the department to shape the ultimate outcome cannot be discounted. For example, of the 19 federal funding sources contained in ISTEA, the regions have significant control over only two. These two sources, called Surface Transportation Program (STP) -Urban and STP- Small Urban, amounted to 13 percent (\$46.7 million) of all federal funding for 1997 in Connecticut. But even these two funding streams require matching funds, which are usually provided by the state. Although the MPOs also have veto power over projects, because no federal money can be spent without the region's approval, this ability is not the same as determining where it will be spent. An MPO would be hard pressed to turn down any money or push an alternative proposal because DOT, being the ultimate steward of federal funding, could decide to spend the money elsewhere in the state. Given DOT's pivotal role, an examination follows of how it identifies needs and prioritizes projects for bridges and roadways.

### **Bridge Safety and Bridge Maintenance Units**

The Bridge Safety and Evaluation (BS&E) and Bridge Maintenance sections of DOT are involved in ensuring the safety of the traveling public and have a role in protecting the state's capital investment in bridges. Both also have a role in initiating repair and rehabilitation projects and confirming they are completed.

**Functional responsibilities.** The BS&E section is responsible for conducting periodic inspections of bridges, evaluating the results of inspections, recommending repairs and ensuring they are performed, posting load limits on restricted bridges, and closing bridges considered unsafe. The bridge maintenance unit is responsible for conducting or overseeing various maintenance activities including painting, deck repairs, concrete repairs to the supporting structural components, cleaning structure drainage systems, and mechanical or electrical repair to drawbridges.

**Bridge inventory.** The bridge safety unit is responsible for inspecting 5,451 state, local, and other types of bridges throughout the state. Bridges meeting certain criteria, such as spanning more than 20 feet, are reported to the Federal Highway Administration and are a part of the National Bridge Inventory (NBI). Table III-1 provides an inventory of these bridges.

DOT is not responsible for maintaining all of the bridges it inspects. For example, DOT is not responsible for town-owned bridges. However, because municipalities usually do not have the expertise to perform the necessary evaluations, the BS&E section inspects all local bridges with a length of 20 feet or greater. The unit will provide the town with its evaluation, noting any deficiencies, but the town is responsible for implementing any repairs. In 1992, on a one-time basis,

DOT inspected all local bridges between six and 20 feet. In addition, the state has established a loan program and a grants-in-aid program to assist local governments in rehabilitating and reconstructing local bridges. Thus far, 540 of the approximately 2,100 local bridges have been rehabilitated.

<b>Table III-1. Connecticut Bridge Inventory</b>			
<i>Type of Bridge</i>	<i>Total</i>	<i>National Bridge Inventory</i>	<i>DOT Responsible</i>
State Bridges	3,663	2,758	3,663
Local Bridges	1,229	1,227	0
Railroad Bridges	375	0	0
Orphaned Bridges	88	86	0
Adopted Bridges	63	60	63
Pedestrian	16	0	0
DEP Bridges	14	14	0
Plaza over Roadway	2	0	0
Tunnel	1	0	1
<b>Total</b>	<b>5,451</b>	<b>4,145</b>	<b>3,727</b>

Note: Orphaned bridges are bridges over a railroad that support a municipal road and whose ownership is in dispute. Adopted bridges were orphaned bridges the state subsequently took responsibility for.  
Source: Department of Transportation, Bridge Safety and Evaluation.

The last column in Table III-1 indicates the bridges DOT is responsible for maintaining. Of the 3,727 bridges DOT is responsible for, 1,866 (50 percent) have been rehabilitated, restored, or replaced since the infrastructure renewal program began in FY 85. In addition, the maintenance unit performs repairs on approximately 1,200 bridges annually.

**Organization of BS&E.** The bridge safety unit contains 50 employees and is located in the Office of Engineering in the Bureau of Engineering and Highway Operations. The unit is divided among nine inspection areas, which are each assigned a two-person inspection team and one senior engineer. An additional team is responsible for special studies and assists the other teams. In addition, two private consulting firms provide assistance with the inspection of "complex" bridges (e.g., large or movable bridges), and one firm provides underwater inspection services.

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The inspection procedures are outlined in the State Bridge Inspection Manual. Bridges are inspected on a rotating schedule and must be inspected at least once every two years. Certain deficient bridges require interim inspections on a more frequent basis, usually within a year or less. The state is seeking permission from FHWA to extend the inspection frequency for smaller concrete bridges rated in a good condition to a four-year interval. Due to the design of these concrete bridges, there is very little change in their condition over a two-year period. The BS&E unit believes that this would result in a better allocation of resources and would not compromise the safety of the state's bridges.

**Bridge ratings.** Bridges are rated along two primary measures. These involve the bridge's structural condition and its functional capacity. Rating a bridge's structural condition involves evaluating its constituent parts. The functional capacity of a bridge relates to its load carrying capacity, clearances, roadway alignment, and other geometric features.

The primary products of the BS&E section are bridge inspection reports. The inspection reports are concerned with the structural integrity and functional capacity of bridges and must adhere to national standards prescribed by FHWA (i.e., National Bridge Inspection Standards). Each report is the result of field work conducted by a team of inspectors. Each of the main critical components of a bridge is evaluated and rated. The main components include the deck (riding surface), the superstructure (structural elements under the deck), and the substructure (piers and abutments). Each of these components is made up of a number of subelements. The evaluation of the subelements results in a numerical rating from zero (failed condition) to nine (excellent condition) for the main component. The load carrying capacity and waterway adequacy are also considered in the structural evaluation. The lowest rating among the three main components becomes the bridge's overall rating. These ratings are excellent, good, fair, and poor. Definitions of the descriptive ratings are found in Table III-2.

Functional capacity measures examine the bridge's geometry and traffic capacity, roadway alignment, load carrying capacity, and waterway adequacy. Evaluations of these items also result in a numerical rating from zero (failed condition) to nine (excellent condition). The functional evaluations are not converted to descriptive categories, however, a numerical rating of three or less for any of the above items will result in a functionally deficient rating overall. If load carrying capacity and waterway adequacy deficiencies are sufficiently severe (i.e., below a three), these bridges are deemed structurally deficient. Any bridge classified as structurally deficient is excluded from the functionally obsolete category.

**Bridge project initiation.** Figure III-2 shows the process by which bridge projects become candidates for repair, rehabilitation, or replacement. The first step involves the bridge inspection report. When a bridge inspection report is completed, the information is used to update the department's bridge inventory database. If there are items in need of repair, inspectors will issue a Bridge Maintenance Memorandum (BMM). The BMMs are used to document and communicate

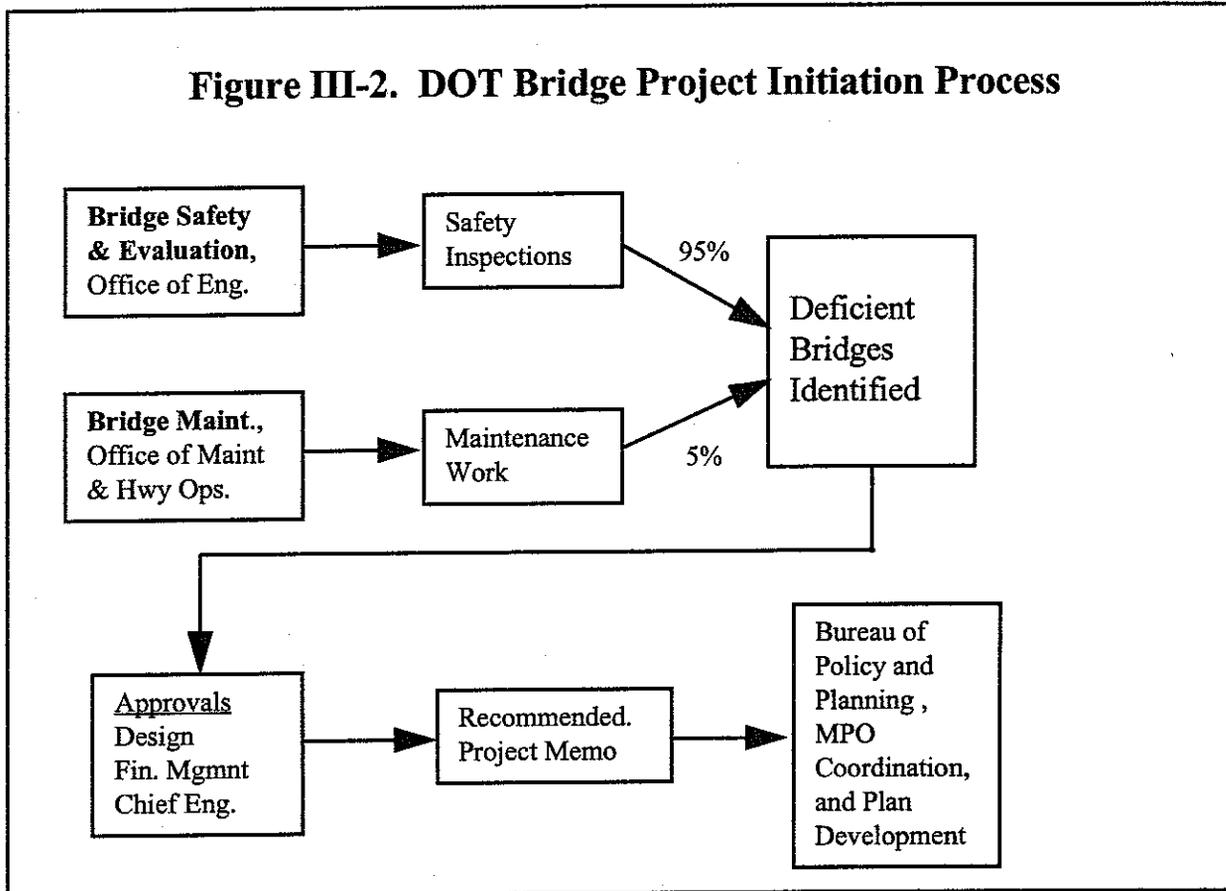
to the bridge maintenance unit various deficiencies noted during inspection. Critical deficiencies are relayed immediately through telephone contact to the maintenance unit and are also later submitted in writing. Bridge maintenance handles critical deficiencies immediately. Non critical deficiencies are added to their maintenance schedule.

<b>Table III-2. Structural Condition Ratings for Bridges</b>		
<i>Classification</i>	<i>Rating</i>	<i>Condition</i>
Excellent	9	Superior condition (new)
Good	8	Very good condition - no problems noted
	7	Good condition - some minor problems
Fair	6	Satisfactory condition - structural elements show some minor deterioration
	5	Fair condition - all primary structural elements are sound but may have minor section loss, cracking, spalling, or scour.
Poor	4	Poor condition - advanced section loss, deterioration, spalling, or scour.
	3	Serious condition - loss of section, deterioration, spalling, or scour have seriously affected primary structural components.
	2	Critical condition - advanced deterioration of primary structural elements.
	1	Imminent failure condition - major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability.
	0	Failed condition - out of service - beyond corrective action

Source: Department of Transportation, Bridge Safety and Evaluation.

After being notified of deficiencies by the inspection unit, the bridge maintenance section will perform necessary repairs. Occasionally, a bridge may be considered unrepairable by the maintenance unit. The bridge will become a candidate for major rehabilitation.

**Figure III-2. DOT Bridge Project Initiation Process**



The bridge database is used to identify projects for inclusion in the capital program. A number of structurally deficient (usually rated poor) bridges needing major repair or replacement are pulled from the list every six months. (A total of about 40 bridges are pulled annually from a listing of about 225 poor bridges). These candidates are sent to the bridge design unit, where proposed rehabilitation, repair, or reconstruction plans are developed. A rough estimate of the costs and time frame to complete the project is also determined by the design unit. These proposed projects are then subjected to review and approval by the fiscal office within the Bureau of Engineering and Highway Operations, and the chief engineer of the bureau. Projects will be sorted out for short-term or long-term consideration during this process based on need, seriousness of deficiencies, and available funding.

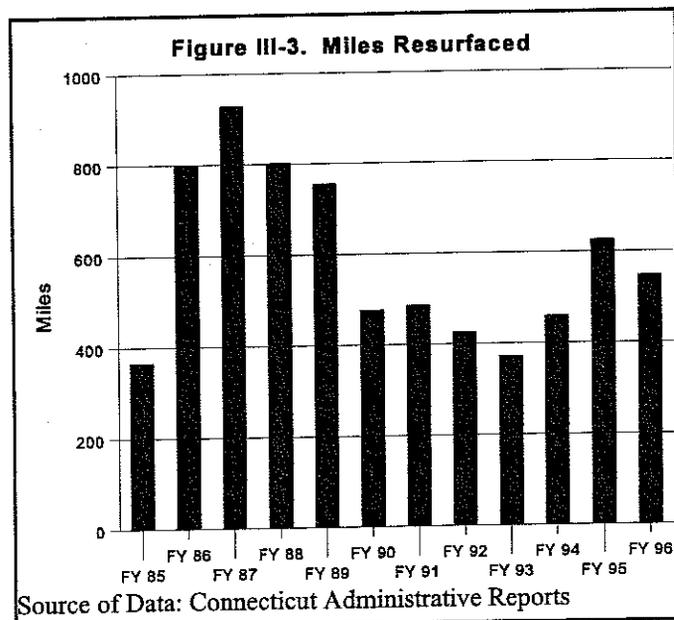
Functionally deficient bridges will also be identified through the bridge database. These bridges are a lesser priority for DOT, as structural integrity of the bridge is usually not the issue. However, functional deficiencies will be addressed if the roadway is considered for widening or rehabilitation, or if traffic safety becomes a significant concern.

After approvals are secured, the candidate bridge projects are listed in a Recommended Project Memo (RPM). The planning process continues, as described in the Planning section above, until the project development process begins through to construction. When a bridge project is complete, the BS&E unit will perform the final inspection.

### Pavement Management

The Department of Transportation's stated goal is to resurface 438, two-lane miles of pavement each year. This represents approximately 10 percent of the mileage in the state system. Figure III-3 shows the number of miles resurfaced annually from FY 84 through FY 96. The most striking aspect of the graphic is the number of times the road resurfacing goal was exceeded in the early years of the infrastructure renewal program.

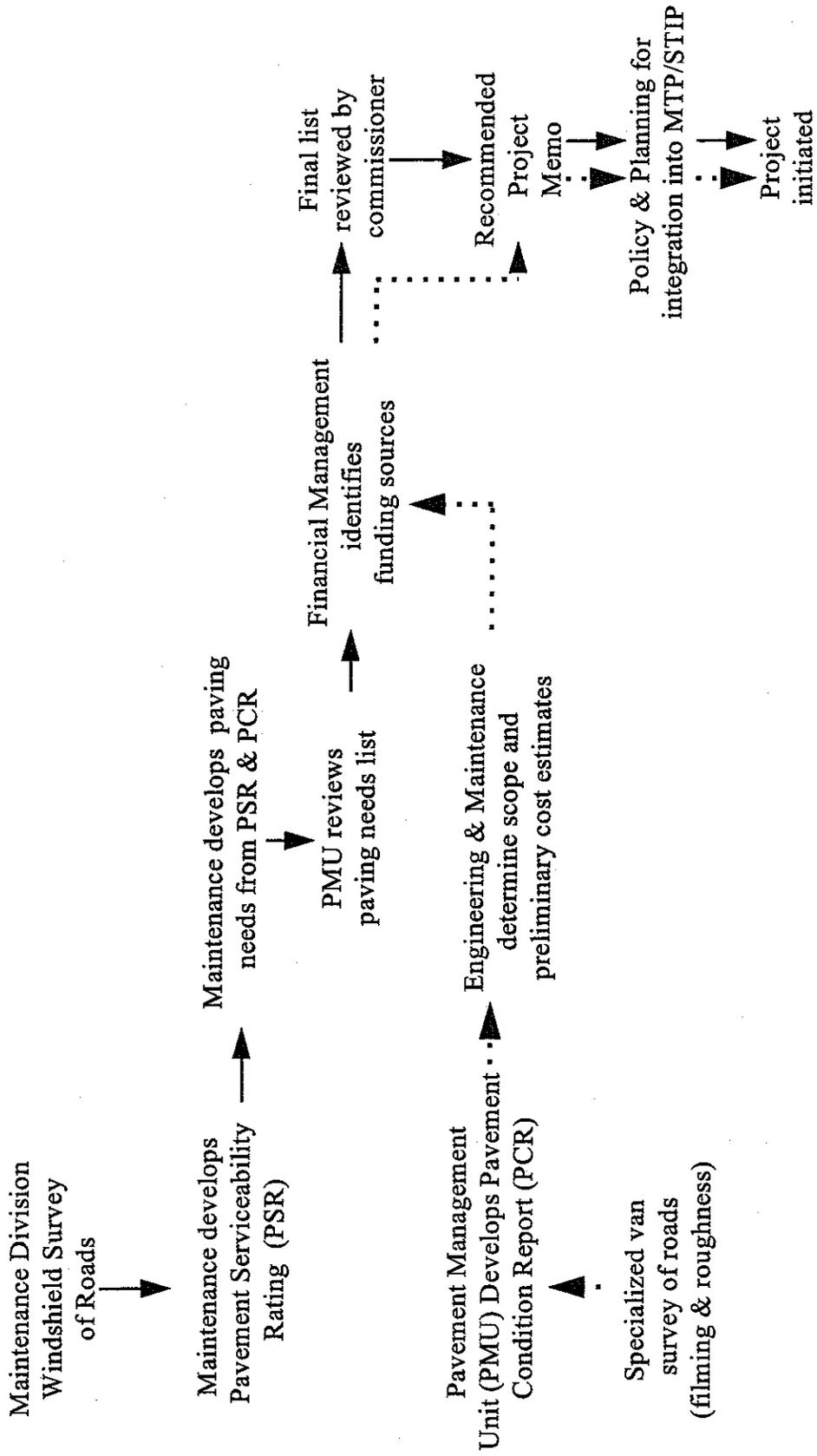
This reflects DOT's efforts to address years of neglecting the deteriorating condition of the state's roads. It should be pointed out that the mileage resurfacing levels achieved were heavily influenced by the road surface treatment methods chosen by DOT. For example, in FY 86 through FY 89, the highest mileage resurfacing years, over 200 miles per year were resurfaced with a liquid overlay, which is intended for low volume roads and can be applied at a considerably lower price than an asphalt overlay. This will be discussed further in the analysis section of this report.



**Identification of paving projects.** The process for the determining the road segments that will be resurfaced is outlined in Figure III-4. The figure shows that two separate units are involved in rating road surfaces and developing resurfacing proposals.

One unit, the Highway Maintenance Division of the Bureau of Engineering and Highway Operations, relies primarily on data obtained from an annual visual inspection of the state's roads.

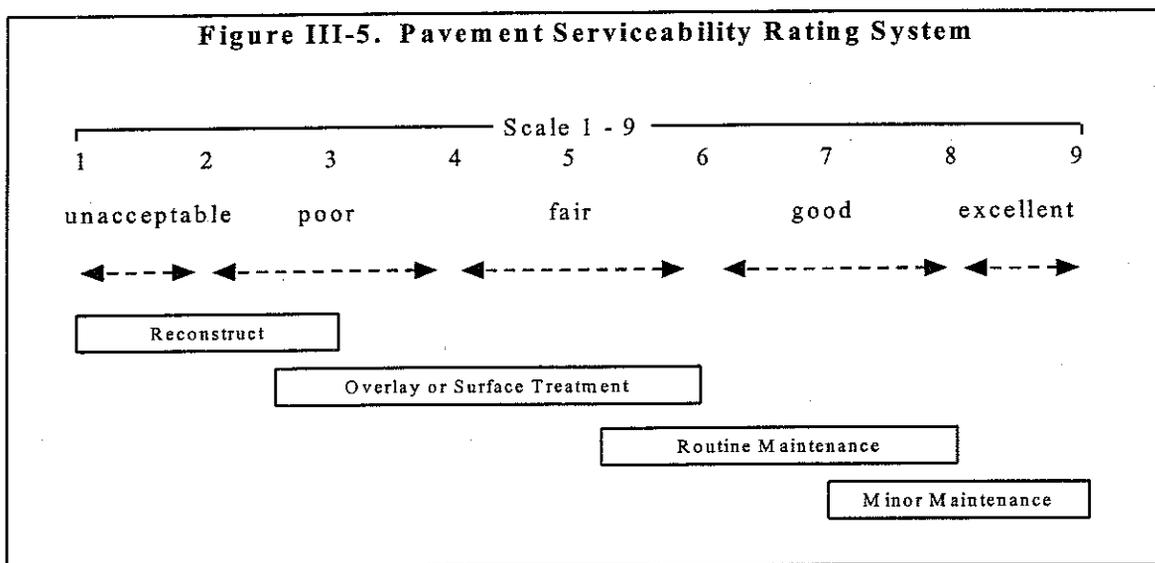
Figure III-4. Overview of Process for Identifying Road Paving Projects



Following the maintenance guidelines of the Pavement Serviceability Rating System (PSR), DOT personnel assess a road on the following five components: cracking (breaking or separation of the pavement surface evident in longitudinal, transverse, alligator, or map type cracks); distortion (deformation of the pavement from its original construction form evident by depressions, rutting, corrugation, or frost heaves); disintegration (wearing away or fragmentation of the pavement); drainage (containment of surface and subsurface water); and riding quality (smoothness of a ride experienced by occupants of an average passenger vehicle).

Each rated component is assigned a value on a scale of 1 to 9. The overall score is computed using a weighted average. Figure III-5 shows the relationship between the PSR numeric scale and an associated qualitative scale. Also shown in the Figure III-5 are the type of road surface treatments typically associated with each rating.

Based on the PSR data and the need to achieve some degree of geographic balance, the highway maintenance division develops a proposed list for road paving. The list is initially reviewed by the Pavement Management Unit, which as Figure III-4 indicates develops its own road ratings. The finalized list is sent to the bureau's financial management section which is responsible for coordinating various funds available to the DOT. After the availability of funds has been determined the paving list is sent to the commissioner for final approval.



After the commissioner approves, other units within DOT such as design and traffic engineering are notified to insure there are no significant conflicts with other scheduled work. In the absence of conflicts, the approved projects receive a recommended project memo (RPM) and are placed on a list of projects ready for initiation.

The pavement rating performed by the Pavement Management Unit is a more technical approach using photographic images and other quantitative data. This unit analyzes data collected from measurements of road distress and roughness taken from high-tech vans as they are driven over a roadway. The results of the unit's analyses are reported annually in a document known as the Pavement Condition Report (PCR).

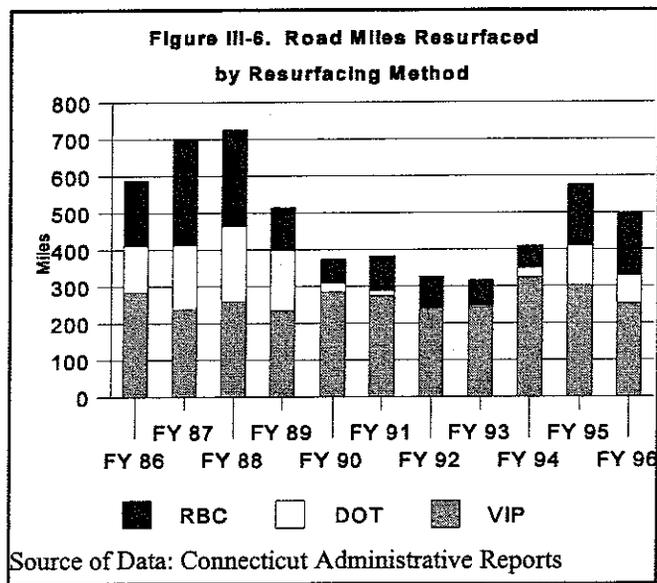
Based on these data, the Pavement Management Unit prioritizes the state maintained network and develops a list of road segments that require major rehabilitation or complete reconstruction. Reflecting the size and the scope of the recommended projects, the list is referred to as the resurfacing-by-contract list (RBC). The projects placed on the RBC are forwarded to the Bureau of Engineering and Highway Operation's engineering design unit where the type of road work needed is determined and a preliminary cost estimate prepared for each proposal. The surviving projects are referred to the highway bureau's financial management unit for a determination of the availability of funds.

A recommended project memo is developed for projects receiving final approval. The paving projects that are scheduled to be initiated within three years are sent to Bureau of Policy and Planning for placement in the Statewide Transportation Improvement Plan. Paving projects on the RPM list that are not scheduled to be initiated within three years are integrated into the Master Transportation Plan under the guidance of the Bureau of Policy and Planning.

**Initiation of paving projects.** Depending on the treatment strategy chosen, resurfacing projects are performed through one of three methods: DOT's maintenance personnel, the Vendor in Place Program (VIP), or the Resurfacing by Contract Program. Generally, road segments identified for a standard asphalt overlay are performed by either DOT or through the VIP program. The road segments identified for major rehabilitation are undertaken by large construction firms capable of performing this type of work on a large scale.

Under the VIP program, contractors are selected through a unit price competitive bidding process to perform resurfacing work in a specified geographic area. As a result, each road segment that is scheduled to be resurfaced does not have to be individually bid. The DOT merely has to schedule and coordinate the work.

Figure III-6 gives a breakdown of the miles resurfaced under each method from FY 85 through FY 96. The totals



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differ from those shown in Figure III-3 as a result of the exclusion of roads treated with a liquid overlay. It should be noted that the mileage attributed to the RBC program is slightly inflated because it includes the construction of new road segments that are added to the state's highway system. Figure III-6 shows that the VIP program is responsible for a majority of the resurfacing done in Connecticut.

## **Traffic Engineering**

Another source of transportation projects is the Division of Traffic Engineering located within the Bureau of Engineering and Highway Operations. The division is responsible for safety matters associated with the transportation system. In this capacity, it may review projects proposed by other units to insure adequate traffic carrying capacity and that potential safety problems are minimized, or the division may develop its own proposals for improvements to state roads, local roads, and rail-highway grade crossings. The division is actively involved in designing traffic control signal systems to deal with congestion management on state roads as well as safety.

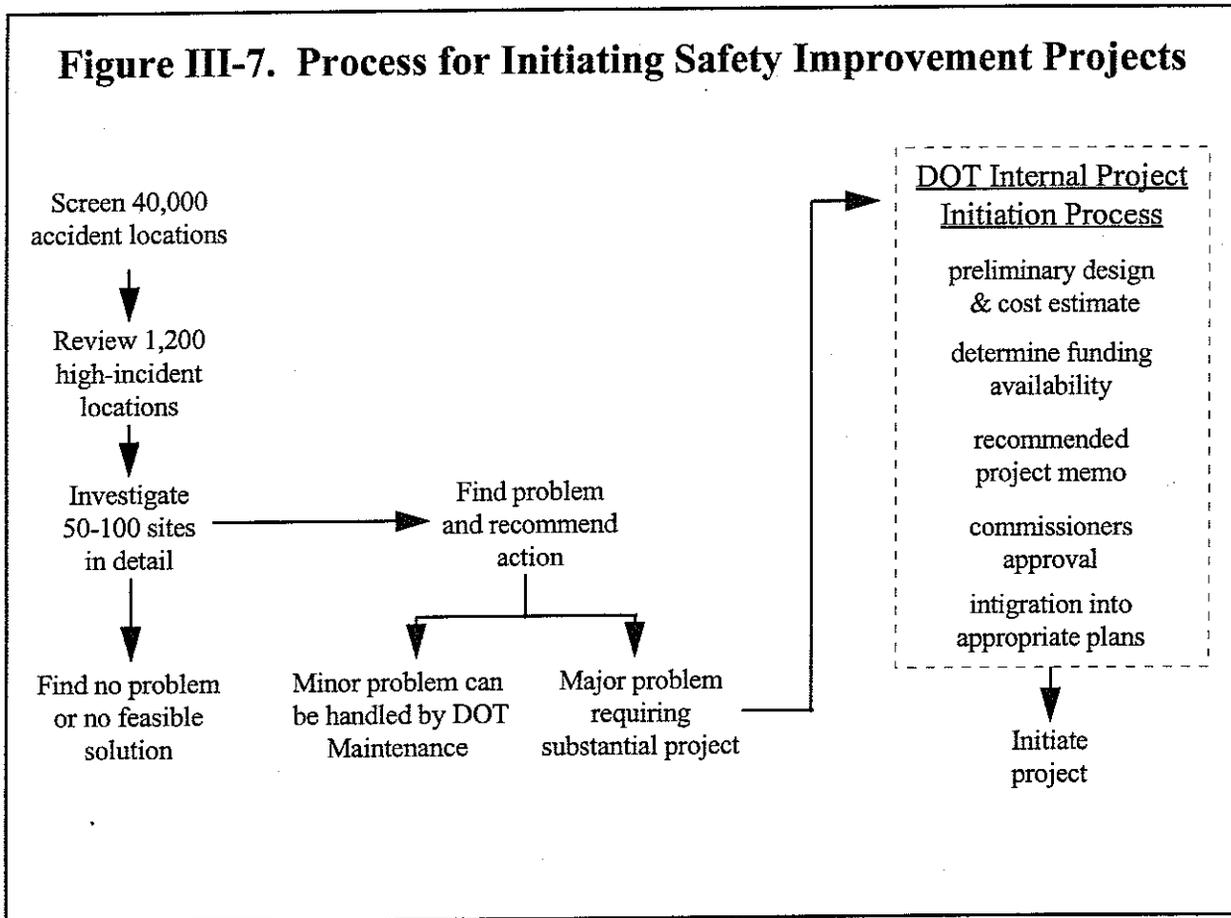
The primary aspect of the division's work that leads to the type and scope of projects of interest in this study is the hazard elimination program for state roads and rail-highway grade crossings. Figure III-7 diagrams the basic process followed by the division in this area.

**State roads.** The process starts with a computer generated analysis of DOT data files pertaining to average daily traffic counts, accident records, and an inventory of roadway characteristics. Approximately 40,000 locations are screened. Those found to exceed accident thresholds established through the computer program are put on a list for further analysis. This list typically numbers around 1,200 sites and is referred to as the SLOSSS (Suggested List of Study Surveillance Sites).

Locations that have been studied previously or those that have had a recent safety improvement are noted. Supervisors are assigned by geographical area (40 people) to review the SLOSSS and propose locations to be studied. Normally locations are studied in the order of their priority on the SLOSSS. However, sites with lower accident rates may be studied as a result of complaints from citizens or town officials. The rationale for this is the notion that the number of accidents does not necessarily reflect the severity of a problem.

The division undertakes a detailed investigation of about 50 to 100 sites each year. The studies involve conducting field observations and collecting and analyzing additional data such as collision diagrams and vehicle speeds. The goal is to identify the root causes of the accident patterns and trends. A report is prepared for each location studied. Depending on the study, the report may include data, accident causes, suggested improvements, and the estimated cost of the improvements.

As Figure III-7 shows three courses of action can result from a study. First, there can be a recommendation that no action be taken. This is the case when the study fails to find a problem or there is no feasible solution. Second, the report can propose a service memorandum be issued for minor work that DOT's maintenance operation can perform. Finally, the report can recommend a major project be developed to resolve the problem.



When significant work is being considered as a recommendation, other DOT units are notified and brought into the process. Specifically, the highway design unit is asked to review the work, develop preliminary designs, and provide estimates of the cost of addressing the problem. (It should be noted that the traffic engineering unit may be brought in to review safety concerns in projects proposed by other units.)

Changes in the project's scope and estimated cost result in a new benefit/cost ratio being computed. This ratio is the primary factor used to determine a project's priority rating. Before

being forwarded to the commissioner, proposals are reviewed by bureau's financial management unit to determine if funds are available to perform the work.

A recommended project memo is developed for projects that receive final approval. At this stage the process that guides all major road transportation projects within DOT is initiated. Projects scheduled to begin within three years are sent to Bureau of Policy and Planning for placement in the Statewide Transportation Improvement Plan. Safety improvement projects on the RPM list scheduled to be initiated within three years are integrated into the Master Transportation Plan under the guidance of the Bureau of Policy and Planning.

Table III-3 shows selected output measures associated with the state road safety improvement program. The increasing number of safety improvement projects in the design phase may indicate an increase in the complexity of the proposed solutions being recommended and advanced.

Table III-3. State Road Safety Improvement Program											
Activity	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96
Sites Investigated	112	68	160	88	97	115	117	71	88	55	48
Recommended Action	12	35	48	34	48	44	45	39	40	26	20
In Design	na	2	6	2	6	7	12	9	10	14	20
Cost of projects in design (in \$ millions)	na	\$0.1	\$0.7	\$1.3	\$1.3	\$1.7	\$2.9	\$3.3	\$3.5	\$6.9	\$5.6
Source of Data: DOT Annual Safety Report											

**Rail-highway grade crossings.** The basic process for initiating projects under the railroad crossing program is similar to that outlined above. The division analyzes data related to roadway volumes, train counts, and vehicle/train accidents. As a result of this analysis, a rail-highway grade crossing priority list is developed. Projects are initiated based on this list and the availability of funding. Table III-4 shows the rail-highway crossing projects completed, under construction, and in some stage of the design process for each year between FY 86 and FY 96

Table III-4. Rail-Highway Grade Crossing Program											
Projects	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96
Completed	10	6	5	8	2	3	7	6	3	6	3
Under construction	19	11	11	9	14	12	5	9	na	5	13
Active Design	30	31	na	na	na	na	10	27	10	12	16
Source of Data: DOT Annual Safety Report											

**Local road program.** As noted above, the Division of Traffic Engineering is also involved in safety improvements on local roads. However, its role is limited to administering the federal Local Road Accident Reduction Program in Connecticut. The program provides federal funds to local governments to improve highway accident locations such as minimizing roadside obstacles, improving sight lines, reducing hazards to pedestrians, and improving poor or unmarked roadways.

Under the program, the division solicits accident-prone sites from regional planning agencies and towns. The intent is for this to be done annually. However, in three of the past 10 years DOT has suspended the program citing a backlog of projects or administrative problems associated with the federal government. When the program was active local authorities have responded with between 13 and 20 sites per solicitation.

The locations are reviewed by the division and the Division of Consultant Design. Recommendations for funding are made based on a benefit/cost ratio. Recommendations follow the process for project approval within DOT that was outlined previously. Table III-5 shows the number of sites submitted, recommended for funding, and the cost of the recommended improvements. The improvements undertaken are managed by the involved municipalities.

Table III-5. Local Road Accident Reduction Program											
	<i>FY</i> 86	<i>FY</i> 87	<i>FY</i> 88	<i>FY</i> 89	<i>FY</i> 90	<i>FY</i> 91	<i>FY</i> 92	<i>FY</i> 93	<i>FY</i> 94	<i>FY</i> 95	<i>FY</i> 96
Sites	16	0	0	*	*	13	15	*	19	19	15
Funded	6	5	5	*	*	4	5	*	11	9	11
Cost	\$0.4M	\$0.3M	\$0.4M	*	*	na	\$0.5M	*	\$1.0M	\$1.3M	\$1.1M
* Program suspended											
Source of Data: DOT Annual Safety Report											

## Key Points

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### *Chapter Four: Environmental Units*

- DOT assigns two units to ensure compliance with an array of federal and state environmental laws -- the Office of Environmental Planning and the Environmental Compliance Division.
  - Environmental Compliance Division is responsible for managing hazardous materials on a work site, while the Office of Environmental Planning provides or oversees various types of environmental assessments of potential or actual transportation projects.
  - Fully state-funded projects must follow the requirements outlined in the Connecticut Environmental Policy Act, which usually requires an environmental impact evaluation or an environmental assessment for significant projects.
  - Federally funded projects must follow the requirements of the National Environmental Policy Act, which usually requires an environmental impact statement or an environmental assessment for significant projects.
  - 2 percent of projects usually require the summittal of an environmental impact statement or an environmental impact evaluation, while 3 percent of projects involve an environmental assessment.
  - In FY 96, the Environmental Compliance Division evaluated 285 projects for possible hazardous or contaminated materials, leading to 68 site evaluations and remedial plans for 39 projects.
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## Chapter Four

### ENVIRONMENTAL UNITS

As an initiator, implementor, and overseer of many significant construction projects throughout the state, DOT has a major impact on Connecticut's environment. Notable challenges are evident in transportation planning because inevitably large and small projects will likely touch upon several environmental issues, such as air and water quality, noise and aesthetic concerns, wetlands preservation, historic and archaeological preservation, and fish and wildlife impacts. Negative environmental consequences can occur during the actual construction process and as a result of a completed transportation project. For example, without appropriate monitoring, improper lead paint removal procedures during a bridge rehabilitation project could cause soil and water contamination. Moreover, an improvement project that widens a roadway could raise the amount of airborne pollutants due to increased traffic.

The department, recognizing its potential impact on the environment, assigns two units from separate bureaus to ensure compliance with an array of federal and state environmental laws. The Office of Environmental Planning, within the Bureau of Policy and Planning, is involved with providing various types of environmental assessments of potential and actual transportation projects. The Environmental Compliance Division, attached to the Bureau of Engineering and Operations, is responsible for managing hazardous materials found on a work site. The following discussion provides a brief outline of the activities of these two units.

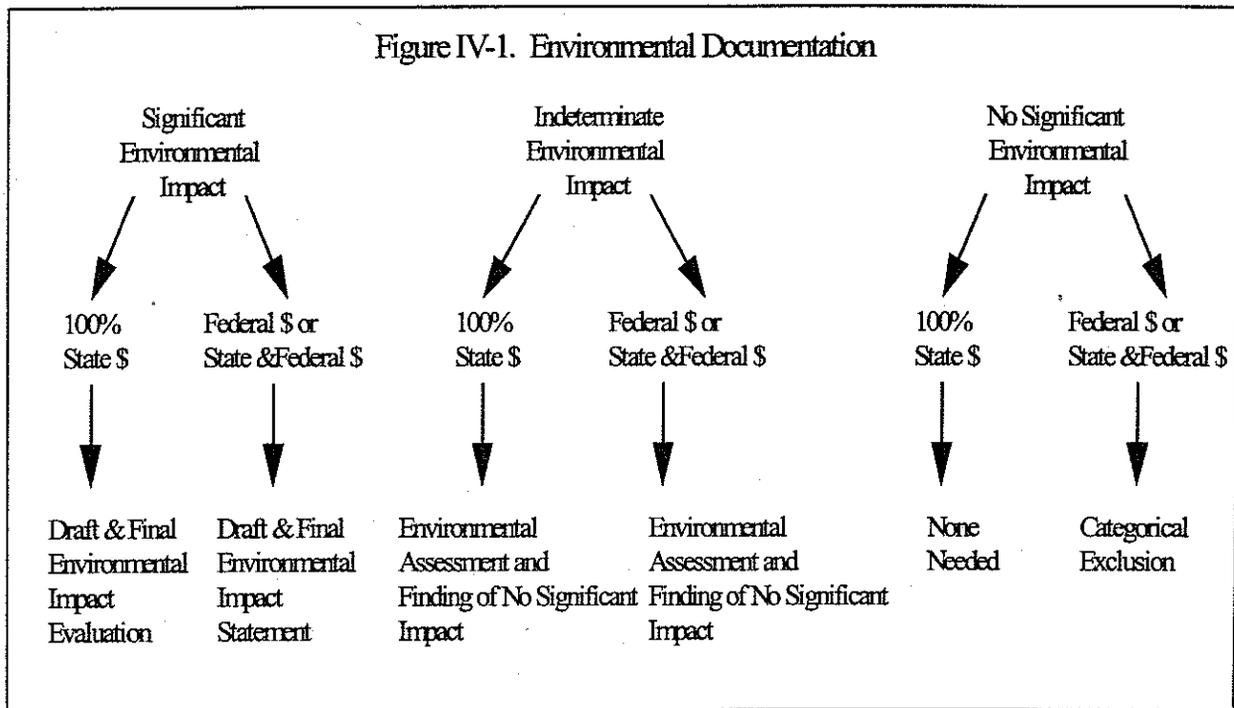
#### **Office of Environmental Planning**

**Organization.** The Office of Environmental Planning is responsible for determining what types of impacts a project may have on the environment, assessing the potential regulatory hurdles a project may present, preparing or overseeing the preparation of documentation pursuant to federal and state laws, and securing various types of construction permits from state and federal regulatory agencies. The unit has 20 employees divided among three sections. They are:

- *Environmental Documentation* - conducts initial reviews of projects and determines what type of environmental evaluation will be necessary to proceed with the project, and prepares environmental documentation as needed;

- *Noise and Air Quality* - prepares documentation for air quality and noise concerns to meet various state and federal regulations; and
- *Water Resources/Construction Surveillance* - secures various permits from the state Department of Environmental Protection and federal agencies, such as the Army Corp of Engineers, independently reviews construction sites for compliance with environmental laws and regulations, and offers expertise to other units involved with environmental issues.

In addition, the unit contracts with nine consulting firms to provide assistance with preparing documentation related to wetlands issues, historic and archeological resources, and other environmental matters.



**Operational requirements.** The environmental planning unit is ultimately responsible for documenting a project's impact on the environment. This documentation is submitted to regulatory agencies for approval. Before this process is delineated, the basic documents will be described.

There are three categories of impact or outcomes a project may have on the environment. The extent of a project's potential impact and its source of funding will determine the type of

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evaluation and documentation required. Figure IV-1 compares the types of impacts to the type of evaluation necessary.

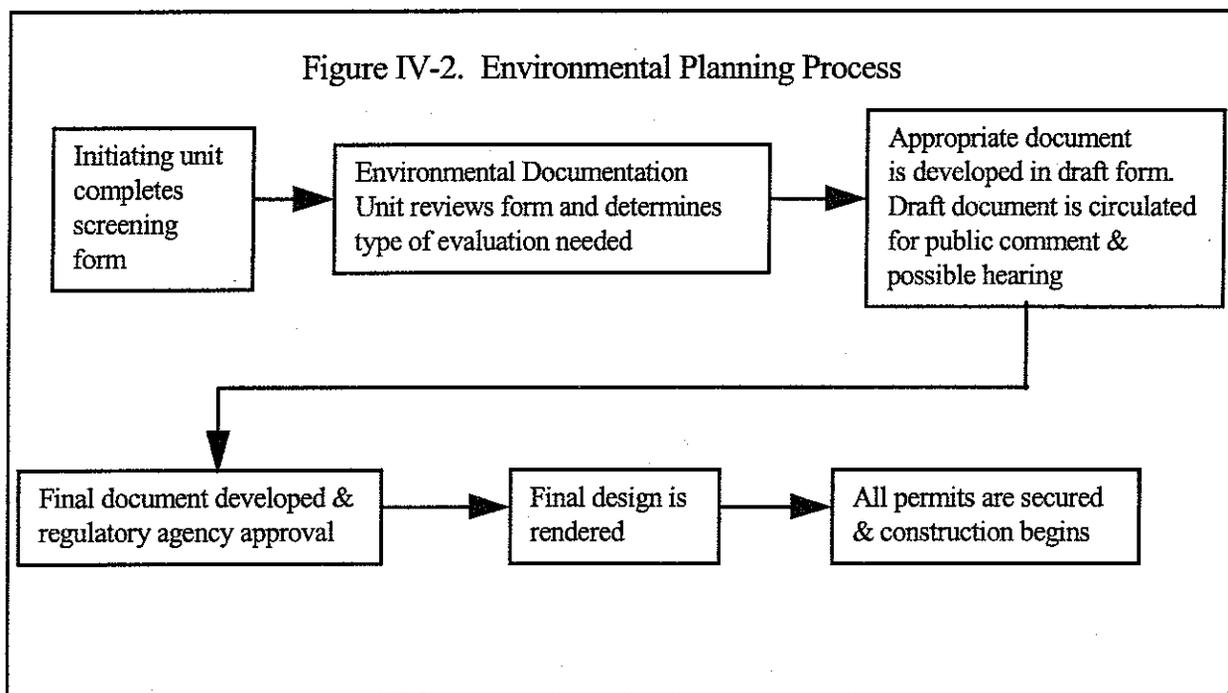
The type of evaluation required, depends on the extent of the project. If a project includes both federal and state funding sources, then federal requirements will be followed and submitted to the state and federal regulatory agencies. Over 95 percent of DOT's projects are federal or federal and state funded.

Projects that include federal funds must adhere to the National Environmental Policy Act of 1969 (NEPA) as amended and associated federal regulations. As the figure illustrates, in order of complexity, either an environmental impact statement, environmental assessment, or documentation of a categorical exclusion will be necessary. The completed documents are sent to the FHWA and other federal agencies, as appropriate, for review and approval. A description of these documents follows.

- *Environmental Impact Statement (EIS)* - Under NEPA, projects that "significantly affect the quality of the human environment" trigger the need for an EIS, the most extensive of evaluations. The impact statement will report the project's effects on noise levels, air and water quality, coastal and inland water quality, potential soil contamination, cultural and historical structures, wildlife, fisheries, and other environmental impacts. Examples of projects that would usually require an EIS include new or relocated roadway on a new alignment; new airport, and new or relocated transit service on a new alignment.
- *Environmental Assessment (EA)* - The EA is also a detailed environmental impact document, though less extensive than the impact statement. An assessment must outline which aspects of the project have potential social, economic, and environmental impacts, identify alternatives and measures that may lessen the impacts, and identify other types of environmental reviews that may need to be performed. Typical projects that may require an EA include minor roadway widening and roadway realignment or reconstruction.
- *Categorical Exclusion (CE)* - A CE includes those projects that do not have significant impacts on planned growth or land use for an area; do not involve the relocation of large numbers of people or significantly impact travel patterns; and do not have a significant impact on any natural (including air and water), cultural, recreational, historic, or other resource. Projects qualifying for a categorical exclusion may include noise barrier installations, landscaping, resurfacing, restoration, bridge rehabilitation, minor road widenings/upgrades, and intersection improvements.

As Figure IV-1 illustrates, if a project is entirely state funded, the Connecticut Environmental Policy Act (CEPA) must be followed. CEPA essentially parallels the national environmental act and is overseen by the Office of Policy and Management (OPM). OPM has the authority to review and approve the content, adequacy, and distribution of required CEPA documents. If the project is determined to have a significant environmental impact, after a preliminary environmental review, an extensive environmental impact evaluation (EIE) must be conducted. Similar to NEPA, if the impact is indeterminate, an environmental assessment (EA) must be conducted, which often leads to a formal finding of no significant impact (FONSI).

The department estimated about 2 percent of its projects have a significant environmental impact resulting in an environmental impact statement or an environmental impact evaluation. Three percent of the projects involve an environmental assessment, while 95 percent present no significant environmental impact. In a typical year, the Office of Environmental Planning unit reviews over 125 projects resulting in approximately five environmental impact statements or assessments.



**Environmental planning process.** The role of this environmental unit in DOT's planning and construction process is presented in Figure IV-2. The operation has been greatly simplified to reveal essentially a six stage process. All projects placed on the recommended project memo list receive an initial environmental screening. The initiating entity within DOT will fill out a

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standardized form that identifies the scope of the project, the potential impacts it may have on the environment (if known), whether rights-of-way will be required, and the sources of funding. The Environmental Documentation Section will determine the type and extent of environmental review that will be required, as described above.

The initiating unit will receive the results of the review from the environmental planning unit. If an impact statement or assessment is required, the initiating unit has three options in completing the documentation. It may request the evaluation be done by personnel within the Office of Environmental Planning, by environmental consultants hired specifically for the project and overseen by environmental planning, or by consultants retained by the highway design unit. The decision on which route to take depends on the complexity of the project, the amount of work the unit has, and the time frame involved. Environmental planning has the final say over the adequacy of any document produced. The evaluations can take anywhere from six months to over a year to complete.

After the appropriate environmental evaluation is completed, it is considered to be in draft form and is made available to the public. The public, interested parties, and federal and state regulatory agencies are given the chance to comment on the document. Public hearings are required for all impact statements and may be held for other smaller projects if there is sufficient interest. The department will also offer the opportunity for public hearings to affected town officials. At this point in the process, only about 30 to 40 percent of the actual design is completed for some projects. There is enough information to determine the extent of environmental impacts, but the final appearance and configuration may not be completed. The project may also offer a choice among several alternatives to the public. Because the design is usually incomplete, there will be another opportunity to comment on any significant project before construction begins.

After considering the public's and other government agencies' comments and making any necessary adjustments, the document will go to the appropriate regulatory agency (usually FHWA or OPM) for concurrence.

The project will then go to DOT's design unit for completion. When the design is nearly completed and depending on the scope of the project, the public is given the opportunity to comment. The final design should represent the most preferred alternative and have acceptable levels of environmental impact.

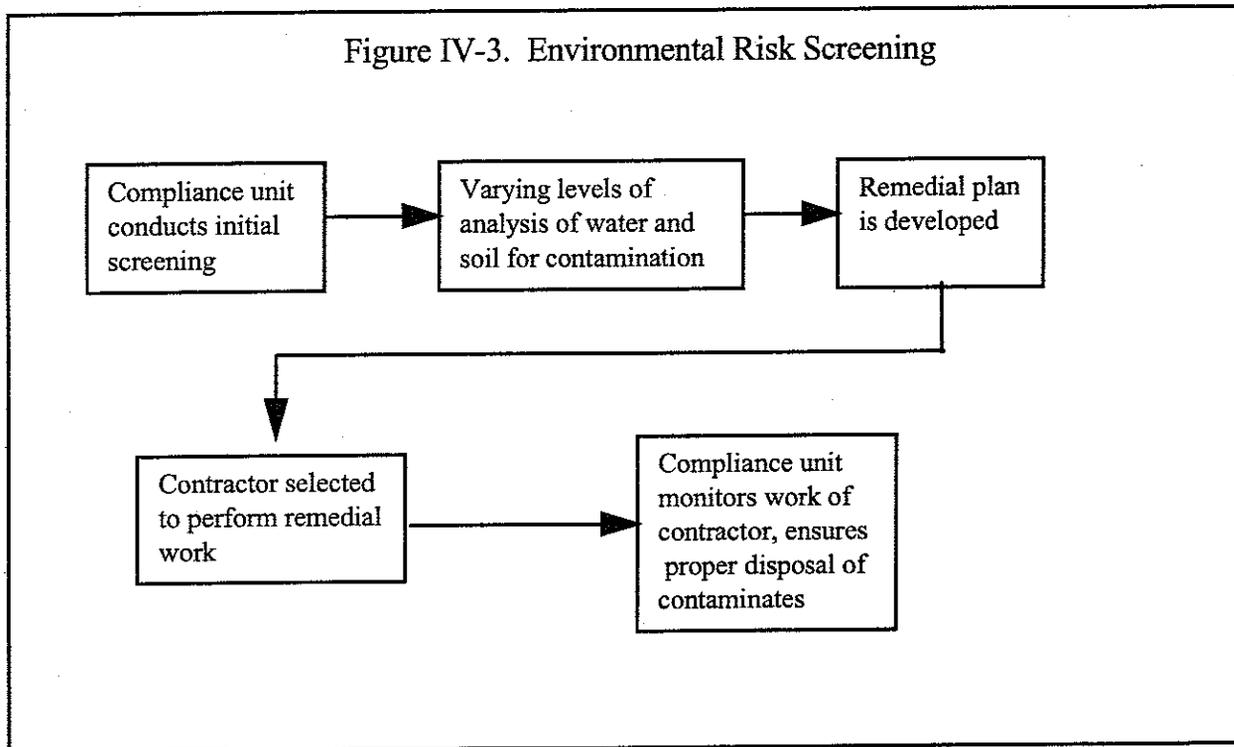
Finally, all permits must be secured by the environmental planning unit or the initiating office before construction begins. Many state and federal agencies can be involved in this process. Most of the permit work, however, involves the Department of Environmental Protection and the Army Corp of Engineers. The DEP, for example, has dozens of different types of permits that could be required. The involvement of wetlands presents particularly difficult hurdles for DOT, so they are avoided as much as possible. In an extreme example offered by the department, one project

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involved 64 square feet of wetland. The improvements cost \$125,000, but the permitting process cost DOT \$200,000.

### Environmental Compliance Division

**Organization.** The Environmental Compliance Division is responsible for managing contaminated and hazardous materials on DOT construction sites and facilities. The techniques employed must comply with a variety of federal and state laws and regulations that govern the handling of contaminated and hazardous materials. The compliance unit is also responsible for responding to emergency situations on the job site when unknown or unexpected contaminants are encountered. The unit contains 14 employees distributed among three subunits: investigative services, regulatory compliance, and remediation services. In addition, the unit oversees six consulting firms, which are involved with all aspects of the work the unit performs.



**Environmental compliance process.** The unit engages in a five step process to ensure the proper identification, handling, and disposal of contaminated or hazardous substances, as illustrated in Figure IV-3. A review is conducted of all projects contained in recommended project memos. All significant projects will require an initial investigation. This investigation usually consists of a site visit to the location of the project for signs of possible inadequate material handling activities

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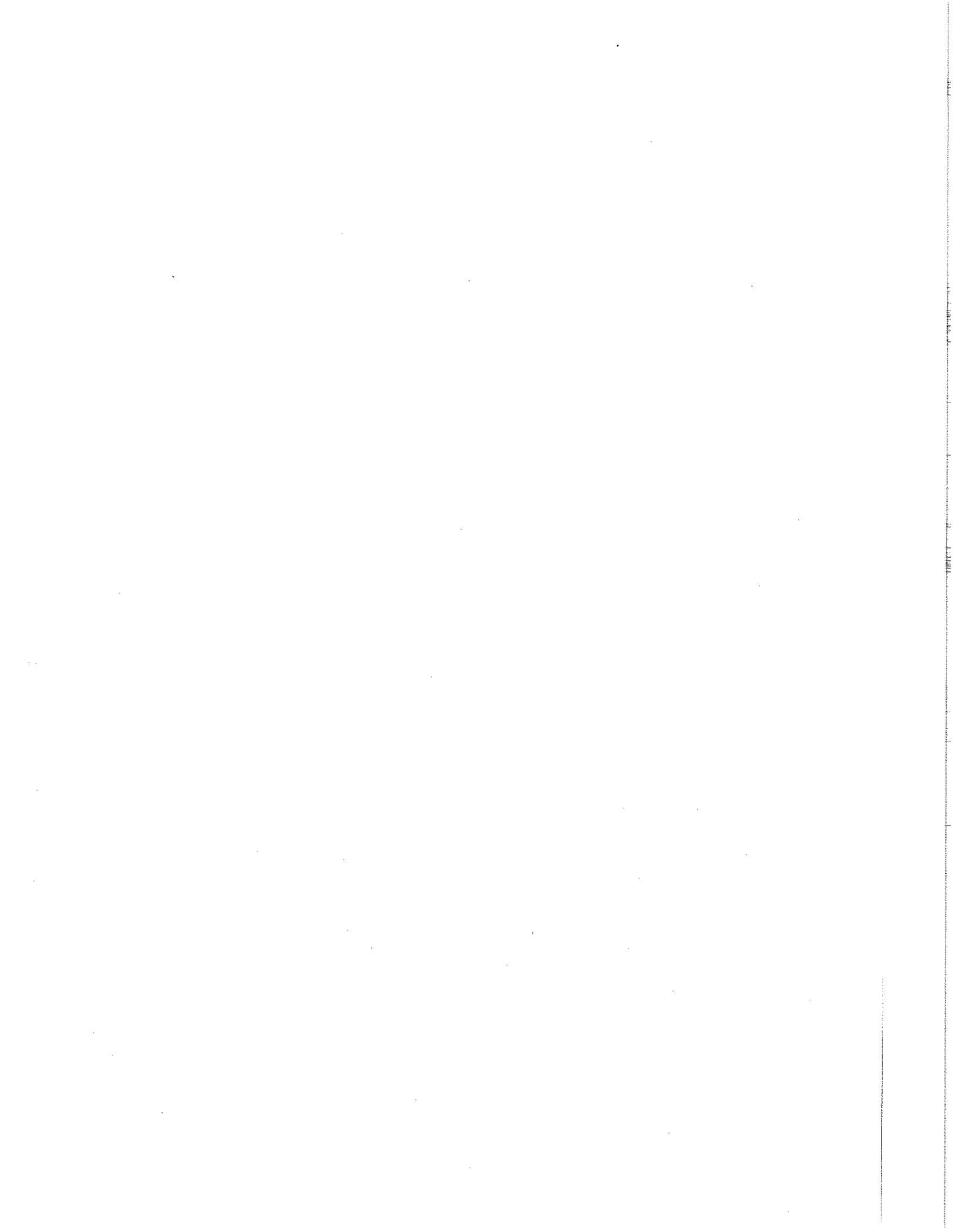
by previous owners and a search through property records for the site in question. The property record search may indicate a type of activity occurred on the property that may pose a potential problem, such as a gas station or a factory.

If the visual inspection or property record search indicates a hazardous or contaminated material may be present, additional tests will be conducted. These tests will involve an analysis of the surface water and soil for contamination. Further analysis may be necessary to assess any groundwater contamination and to ascertain the lateral and vertical limits of the pollution.

After analysis is completed, the type and extent of the contamination should be known. The next step involves the development of a remedial plan. The remedial management plan will identify the materials, describe the transport and disposal requirements, and detail plans for the environmental work to be carried out in support of the project. Work site health and safety issues will also be identified in the plan. The plan will be coordinated with the appropriate regulatory agencies.

Finally, the remedial work will be bid out with the construction contracts, and a contractor will be selected. The compliance unit will monitor the contractor performing the remedial work to ensure it is done properly and check the chain-of-custody of all hazardous materials. DOT is ultimately responsible for the proper disposal of all hazardous and contaminated materials.

During FY 96, the Environmental Compliance Division evaluated 285 projects for possible hazardous or contaminated materials. This led to 68 site evaluations and 91 subsurface soil or groundwater investigations. Remedial plans were developed for 39 (14 percent) projects. The unit also responded to 14 emergency situations throughout the year.

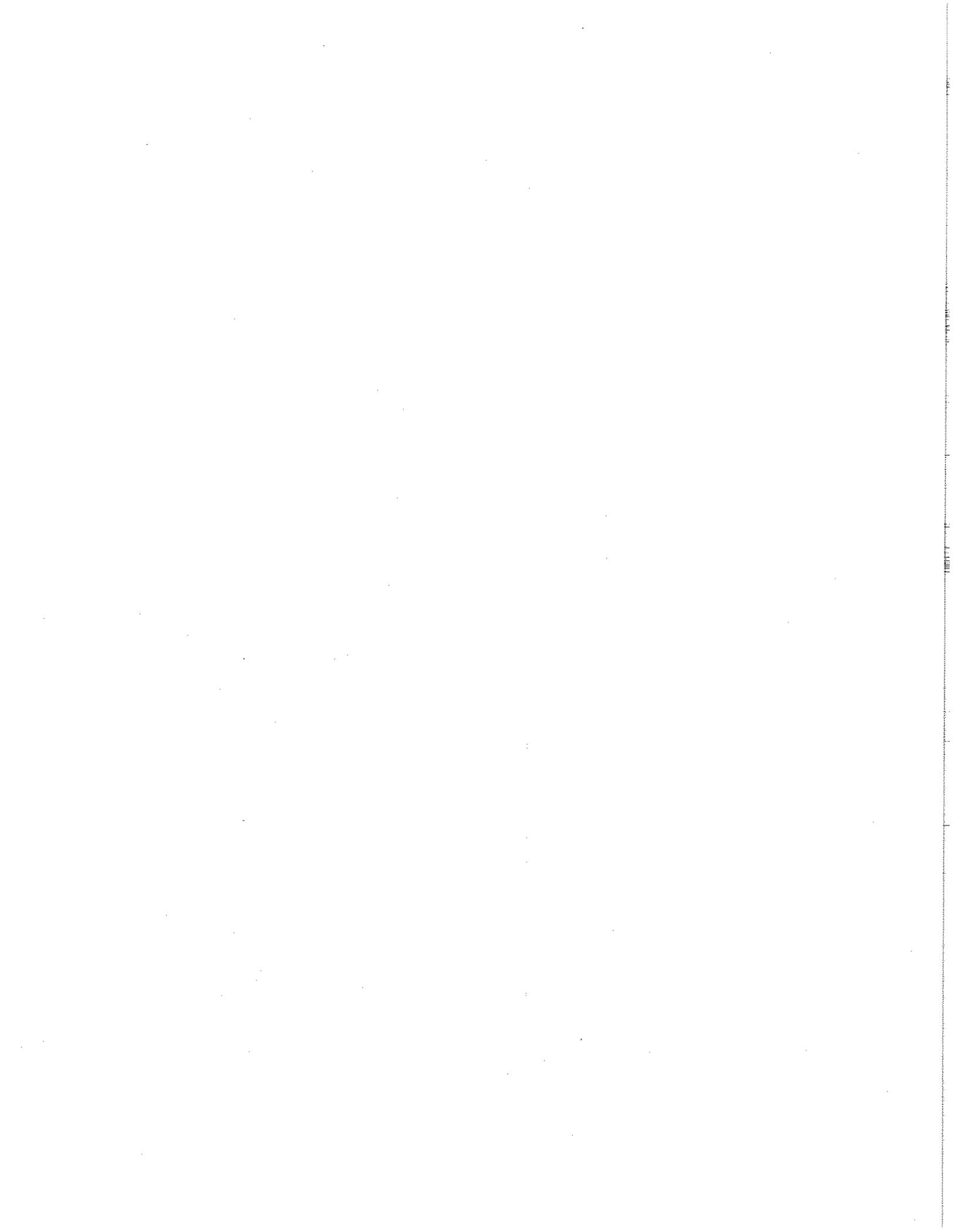


## Key Points

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### *Chapter Five: Products and Specifications*

- DOT's policy is "to provide a fair and systematic evaluation of proprietary materials, products, and methods intended for use in construction projects and maintenance activities."
  - Two DOT standing committees are responsible for carrying out this policy -- Research Liaison Committee (RLC) and Standard Specifications Committee (SSC).
  - In FY 97, the RLC considered requests to approve for use 107 products, approving 25, rejecting 25, continuing 34 for further study, and ordering trail installations for 12.
  - It processes about 20 proposed changes in standards for roads, bridges, and incidental construction per year. Over the past two fiscal years it approved approximately 95 percent of the proposals it received -- 85 percent as proposed and 10 percent with modifications.
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### PRODUCTS AND SPECIFICATIONS

It is the policy of the Department of Transportation to provide a fair and systematic evaluation of proprietary materials, products, and methods intended for use in construction projects and maintenance activities (Policy No. HWYS-2). The responsibility for carrying out this policy falls on two standing committees, the Research Liaison Committee (RLC) and the Standard Specifications Committee (SSC). The research committee focuses primarily on product evaluation, while the standards, as its name implies, deals with proposed changes in the standards for roads, bridges, and incidental construction.

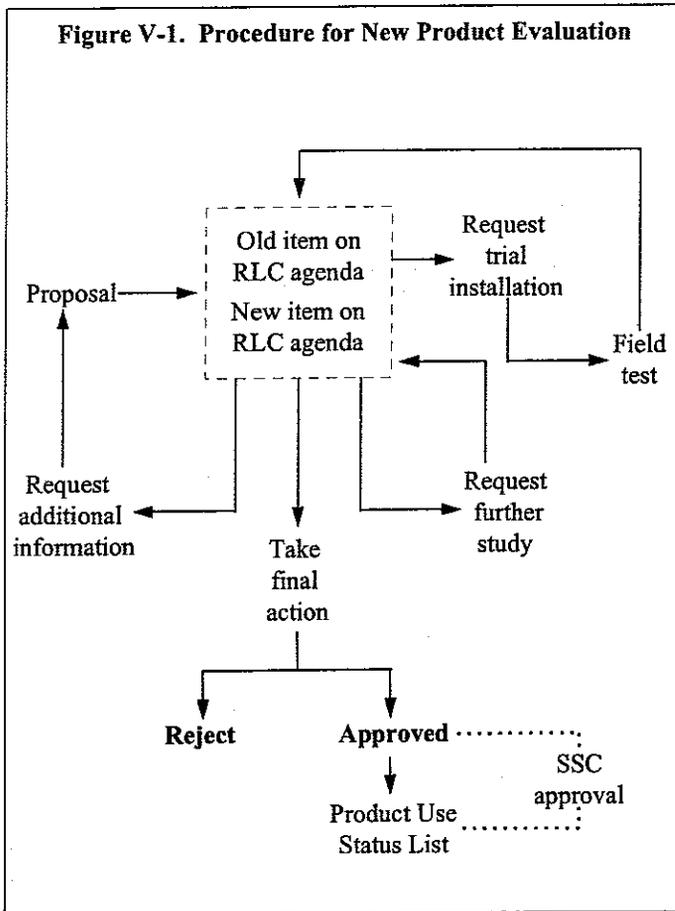
**Research Liaison Committee.** The research committee administers the entire product evaluation process from screening proposals for review to the decision to approve or reject a product for use. It is composed of 10 members representing various units with the Bureau of Engineering and Highway Operations. Personnel from the bureau's research and materials unit provide staff support to the committee. RLC meets every other month and on such occasions as are required to deal with any special issues that may arise.

The basic review process is illustrated in Figure V-1. It typically starts when a vendor requests that DOT approve for use a product, material, or process. Individuals or firms making such a request must provide the following to RLC:

- condition or problem that the proposal would improve;
- data substantiating all claims; and
- a sample for laboratory testing, or if a field test is required, installation at no cost to the state.

This information is distributed to the committee, which has the option of moving for immediate adoption, requiring a trial installation, requesting the vendor supply more information, or rejecting the proposal. In making its decision, RLC may consult results reported by nationally recognized testing organizations and associations particularly the National Transportation Product Evaluation Program of which DOT is a participant.

**Figure V-1. Procedure for New Product Evaluation**



If a trial installation is called for the committee assigns a member the responsibility of overseeing the trial and writing a report. Vendors are notified of RLC's final action. Approved products are added to the Product Use Status List. If changes need to be made in DOT's standard specifications, RLC initiates the process either directly or through a designated unit.

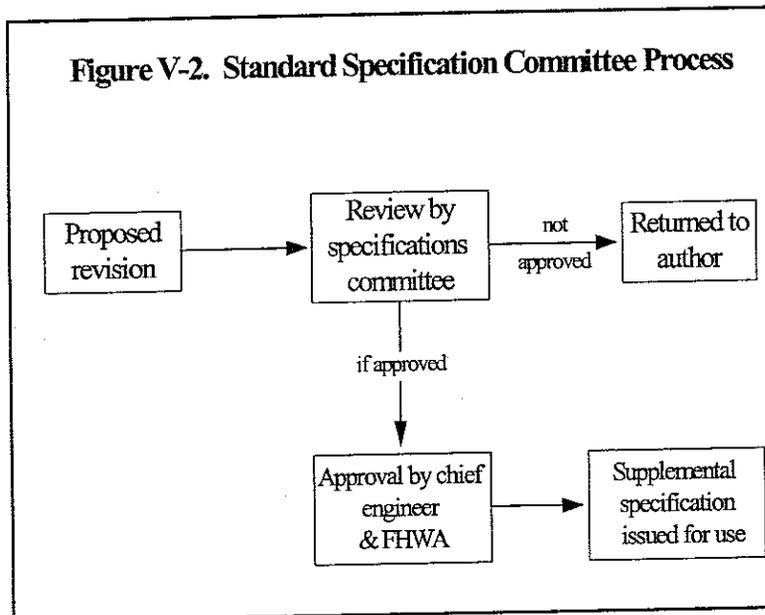
During FY 97, RLC met six times. A review of the minutes of the meetings found a total of 107 product related items appeared on the six agendas. Final action was taken on nearly half the items, with 25 (23 percent) being approved and 25 (23 percent) rejected. In 12 instances (11 percent), the committee requested a trial installation and in 34 cases (32 percent) the decision was to study the item further. The remaining decisions involved such actions as changing the name of an approved product or requesting more information.

**Standard Specifications Committee.** The specifications committee is composed of 17 members drawn from various units within the Bureau of Engineering and Highway Operations. In addition, there are four non-voting members of the committee representing each of the following: the Federal Highway Administration; Connecticut Construction Industry Association (2); and the Office of the State Attorney General.

Essentially, it is SSC's responsibility to review and take action on proposals for changes in the department's standard requirements for the performance of work and the furnishing of materials for roads, bridges and incidental construction. The requirements are contained in the Standard Specifications for Roads, Bridges and Incidental Construction Form 814A/815 dated 1995, which is published by DOT as a standard specification for prospective bidders on transportation projects.

The committee may receive proposals for specification changes from sources internal or external to DOT. External proposals are typically presented to SSC by one of its members. Included in this group are proposals growing out of research undertaken directly or on behalf of organizations such as the Federal Highway Administration or the American Association of Highway and

Transportation Officials. Internal proposals may result from research conducted by DOT in response to problems experienced in the field. If the remedy requires a change in existing specifications a proposal is forwarded to SSC. The process followed by the specifications committee in dealing with proposed changes is outlined in Figure V-2.



The committee met twice in each of the last two years. It processed an average of 20 proposals per year, with 95 percent being approved -- 85 percent as proposed and 10 percent with modifications. Changes approved by the committee are reviewed by the department's chief engineer and if approved, forwarded to the Federal Highway Administration for its review before becoming an official requirement of the DOT.

**Compliance.** DOT has an intensive compliance effort to insure the material specifications of

their construction and maintenance projects are met. The Division of Materials Testing, which has 54 authorized positions, performs or oversees the testing of concrete, steel, asphalt, chemicals and essentially all materials or products used by DOT. Many of the tests are performed on samples prior to their use. For example, a sample from a particular lot of paint, sand, or asphalt is tested, and if approved can be use by contractors on DOT projects. In other instances, tests may be performed after a product has been used. In these cases if deficiencies are found, the department may order the material be replaced, or it may seek a monetary remedy from the contractor or supplier.



# Key Points

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## *Chapter Six: Findings and Recommendations*

### **Pavement Management**

- The overall condition of pavement under DOT's management has improved since the inception of the state's transportation infrastructure program.
- DOT could do a better job in targeting its paving resources (25 percent of a sample of pavement identified as in need surface treatment in 1993, was not resurfaced within the following three years, while 20 percent of the pavement identified as good or better was resurfaced).

### **Roadway Congestion**

- Congestion in Connecticut has worsened over the last several years and is projected to continue worsening.

### **Bridge Analysis**

- The condition of state bridges has improved to a considerable degree and these conditions are relatively stable.
- Bridge conditions were generally declining faster than they could be repaired or maintained in the early years of the rehabilitation program, however, dramatic improvement in their condition occurred in the last few years.

### **Comparative Performance**

- Connecticut dedicates considerable resources to transportation purposes and is among the best in bridge conditions and overall safety, but interstate road conditions and urban congestion are among the worst in the country.

### **Infrastructure Renewal Financing**

- Debt service has exceeded the amount of new investment by the state in the capital program since 1993 and this trend will continue for foreseeable future.
  - Connecticut's reliance on debt to finance road and bridge improvements has outpaced the region and the nation.
  - In some instances, Connecticut borrows money for improvements that have a pay-back period longer than the useful service life of the improvement.
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# Key Points

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## **Environmental Planning, Permitting, and Enforcement**

- Public and private developers are subject to environmental oversight, though the scope and authority of that oversight differs depending on the type of property, location, and environmental impact.
- Relative to the number of complaints, DOT has had relatively few inland wetland violations issued against it recently.
- DOT has engaged in corrective actions in about one-third of the instances where complaints have been filed with DEP.
- DOT's environmental violations cannot be accurately determined due to inadequate enforcement activities at DEP.
- In early 1997, three DOT facilities were cited for violations of certain federal and state environmental laws and regulations. However, DOT claims it was not aware of the violations prior to EPA's enforcement action until the fall of 1997.

## **Products and Specifications**

- There is no evidence of bias or arbitrary decision-making related to specific product types or vendors in the records of the two Department of Transportation committees responsible for reviewing new products and specifications.

## **Mandated Reports**

- DOT is in compliance with report submission deadlines and content requirements specified in the state statutes.
- The reports produced by DOT do not provide a means whereby the department's performance outcomes can be readily measured over any specified time period.

## **Compliance with 1995 Program Review Committee Study**

- DOT is in substantial compliance with five of the seven administrative recommendations made by the committee in the 1995 contract management study.
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### Findings and Recommendations

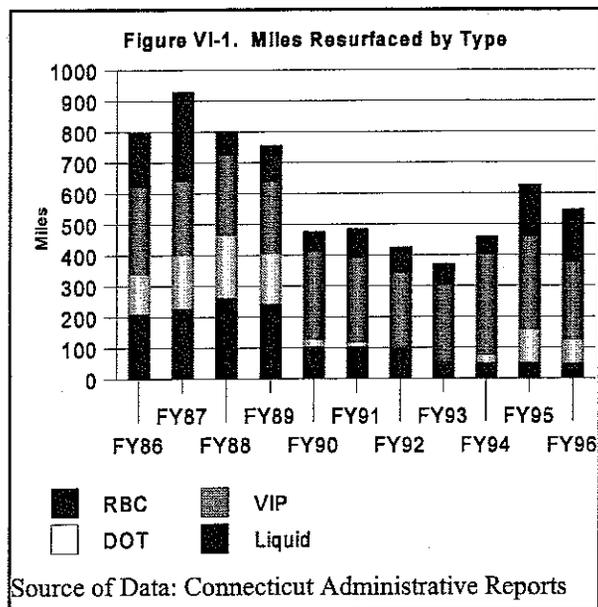
This chapter is divided into nine sections. Sections one, two, and three present an analysis on the condition of the roads and bridges as well as congestion management throughout the state over the last 12 years. Section four provides the results of a comparative analysis between Connecticut, neighboring states, and the nation with regard to the resources devoted to roads and bridges and the outcomes derived. Section five discusses capital versus maintenance expenditures as well as issues surrounding the financing of infrastructure projects. Sections six and seven address specific concerns raised by the committee on DOT's environmental compliance record and materials review process. Finally, sections eight and nine present the results of the committee's assessment of DOT's statutorily mandated reports and the department's compliance with the 1995 program review study of contract management.

#### **Pavement Management.**

At the beginning of DOT's infrastructure renewal program, the department's goal was to resurface 500 miles of roads per year. In 1993, the resurfacing goal was revised downward to 438 miles. The DOT's 1993 Master Transportation Plan infers that this change was related to a revised mission statement and new strategic plan. Figure VI-1 compares the department's performance with its goals from FY 86 through FY 96. It shows DOT either exceeded or matched the stated goal in every year except FY 92 and FY 93.

Figure VI-1 also shows the relative contribution to the overall resurfacing mileage attributable to four treatment programs: the resurfacing-by-contract; vander-in-place; liquid overlay; and DOT's own maintenance crews -- which typically use a thin asphalt overlay. The graph indicates the annual mileage related to the liquid treatment and DOT programs varies much more than the mileage under the VIP -- which is remarkably consistent -- and the RBC programs.

Figure VI-1 shows that in the years DOT substantially exceeded its resurfacing goal - FY 86 through FY 89 - nearly half of the mileage was

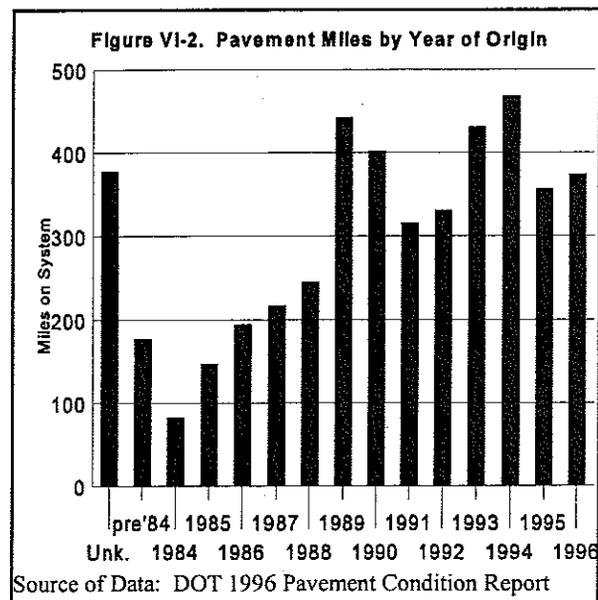


accounted for by applying a liquid overlay (28.7 percent) and DOT maintenance crews (20.4 percent). The advantage of these two methods is their low initial cost compared to the VIP or RBC programs. The drawback is that the liquid treatment and thin overlay typically applied by DOT crews have life cycles estimated at three and eight years respectively, compared to a 14 year life expectancy for the structural overlays typically applied under VIP and RBC programs.

The drop in the annual road resurfacing mileage that begins in FY 90 corresponds to a decline in the liquid treatment program and the near total disappearance of DOT's direct involvement.

The trend for the liquid treatment program has been negative since FY 89 and probably will not be reversed as primary use for this resurfacing method is on low volume roads, which are disappearing from the system. On the other hand, the resurfacing performed by DOT has shown signs of recovery in the last two fiscal years.

Figure VI-2 shows the year of origin of the existing surface pavement on the state's road network at the start of 1997. The graph shows that at least two-thirds of the state's road surfaces were eight years old or less. This percentage might be even higher if the year of origin of 8 percent of the total road surfaces were known.



**Road quality.** There are two sources of road quality measures. One is the pavement serviceability rating system, which is a subjective assessment of the state's road network. It involves DOT personnel assigning to each segment a rating between 1 (unacceptable) and 9 (excellent). Under this system, segments rated below six are viewed as needing either resurfacing or complete reconstruction.

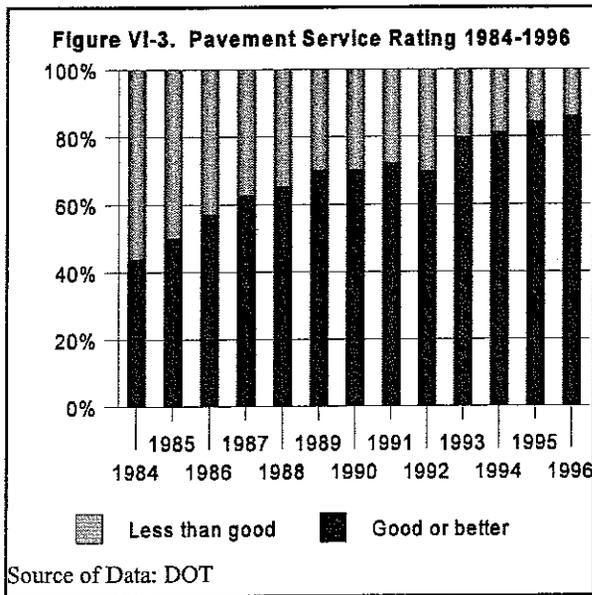
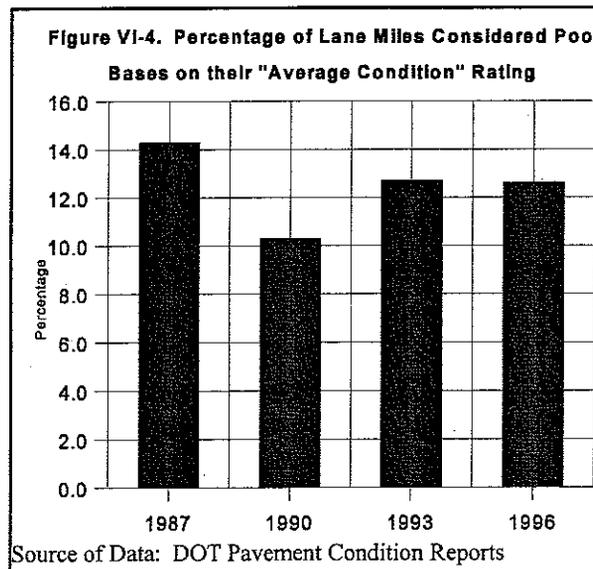


Figure VI-3 illustrates the portion of the roads on the state's network rated as "less than good" and "good or better" based on PSR data. The graph shows a steady improvement in the quality of the state's roads as determined by the PSR data.

The second pavement evaluation method employed by DOT uses quantitative data collected mechanically by a specially equipped van as it is driven over a roadway. The data obtained from this method yield several measures, but the key element for pavement management purposes is the "average condition", which is a

combination of the segment's recorded roughness and its distress rating.<sup>1</sup>

The picture is not as clear when the "average condition" data are used. Figure VI-4 shows the percentage of lane miles rated much poorer (one or more standard deviations below the mean) than the average for all the lane miles rated (mean of the "average condition") at three year intervals beginning in 1987. The trend depicted in Figure VI-4 is in the same direction as that based on the PSR data.



<sup>1</sup> The scale used to measure the "average condition" varies from year to year, therefore, a standard rating cannot be established that identifies a road segment as excellent, good, fair, or poor. As a result, the meaning attached to the "average condition" rating of a specific road segment is based on the relationship between the segment's rating and the average for all the segments rated in a given year.

This problem was dealt with by calculating separately for each year a standard deviation for the "average condition" ratings (a measure of the variation of all "average condition" ratings from the mean of all the ratings) and subtracting it from the mean for the corresponding year to yield a cut-off score. While the number of road segments below the cut-off represents approximately 16 percent of the segments in each year, the lane miles accounted for by the segments varied for 10 to 14 percent of the total lanes on the state's road network.

**Analysis of pavement activities.** The committee's review of DOT's adherence to the system for identifying pavement problems made extensive use of a sample of the state's roadway system. The sample consisted of 93 road segments ranging in length from two tenths of a mile to slightly more than eight miles. The segments were drawn at random from the 2,202 road segments identified in DOT's 1996 Pavement Condition Report. The sample totaled 232 lane miles or about 5 percent of the lane miles included in the 1996 report. Data were obtained for three year intervals starting in 1987 from the pavement condition reports produced annually by DOT. Among the data elements included in the sample were the location, length, average daily traffic, pavement type, surface treatment used, year the treatment was completed, pavement service rating, and average condition.<sup>2</sup>

The initial analysis of DOT's pavement management activities focused on the Pavement Serviceability Rating System. Each road segment in the sample was assigned to one of four categories based on its 1993 PSR. This was followed by an examination of the database to determine what, if any, surface treatment was performed on the road segments in each category by DOT between 1993 and 1996. The results are shown in Table VI-1.

Table VI-1. Relationship between PSR and DOT's Paving Activities					
PSR Rating	Lane miles in sample*	Lane miles treated	Percent of class treated	Miles by treatment method	
				VIP**	RBC***
< 4 (poor)	2.6	2.6	100%	2.6	
4 to 5.9 (fair)	63.4	45.5	72%	30.6	14.9
6 to 7.9 (good)	102.2	21.3	21%	11.4	9.9
> 7.9 (excellent)	46.7	5.4	11%		5.4

\*includes only lane miles that had a 1993 PSR \*\*Vendor in Place \*\*\*Resurface by Contract  
Source of Data: DOT

The data revealed that about 72 percent of the pavement miles with a PSR below 6.0 -- less than good -- received some form of surface treatment. At the same time, 18 percent of the pavement miles with a PSR of 6.0 or above -- good or better -- were given a surface treatment.

Next, the committee examined DOT's pavement management activities using the "average condition" rating obtained from the department's pavement condition reports. This analysis

<sup>2</sup> Slight variations in mileage occur among the four years from which the data were collected due to minor differences in the starting and ending points of the sampled road segments. This problem was minimized by eliminating from the sample any road segment whose measured length changed significantly over the sampled years.

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involved examining the relationship between each road segment's 1993 "average condition" rating and subsequent surface treatments. Due to missing data, only 66 of the sample's road segments and 156 lane miles could be examined. In conducting the analysis, the committee considered pavement to be in need of treatment if its "average condition" was 6.1 or less.<sup>3</sup> This resulted in 21 of the sample's 156 lane miles being deemed in need of surface treatment. A review of the database found approximately 75 percent of the 21 miles had been resurfaced by the time the 1996 pavement condition report was issued. The review also showed slightly more than 20 percent of the pavement above the 6.1 cut-off point had been resurfaced within the same period.

Using either data set, it appears DOT has failed to improve a significant amount of poor pavement, while at the same time resurfacing a substantial amount of good pavement. In the committee's view, the failure to treat approximately 25 percent of the pavement rated at the bottom of either the PSR or the "average condition" scale, while treating about 20 percent of the pavement with a higher rating raises questions about how DOT targets its resources.

A plausible explanation for not treating some of the pavement rated as less than good would be DOT's knowledge that a poorly rated road segment was going to be completely reconstructed within a few years. However, the committee doubts this reason could account for all of the approximately 25 percent of the poor rated pavement not being improved. Similarly, some of the resurfacing of pavement rated good or better can be attributed to factors such as road realignments, safety improvements, or the extension of a resurfacing project from an adjacent road segment with a low pavement rating. Again, the committee doubts that all the resurfacing of pavement rated good or better could be explained by such factors.

**Time between surface treatments.** Another aspect of DOT's pavement management examined by the committee involved the length of time between surface treatments. A review of the data showed 94 percent of the lane miles in the sample received some form of surface treatment between 1984 and 1996. The data revealed slightly more than 25 percent of the sample lane miles were treated at least twice since the beginning of the infrastructure renewal program. The time between treatments ranged from two to 11 years. This raises some concerns given the average life span of resurfacing materials other than liquid overlay generally is put at 14 years.

**State comparisons.** The committee also reviewed the condition of Connecticut's pavement relative to that of other states in the region. Data used in the comparisons were obtained from the Federal Highway Administration (FHWA). As a result of the limited data available from FHWA, the "international roughness index" (IRI) had to be substituted for the "average condition" measure. It will be recalled that the IRI is a component of Connecticut's "average condition" rating. It should

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<sup>3</sup> The standard deviation calculated for the sample was 1.4, which when subtracted from the sample mean of 7.5 yielded a cut-off score of 6.1. The number of road segments below this rating represents approximately 16 percent of the segments in the sample and 13.4 percent of the sample's total lane miles.

be noted that 1994 IRI data had to be used because only estimates for 1995 were available for Connecticut.<sup>4</sup>

The states were compared on the percentage of urban and rural roads rated poor under the PSR and IRI methods. Table VI-2 summarizes the results. There are many caveats that must be considered in making cross-state comparisons that reduce their policy-making value (e.g., policy goals, traffic volumes, data quality, etc.). However, when such comparisons are limited to similar states, they do provide a rough indicator of how a state is performing within a broader context.

The data show Connecticut has a mixed record in comparison to other states in the region. Using the subjective PSR scale, Connecticut ranks in the top half of the eight states in the region on the quality of its rural roads (4th) and urban expressways (3rd). However, when the objective IRI rating scale is used, Connecticut is ranked fifth in rural roads and seventh on urban highways.

Table VI-2. Percentage of Pavement Rated Poor in Eight Northeastern States				
State	% of rural mileage with a PSR of poor*	% of urban mileage with a PSR of poor*	% of rural mileage with an IRI rating of poor**	% of urban mileage with an IRI rating of poor**
Connecticut	3.0%	3.0%	11.5%	23.0%
Maine	0.0%	0.3%	4.1%	3.0%
Massachusetts	11.9%	6.1%	9.0%	2.3%
New Hampshire	0.8%	14.5%	3.1%	0.0%
New Jersey	3.1%	5.8%	19.7%	13.1%
New York	0.0%	0.1%	16.8%	27.6%
Rhode Island	9.8%	6.1%	35.6%	12.0%
Vermont	20.6%	37.1%	10.0%	1.7%

Source of Data: Rural and urban PSR data from FHWA 1995 Highway Statistics; rural and urban IRI data from FHWA 1994 Highway

<sup>4</sup> In a meeting with committee staff after the findings and recommendations had been presented to the program review committee, officials from the Department of Transportation objected to the inclusion of data comparing Connecticut to other states in the committee's final report. It is DOT's position that variations among states in terms of climate, costs, geology, and other relevant factors such as policy goals preclude any meaningful comparisons among states.

However, due to recent media focus on state comparisons the committee believes it has a responsibility to examine how Connecticut fares among other states and to discuss the findings. Committee staff are confident that properly informed policy makers will not be misled by the data and can use it appropriately. To minimize problems associated with state comparisons many of the limitations are noted within the text of the report.

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Based on the data presented above, the program review committee finds:

- *the overall condition of pavement under DOT's management has improved since the inception of the state's transportation infrastructure program;*
- *DOT could do a better job in targeting its paving resources (in a sample of road segments, 25 percent of the pavement identified as in need of some form of surface treatment in 1993, was not resurfaced within the following three years, while about 20 percent of the pavement identified as good or better was resurfaced);*
- *DOT is resurfacing a significant percentage of the state's roads within a time span that is shorter than the generally expected pavement life span of 14 years (approximately 25 percent of the pavement in a sample of state road segments has been treated twice between 1984 and 1996); and*
- *despite the improvement in the condition of Connecticut's roads, the state does not fare well when compared to neighboring states.*

These findings strongly suggest that DOT's pavement management activities, particularly the ability to target its resources could be improved. This would be of critical importance, if the resources at DOT's disposal were to become more limited than they are at present. To move DOT in that direction and to enhance the tools available to hold the department accountable, the program review committee recommends:

**The Department of Transportation should change its pavement management goal from annually resurfacing a set number of lane miles (438) to keeping the amount of lane miles rated as less than good below 10 percent.**

**The Department of Transportation should adopt as performance indicators and make available through its web site:**

- **percentage of lane miles rated less than good under the Pavement Serviceability Rating System and DOT's quantitative system;**
- **average age in months of the surface of all road segments prior to their being resurfaced or reconstructed; and**

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- **Connecticut's ranking compared to other northeastern states on the percentage of lane miles rated less than good on the Pavement Serviceability Rating and International Roughness Index scales.**

## Roadway Congestion

Recent measurements have shown congestion in Connecticut has increased, and it is projected to worsen into the next century. Several demographic trends including increases in state population, the number of households, and the number of vehicles per household over the last 30 years have contributed to a growth in the amount of traffic on Connecticut's highways. In addition, employment and population shifts from urban centers to suburban regions have affected the volume of traffic as commuters engage in longer trips to work.

In 1988, DOT systematically measured arterial capacity flows, and in May 1994, updated the 1988 report to include expressways and all state numbered routes maintained by the state. In 1996, the department began issuing an annual report on congestion throughout the state, using a congestion management system.

Capacity, according to DOT, is the maximum hourly rate at which vehicles can reasonably expect to pass a uniform segment of roadway during a specified time period under prevailing roadway, traffic, and control conditions. State roads are divided into segments based on average daily traffic, lane widths, and number of lanes. Road segments are assigned peak hour traffic capacities based on roadway characteristics. The actual hourly traffic volume of a road segment is compared to its capacity to develop a ratio. Any segment with a volume to capacity ratio of 1.0 or more is considered *over capacity*. Any segment within 10 percent of capacity (or a ratio of .90 to .99) is considered *approaching capacity*.

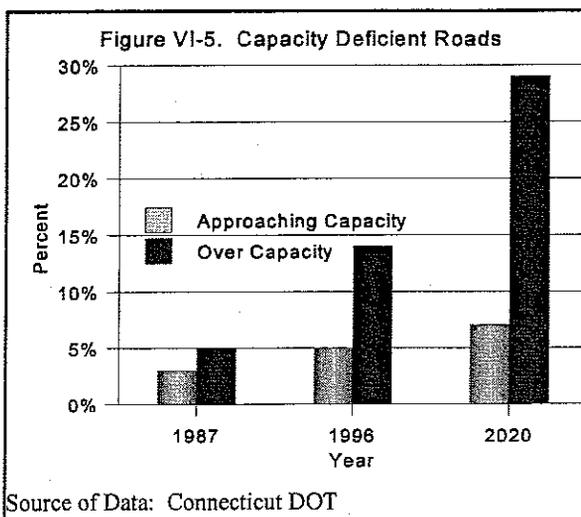
Figure VI-5 shows the actual capacity status of Connecticut arterial roadways for 1987 and for state roads and expressways in 1996. Forecasts by DOT of population, employment, land use, traffic volumes, and transportation projects have been used to develop a projection for the year 2020.

In 1987, 5 percent of state numbered routes were over capacity, while 3 percent were approaching capacity. By 2020, the expectation is that 29 percent of roadways will exceed capacity, and 7 percent will be approaching capacity.<sup>5</sup>

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<sup>5</sup> Expressway data were not included in DOT's 1987 congestion report, but are part of the 1996 report and the 2020 forecast. Concern over the comparability of the years based on this factor was reduced after committee staff found the proportion of expressways approaching and over capacity in 1996 was basically the same as that found for other state roads.

Table VI-3 shows a comparison of the amount of congestion between Connecticut and neighboring states, based on information submitted by the states to the FHWA. This measure is slightly different from what is presented above. Instead of using the terms approaching capacity and over capacity, congestion is defined as the percentage of roadway mileage where the traffic volume to estimated capacity ratio exceeds 0.70. Connecticut is higher than its boarded states and second only to New Jersey in the amount of congestion on its highways in the region.



State	Percent Congested	Rank	State	Percent Congested	Rank
Connecticut	13.42%	2	New Jersey	21.4%	1
Maine	4.55%	7	New York	8.56%	6
Massachusetts	13.38%	3	Rhode Island	9.91%	4
New Hampshire	9.69%	5	Vermont	2.92%	8
Regional Mean	11.0%		National Mean	5.6%	

Source: FHWA, *Highway Statistics*, Table HM 61, 1995

Based on the information presented above, program review committee makes the following findings and recommendation:

- *Congestion in Connecticut has worsened over the last several years and is projected to continue worsening; and*
- *Connecticut has one of the worst roadway congestion problems in the region.*

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**When conducting a major transportation corridor study involving congestion issues, the Connecticut Department of Transportation shall explore and present a variety of supply (e.g., commuter lanes, bus, rail, etc.) and demand management (e.g., staggered work hours, parking fees, etc.) alternatives to the public and policy makers.**

## **Bridge Conditions**

The State Bridge Program has received \$2.2 billion (24 percent) of the \$9.4 billion in capital funding since 1984, which represents the most money for any single program. When the state program is combined with the Local Bridge Program and the Orphan Bridge Program, the total spent on rehabilitating and repairing bridges throughout the state rises to \$3.2 billion. This section provides an overview of how bridge conditions have changed since the beginning of the infrastructure renewal program based on DOT provided data. The results of an analysis of sample data used to verify DOT information on bridge conditions and the bridge project selection process is also presented. Finally, a comparison of Connecticut's bridge conditions to that of neighboring states is provided.

As discussed in Chapter Three, bridges are rated by two measures: structural condition and functional capacity. Structural evaluations of bridges relate to the condition of a bridge's principal components (deck, superstructure, or substructure) as well as its load carrying capacity and waterway adequacy. The structural evaluation results in a numerical rating from zero (failed condition) to nine (excellent condition) being assigned to each part of a bridge. These ratings are converted to one of four descriptive categories - excellent, good, fair, or poor. The lowest rating among a bridge's main components becomes its overall structural rating. Thus, if any one of a bridge's components is rated in poor condition the entire bridge is classified as structurally deficient.

Functional capacity relates to the bridge's geometry and traffic capacity, roadway alignment, load carrying capacity, and waterway adequacy. Evaluations of these items also results in a numerical rating from zero (failed condition) to nine (excellent condition). The functional evaluations are not converted to descriptive categories, however a numerical rating of three or less for any of the above items will result in a functionally obsolete rating overall. In addition, if load carrying capacity and waterway adequacy deficiencies are sufficiently severe (i.e., below a three), a bridge is deemed structurally deficient. It should also be noted that any bridge classified as structurally deficient is excluded from the functionally obsolete category.

**Overall analysis.** Due to the difficulties DOT had in obtaining and providing complete data, only three-quarters of all bridges could be incorporated into the following analysis. Bridges omitted include those less than 20 feet long, railroad bridges, pedestrian bridges, bridges owned by the Department of Environmental Protection, tunnels, and plazas over roadways. In addition, the

absence of good data on the functional capacity of bridges in 1986, 1988, and 1989 resulted in those entire years being omitted from a portion of the this analysis.

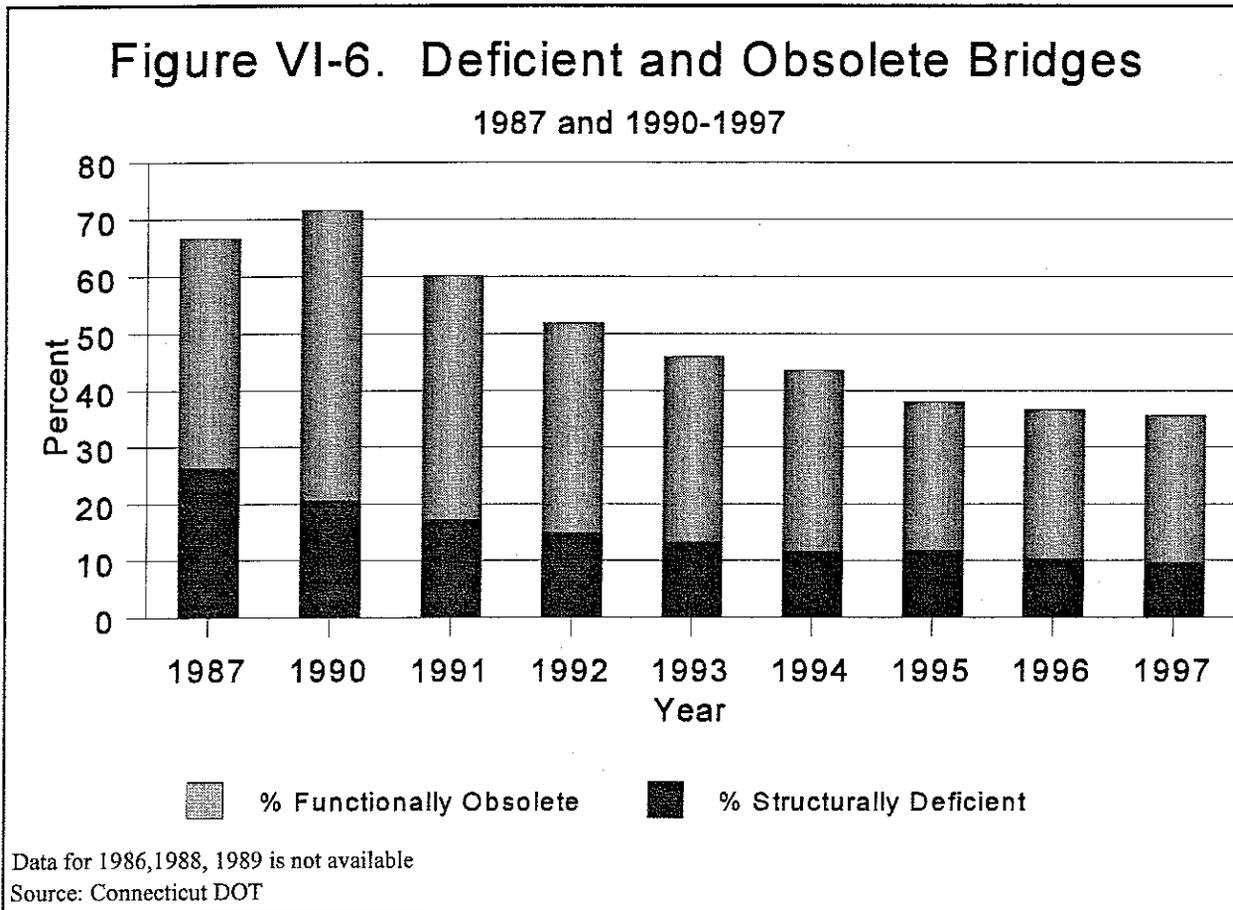
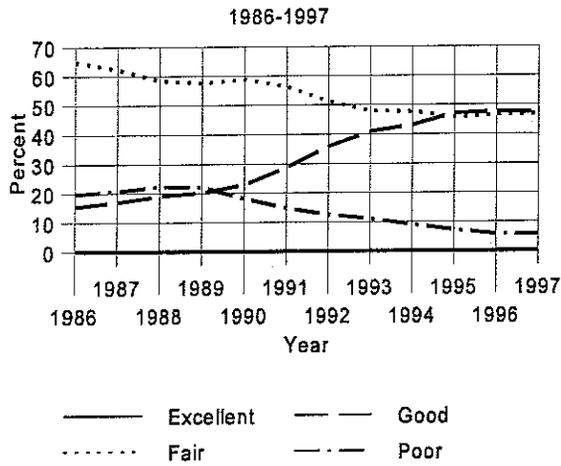


Figure VI-6 shows the percentage of structurally deficient and functionally obsolete state and local bridges for 1987 and 1990 through 1997. Overall, the total percentage of structurally deficient and functionally obsolete bridges has declined from 67 percent to 36 percent since 1987. In 1987, approximately 25 percent of the bridges were structurally deficient, but by 1997 only about 10 percent were deficient. Similarly, the number of obsolete bridges has dropped from 40 percent in 1987 to 26 percent in 1997.

Of the two types of bridge measurements, structural deficiencies receive the most attention and emphasis because this measure relates directly to the integrity of a bridge's components. Not surprisingly, the focus of the state bridge program has been to improve the bridges in fair and poor condition. It appears this strategy has been successful. Figure VI-7 shows the structural ratings for

**Figure VI-7. State Bridge Ratings**



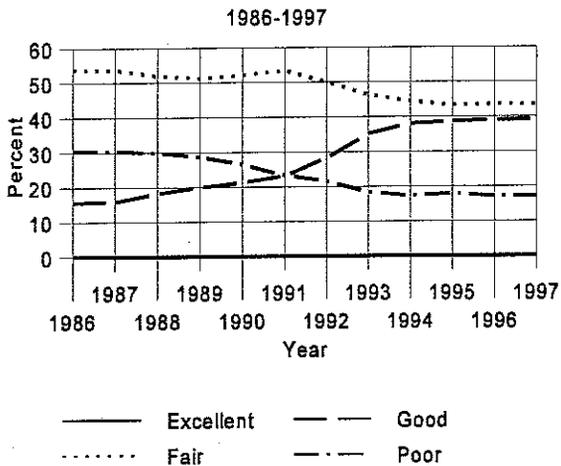
Source: Connecticut DOT

state bridges for 1986 through 1997. Of the bridges DOT is responsible for, 85 percent were in poor or fair condition in 1986; by 1997, those categories fell to 53 percent. Specifically, the percent of poor bridges declined from 20 percent in 1986 to 6 percent in 1997, while fair bridges declined from 65 percent to 47 percent over the same time period. Good bridges increased from 15 percent in 1986 to 47 percent in 1997. As Figure VI-7 shows, the number of bridges rated excellent is insignificant over all time periods.

The structural ratings of local bridges also showed improvement between 1986 and 1997. Figure VI-8 shows that the percent of poor bridges declined during that time period

from 31 percent to 17 percent, while the number of fair bridges declined from 54 percent to 44 percent. The number of good bridges increased from 16 percent to 39 percent.

**Figure VI-8. Local Bridge Ratings**



Source: Connecticut DOT

Another indicator of the condition of Connecticut's bridges is the number of load posted bridges. Bridges may become "posted for load" after an inspection reveals serious structural deficiencies. These bridges restrict the type of traffic that may travel over them because they have deteriorated to the point where they can no longer carry the weight which they were intended. It should be noted that while these bridges are not performing as designed, they are still considered safe for travel within the posted weight limits. Figure VI-9 shows the number of local and state load posted bridges for three time periods. The figure shows the number of state and local weight restricted bridges has declined, but the state

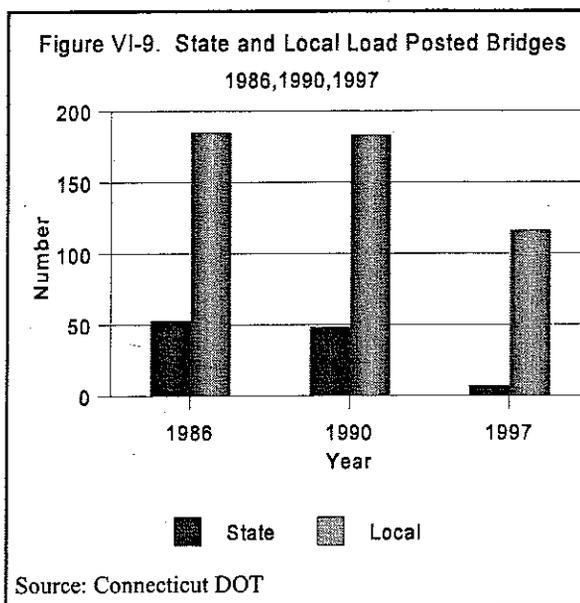
bridges have shown greater improvement than the local. The number of posted state bridges has declined from 53 in 1986 to 7 in 1997, while posted local bridges have declined from 185 to 116 over the same time period.

While the overall functional and structural conditions of bridges throughout the state have improved since the inception of the infrastructure renewal program, there is an important distinction between the condition of state and local bridges. The state has fewer structurally deficient bridges than locals (6 percent versus 17 percent), but more functionally obsolete bridges (29 percent versus 20 percent).

**Bridge sample analysis.** In order to verify DOT information and the bridge project selection process, committee staff randomly selected 118 (3 percent) of the 3,727 bridges DOT is responsible for maintaining and obtained historical bridge condition data for each. The committee's analysis was hampered by quirks in DOT's record keeping. For example, different offices track bridge projects differently -- the construction division goes by contract numbers, and the bridge safety unit goes by bridge number. Construction and maintenance information on each bridge is incomplete and will usually not be in the bridge's file. In addition, cost information is not in the bridge's file. Due to the way contracts are handled, costs cannot always be readily correlated with a particular bridge -- often many bridges are included in a single contract and sometimes other bridges are substituted. Had appropriate data been available and easily accessible, the committee could have examined the actual maintenance history and cost data on each bridge.

DOT has been promising a better bridge information management system since the early 1990s. In 1994, the FHWA established regulations implementing a specific mandate for six information management systems that were a requirement under the federal Intermodal Surface Transportation and Efficiency Act. This included a bridge management system that would, among other things, allow DOT to prioritize the rehabilitation and replacement of the state's bridges, predict deterioration rates, identify alternative courses of action, and predict costs. This system would permit DOT to better identify and recommend projects based on a cost benefit analysis within policy and budget constraints. While the federal government dropped the requirement, DOT is still pursuing such a system, called Pontis. It is not yet fully operational, but DOT expects to be using some of the data produced from the system in the next year.

The analysis presented below will focus on how bridge conditions changed in our sample from 1984 through to 1996. The assumption is that if bridge condition ratings improve, it is because of the maintenance and rehabilitation efforts of DOT, rather than inspector error. The



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committee is satisfied with the integrity of the inspection process as explained and as a result of a review of a selection of bridge safety files. A key feature of the inspection process is the photographic evidence that is maintained. Each new inspection is checked for consistency by bridge safety staff with the previous inspection report. Conditions, then, would not improve without the physical confirmation of work being done to the bridge.

Since the focus of the state bridge program was on improving the structural condition of bridges, the analysis that follows also concentrates on the structural rating rather than the functional rating of bridges. Structural ratings of a bridge refer to the integrity of the bridge's principal components, while functional capacity relates to a bridge's geometry and traffic capacity. It should be noted local bridges were not included in the sample, as they are not the state's responsibility to maintain.

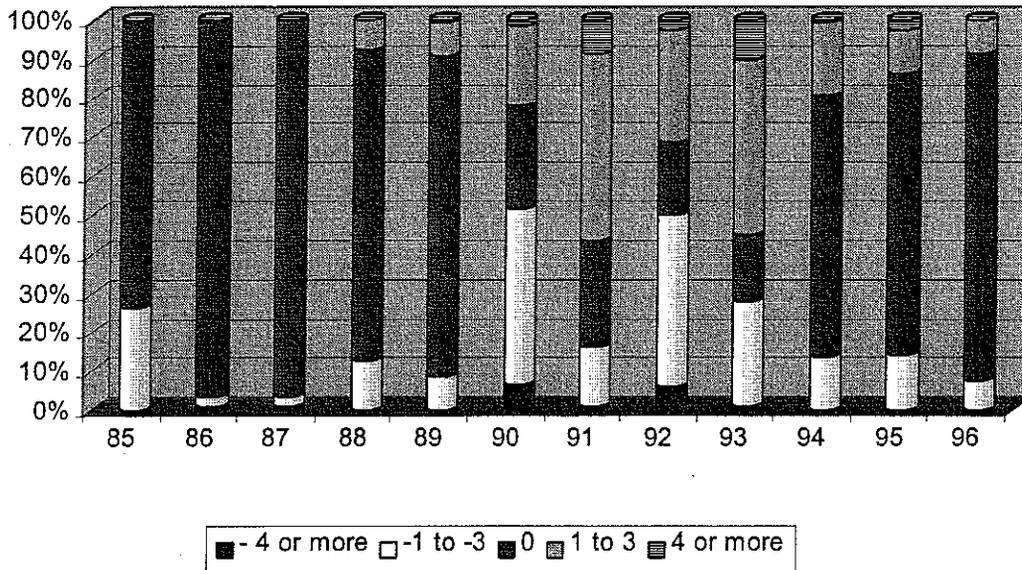
*Sample trend analysis.* All the main components of a bridge are inspected and rated. From these ratings each bridge is given a composite rating that depicts the overall condition of the bridge. The ratings run from zero (poor- beyond corrective action) to nine (excellent). Figure VI-10 shows the rating changes for the entire sample of bridges from 1985 through 1996. A change in the positive direction ("1 to 3" or "4 or more" in the figure) generally means that corrective work has been done to a bridge to increase its rating. A change in the negative direction ("-1 to -3" or "-4 or more" in the figure) means that the bridge's condition is worsening, while no change indicates the condition is stable.

Caution should be exercised in the interpretation of some of the data indicating a decline in condition. This is because after a bridge is rehabilitated or newly built, it is to be expected the bridge rating would drop in a subsequent rating, even though the bridge is still in good condition. Because the figure indicates only changes in the ratings and not the degree of the change in condition, the data are examined in conjunction with information on the changes in the median of the bridges' ratings over time. Ideally, as one proceeds through the years, one would want to see an improvement in overall bridge conditions and then a stabilization of conditions, with a median rating in the range of 6 or above (high end of fair to excellent).

As illustrated in Figure VI-10, in 1985, over one-quarter of the bridges declined in their ratings, 1 percent increased, and 73 percent remained the same as compared with the year before. The median rating of the sample was six (fair). In 1990, 52 percent of the bridges had experienced a decline in their rating, 22 percent had increased, and 26 percent had remained the same. Seven percent had experienced an extreme decline of four points or more -- the highest amount over the 12 year period. The median rating was four (poor). So, in the first years of the bridge rehabilitation program, bridges were generally declining faster than they could be repaired or maintained. Additionally, there was a considerable amount of activity, up and down, from 1990 through 1993. This is seen in the rapid expansion and contraction of the rating categories except the no change ("0") group during this period.

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**Figure VI-10. Ratings Changes for Bridges**



Source: LPR&IC analysis of DOT data

As a result of that activity, the picture changes dramatically during the last few years of the program. More bridges improved or stabilized than declined in the last four years. The percent of bridges exhibiting no change, for example, begins to increase to 64 percent in 1994 and to 72 percent in 1995. By 1996, only 8 percent of the bridges declined in rating, and all declined by only one point. Eight percent of the bridges increased in rating, while 84 percent did not change in that year. The median rating for the bridges was seven (good). Thus, according to results of the sample analysis, the state bridges have improved to a considerable degree, and the conditions are relatively stable -- indicating that rehabilitation and continued preventative maintenance efforts have been successful.

*Planning and prioritizing analysis.* The foregoing analysis examined the entire sample of bridges as a whole. To verify DOT's planning and prioritizing of bridge projects, attention is turned to a comparison of how bridges in poor condition versus bridges in good condition were handled over the last 12 years.

The bridges in the sample were sorted according to their overall condition in the base year of 1984. Bridges were separated into two groups -- poor (meaning they scored between zero and five) and good (meaning they scored between six and nine). (Note the program review committee's definition of good and poor differs from the DOT definition. The committee

collapsed DOT's four categories of excellent, good, fair, and poor into two.) The two groups of bridges were then tracked and the average overall condition of each group was calculated for five time periods. One would expect DOT to devote more attention to the poor bridges in the early years of the program and to see a gradual general improvement in all bridge conditions.

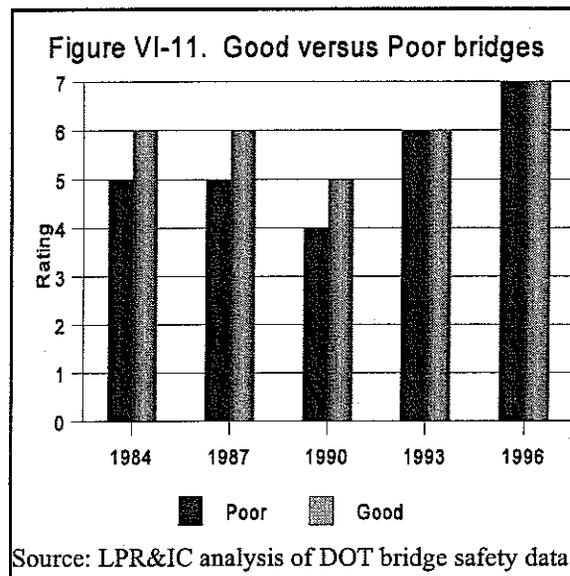
Figure VI-11 shows the median scores for the good and poor bridges over five time periods. The poor bridges begin in 1984 with a median score of five. The median score remains the same in 1987 and declines to four in 1990. But by 1993 the median score for these bridges makes a marked jump to six and then to seven in 1996.

The median score for good bridges remained at six in 1984 and 1987. In 1990, the median score drops to five. Again, a jump in scores is evident by 1993 as the median for the bridges in this group increases to six and then to seven by 1996.

Thus, after a period of no noticeable change in ratings, then a decrease, DOT dramatically improved the ratings of both poor and good bridges. Given the lead time necessary to complete a bridge project (plan, design, secure necessary permits and approvals, construct, etc.), it would be expected that the initial start would be delayed. But it should also be noted the large amount of money pumped into the effort allowed DOT to raise the conditions of nearly all bridges simultaneously.

**Comparisons to other states.** Table VI-4 provides comparative data on structurally deficient bridge conditions between Connecticut, the nation (including the District of Columbia), and the region (New England, New Jersey, and New York). These data include information on both local and state bridges (over 20 feet in length) on the National Bridge Inventory. The table indicates Connecticut ranks third lowest in percentage of structurally deficient bridges in the nation.

Connecticut, also, has a significantly smaller proportion of substandard bridges than other states in the region. While New Jersey, for example, ranks second in the region, it reports nearly one-third of its bridges are structurally deficient compared to Connecticut's 10 percent. In addition, four states in the region are among the 10 worst in the nation -- Vermont (41), Massachusetts (43), New York (45), and Rhode Island (51).



<b>Table VI-4. Comparative State and Local Bridge Conditions</b>			
<i>State</i>	<i>Percent Structurally Deficient</i>	<i>National Rank (Low to High)*</i>	<i>Regional Rank (Low to High)*</i>
Connecticut	10%	3	1
Maine	34%	32	3
Massachusetts	41%	43	6
New Hampshire	36%	38	4
New Jersey	32%	29	2
New York	42%	45	7
Rhode Island	61%	51	8
Vermont	41%	41	5

\*Lower rating indicates better bridge conditions  
Source: *Better Roads*, Volume 66, No. 11 (November 1996) p.26.

<b>Table VI-5. Comparative State Bridge Conditions</b>			
<i>State</i>	<i>Percent Structurally Deficient</i>	<i>National Rank (Low to High)*</i>	<i>Regional Rank (Low to High)*</i>
Connecticut	7%	3	1
Maine	31%	38	5
Massachusetts	39%	48	7
New Hampshire	26%	28 (tie)	2 (tie)
New Jersey	26%	28 (tie)	2 (tie)
New York	30%	35	4
Rhode Island	60%	51	8
Vermont	37%	46	6

\*Lower rating indicates better bridge conditions  
Source: *Better Roads*, Volume 66, No. 11 (November 1996) p.26.

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Table VI-5 shows comparative data on the structural condition of state bridges only. When local bridge conditions are removed, the percent of deficient bridges is reduced in Connecticut to 7 percent. The rank of Connecticut, though, remains the same when compared nationally and regionally-- third in the nation and first in the region.

Based on the above information and analysis, the committee makes the following findings:

- *The condition of state bridges has improved to a considerable degree and these conditions are relatively stable -- indicating rehabilitation and continued preventative maintenance efforts have been successful;*
- *Bridge conditions were generally declining faster than they could be repaired or maintained in the early years of the rehabilitation program, however, dramatic improvement in their condition occurred in the last few years. The lead time necessary to rehabilitate a poor bridge and the large amount of money infused into the program obscures the extent of project prioritization;*
- *Connecticut ranks third lowest in the percentage of structurally deficient state and local bridges in the nation and the lowest in the region. The results remain the same when only state bridges are considered; and*
- *DOT's current bridge management system does not allow for a complete examination of all factors that would lead to a cost-effective decision to rehabilitate or replace a bridge, though, DOT has been trying to develop that capacity for a number of years.*

Based on the findings presented above, the program review committee makes the following recommendation:

**The Connecticut Department of Transportation continue to pursue an enhanced bridge management system. In addition, when the system becomes operational, the department shall identify and list the bridges that are deficient, how they are deficient, and the estimated cost to improve each bridge. This information shall be made available to the public in print and on the department's web site.**

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## Comparative Performance

The University of North Carolina's Center for Interdisciplinary Transportation Studies (CITS) has published six reports since 1984 on the cost-effectiveness of state highway expenditures. This effort represents one of the few attempts to provide a full comparative assessment of state highway systems. The study suggests Connecticut dedicates a considerable amount of resources to transportation purposes and has improved its bridges and the overall safety of its highways, but interstate road conditions and urban congestion are among the worst in the country.

The study uses data submitted by each state to the Federal Highway Administration (Highway Statistics, FHWA 1984-95; Better Roads, 1996 Bridge Inventory; and the Fatal Accident Reporting System). Twelve measures (five resources and seven results) are used in this study to compare performance and include:

- Resources
  - Receipts for state-owned highways per mile
  - Capital road and bridge disbursements per mile
  - Maintenance disbursements per mile
  - Administrative disbursements per mile
  - Total disbursements per mile
  
- Results
  - Percentage of poor pavement on rural interstates
  - Percentage of poor pavement on other rural principal arteries
  - Percentage of poor pavement on urban interstates
  - Percentage of urban interstate congestion
  - Percentage of deficient bridges
  - Fatal accident rates
  - Percentage of narrow lanes in rural arteries

Each measure is "normalized" to facilitate comparability among the states. Financial data, for example, are normalized by dividing the amount received/spent for highways by the mileage under state control to get the amount received/spent on a per mile basis. In addition, an adjustment is made to the resource measures to accommodate states with wider than average roads. Results measures are calculated as the percent of the system with deficiencies, except for fatal accident rates, which are reported as number of fatal accidents per 100 million vehicle miles driven annually.

The first part of the analysis below compares Connecticut to the other 49 states and to the region. The region is defined as the New England states and also includes New York and New

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Jersey. The second part of the analysis examines the performance ratios developed by CITS and the ranking developed from the ratios for each of the states.

<b>Table VI-6. How Connecticut Transportation Resources Compare, 1995</b>				
	<i>Compared to Nation (50 states) Rank = 1 low - 50 high</i>		<i>Compared to Region (8 states) Rank = 1 low - 8 high</i>	
Total Receipts Per Mile	47	(4th highest)	6	(3rd highest)
Total Dollars Spent per Mile	47	(4th highest)	6	(3rd highest)
Capital Roads and Bridges \$/Mi	45	(6th highest)	5	(Middle)
Maintenance Dollars per Mile	34	(17th highest)	3	(3rd lowest)
Admin. Dollars per Mile	44	(7th highest)	5	(Middle)

Source: Center for Interdisciplinary Transportation Studies, UNC, *Resources versus Results:... 1984-1995*, 3/97

**Comparing resources.** Table VI-6 shows how Connecticut, under CIT's methodology, compares to the nation and the region for resources dedicated to transportation purposes for 1995. For each measure the states are ranked from low to high. A review of the measures in the table indicates:

- Total receipts and expenditures on transportation in Connecticut rank the state among the top five in the country and region;
- Amount of funding the state specifically dedicated to capital expenditures for roads and bridges ranks the state among the top six in the country and in the middle in the region;
- Amount the state spent on maintenance is among the highest one-third of the states but the third lowest in the region; and
- Amount the state spent on administration places Connecticut among the top 10 states in the country, but in the middle in the region.

**Comparing results.** Table VI-7 presents the state's ranking for seven "results" measures, based on the CITS report. The states are ranked from low to high for each measure. The CITS analysis of the data indicate:

- Connecticut ranks among the bottom 10 states for urban and rural interstate pavement condition in the nation and among the worst in the region;
- The state is in the bottom one-third of all states for the condition of rural roads designated as principal arterial;
- Urban interstate congestion is among the worst 10 states in the country and worst in the region;
- Bridge conditions are among the best in the country and region; and
- Fatal accident rate is among the lowest in nation and region, and Connecticut has no travel lanes considered narrow on the state system.

**Table VI-7. How Connecticut Transportation Results Compare, 1995**

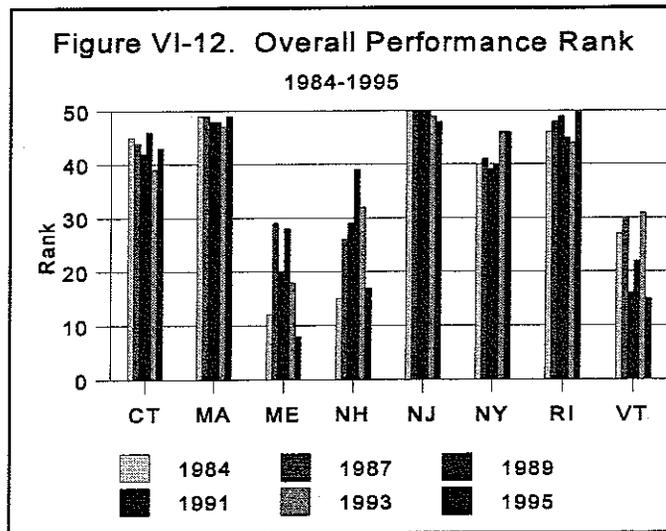
	<i>Compared to Nation (50 states) Rank = 1 low - 50 high*</i>	<i>Compared to Region (8 states) Rank = 1 low - 8 high*</i>
Percentage of poor pavement on rural interstates (as measured by % IRI above 170)	46 (5th highest)	8 (Highest)
Percentage of poor pavement on rural arteries (as measured by % IRI above 220)	35 (16th highest)	5 (Middle)
Percentage of poor pavement on urban interstates (as measured by % IRI above 170)	43 (8th highest)	7 (2nd highest)
Urban interstate congestion	43 (8th highest)	8 (Highest)
Bridge condition (% deficient)	3 (3rd lowest)	1 (Lowest)
Fatal accident rate	5 (5th lowest)	4 (Middle)
Narrow lane width on rural arteries (% less than 12 ft.)	1 (Lowest)	1 (Lowest)
<i>Overall Performance Average</i>	<i>44 (7th worst)</i>	<i>4 (Middle)</i>

\*Low ranking means less deficiencies

Source: Center for Interdisciplinary Transportation Studies, UNC, *Resources versus Results:... 1984-1995*, 3/31/97

**Performance ratios.** The CITS study developed performance ratios for the states and ranked each one. Each of the 12 statistics for each state is reduced to a single number and this allows the states to be ranked overall. The methodology involves bringing the 12 measures to a common base by computing a ratio of each state's 12 statistics and comparing it to each statistic's national mean. The average performance ratio for each state, across the 12 statistics, is then computed and states are ranked according to their weighted average ratios. So, the lower the overall performance ratio, the better the ranking. Ratios below 1.0 mean the state is performing better than the U.S. average; above 1.0 worse than the U.S. average.

Connecticut's performance ratio was 1.85 for 1995, which was worse than the national average. The state ranks 44th in the nation (or the seventh lowest) overall in performance and it ranks fourth out of eight states in the region. In Figure VI-12, rankings for the Northeast states are shown for six time periods over the last 12 years. Five of eight Northeast states tend to be among the worst 10 states for the last 12 years. However, Maine, New Hampshire, and Vermont are doing considerably better.



**Committee concerns.** After extensively reviewing the CITS report, the committee noted some concerns. One concern is that the composite performance ratio seems to work against states with high traffic volumes and high labor costs. As Figure VI-12 shows, Rhode Island, Massachusetts, New Jersey, New York, and Connecticut are among the worst performing states. These are states that traditionally have high labor costs and high traffic volume. Rural, low traffic areas seem to do better overall. Although, this may skew the national comparison, similar state comparisons should be valid.

Table VI-8 compares the actual costs per mile for capital and total expenses among the Northeast states. In the comparison, the states with the lowest capital and total expenses tend to be the northern New England states. If New Hampshire, Maine, and Vermont are removed from the analysis, Connecticut ranks as the second lowest in capital expenses per mile (New York is lower), and in the middle for total expenses per mile (New York and Rhode Island are lower). When the overall rankings are considered, just among the high cost industrial northeast states, Connecticut performs the best.

In addition to those concerns, it should be noted that the composite ranking, by design, is a relative measure -- some states will always be on the bottom no matter what they have done. The measure does not indicate what is cost effective other than comparing each state to the national average. Also, the policy goals of each state differs based on a variety of local considerations and this will affect how money is allocated and what modes of transportation will be emphasized.

Table VI-8. Capital and Total Expenditures Per Mile, 1995				
State	Capital Expend. Per Mile	National Rank	Total Expend. Per Mile	National Rank
CT	\$150,009	45	\$284,683	47
MA	\$370,767	50	\$617,485	50
ME	\$18,257	6	\$41,430	11
NH	\$32,143	20	\$74,074	31
NJ	\$222,461	49	\$586,562	49
NY	\$113,270	43	\$240,997	44
RI	\$174,306	46	\$253,195	45
VT	\$26,332	15	\$56,784	21
National Mean	\$38,186		\$68,655	

Capital expenses are for roads and bridges only  
 Source: Center for Interdisciplinary Transportation Studies, UNC, *Resources versus Results... 1984-1995*, 3/97

The committee believes the “results” measures are comparable. These measures are consistent with the analysis presented elsewhere in the committee’s report. The percentage of poor pavement on rural and urban interstates is among the worst in the region and the nation. Similarly, congestion in Connecticut is among the worst in the nation and region. On the other hand, bridge conditions and overall safety of the system are among the best.

Based on the information and analysis presented above, the committee makes the following finding:

- *Connecticut dedicates considerable resources to transportation purposes and is among the best in bridge conditions and overall safety, but interstate road conditions and urban congestion are among the worst in the country.*

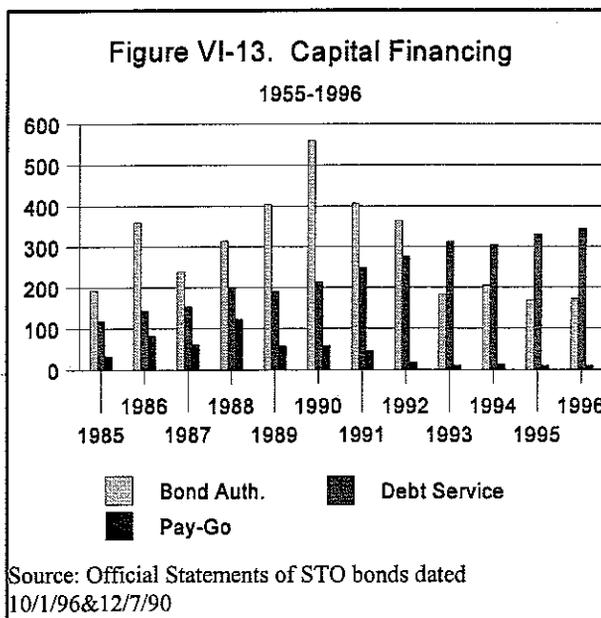
## Infrastructure Renewal Financing

The committee expressed concerns about how the infrastructure renewal program was financed. Chapter Three describes DOT's process used to identify and prioritize its capital needs. In addressing those needs, the department has indicated it will request about the same amount of funds over the next 10 years from bonding and current revenue (referred to as pay-go) as it has over the last several years. Underlying DOT's position are three assumptions. First, federal programs will remain the same as those in ISTEA and the funds would continue at the FFY97 levels. Second, state funding will be available to DOT at the same levels as it has been in recent years. Finally, DOT assumes the state's transportation needs will always exceed available funds.

At this point it should be noted that the broad goals of the transportation program are essentially unchanged from the beginning of the renewal effort. There is a shift, however, in spending priorities over the next 10 years as compared to the previous 13 years. Funding for bridge rehabilitation will dramatically decrease as the maintenance and rehabilitation of roadways receives more emphasis.

In this section, a review is provided of the amounts the state has spent on the capital program through bonding and current revenue on an annual basis. These figures are compared to the amount the state is paying in debt service. An analysis is also provided of the changes in DOT indebtedness since 1984, and this is compared to the U.S. as a whole. In addition, a comparison is made between the U.S. and Connecticut's capital, maintenance, and bond retirement expenses.

**Capital Financing.** Figure VI-13 compares the amount the state has paid for debt service to the amount it has received for bond proceeds and the amount of current revenue it has used (also called pay-go) to finance infrastructure improvements. The figure illustrates that Connecticut has used bonding as its primary tool to finance its infrastructure renewal program. Bond authorizations show a steady increase through 1990, reaching a high point in that year of \$560 million. As the cumulative value of the bond authorizations increase, so too does DOT's debt service. Therefore, the amount paid for debt service has steadily risen to the point, beginning in 1993, where debt payments exceed bond authorizations. In FY



96, the amount paid for debt service was \$346 million, and the amount of new bond authorization was \$172 million.

As Figure VI-13 shows, pay-go money has experienced a decline since its high point in 1988 of \$123 million. The average amount of money directed to pay-go projects for the first six years of the infrastructure program was about \$70 million. The average for the last six years was \$18 million. Pay-go as a percentage of bond authorizations has also decreased over the time period. Pay-go represented 18 percent of the bond authorization in 1985, nearly 40 percent in 1988, but just 6 percent in 1996.

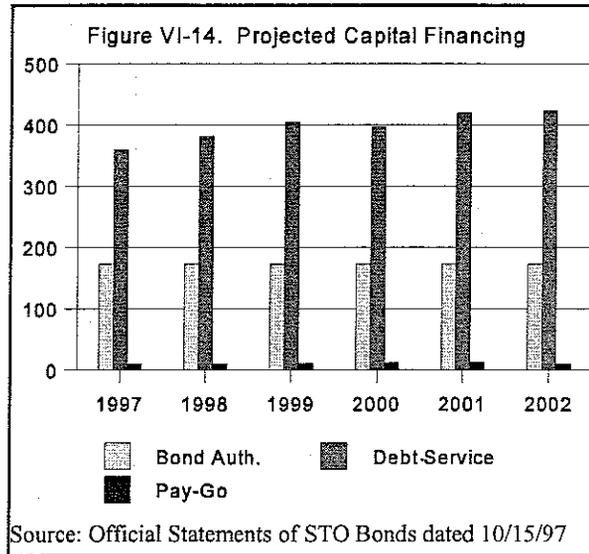


Figure VI-14 shows the amounts projected for new bond authorizations, debt service, and pay-go from FY97 to FY02. The figure indicates debt service will continue to increase reaching \$424 million by FY02, while bond authorizations will remain the same at \$173 million for each year. Amount spent on pay-go is will remain at about \$10 million per year.

**Changes in indebtedness.** Table VI-9 presents changes in state debt for highway purposes for Connecticut, the Northeast (New England (excluding Connecticut), New York and New Jersey), and the U.S. for three time periods from 1984 through 1995. Connecticut's reliance on debt has out paced the region and the nation. The table shows that Connecticut's outstanding debt has increased from \$700 million in 1984 to \$2.9 billion in 1995 -- a 318 percent increase. At the same time, the Northeastern states have increased 245 percent and the U.S. 107 percent.

	Connecticut	Percent Change	Northeast	Percent Change	US	Percent Change
1984	\$ 698,065		\$ 3,992,511		\$ 18,978,509	
1990	\$ 1,836,750	163%	\$ 7,977,456	100%	\$ 28,066,297	48%
1995	\$ 2,919,081	59%	\$ 13,775,706	73%	\$ 39,227,857	40%
1984-95		318%		245%		107%

Thousands of dollars  
 Northeast includes the New England states (excluding Connecticut), New York, and New Jersey.  
 Source: FHWA, *Highway Statistics*, Table SB-2, 1984, 1990, 1995.

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Borrowing money to finance capital projects is often the only solution to completing a large infrastructure improvement. Bonding, however, is an expensive method to finance capital projects. Basic principles of finance require that the improvement for which the money is being borrowed last as long, if not longer, than the time to pay back the bond. Clearly, borrowing for bridge rehabilitation projects or replacements makes fiscal sense, as the pay-back period for typical bonds is 20 years and bridges last for at least 50 years.

Bonding for certain other projects, like repavement, are financially imprudent. Basic resurfacing extends the life of a road between 10 to 15 years. Connecticut has bonded and currently bonds a large portion of its resurfacing program -- \$387 million from FY 85 through FY97. This means the state pays back money for an additional 5 to 10 years beyond the life of the improvement. The problem is further compounded by the program review finding, in the first section, of 25 percent of pavement in a random sample was resurfaced twice within an 11 year time period. In addition, funding on a pay-as-you-go basis saves money by not incurring bond interest and issuance costs.

**Capital and maintenance expenses.** Analysis of the state's financing strategy is complicated by the absence of agreement on what constitutes a capital or maintenance expenditure. The state statutes do not clarify the issue, nor does DOT does not have its own formal definition of capital or maintenance expenses.

However, some guidance is available from the Federal Highway Administration (FHWA). DOT must annually report its highway and bridge expenditures to FHWA in those two categories. FHWA defines maintenance expenditures as costs "required to keep highways in usable condition [provided] the service life of a highway is not extended beyond the original design."

The FHWA definition of capital expenditures is quite broad. Capital expenditures, according to FHWA, involve "highway improvements" and include: land acquisition, and other right-of way costs; preliminary and construction engineering; construction and reconstruction; resurfacing, rehabilitation, and restoration costs of roadway and structure; and installation of traffic service facilities such as guard rails, fencing, signs, and signals.

Table VI-10 shows a comparison of capital, maintenance, and bond retirement expenses devoted to highway purposes between Connecticut and all state departments of transportation for five time periods over 11 years. Each state transportation department furnishes the information to the Federal Highway Administration on an annual basis using a standardized guide to report specific data about money spent on roads and bridges. Expenditures for highways are grouped into major classes, three of which are shown in the above table. Costs not included are associated with administration, highway enforcement and safety, and interest on debt.

**Table VI-10. U.S. and CT Capital, Maintenance, and Bond Retirement Expenses as Percent of Total Expenses**

	<i>Connecticut Capital Expenses</i>	<i>U.S. Capital Expenses</i>	<i>Connecticut Maint. Expenses</i>	<i>U.S. Maint. Expenses</i>	<i>Connecticut Bond Retirement</i>	<i>U.S. Bond Retirement</i>
1995	53%	56%	6%	19%	18%	5%
1993	37%	50%	5%	17%	41%	15%
1989	68%	55%	6%	19%	11%	9%
1987	60%	54%	10%	19%	9%	9%
1984	43%	54%	13%	20%	20%	7%

Expenses are for roads and bridges only.

Source: FHWA, *Highway Statistics*, Table SF-4; Center for Interdisciplinary Transportation Studies, *Resources Versus Results*, 3/31/97, UNC Charlotte.

The table shows that Connecticut on average has spent proportionally about the same (52 percent) as the rest of the United States (54 percent) over the 11-year time period on capital expenses. The range for Connecticut, though, is more variable going from a low of 37 percent to a high of 68 percent. In addition, Connecticut devotes considerably less to maintenance expenses than the rest of the country -- the average for Connecticut is 8 percent versus 19 percent for the U.S. Finally, on average Connecticut spends more than double on the retirement of debt as a proportion of total expenses, than its counterparts in the rest of the country (20 percent for Connecticut versus 9 percent for the U.S.).

Based on the information summarized above, the committee makes the following findings:

- *Connecticut does not have a formal definition of maintenance expenses. The definition, however, of maintenance or capital expenditures is not as important as the pay-back period of the expenditure;*
- *Connecticut has used bonding as the primary tool to finance infrastructure renewal efforts over the last 12 years;*
- *The amount of current revenue (pay-go) devoted to capital projects has declined sharply over the last six years;*

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- *Debt service has exceeded the amount of new investment by the state in the capital program since 1993, and this trend will continue for the foreseeable future;*
  - *Connecticut's reliance on debt to finance road and bridge improvements has out-paced the region and the nation; and*
  - *In some instances, Connecticut borrows money for improvements that have a pay-back period longer than the useful service life of the improvement.*

Based on the findings presented above, the program review committee recommends:

**The Connecticut Department of Transportation re-examine its capital financing strategy with the goal of reducing the state's reliance on debt by paying for improvements that do not have a useful life longer than a bond repayment out of current revenue.**

### **Environmental Planning, Permitting, and Enforcement**

In this section, the program review committee addresses the concerns raised about DOT's interaction with the environment. Specifically, an overview of how public sector and private sector developers are handled with regard to environmental planning and permitting is provided. In addition, the committee performed a limited review of some enforcement efforts conducted by the Inland Water Resources Division of the Department of Environmental Protection (DEP), as well as the federal Environmental Protection Agency (EPA).

**Environmental planning.** The process for acquiring environmental approvals for construction projects is different for the public sector and the private sector. Both sectors are subject to government regulation, however, the source and scope of that authority differs.

Because state authority supersedes local ordinances, state agencies follow a process, developed by the General Assembly, for obtaining authorization for projects that impact the environment. Through the Connecticut Environmental Policy Act (CEPA), an environmental review process has been established that state agencies must complete in order to undertake a project that "significantly affects the environment." The act requires the initiating agency to conduct a detailed written evaluation of a project's environmental impact. As discussed in the staff briefing paper, the environmental impact document required under CEPA is made available for public comment and may be subject to a hearing before being reviewed by the Office of Policy and Management (OPM) -- the final authority under CEPA.

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Comments are obtained from the Council on Environmental Quality (CEQ), the Department of Environmental Protection, the Connecticut Historical Commission, the Department of Economic and Community Development (if housing impacts are involved), other appropriate agencies, the town clerks of affected towns, and members of the public. Then, the Office of Policy and Management makes the decision as to whether the evaluation identifies all environmental impacts of a proposed project.

Once it is satisfied with the accuracy of the environmental impact evaluation, OPM makes a decision on whether the project should proceed. In making this decision, OPM balances the public need for a particular state investment with the environmental impact of that project. A framework for the decision-making process is provided in OPM's five-year State Policies Plan for the Conservation and Development of Connecticut. This plan is used to guide operational and capital investment decisions of state government by comparing the need for the project to the state's human and environmental needs. The legislature is a formal participant in the development of this plan. Section 16a-28 of the Connecticut General Statutes establishes the process for the development, legislative review by the Planning and Development Committee, public hearings, and General Assembly adoption of the five-year conservation and development plan.

Private developers are not required to follow the CEPA process. They are, though, subject to local ordinances and may have to obtain various types of approvals, such as zoning and land use, before beginning a project.

**Permits.** State and private sector projects may also require the procurement of various permits for specific activities that impact the environment in specific ways. State agencies are exempt from local permit requirements, but often must get permits from DEP to undertake construction projects. Private developers, on the other hand, may have to obtain permits from DEP or from local governments depending on the activity. The fact municipalities have jurisdiction over a limited number of areas including wetlands, residential underground storage tanks, residential and commercial above-ground tanks, sewer ordinances, and aquifer protection, means most large-scale private sector activities impacting the environment will involve interaction with DEP. Public agencies have to obtain permits from DEP only.

An additional distinguishing characteristic of DOT initiated projects and private developments is that many private businesses require periodic renewals of certain permits to operate their businesses. For example, any business that discharges a large amount of wastewater into the waters of the state is required to renew that application every five years. Most activities initiated by DOT are short-term construction projects and do not require periodic renewal.

*Pre-application activity.* DEP provides pre-application assistance to private developers to expedite the permit application process. Similarly, for larger projects DEP may be involved in the early planning stages of a DOT project to provide advice on the best course of action and indicate

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the permits that may be needed. DEP and the U.S. Army Corps of Engineers also meet monthly with DOT to review current and proposed projects affecting wetlands and watercourses, an opportunity not routinely available to private developers.

*Wetlands.* The difference between the permitting activity of private and public developers is perhaps most salient in the application for wetlands permits. When private developers propose any action that affects wetlands, they must obtain a permit from a municipal wetlands agency in the town where the project is located. Consequently, a developer could theoretically deal with 169 different municipal boards to secure inland wetlands permits, but DOT has to deal with one agency -- DEP.

Private developers, however, are guaranteed action on a wetlands permit within a specified time frame. While each municipality has its own set of wetlands regulations, they are based on a model provided by DEP. The regulations are also reviewed and approved by DEP. Even though there may be variability in the regulations used by localities, they must act on an application within 35 days after the completion of a public hearing or, in the absence of a hearing, within 65 days of receipt of an application (C.G.S. 22a-42a). DEP is not bound by any time frame when reviewing an inland wetlands permit application for a state agency. According to DOT and DEP, typical inland wetlands permits take DEP on average six months to process. For major projects this time frame could be extended to 1 ½ years.

*DOT permit activity.* DEP has 29 different permits to regulate pollution in Connecticut. Most of DOT's construction activities that require a permit, fall under one or more of seven permit programs. Listed below are the typical permits DOT applies for and the number applied for in 1997 through the end of October:

- Inland/Wetlands and Watercourses (37);
- Certificate of Permission (13);
- Flood Management (15);
- General Permit (5);
- Stream Channel Encroachment (4);
- Dam Maintenance (1); and
- Structures and Dredging - Tidal Wetlands (5).

Generally, these permits can take from one month to one year to process. The difference in timing has to do with the type of permit required and the extent of the impact of the proposed project.

By far, the permit DOT applies for the most is the inland wetlands permit. Table VI-11 presents DOT's wetlands permit application activity with DEP over the last five years. During this

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period, DOT applied for 178 permits -- averaging 36 per year. Twelve of the 178 (7 percent) were not issued, but 10 of those were not issued because DOT withdrew the application. (One was denied, and the other was inactivated.) DOT will usually withdraw an application if there are changes in the project plans, which may or may not be in response to environmental concerns. DOT in 1997 has or plans to permanently impact a total of about 10 acres of wetlands. Typically, according to DOT, the department will permanently impact about three to five acres per year.

**Table VI-11. DOT Inland Wetlands and Watercourses Applications with DEP**

	<i>Total Applied</i>	<i>Number Issued</i>	<i>Number Withdrawn</i>	<i>Number Rejected</i>	<i>Number Inactivated</i>
1996	26	24	2	0	0
1995	28	26	2	0	0
1994	41	36	3	1	1
1993	33	31	2	0	0
1992	50	47	3	0	0

Inactivated refers to a situation where DOT was supposed to apply for a permit regarding a temporary impact but did not.

Source: DEP, Bureau of Water Management, Inland Water Resources Division

**Enforcement.** To obtain an understanding of how environmental enforcement is handled by the state, the committee examined the regulated area in which DOT has the most activity -- inland water resources. Due to time constraints, the committee could not examine every permit program or every enforcement area in DEP. The information gathered about the inland wetlands division may or may not be representative of DEP's efforts in the enforcement area. However, it does represent the area with the most interaction between DOT and DEP. Several permits are issued out of this office including the inland wetlands permit, stream encroachment, and flood management. A considerable amount of time and resources of both agencies are devoted to the regulation and protection of this resource.

*DEP complaints and violations.* Committee staff reviewed complaint and violation data supplied by DEP's Inland Water Resources Division. According to the data, DOT had 33 complaints from the public lodged against it through the water resources division in DEP from 1994 through November 1997. This included nine complaints in 1994, three in 1995, 11 in 1996, and 10 in 1997. The complaints ranged from various erosion and siltation problems caused by

DOT activity or facilities to debris being dumped into rivers. Twenty-two of the complaints were closed and the average time to close a case was five months.

Table VI-12 shows the outcomes of the 33 complaints. Five complaints did not result in a finding of any violation or wrongdoing by DOT. Two complaints resulted in a violation, and 10 conditions were corrected before a violation was issued. Sixteen cases had no clear resolution. Eleven of the 16 are still open, including one dating back to May 1996. Five of the 16 cases were considered closed by DEP, even though in two cases DOT did not respond, and in one case the reason for closure is not clear.

<b>Table VI-12. Complaints Registered with DEP Inland Water Resources, 1994-1997</b>	
<i>Outcome</i>	<i>Number</i>
Violations	2
Conditions corrected without violation notice	10
No violation	5
Unknown	16
Unknown refers to cases not resolved Source: DEP, Bureau of Water Management, Inland Water Resources Division	

The committee also examined violation data supplied by DEP. Violations are issued for various transgressions, generally due to DOT not responding to a complaint or not applying for a permit they should have. DOT had 12 violations issued against it for inland wetlands violations since 1990. There were five issued in 1990, one in 1991, one in 1994, one in 1995, and four in 1997. None were issued in 1992, 1993, or 1996. However, between 1991 and 1997, DEP had an informal policy not to issue violations to DOT. Instead, complaints were handled as referrals to DOT, which in essence became a self-policing entity in this area. Consequently, DEP data are not complete.

Five of the 12 violations were closed, six cases are still open, and one case could not be located. The oldest violation still open is over three years old; the average time to close a case was 21 months.

Program review staff, also interviewed the executive director of the Council on Environmental Quality to solicit the organization's opinion on DOT's recent environmental record. CEQ serves Connecticut citizens as an environmental advocate and a resource for reporting violations of environmental laws. CEQ reported very few complaints (six) against DOT over the last two years, and these involved very minor issues.

In addition, committee staff interviewed members of the federal Environmental Protection Agency's (EPA) New England Public Agencies Team, which is responsible for ensuring public

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sector compliance with federal environmental laws. Recently, DOT has been found in violation of federal environmental laws and assessed the largest environmental fine ever levied against the state (\$450,000). The fine is still subject to settlement negotiations.

EPA conducted an inspection in February 1997 and found DOT in violation of environmental laws -- specifically the federal Clean Water Act, the Resource Conservation and Recovery Act, and related state statutes. DOT was cited for nine violations at Bradley International Airport, including open containers of unmarked hazardous waste and inadequate training of workers, as well as violations at a facility in Rocky Hill and another in Wethersfield. EPA believed the problems were systemic, but it did not check other DOT facilities.

EPA did a follow-up and performed further investigations at the sites two months later. It found DOT had still failed to address the issues. DOT claims it was not notified of any problems when EPA inspected in February 1997, nor on subsequent inspections until the formal notice was received in September. Neither DEP nor DOT were aware of violations at Rocky Hill or Wethersfield prior to EPA involvement. DEP cited DOT in 1994 for hazardous waste management violations at Bradley, which DOT did not address.

In summary, the program review committee finds:

- *Public and private developers are subject to environmental oversight, though the scope and authority of that oversight differs depending on the type of property, location, and environmental impact;*
- *Relative to the number of complaints, DOT has had relatively few inland wetlands violations issued against it recently;*
- *DOT has engaged in corrective actions in about one-third of the instances where complaints have been filed with DEP;*
- *DOT's environmental violations cannot be accurately determined due to inadequate enforcement activities at DEP; and*
- *In early 1997, three DOT facilities were cited for violations of certain federal and state environmental laws and regulations. However, DOT claims it was not aware of the violations prior to EPA's enforcement action until the fall of 1997.*

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Based on the above findings, the program review committee recommends:

**A review of the Department of Environmental Protection be conducted focusing on the effectiveness of the department's oversight of public sector compliance with environmental laws and regulations (See also Other Issues and Concerns below.);**

**DOT shall conduct, by the end of 1998, a comprehensive environmental audit of its own facilities throughout the state for compliance with all appropriate environmental laws and make that report available to the public indicating methodology and findings;**

**DOT shall ensure appropriate department personnel are adequately trained and familiar with policies and procedures that concern the proper handling, storage, and disposal of contaminated or hazardous materials; and**

**DOT shall review, evaluate, and implement internal communication procedures that would enhance reporting capabilities to allow DOT's environmental compliance division to become aware of and respond to environmental violations in an expedited manner.**

**Other issues and concerns.** With regard to the environmental enforcement process in the Inland Water Resources Division, the program review committee found a number of noteworthy issues. The committee was unable to develop these concerns into formal findings because they presented complex issues well beyond the scope of the current evaluation of DOT. The committee considers these issues worthy of further study. The issues include:

- enforcement at the Inland Water Resources Division is mainly citizen complaint driven. If there are no complaints external to DEP, the department will usually not become aware of a violation, although there have been instances where DOT has reported itself;
- when complaints come to DEP regarding a potential problem, the DEP relies on DOT to investigate the problem;
- when DOT reports back to DEP in response to a complaint, the DEP will rely on the complainant to verify if a problem has been resolved. If the complainant reports further problems, only then will DEP consider investigating the problem;

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- DEP does not engage in any checking of DOT for permit compliance;
  - DEP does not regularly review permit monitoring reports nor ensure they have been received in a timely manner despite the fact that the permit monitoring reports are designed to indicate if any problems detrimental to a wetland have occurred on work sites where permits have been issued; and
  - DEP does not inspect any DOT sites after work is completed, nor is there any sign-off indicating that the site or facility is in compliance with appropriate wetlands regulations.

## **Products and Specifications**

The scope of the study adopted by the program review committee included a requirement to examine DOT's practices for approving new products and procedures. In meeting this requirement, the committee pursued two objectives. First, determine the department's official policy toward the use of new products and procedures. Second, examine the processes in place for evaluating new products and procedures.

Regarding the first objective, as noted in Chapter Five, the committee found it is the policy of the department to provide a fair and systematic evaluation of proprietary materials, products, and methods intended for use in construction projects and maintenance activities (Policy No. HWYS-2). Pursuit of the committee's second objective led it to review the activities of two standing committees within the department -- the Research Liaison Committee (RLC), which focuses primarily on product evaluation, and the Standard Specifications Committee (SSC), which deals with standards for roads, bridges, and incidental construction.

The Research Liaison Committee is composed of 10 members representing various units within the Bureau of Engineering and Highway Operations. It meets every other month and on such occasions as are required to deal with any special issues that may arise. In reviewing a product, material, or process the RLC has the option of moving for immediate approval, requiring a trial installation, requesting the vendor supply more information, or rejecting the proposal.

The program review committee staff examined the minutes from the six RLC meetings that were held in FY 97. A total of 107 product-related items were listed in the minutes. The staff found final action was taken on nearly half the items, with 25 (23 percent) being approved and 25 (23 percent) rejected. Of the remaining 57 items, 12 (11 percent) were recommended for trial installations, 34 (32 percent) were set aside for further discussion, and 11 (10 percent) involved

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the RLC taking minor actions such as requesting more information or approving the name change of a previously qualified product.

The program review committee staff also examined the minutes to identify the product type and vendor associated with each RLC decision to approve or reject a product. Using these data, the staff focused on detecting whether a pattern existed that indicated a bias with respect to specific product types or vendors. In conducting this analysis, the staff divided the products into six categories based on the descriptions provided in the minutes -- pavement markers, structural materials, pavements types, sealants, chemical anchors, and miscellaneous. It should be noted that in instances where the minutes were inadequate to clearly identify the product type the committee staff used a best-guess method to assign the product to a category.

Table VI-13 shows the number of approvals and rejections for the six categories used by the committee. The data do not reveal any pattern of bias in the DOT's decision-making with respect to the type of product under review.

The committee also analyzed RLC decisions based on the identity of the vendors submitting products for review. The minutes revealed that in FY 97 the RBC issued decisions on products submitted by 41 different vendors, including eight companies that submitted two different products for consideration. Three of the eight companies with decisions on multiple products experienced both an approval and a rejection. One company had both products it submitted approved, and four companies had each of their two products rejected. An examination of the decisions affecting the latter five companies revealed that six were based on either a field or laboratory test, two resulted from the failure of the products to meet existing AASHTO standards, and two products were rejected because they could not be tested without great expense to the state.

<b>Table VI-13. Distribution of Product Types Approved and Rejected by the Research Liaison Committee in FY 97</b>						
<i>Committee decision</i>	<i>Pavement markers</i>	<i>Structure</i>	<i>Pavement types</i>	<i>Sealants</i>	<i>Chemical anchors</i>	<i>Misc</i>
Approve for use	3	9	2	5	4	2
Reject for use	6	2	5	7	3	1
Source of Data: Staff analysis of RLC minutes						

The Standard Specifications Committee -- the other DOT committee involved in approving products and specifications -- is composed of 17 members drawn from various units within the Bureau of Engineering and Highway Operations. In addition, there are four non-voting members

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of the committee representing each of the following: the Federal Highway Administration; Connecticut Construction Industry Association (2); and the Office of the State Attorney General.

Essentially, it is the specifications committee's responsibility to review and take action on proposals for changes in the department's standard requirements for the performance of work and the furnishing of materials for roads, bridges, and incidental construction. The committee may receive proposals for specification changes from sources internal or external to DOT.

As noted in Chapter Five, the specifications committee met twice in each of the last two years. It processed an average of 20 proposals per year, with 95 percent being approved -- 85 percent as proposed and 10 percent with modifications. Based on the high approval rate, the program review committee did not believe it was necessary to conduct a detailed examination of these decisions.

In summary, the program review committee finds:

- *the Department of Transportation has a reasonable policy toward the use of new products and specifications in its projects; and*
- *there is no evidence of bias or arbitrary decision-making related to specific product types or vendors in the records of the two Department of Transportation committees responsible for reviewing new products and specifications.*

### **Mandated Reports**

The Department of Transportation is required under state statutes to produce various reports detailing the department's plans, activities, and accomplishments. The program review committee identified six reports with potential relevance for assessing the transportation infrastructure renewal program. The title and a brief description of each of the six reports follows:

Master Transportation Plan (C.G.S. Sec. 13b-15) -- a long-range plan designed to identify needs and spell out the department's plans and priorities.

Special Tax Obligation Bonds Report (C.G.S. Sec. 13b-79a) -- a progress report detailing the cost and timeliness of completed projects and the status of remaining projects authorized under the infrastructure renewal program.

Special Transportation Fund Report (C.G.S. Sec. 13b-79b) -- a financial report detailing the revenues and expenditures of the Special Transportation Fund.

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Alterations to the State Highway System Report (C.G.S. Sec. 13b-26(a)) -- a biennial report identifying any changes in the state highway system

Limited Access State Numbered Highways (C.G.S. Sec. 14-298) -- an annual listing of all the state's limited access highways as officially designated by the DOT commissioner, with the advice and consent of the governor and attorney general.

Connecticut Public Transportation Commission's Annual Report (C.G.S. Secs. 13b-11a(e) and 13b-11(b)) -- a report detailing the commission's recommendations for improving the state's public transportation system.

The committee reviewed the reports to determine DOT's compliance with the requirements set forth in the statutes. The committee also assessed the usefulness to policy makers and others of the information provided in the documents. The latter effort involved judgments based on how DOT officials rated the reports, how highly they were valued by legislators, and how useful the reports were to the committee in reviewing the transportation infrastructure renewal program.

The Department of Transportation's perspective was gained by asking DOT officials to provide estimates of the cost attached to each report in terms of staff hours and actual financial outlays. In addition, DOT officials were requested to rate the value to the department of each report and give its perception of the utility of each report to individuals and organizations external to DOT. The department officials were also asked to indicate any changes they would make in terms of each report's content, submission date or frequency, or designated recipients.

A total of 40 legislators were sent surveys to obtain their views on the reports. Included among those surveyed were all members of the Transportation Committee and the subcommittee of the Appropriations Committee with jurisdiction over DOT, the chairs and ranking members of the appropriations and the finance, revenue and bonding committees, and the chairs of the bonding subcommittee. The survey asked legislators to indicate if they received the reports, how readable the reports were, how they were used, and what if any changes should be made.

**Findings.** According to DOT's estimates, work associated with the six reports consumes 4,000 staff hours and costs in excess of \$225,000. The bulk of these resources are devoted to producing the Master Transportation Plan, which consumes about 3,000 staff hours and nearly \$200,000 in expenditures. This report and the Limited Access State Numbered Highways report -- 40 staff hours and \$2,000 -- were judged by DOT to be useful internally and very useful to individuals and organizations external to the department.

DOT officials indicated that the Special Tax Obligation Bonds and the Special Transportation Fund reports -- 875 staff hours and \$23,500 in total -- were of marginal value to the either the department or individuals and organizations outside of DOT. In assessing the

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Connecticut Public Transportation Commission's Annual Report, DOT noted it had no involvement in developing the report and indicated it was of little benefit to the department. However, DOT stated the report had some value for individuals and organizations external to the department.

According to DOT, the Alterations to the State Highway System Biennial Report -- 90 staff hours and \$4,500 -- is used on a regular basis by the department's planners, engineers, and district personnel. DOT officials noted the report had only modest utility for external sources.

The few legislators responding to the program review committee's survey (seven) indicated they generally reviewed the reports and found them readable. However, when asked what changes they would recommend, three legislators expressed a desire to see the clarity of the reports improve. Another legislator noted concerns about the content of the reports.

During the course of the committee's review, the staff regularly consulted the DOT's Master Transportation Plans and the current version of Special Tax Obligation Bonds and Special Transportation Fund reports. The other three reports -- Alterations to the State Highway System Biennial, Limited Access State Numbered Highways, and Connecticut Public Transportation Commission's Annual Report -- offered little in terms of data for assessing the state's transportation infrastructure renewal program and as a result were rarely used after an initial review.

The program review committee staff found the Master Transportation Plan to be a good document for detailing where the department is headed, but of minimal use for evaluating its past performance. The Special Tax Obligation Bonds and Special Transportation Fund reports were found to have some value, particularly if the focus was on project-level data. However, the data in these reports are not organized in a way that easily facilitates analyzing the department's performance relative to the expectations set forth in the legislation underlying the state's transportation infrastructure renewal program.

Based on the statutory requirements, opinions of DOT officials and legislators, and use of the reports during this study, the program review committee finds:

- *an excessive amount of paper is needed to produce and distribute the six reports given their utility -- a single up-to-date set of the reports is approximately 3.5 inches thick;*
- *DOT is in compliance with report submission deadlines specified in the state statutes;*
- *the content of the reports reviewed is consistent with the requirements of the state statutes; and*

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- *despite the intent of the reporting requirements included in the transportation infrastructure program, the reports produced by DOT do not provide a means whereby the department's performance outcomes can be readily measured over any specified time period.*

Based on the above, the program review committee recommends:

**DOT should notify legislators and others of the availability of all its reports, but distribution should be limited to those who specifically request a copy; further, those requesting copies should be given the option of receiving the report in either paper or diskette form.**

**The reports required under C.G.S. Sections 13b-15; 13b-79a; 13b-79b; 13b-26a; 14-298; 13b-11a(e); and 13b-11(b) should be made available for review through DOT's web site.**

**DOT in consultation with members of the Transportation Committee and the subcommittee of the Appropriations Committee having jurisdiction over the department shall develop by January 1, 1999, a set of performance measures that at a minimum report and track changes in:**

- **bridge conditions in the aggregate and for each state bridge;**
- **road conditions in the aggregate and for all measured road segments;**
- **traffic congestion in the aggregate and for all identifiable road segments; and**
- **safety conditions in the aggregate and for all identifiable locations.**

**The data supporting the performance measures developed by DOT shall be made available through online means to members and staff of the Transportation Committee and the appropriations subcommittee having jurisdiction over the department.**

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## Contract Management Study Compliance

The scope of the study adopted by the program review committee required the staff to conduct a review of DOT's compliance with the recommendations made in the committee's 1995 Contract Management Study. The 1995 study focused on the policies and procedures used by state agencies to ensure that vendors complied with contract specifications. Three state agencies were examined in detail -- the Department of Administrative Services, the Department of Public Works, and the Department of Transportation.

The 1995 study resulted in the committee adopting 19 recommendations, including 10 that applied directly to DOT. The recommendations sought to improve the contract management process within the department by: requiring it to regularly analyze contract monitoring data; strengthening the sanctions that the department could place on contractors who did not perform well; and increasing the amount of training provided to DOT's contract management staff.

Seven of the 10 recommendations relevant to DOT were in the form of administrative directives requiring the department to take corrective action. The other three recommendations were raised as legislative proposals (HB 5465) by the committee during the 1996 session of the General Assembly, but were deleted from before the bill was voted out of the committee. The committee did add substitute language to the bill to create a council to monitor the construction management policies and practices of DOT. This provision was deleted by the Government Administration and Elections Committee during its deliberations on HB 5465. As a result, the bill that arrived on the House floor was void of any provisions relating directly to DOT's contract management responsibilities.

The compliance review presented below deals with the 10 DOT related recommendations in the 1995 contract management study. The committee focused its efforts on updating the data obtained as part of the committee's routine post-study compliance review, which was performed in late 1996.

Table VI-14 summarizes the information obtained by the committee that is related to DOT's response to specific recommendations. The data in the table identifies each recommendation including its position number in the 1995 report, indicates whether it was an administrative or legislative recommendation, notes DOT's position on the recommendation, and describes the actions taken by DOT in responding to each recommendation.

In addition to obtaining information on the degree to which DOT has implemented the recommendations contained in the program review committee's 1995 report, the committee also obtained cost and time data on projects completed in 1997. These measures were used as key indicators of DOT's contract management performance in the committee's 1995 study.

<b>Table VI-14. Summary of DOT's Compliance with Contract Management Study Recommendations</b>			
<i>Recommendation -- summary*</i>	<i>Type</i>	<i>DOT Position</i>	<i>Status</i>
# 5. Routinely analyze change order data	Adm.	concur	Established a design committee to review recurring change order issues and propose corrective actions
# 6. Establish a post construction review process	Adm.	concur	Established a permanent process to review all aspects of selected projects (goal one/month)
# 7. Conduct a cost analysis when the dollar value of changes orders exceeds 10% of the contract value	Legis.	disagree	Believe system in place ensures change orders in excess of 10% are appropriate, but DOT is beginning to track change orders in excess of 10%, with the hope of systematically addressing common causes of overruns.
# 8. Develop a weighted contractor rating system, use the rating as the primary factor in awarding noncompetitive contracts, and with DPW establish a joint contractor performance database	Adm.	concur partially	A contractor performance rating system using weighted factors has been implemented, but the ratings are only one factor in awarding noncompetitive contracts. DOT is developing its own database; it will share all summary data with DPW and specific data as requested.
# 10a. Amend C.G.S. Sec. 49-41b to permit state to retain up to 10 percent of any periodic or final payment to DOT contractor	Legis.	disagree	DOT believes the 2 1/2% retainage is sufficient and in any case is prohibited by the applicable statute from increasing the amount.
# 10b. DOT include as standard contract provision a requirement that contractors complete identified corrective work and supply all required documentation within 90 days of project's substantial completion date	Legis.	disagree	DOT believes its system works well and is concerned that the introduction of the term "substantially complete" may cause unknown problems. (Currently, DOT develops a list of corrections needed after the "semi-final" inspection and does not close out a project until all the corrective work has been done.)
# 11. DOT develop a manual and provide training on monitoring, evaluating, and documenting contractor performance	Adm.	concur	DOT is providing the training to project staff during its annual inspector school. In place of a manual, DOT issues numbered Construction Advisories to define inspection procedures.

Table VI-14. Summary of DOT's Compliance with Contract Management Study Recommendations			
Recommendation -- summary*	Type	DOT Position	Status
# 16. DOT periodically evaluate district office operations regarding construction project management and determine whether successful practices in one district can be applied to others	Adm.	disagrees	DOT believes its regular management practices accomplishes this objective and sees no need to institute a formal evaluation process.
# 17. DOT update and improve its categories for field staff to indicate why change orders are needed	Adm.	concur	This is expected to be a part of the new information system scheduled to be implemented in 1998.
# 18. DOT review all projects idle for one month to determine the cause and take action where needed to resume work	Legis.	concur partially	DOT is more focused on tracking delays to monitor whether a project is on schedule than in worrying about idle days.
# 19. DOT compile and review all available data on work area safety incidents at the end of each construction season	Adm.	disagree	DOT indicates that it is unable to obtain accident data in any systematic and reasonable way and expresses concern that it could do little even if the data were available.
* The number in front of the recommendation is its number in the 1995 Contract Management Report. Source: LPR&IC 1996 compliance report and staff interviews with DOT staff in the November 1997			

In its 1995 study, the committee calculated that approximately 40 percent of DOT contracts exceeded their original cost estimate by 10 percent or more. In terms of time changes, the committee found that about 67 percent were completed after the date originally estimated. The latest data provided by DOT shows that 54 percent of the projects were over their original budget by 10 percent or more and 65 percent took longer to complete than the initially estimate d

Based on the information summarized in Table VI-14 and the performance data obtained from DOT, the committee make the following findings.

- *DOT is in substantial compliance with five of the seven administrative recommendations made by the committee in its 1995 contract management study specifically:*
  - *analysis of change order data;*
  - *establishment of a post-construction review process;*

- 
- *establishment of a weighted contractor evaluation system and related data base;*
  - *manual and training for contract management staff; and*
  - *improvement of the categories used to indicate the need for change orders.*
  
  - *DOT is not in compliance with two of the administrative recommendations made by the committee in its 1995 contract management study specifically:*
    - *periodically evaluating district office operations; and*
    - *compiling and reviewing data on work area safety.*
  
  - *DOT has chosen not to comply with any of the three failed legislative recommendations made by the committee in its 1995 contract management study including:*
    - *performing a cost analysis when project change orders exceed 10 percent of the projects original cost;*
  
    - *retaining 10 percent of final payment until all corrective work has been completed (compliance is prohibited by current law), and including as a standard contractual provision a requirement that contractors complete corrective work and supply all documentation within 90 days of a project being substantially complete; and*
  
    - *reviewing all projects that have been idle for more than 30 days;*
  
  - *The percentage of projects with cost overruns in excess of 10 percent is greater now than when the program review committee did its contract management study in 1995; and*
  
  - *The percentage of projects completed after their originally estimated date, while slightly lower than when the program review committee did its contract management study in 1995, still represents more than half of all contracts.*

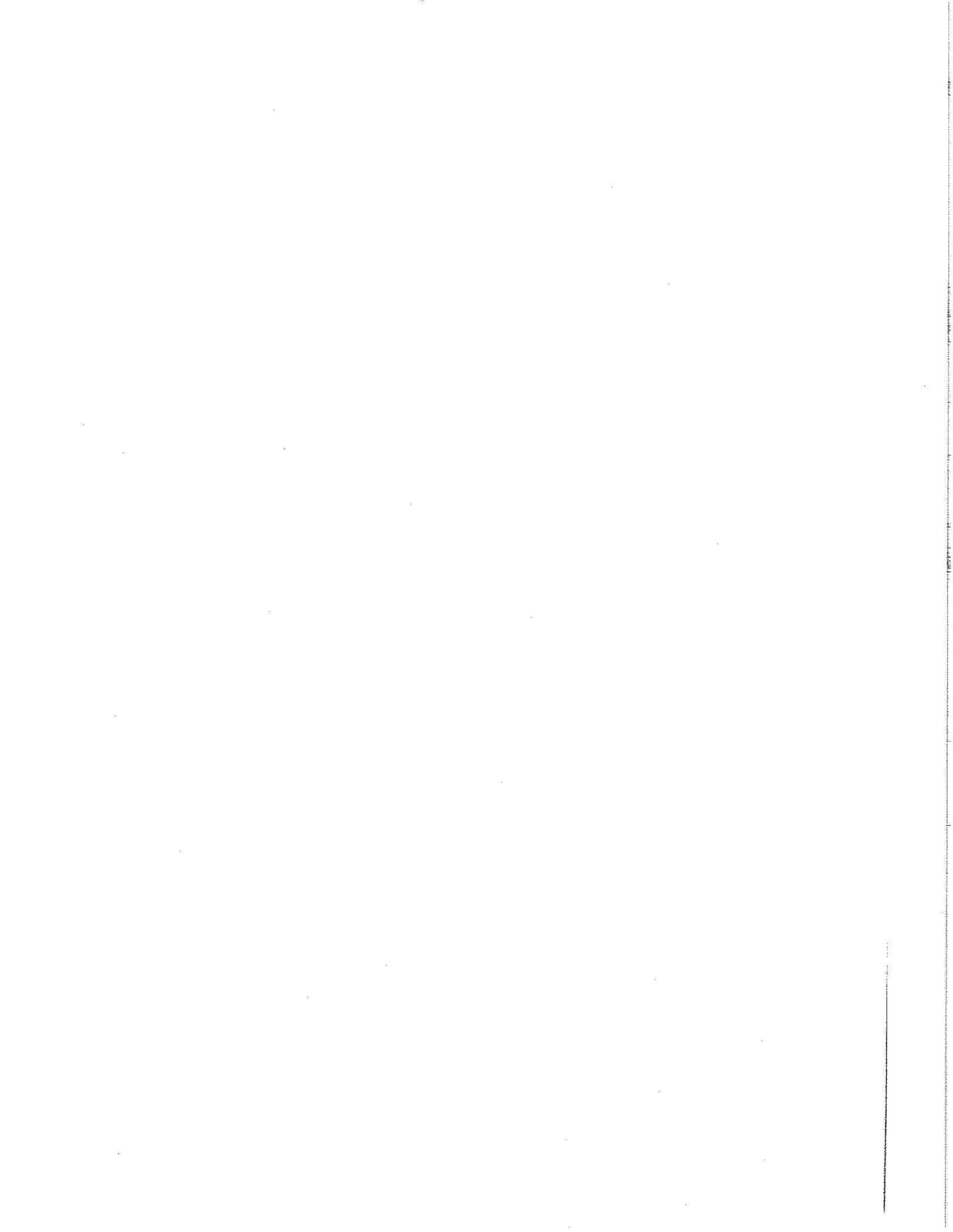
Based on the findings presented above, particularly the lack of progress on cost overruns and time delays, the program review committee recommends:

**Readopt the recommendations contained in the 1995 Contract Management Study that have not been implemented by the Department of Transportation and send a letter to the commissioner urging the immediate implementation of those not prohibited by state statutes. (See Appendix A for relevant 1995 recommendations.)**

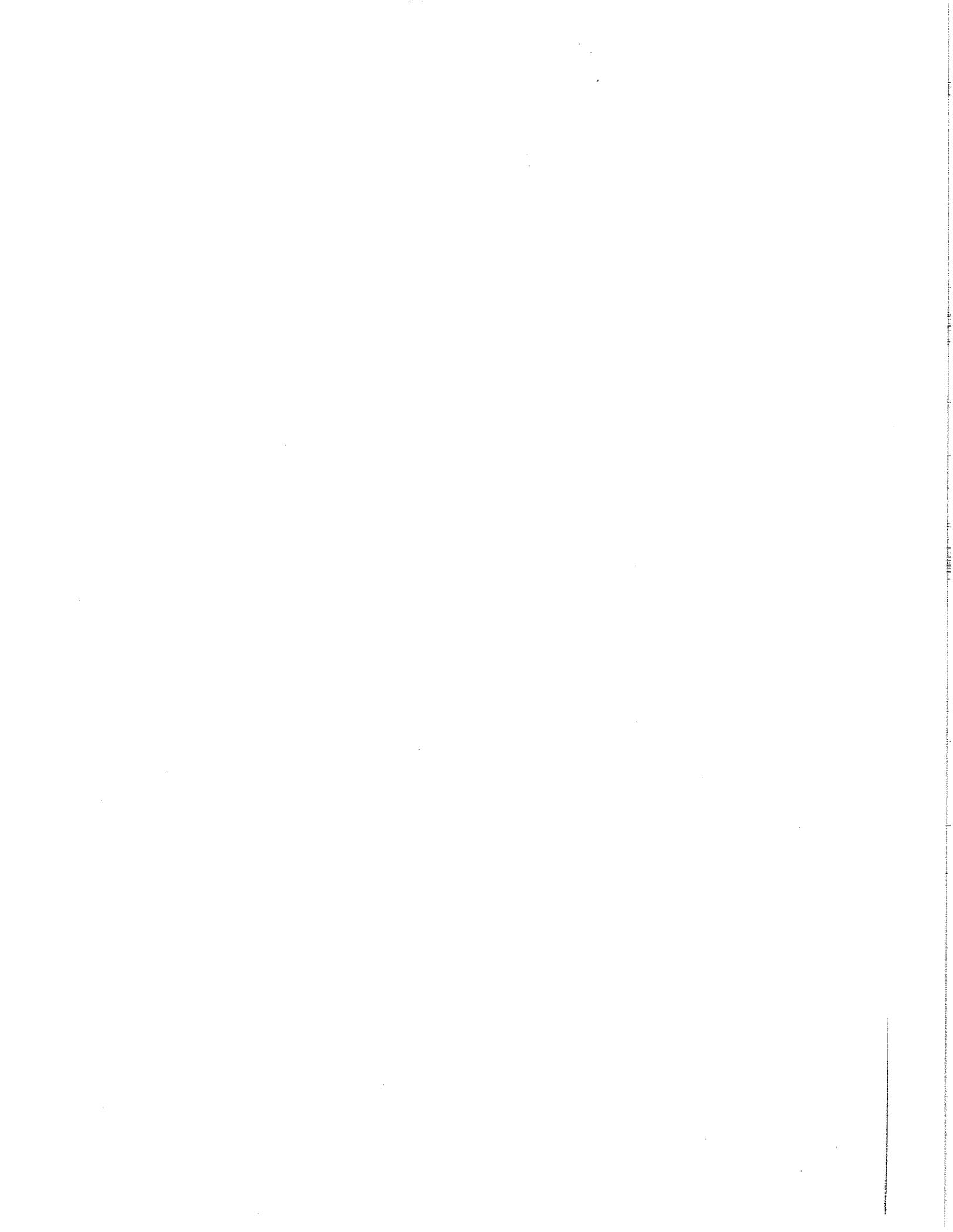
# APPENDIX A

## State Contract Management Recommendations Not Implemented by DOT

- A. If the dollar value of change orders on an individual project is greater than 10 percent of the original value of the contract, then the Departments of Transportation and Public Works shall perform a cost overrun analysis of the project within 10 days of the approval of the change order that triggers the review.
  
- B. C.G.S. Section 49-41b shall be amended to permit the state to retain up to 10 percent of any periodic or final payment to a contractor. DPW and DOT should include as a standard provision in their construction contracts the requirement that contractors must complete identified corrective work and supply all required documentation to the agency within 90 days of the project's substantial completion date.
  
- C. The Department of Transportation central office shall periodically evaluate district office operations with respect to the management of construction projects to determine the areas of difference between each. The central office should then determine whether any of the practices that are successful in one region could be applied in the other districts to improve the department's construction management practices.
  
- D. The Department of Transportation shall review all projects that have been idle for one month to determine the cause of the work stoppage and the steps needed to resume work.
  
- E. At the end of each construction season, the transportation department shall compile and review all available data on work area safety incidents as another way to identify possible improvements.



**APPENDIX B**  
**AGENCY RESPONSE**





STATE OF CONNECTICUT  
DEPARTMENT OF TRANSPORTATION  
2800 BERLIN TURNPIKE, P.O. BOX 317546  
NEWINGTON, CONNECTICUT 06131-7546



Office of the  
Commissioner

February 5, 1998

An Equal Opportunity Employer

Mr. Michael L. Nauer  
Director  
Legislative Program Review  
and Investigations Committee  
State Capitol, Room 506  
Hartford, CT 06106-1591

Dear Mr. Nauer:

The Department has completed its review of the Committee's Final Report on the Transportation Infrastructure Renewal Program – Highway and Bridge Elements. Enclosed is a listing of minor editorial comments for your information. Below are comments on some of the major recommendations contained in the Report.

**Pavement Management:**

The findings presented in the Report are based upon an analysis of 93 roadway segments, or 4.3% of the 2202 segments identified in the Department's 1996 Pavement Condition Report. This small sample was followed through a three-year period without reviewing the changes in segment pavement condition ratings that occurred during the period and without consideration of the other factors that might result in the resurfacing of a roadway segment. This results in the erroneous conclusion that the Department could do a better job in targeting its paving resources. The Department uses the two-pronged approach, presented on page 40 of the report, to structure its annual resurfacing. This combines the knowledge and skill of our field Maintenance Managers with the technology of our Pavement Management System. This approach provides the most effective targeting of our pavement financial resources. The graphs on page 67 support the Department's position and demonstrate that the resurfacing program continues to enhance the condition of Connecticut's pavements. The statement that Connecticut's roads do not fare well when compared to neighboring states is based upon faulty data and does not reflect the actual condition of Connecticut's pavements.

**Roadway Congestion:**

The statement that Connecticut has the worst roadway congestion in the region is completely false. To say that the congestion in Connecticut is worse than New York City, Northern New Jersey, or the greater Boston area is clearly not true. Congestion has increased in Connecticut, as it has in most urbanized areas throughout the nation. As population and population density increase, congestion increases. The report does not recognize Connecticut's leadership in applying technology to reduce traffic congestion. The Incident Management Program on I-95, the CHAMP program, electronic variable message signs throughout the state, and computer-controlled interconnected traffic signal systems are a few examples of Connecticut's efforts to manage and reduce congestion.

**Comparative Performance:**

This entire section is based upon data that the Committee staff knew was not accepted by the American Association of State Highway and Transportation Officials (AASHTO). The North Carolina report is a gross oversimplification of an extremely complex subject. It does not consider the demographics, geology, climate, prevailing wages, traffic volumes, percent of heavy truck traffic, or any of the many other factors that affect the cost of various types of highway and bridge maintenance and construction. For example, the reconstruction cost of one mile of the Interstate Highway system in a rural desert area in Arizona is compared as equal to the cost of reconstructing one mile of the Interstate System in Bridgeport, Connecticut. The average person recognizes that this is not a valid comparison. The General Assembly should not give credence to such a technically flawed report.

**Infrastructure Renewal Financing:**

The Department agrees with the findings presented on pages 91 and 92 of the report. The recommendation, however, is off the mark. The Department does not set the capital financing strategy, the General Assembly does. Historically, the Department has requested that the Pay-As-You-Go program be increased and that a compensating decrease be made to the Bonding program. In the Governor's FY98-FY99 biennial budget, it was requested that the Pay-As-You-Go program be increased by \$20.0 million annually. This request was rejected by the General assembly.

Mr. Michael L. Nauer

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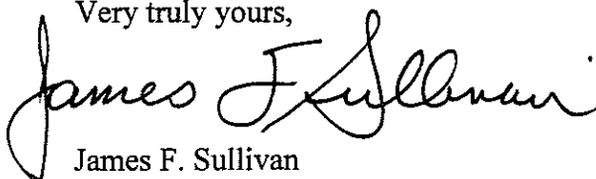
February 5, 1998

**Contract Management Study Compliance:**

The recommendations from the 1995 Contract Management Study that were not implemented by the Department were submitted to the General Assembly and were rejected. The Department remains opposed to these recommendations. Enclosed are the Department's previously submitted comments on these recommendations.

Thank you for giving the Department the opportunity to present its comments to the Committee.

Very truly yours,

A handwritten signature in cursive script that reads "James F. Sullivan". The signature is written in black ink and is positioned above the printed name and title.

James F. Sullivan  
Commissioner

Enclosures



**CONTRACT MANAGEMENT STUDY COMPLIANCE**  
**1995 CONTRACT MANAGEMENT STUDY – PREVIOUS COMMENTS**

**THE DEPARTMENT OF TRANSPORTATION IS NOT IN COMPLIANCE WITH TWO OF THE ADMINISTRATIVE RECOMMENDATIONS MADE BY THE COMMITTEE IN ITS 1995 CONTRACT MANAGEMENT STUDY SPECIFICALLY:**

- PERIODICALLY EVALUATING DISTRICT OFFICE OPERATIONS;**
- AND**
- COMPILING AND REVIEWING DATA ON WORK AREA SAFETY**

**PERIODIC EVALUATION OF DISTRICT OFFICES**

**DOT RESPONSE:** The Department of Transportation (Department) continues to believe that its current practices meet the intent of the committee's recommendations in this area.

The Department of Transportation's Office of Construction conducts periodic meetings of the senior management staff from each district at which management issues, policies and procedures are discussed. The intent of these meetings is to provide general guidance in the management of the Department's construction program, policies and procedures without "micro managing" the district operations. The District management must be free to utilize their work force and resources as efficiently as possible to meet the particular needs of each district and the programs they are responsible for.

As a result of these meetings, many changes and improvements are implemented as the ever-changing needs of the Department warrant. Policies and procedure improvements are implemented through a series of "Construction Advisory Memorandums" which are issued to all Office of Construction staff and consultants working for the Office of Construction.

In addition to the Office of Construction periodic management meetings, the District Engineers meet on a regular basis to discuss issues common to the Districts. The Office of Construction also conducts annual meetings of its inspection staff at which policy and procedure issues are discussed and the staff is encouraged to provide suggestions on improving the operations of the Department in managing its construction projects. Many suggestions are received which are evaluated and implemented to improve the Department's ability to manage its construction projects.

In addition, the Department has established a joint committee with the Connecticut Construction Industries Association whose purpose is to identify issues of concern to the industry and the Department in the management of the construction programs of the Department of Transportation.

The Department's Office of Construction's current practices and review procedures do allow the Department to identify those project management areas that are effective and to implement the successful practices on a statewide basis. Some examples of revised procedures implemented over the past several years include revised construction order processing procedures, improved procedures and methodology for cost-plus work, new procedures for estimating "incidentals to construction" costs, standardization of cost-estimating procedures for survey work, establishment of a standardized plan constructability review process, and an ongoing review of the costs involved in administering construction projects.

### **COMPILING AND REVIEWING DATA ON WORK AREA SAFETY.**

**DOT RESPONSE:** The Department of Transportation takes highway construction safety very seriously. Major accidents are reported to the Office of Construction immediately. Any information considered critical for the prevention of similar types of incidents are conveyed at once to all district offices for action.

Data sources for work zone traffic accidents include Department records, State Police reports and Motor Vehicle Department records. It is not currently feasible to combine this data due to the extensive manpower effort to collect the information. The Department is participating with the other agencies to develop a method to combine the data, but fiscal and manpower resources are not currently available to develop the system.

The Department of Transportation is currently arranging to send an additional six Department of Transportation and Department of Public Safety (State Police) supervisory personnel to a Worksite Traffic Supervisor Training Course sponsored by the American Traffic Safety Services Association (ATSSA). The course will be held March 9-11, 1998. Twenty-two Department of Transportation and two Department of Public Safety employees attended training sessions in February and December 1996. All passed the written examination and are certified as "Worksite Traffic Supervisors" by ATSSA. These individuals are part of the committee established to review work zone safety practices and procedures in the Office of Construction.

The Department has found the course to be beneficial to improving work zone safety. The Department intends to continue providing training opportunities as budgetary funding permits.

In addition, the Department has begun requiring contractors to provide certified Worksite Traffic Supervisors on selected projects.

The Office of Construction also conducts an annual training school for all inspectors during the winter period. Construction safety is included as one of the topics discussed during this yearly event and work zone safety issues which developed during the past construction season are reviewed with all construction field personnel.

**THE DEPARTMENT OF TRANSPORTATION HAS CHOSEN NOT TO COMPLY WITH ANY OF THE THREE FAILED LEGISLATIVE RECOMMENDATIONS MADE BY THE COMMITTEE IN ITS 1995 CONTRACT MANAGEMENT STUDY INCLUDING:**

**- PERFORMING A COST ANALYSIS WHEN PROJECT CHANGE ORDERS EXCEED 10 PERCENT OF THE PROJECTS ORIGINAL COSTS.**

**DOT RESPONSE:** The Department of Transportation currently has a process for reviewing contract increases which exceed ten (10) percent of the contract value. Under the established procedures, the project forces prepare a proposed construction order that then must be reviewed by supervisory personnel at the district level. If the construction order exceeds the amount of the project contingency (typically five percent of the contract value) then additional funding must be required for the project. As part of the funding request, which is outside the normal construction order approval process, an explanation must be provided of the need for the additional funding. This project modification is then reviewed by senior district management, department fiscal personnel, and ultimately must be approved by the Bureau Head. At any point in this process, questions may be raised regarding the appropriateness of the change.

It perhaps should be explained that, in many cases on transportation projects, once the project is under construction there is little flexibility to abandon the work if field conditions require cost increases. In many cases, the existing facility no longer exists when the problem is encountered and there is really no feasible alternative but to complete the project. Even if the project could be conveniently abandoned due to the existence of unforeseen conditions, the costs of terminating a construction contract are significant, many times in the hundreds of thousands of dollars in termination costs.

The Department of Transportation believes that the current system provides safeguards to ensure that any changes in excess of ten percent are appropriate and that senior Department management is informed of the changes being made. The Department continually reviews processes such as the one described and makes refinements to the procedures as appropriate to ensure adequate safeguards are maintained.

**RETAINING 10 PERCENT OF FINAL PAYMENT UNTIL ALL CORRECTIVE WORK HAS BEEN COMPLETED (COMPLIANCE IS PROHIBITED BY CURRENT LAW), AND INCLUDING AS A STANDARD CONTRACTUAL PROVISION A REQUIREMENT THAT CONTRACTORS COMPLETE CORRECTIVE WORK AND SUPPLY ALL DOCUMENTATION WITHIN 90 DAYS OF A PROJECT BEING SUBSTANTIALLY COMPLETE.**

**DOT RESPONSE:** The Department cannot change the amount of retainage it withholds unless the Legislature changes the governing statute (CGS 49-41b).

The amount retained on periodic payments has been gradually reduced by Statute during the past twenty years to its current amount, 2 1/2%.

The construction industry complained, due to the economy, that contractors had insufficient cash flow. Labor rates and costs of materials were significantly increasing and the contractors needed as much of their earnings as possible. In particular, smaller contractors were the majority of those incurring the financial problem.

The Department received numerous complaints from Disadvantaged Business Enterprise (DBE) subcontractors that prime contractors were retaining too much money. (Primes pass the retainage on to the subcontractor.) The reduction of the retainage to 2 1/2% assisted the DBE subcontractors by increasing their cash flow.

Increasing the retainage to 10% will have a negative financial effect on a majority of the contractors working on Department projects.

It will also be detrimental to the smaller contractors and subcontractors, especially those who participate in the DBE and State SBE programs.

The Department of Transportation does not use the term "substantial completion date" in their highway and bridge contracts. "Award," "Start," "Completion," and "Acceptance" dates are documented. The punch-list of work that must be corrected is given to the contractor after the "semi-final" inspection is made. The "Final" inspection is made after all the corrective work is done.

A project cannot be considered "complete" until the final inspection has been held, any required additional work and the final clearing up has been completed, and all equipment and construction signs have been removed.

A project cannot be "accepted" until all required paperwork has been received from the contractor. The 2 1/2% retainage is more than sufficient to cover the waiting for deliverance. Secondly, many of the contractors submit securities in lieu of cash retainage. These securities are tied up and cannot be returned to the contractor until the project is accepted. This in itself is an incentive to a contractor to submit final papers as quickly as possible.

Raising retainage to 10% and requiring contractors to submit all final papers within 90 days of the "completion" date will do little to resolve the majority of close-out problems the Department is presently experiencing.

#### **REVIEWING ALL PROJECTS THAT HAVE BEEN IDLE FOR MORE THAN 30 DAYS.**

**DOT RESPONSE:** The Department of Transportation does monitor project performance and is currently aware of the reasons for project idle periods.

Department project personnel are aware of why contractors have stopped work for more than 30 days. Stoppages that are considered normal for the construction industry are for reasons such as: weather/temperature; contract restrictions; utility delays; labor union strikes; delays in receiving manufactured materials; and major design revisions initiated by the Department.

In a case where a contractor is not on the job for no apparent reason, the district contacts the contractor in a matter of days. It is true the public inquires why a contractor is not working on a project even for one day. Historically the public complains when travel lanes are closed and there is no contractor presence. District management personnel are aware of any lack of activity for no apparent reason and pursue the resumption of work under the contract provisions for enforcement.

The AASHTO-CMS that will be available in late 1998 or early 1999 will have the ability to produce a list of idle projects (30 days or more) with reasons. Because of the difficulty in revising the current CMR system, the Department is pursuing incorporating the review committee's recommendation in the proposed AASHTO-CMS program.

#### **THE PERCENTAGE OF PROJECTS WITH COST OVERRUNS IN EXCESS OF 10 PERCENT IS GREATER NOW THAN WHEN THE PROGRAM REVIEW COMMITTEE DID ITS CONTRACT MANAGEMENT STUDY IN 1995.**

**DOT RESPONSE:** The Department has undertaken a study of all projects completed in the past three years to evaluate the trends that may be causing cost overruns. A committee comprised of senior engineering and construction staff will evaluate the causes of major cost overruns, and develop procedural or technical recommendations aimed at reducing the frequency and cost of project overruns.

In addition, the Design Practices Committee established as a result of the 1995 Contract Management Study has developed a "Quality Control Checklist" which will assure that recurring design issues which result in cost overruns are considered and addressed during the design process.

The Office of Construction has also developed a standardized "Plan Constructability Review" procedure that will be utilized for reviewing plans prior to advertising for bids. This will result in a final "quality control" check of the plans to avoid cost overruns.

It must be noted that the "typical" project development schedule takes several years from initiation to advertising for bids. Construction then takes one or more years for completion. As a result, the quality control initiatives undertaken over the past two years will not begin to show results in improving cost overruns until the projects on which the initiatives were applied are completed in construction over the next several years.

**THE PERCENTAGE OF PROJECTS COMPLETED AFTER THEIR ORIGINALLY ESTIMATED DATE, WHILE SLIGHTLY LOWER THAN WHEN THE PROGRAM REVIEW COMMITTEE DID ITS CONTRACT MANAGEMENT STUDY IN 1995, STILL REPRESENTS MORE THAN HALF OF ALL CONTRACTS.**

**DOT RESPONSE:** Project completion schedules that are determined prior to the start of work are based on completing the project without any delays. The reality of construction and rehabilitation work is that project delays will frequently occur due to external influences. The Department contract provisions define those delays for which a time extension may be granted. Such things as utility delays, unforeseen sub-surface conditions, strikes, extreme weather (i.e., hurricanes, floods, etc.), environmental issues, etc., all contribute to reasons a project is not completed on time.

The only way to reduce the number of projects that extend beyond the original completion date would be to revise the specifications to state that there would be no contract time extensions granted. This would not be in the State's best interest since contractors would then have to include a contingency in their bid for acceleration costs and other costs associated with delays. The courts have also found that exculpatory clauses of this type are not enforceable and the State would, therefore, be subject to cost claims resulting from such contract language.

It would also not be in the State's interest to provide some additional calendar days to complete the work in the event delays would occur. Projects could then take longer to complete when the time was really not needed resulting in inconvenience to the traveling public.

Department contracts include liquidated damage provisions which are applied when contractors exceed the allowable contract time and the delays are not excusable under the contract