KPMG

A PERFORMANCE REVIEW

OF THE

NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

FINAL REPORT

MAY 1998

KPMG Peat Marwick LLP

150 Fayetteville Street Mall
Suite 1200
Post Office Box 29543
Raleigh, NC 27626-0543

Telephone 919 664 7100

Telefax 919 664 7250

May 18, 1998

Mr. Ralph Campbell, Jr.
State Auditor of North Carolina
Office of the State Auditor
300 North Salisbury Street
Raleigh, North Carolina 27603

Dear Mr. Campbell,

This report presents the results of our performance audit of the North Carolina Department of Transportation (NCDOT). The audit was conducted in accordance with Government Auditing Standards issued by the Comptroller General of the United States.

Purpose and Scope

KPMG Peat Marwick LLP, with assistance from MGT of America, has undertaken a comprehensive performance audit of the NCDOT to accomplish the following goals:

- Provide an objective analysis of the Department's operations
- Assess whether the Department's structure, functions and processes are meeting the public's needs
- Evaluate the Department's programs, functions and operating procedures
- Recommend changes to improve operational efficiency and responsiveness
- Communicate sensitive issues and complex solutions in a way the public can understand and accept

This audit, performed for the North Carolina Office of State Auditor, covered the public input process, Transportation Improvement Program (TIP) process; right of way procedures; preconstruction, construction and maintenance functions; long-range planning process; management structure and customer service; and personnel procedures. The Division of Motor Vehicles was not included in the scope of work.

Background

NCDOT is responsible for planning, engineering, constructing and maintaining the State's transportation system. This includes managing one of the largest state-maintained highway systems in the nation, as well as a sizeable network of seaports, airports, railroads, public transit, bicycle and pedestrian traffic and safety.

As North Carolina's economy continues to grow, the demands for transportation projects—and the stakes associated with them—steadily increase. At the same time, the Department is undergoing major internal changes, with the arrival of Secretary of Transportation Norris Tolson and the implementation of recent initiatives to improve the Department's operations.

Results in Brief

Our review found that the Board and Department of Transportation do not have a formal, documented methodology for considering overall construction and maintenance needs and translating these needs into a viable financial strategy. There is also a significant gap between the resources set aside for the State's Transportation Improvement Program and the projects the Department is committed to build. While over $8 billion has been programmed for projects from fiscal years 1998 through 2004, there is an additional $6 billion worth of "identified future needs" projects in the program. Moreover, the Department's projected costs of implementing these projects do not take into account the effect of inflation or project expansion, which could dramatically increase actual costs.

Many of the Department's highway project development functions are built on a foundation of solid management practices and operating procedures. However, the Department is being challenged to meet its ambitious letting schedule, as evidenced by over $400 million of projects which needed to be postponed for this federal fiscal year. The Department also has had difficulty securing environmental permits on a timely basis.

While the State is building new roads, it is not adequately maintaining its transportation infrastructure as required. As a result, road conditions are deteriorating, threatening North Carolina's reputation as the "Good Roads State." In addition, the State has a high number of substandard bridges (those that are in poor condition or are functionally obsolete) compared to its peers. Our analysis indicates that the State does not have the resources in place to adequately address current and emerging maintenance needs.

Recommendations

Our report provides numerous recommendations for improvement in the areas of: strategic management and customer service; statewide planning; public input; transportation improvement programming; project planning and preconstruction; highway construction, maintenance, and operations; personnel practices; finance; and administration.

Conclusion

Actions taken by Secretary Norris Tolson are already improving the Department's performance and morale. However, important issues remain to be resolved. The Board and Department of Transportation will need to make difficult choices to address the backlog of road and bridge maintenance and the lack of adequate funding for commitments to new highway projects. The eventual success or failure in addressing these and other challenges identified in this report will depend on a focused, coordinated approach involving the General Assembly, Governor, Secretary, Department managers and employees, and people of North Carolina.

KPMG Peat Marwick LLP

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EXECUTIVE SUMMARY

Transportation is vital to North Carolina's economic vitality and high quality of life. Managing the State's vast transportation system—a critical responsibility—has been entrusted to the Department of Transportation (NCDOT) by the government and people of North Carolina.

The purpose of this audit, according to the State's Request for Proposals, was to:

- Provide an objective basis for considering and improving NCDOT's operations
- Assess whether the Department's current structure, functions and processes are meeting the public's needs and allowing sufficient opportunity for public input
- Evaluate the programs, functions and operating procedures of the Department
- Recommend changes to improve operational efficiency and responsiveness to the public

KPMG Peat Marwick LLP, with assistance from MGT of America, spent the last three months conducting this audit, in accordance with Government Auditing Standards, issued by the Comptroller General of the United States. In addition to this performance audit, the Office of the State Auditor is undertaking separate reviews of the Highway Trust Fund, NCDOT computer systems, and selected maintenance units.

To conduct this performance audit, KPMG Peat Marwick and MGT of America performed numerous fact-finding and analysis activities which included:

- Reviewing budgets, organizational charts, planning documents, maintenance reports, technical standards and other documentation
- Surveying nearly 600 Department managers, supervisors and selected staff to determine employee responsibilities, reporting relationships, and strengths and concerns of functional groups
- Conducting over 160 interviews with internal and external stakeholders
- Making site visits to Highway Divisions in various parts of the State
- Comparing NCDOT to transportation departments in other states

This audit was conducted at a time when the Department was undergoing a major transition. Secretary Norris Tolson, charged by Governor Hunt to develop a plan for action in 45 days, announced significant changes to the organization's structure, staffing and priorities in March 1998. As a result, we have been evaluating an evolving—not static—organization. Our findings and conclusions are presented with this understanding, in the hope of helping the Department move further forward.

FINDINGS AND RECOMMENDATIONS

The performance audit includes numerous recommendations for improvement. These recommendations, and the analysis that supports our conclusions, cover 12 areas:

- Strategic Issues and Management Structure
- Statewide and Long Range Planning
- Transportation Programming Development
- Public Input
- Project Planning and Preconstruction
- Right of Way
- Divisions
- Construction
- Maintenance
- Operations
- Personnel
- Finance and Administration

Key findings and recommendations are presented below.

Transportation Finance. Our review found that the Board and Department of Transportation do not have a formal, documented methodology for considering overall construction and maintenance needs and translating these needs into a viable financial strategy. This performance review also found that construction program and maintenance needs of the Department cannot be addressed at current funding levels. More specifically:

- We estimate a *shortfall of over $2.1 billion* for the 2,281 projects funded in the current FY 1998-2004 Transportation Improvement Program.

- Over *$6 billion of projects* in the Transportation Improvement Program are "identified future needs" *for which no funding is currently provided.*

- To complete all the projects in *the current TIP would require approximately 26 years* at current funding levels.

- According to the Department's management systems, the *roadway and bridge maintenance backlog is increasing.* For example, pavement resurfacing is *underfunded by approximately $95 million per year.*

These challenges will require the Board and Department of Transportation to take aggressive steps to increase funding and/or scale back these programs to manageable levels. The Board and Department of Transportation will also need to institute more effective management practices to ensure that transportation programs reflect the State's priorities and available resources.

Long-Range Transportation Planning, Programming and Public Input. This review found numerous strengths in the way that the Department conducts its long-range planning, programming, and public input processes. Several concerns were found as well, including the following:

- The goals set in the Statewide Transportation Plan are not formally and consistently measured.
- The statewide planning process does not devote sufficient resources to studying the external forces shaping travel and transportation needs.
- North Carolina's cities, counties, and Metropolitan Planning Organizations are not sufficiently involved in the process for setting transportation priorities.
- Responsibility for managing and conducting the Department's public input processes could be better coordinated.

To address these concerns, the Department will need to enhance the statewide planning process and provide more effective coordination for soliciting and responding to public input. The Board and Department of Transportation will also need to consider various ways to strengthen the involvement of North Carolina's localities and Metropolitan Planning Organizations in setting transportation funding and project priorities.

Project Planning, Preconstruction and Right of Way. The review found that many of the Department's highway project development functions are built on a foundation of solid management practices and operating procedures. However, the Department faces several operational and workload issues in this area:

- The Department is challenged to meet its ambitious letting schedule— over $400 million of projects were postponed this federal fiscal year.
- The Department has had difficulty securing environmental permits on a timely basis.
- Time allotted for right of way activities is inconsistent with Department guidelines.

The Department is actively addressing these challenges, and will need to continue to do so in order to meet the State's transportation improvement objectives.

Construction, Maintenance and Operations. Our review of the Department's field-oriented highway functions yielded a positive overall assessment: numerous strengths were identified in each of these areas. Areas where improvements should be made include the following:

- The incentives for timely construction project completion could be stronger.
- Construction project scheduling requirements need to be strengthened.
- Maintenance underfunding has impeded a strategic approach to maintenance.

The Department will need to change several construction and maintenance procedures to address these and other concerns.

Department Management and Administration. Our review of the Department's overall management practices, personnel practices, and finance and administration units resulted in several key findings:

- The Transportation Program Plan and the program/performance budget do not adequately address funding shortfalls or strategies for reducing unmet construction and maintenance needs.
- Budgets are developed with limited involvement of NCDOT managers.
- The Department lacks an effective information technology strategic planning process.
- The Department is increasingly challenged to recruit and retain engineering and technical staff.

The Department will need to continue improving its budgeting, information systems planning, and other strategic management activities in order to address these concerns.

A complete listing of this performance audit's findings and recommendations in provided in Exhibit E-1 on the following pages.

Exhibit E-1: Summary of Findings and Recommendations

STRATEGIC ISSUES and MANAGEMENT STRUCTURE	
Findings	**Recommendations**
The Board and Department of Transportation lack an effective process for developing a transportation finance strategy.	Restructure the process for defining the State's maintenance and long-range transportation needs.
The Transportation Program Plan and the program/performance budget do not adequately address funding shortfalls or strategies for reducing unmet construction and maintenance needs.	Use the Transportation Program Plan and the program/performance budget to address and document transportation financing and operating strategies.
The strategic planning process is not fully integrated with the Department's management practices and operations.	Use the Transportation Program Plan to guide and monitor day-to-day operations of NCDOT.
The Department lacks an effective Department-wide information technology strategic planning process.	Create a Department-wide information technology strategic planning process.
The customer service improvement initiative started last year has begun to deteriorate due to a lack of management support and attention.	Revitalize and refine the customer service improvement program.
The Department's organizational structure offers additional opportunities for improvement over the long term.	Consider additional changes to the organizational structure over the next two years.

Exhibit E-1: Summary of Findings and Recommendations (continued)

STATEWIDE AND LONG-RANGE PLANNING	
Findings	**Recommendations**
The goals set forth in the Statewide Transportation Plan are not formally and consistently measured.	Develop performance indicators for addressing how well NCDOT meets the goals and objectives of the Statewide Transportation Plan.
The process for evaluating transportation research efforts is not linked sufficiently to statewide transportation planning.	Enhance the research program by linking efforts to goals established in the Statewide Transportation Plan.
The statewide planning process does not devote sufficient resources to studying the external forces shaping travel and transportation needs.	Devote resources to understanding the external forces shaping travel and develop transportation strategies that address these forces.
The Statewide Planning branch has limited resources to carry out its mandated multi-modal planning activities.	Consider providing additional resources to, and/or changing the responsibilities of, the Statewide Planning branch.
TRANSPORTATION PROGRAM DEVELOPMENT	
Findings	**Recommendations**
We estimate a shortfall of over $2.1 billion for projects funded in the current FY 1998 - 2004 TIP. To complete all the projects in the current TIP would require approximately 26 years at current funding levels.	Develop, communicate and implement a strategy for addressing the TIP funding shortfall.
North Carolina's cities, counties, and Metropolitan Planning Organizations are not sufficiently involved in the process for setting transportation priorities.	Evaluate the role of North Carolina's cities and counties in setting transportation priorities, and strengthen involvement with the Metropolitan Planning Organizations.
The Department has proposed switching from a one-year to a two-year TIP development cycle.	Adopt a two-year TIP development cycle, as proposed by the Department.
PUBLIC INFORMATION	
Findings	**Recommendations**
Responsibility for managing and conducting public input procedures could be better coordinated.	Expand the role of the Citizens Participation Unit to coordinate all program and project-specific public involvement at NCDOT.
NCDOT must continue to increase its responsiveness to public concerns.	Enhance efforts to explain the various project development processes and expand the types of public input available.

Exhibit E-1: Summary of Findings and Recommendations (continued)

PROJECT PLANNING AND PRECONSTRUCTION	
Findings	**Recommendations**
The Department is challenged to meet its ambitious letting schedule— over $400 million of projects were postponed this federal fiscal year.	Continue to review and balance the Department's construction letting schedule.
NCDOT has had difficulty securing environmental permits on a timely basis.	Secure external agency approval earlier in the project development cycle. Improve the process for addressing mitigation commitments. Develop a general memorandum of understanding between the Department and environmental agencies.
Planning and Environmental staff lack appropriate project management authority.	Delegate project management responsibility to project planning staff.
Planning and Environmental lacks a clear, concise policies and procedures manual.	Complete development of an up-to-date environmental policies and procedures manual. Develop an up-to-date environmental permits manual.
The procurement of engineering consultants is not sufficiently coordinated.	Consolidate procurement responsibilities for consultant engineering.
Technology is not being utilized fully within the Planning and Environmental branch.	Create an initiative to resolve technology issues in Planning and Environmental.
There are several units involved in surveying, mapping, and geographic information management.	Consider the combination of Location and Survey, Photogrammetry, and Graphical Information Systems (GIS) into one organizational unit.
The process for selecting and procuring technical equipment for the Location and Survey unit is too cumbersome.	Establish an annual equipment budget for the Location and Survey unit.
Location and Survey unit does not have sufficient staff to cover Division 12.	Establish a location field office in Division 12 with a staff of eight.
The process for stamping plan sheets is too cumbersome.	Request the State Board of Professional Registration to change the procedure for stamping plan sheets.

Exhibit E-1: Summary of Findings and Recommendations (continued)

RIGHT OF WAY	
Findings	**Recommendations**
A recent right of way claim settlement indicates the need to make changes in the settlement review process.	Continue to take steps to strengthen the right of way settlement review process.
The time allocated for right of way is inconsistent with Department guidelines.	Continue to adjust project schedules to provide a more realistic estimate of time required for completion of right of way activities.
Many right of way procedures are paper intensive.	Increase automation for right of way processes. Complete installation of wiring and software to ensure that Right of Way personnel can print files electronically.
DIVISIONS	
Findings	**Recommendations**
The organizational structure of the Divisions lacks consistency.	Consider a more consistent Division organizational structure.
The Division Design and Construct function is developing without adequate coordination and consistency.	Provide enhanced monitoring and guidance for the Division Design and Construct function.
CONSTRUCTION	
Findings	**Recommendations**
The incentives for timely construction project completion need to be stronger.	Strengthen incentives for timely construction project completion.
Construction project scheduling requirements need to be strengthened.	The Department and its construction contractors should adopt enhanced scheduling methods.
The Department lacks a standard set of construction program performance measures.	Strengthen construction program performance measures.
The Department has been developing its Highway Construction and Materials System (HiCAMS) since 1994.	Implement up-to-date construction management software as soon as possible.
NCDOT lacks a formalized training plan to ensure that the future leaders and managers in construction are adequately trained, both professionally and technically.	Develop training plans and requirements for the professional and technical development of personnel for key construction positions.
A majority of roadway and bridge construction stakeout surveys are being accomplished by NCDOT survey crews.	Incorporate construction stakeout surveys in construction contracts.

Exhibit E-1: Summary of Findings and Recommendations (continued)

MAINTENANCE	
Findings	**Recommendations**
The annual roadway maintenance funding allocation has not kept pace with the growth in maintenance responsibilities. The current annual pavement resurfacing funding allocation represents a shortfall of approximately $95 million. Roadway condition is deteriorating. The current funding allocation for bridge maintenance has not been adequate to address bridge maintenance backlog.	Increase the funding allocation for maintenance to address routine maintenance needs and the maintenance backlog.
Maintenance underfunding has impeded a strategic approach to maintenance.	Develop a strategic approach for maintenance.
The Roadway Maintenance unit lacks certain performance objectives/measures for core maintenance functions.	The Roadway Maintenance unit should develop specific, measurable performance objectives for each core maintenance function.
The Bridge Maintenance unit requires improved automation.	Enhance automation in the Bridge Maintenance unit.
The bridge maintenance database needs to be expanded.	Expand the bridge maintenance database.
Contract management training is needed at the Highway Division level.	The Department should provide contract management training at the Division level.
OPERATIONS	
Findings	**Recommendations**
The Department does not have an effective inventory of installed traffic control devices.	Develop an inventory and management system to monitor and maintain traffic control devices.
Traffic signal systems and pavement markings are becoming more complex.	Establish stringent certification requirements for installing and repairing NCDOT's traffic control devices.
Funding for the Division of Highway's buildings and facilities is inadequate.	Request adequate funding for the Capital Improvement Program.
Procurement of specialty equipment takes too long.	The planning for equipment procurement process should start early.
The current process for issuing oversize/overweight permits involves manual verification of the proposed routes.	The Oversize/Overweight Permit Office should evaluate an automated permit system implementation.
A large majority of permits issued are manually faxed to applicants.	The current permit system should be upgraded to provide a direct fax capability.
The present inventory turnover rate does not meet the Department's goal.	Continue efforts to meet inventory turnover goals.

Exhibit E-1: Summary of Findings and Recommendations (continued)

PERSONNEL	
Findings	**Recommendations**
The current performance appraisal system is not effective.	Consider ways to increase the effectiveness and credibility of the performance appraisal system.
The Department is being increasingly challenged to retain engineering and technical positions.	Increase efforts to retain engineering and technical staff.
The current approach for providing hiring managers with information regarding applicant ethnicity is excessive and inappropriate.	Discontinue providing information regarding applicant ethnicity to hiring managers.
The Personnel Office is excessively involved in the process for routine reorganization of Departmental units.	Refocus the Position Management section on updating the Department's position classifications and descriptions.
The Personnel Office has two vacant positions that could be eliminated.	Consider eliminating or reallocating the two vacant positions in the Personnel Office.
FINANCE AND ADMINISTRATION	
Findings	**Recommendations**
Budgets are developed with limited involvement by NCDOT operating management.	Create a Budget Office responsible for establishing and managing a budget development process that is founded on resource requests from operating units.
The Department lacks an effective customer service structure for management information systems issues.	Consolidate the responsibilities for networking and information systems training.
The current automated fiscal systems have limited capabilities for producing ad hoc reports requested by managers.	Continue to modify and improve the current fiscal system until the new system is implemented.
Functions related to worker safety and injury compensation are organizationally separated and misplaced.	Establish a new Workers' Safety unit within the Personnel section by merging the Workers' Compensation and Safety and Loss Prevention units.
Research and Policy Analysis functions are limited to customer-satisfaction market research studies.	Reformulate the Research and Policy Analysis unit so that it becomes a Department-wide resource for improved customer service.
Internal Audit reports to the Deputy Secretary for Administration.	Establish Internal Audit as a staff function reporting directly to the NCDOT Secretary.
Only FHWA-mandated audits and certain other financial audits of the highest priority are currently being performed.	Establish a comprehensive internal audit program, consisting of financial, compliance and operational audits.
The Management Assessment unit consists of five dissimilar functions.	Eliminate the Management Assessment unit and transfer the functions to other units.
Contractor EEO compliance problems are not identified while construction projects are in process so that corrective actions can be taken.	Require monthly reports from contractors of actual EEO participation.
Purchasing processes payment approval requests for imprest cash and transmittal emergency purchases even though payment has already been made.	Streamline the imprest cash and transmittal emergency purchases approval.

1. INTRODUCTION

The North Carolina Department of Transportation (NCDOT) is responsible for managing the State's vast transportation system, including highways, bridges, airports, seaports, railroads, mass transit, bicycles and pedestrians and safety. What the Department does—and how well it performs—thus plays a major role in North Carolina's economic development, environment and quality of life.

To determine the quality of services and consider opportunities for improvement, the State Auditor and former Secretary of Transportation Garland Garrett called for a performance audit of NCDOT. This report presents the results of that audit, conducted by KPMG Peat Marwick LLP with assistance from MGT of America. In this introductory chapter, we explain the audit in terms of background, scope, objectives and methodology; the following chapter presents an introduction to the Department itself. This information provides a framework for understanding the findings and conclusions addressed in the remainder of the report:

- Strategic Issues and Management Structure
- Statewide and Long Range Planning
- Transportation Programming Development
- Public Input
- Project Planning and Preconstruction
- Right of Way
- Divisions
- Construction
- Maintenance
- Operations
- Personnel
- Finance and Administration

BACKGROUND

NCDOT manages, and the Board of Transportation oversees, a complex transportation system with a multi-billion dollar annual budget. These are big dollars and high stakes—for communities, developers, businesses and current and future citizens.

Recent allegations of impropriety at the Board level have had a significant effect at the Department level. For example, reports of the last few months have suggested that the process for funding safety projects such as stoplights and turn lanes may have been subject to political influences; that the public may lack the opportunity to provide adequate input into the process; and that the system of allocating funds between highways and mass transit may not be equitable.

NCDOT is also facing the general issues that plague transportation departments across the country:

- A growing infrastructure that must be maintained to avoid huge deferred costs
- Environmental and quality of life considerations that require increasing levels of analysis and public involvement

- Increasing pressure from constituents to enhance and expand the transportation network
- Increasing demands of high-tech highways

Some changes have already been made to improve the operation of the Board and the Department. Early this year, Governor Hunt appointed a new Secretary, Norris Tolson, and charged him with developing a plan for change within 45 days. Secretary Tolson has taken action to change the Department's organizational structure, shift people, and reorder priorities, and more changes are on the way.

In addition, Secretary Tolson has been cooperative with the audits of NCDOT and the Board of Transportation called for by the State Auditor and former Secretary. KPMG's audit of the Board was released in April and is now being considered by the General Assembly. This report focuses on the Department's operation and activities, as outlined below.

OBJECTIVE

Our audit is intended to help NCDOT achieve its goal: to greatly enhance the quality of service provided by the Department, its management and employees. Specifically, the objectives are:

- To provide an objective basis for considering and improving the Department's operations
- To assess whether the Department's current structure, functions and processes are meeting the public's needs and allowing sufficient opportunity for public input
- To evaluate the programs, functions and operating procedures of the Department
- To recommend changes to improve operational efficiency and responsiveness to the public
- To communicate sensitive issues and complex solutions in a way the public can understand and accept

SCOPE

Our performance audit covered the following areas, as directed by the State Auditor:

- Public input process
- Transportation Improvement Program (TIP) process
- Right of way procedures
- Preconstruction, construction and maintenance functions
- Long-range planning process
- Management structure and customer service
- Personnel procedures

The Division of Motor Vehicles was not included in the scope of work.

METHODOLOGY

This audit was conducted in accordance with the *Government Auditing Standards*, issued by the Comptroller General of the United States. We organized our work to follow the three major components of a "Yellow Book" performance audit: audit work plan, field work and reporting. The field work portion of the audit relied on the following activities.

Reviewing data provided by the Department. We reviewed reams of information to familiarize ourselves with the various divisions of the Department and to gain a clear understanding of the issues it faces. This included reviewing applicable organization and program descriptions and responsibilities, planning and budget documents, routine maintenance and financial reports, technical standards and guidelines, administrative operating policies and procedures documentation, project databases and historical materials.

Analyzing Job Activity Questionnaires (JAQs). We distributed 581 confidential questionnaires to managers, supervisors and selected staff to compile information on employee responsibilities, reporting relationships and strengths and issues of functional groups. Five hundred nineteen questionnaires were completed and returned, for a response rate of almost 90 percent. The questionnaires were invaluable in providing feedback on many aspects of the NCDOT from those who are actually doing the work.

Conducting interviews. The team conducted over 160 interviews to cover a wide range of perspectives, functions and services. Among those we interviewed:

- Department executives
- Board of Transportation members
- North Carolina legislators
- High-level Department managers
- Selected staff in Raleigh and the field offices
- United States Department of Transportation representatives
- Metropolitan Planning Organizations
- Members of the Association of General Contractors, North Carolina chapter
- Consulting engineering firms
- Local transit agencies

These interviews provided comprehensive information on the roles and responsibilities of the various divisions, as well as candid views on barriers to effective management of NCDOT resources and activities.

Conducting site visits. To gain a deeper understanding of NCDOT's operations, we made site visits to offices in various parts of the State. These visits took us to four of the State's 14 Highway Divisions: Division 3 (Wilmington), Division 7 (Greensboro), Division 10 (Charlotte-Mecklenburg) and Division 13 (Asheville).

Obtaining and analyzing comparative statistics. As part of this audit, we compared NCDOT to transportation departments in 13 neighboring states, as well as to regional and national averages, on key

variables. Our assessment also included interviews with knowledgeable representatives from programs in other states. The information gathered through these means enabled us to identify potential strengths and weaknesses in the Department's management practices, operational efficiency and effectiveness, organizational structure and staffing levels.

DEPARTMENT IN TRANSITION

This audit was conducted from February to May 1998—a period during which the Department was undergoing a major transition. The appointment of the new Secretary was followed by significant organizational changes, personnel shifts and a reordering of priorities. As a result, the NCDOT we encountered when we began our work is not the same as the one in place today.

We present this report in the hope that the recommendations for change outlined here will help the Department in its efforts to meet the challenges it currently faces and those that lie ahead.

2. DEPARTMENT OVERVIEW

The North Carolina Department of Transportation (NCDOT) is responsible for the State's transportation system, which includes an extensive highway system, seaports, airports, railroads and public transit. North Carolina's residents and businesses rely on this transportation system for the effective and safe movement of people, goods and services throughout the State. What the NCDOT does also has a tremendous impact on economic development and quality of life in North Carolina's neighborhoods, communities and regions.

It is hardly surprising that the Department's activities are among the most visible of all State government functions. But to understand how well the Department is fulfilling its responsibilities—and how it can improve—it is necessary to grasp the basics of this vast and complex organization.

This chapter provides that overview in six areas:

- Brief History
- Challenges
- Organization and Staffing
- Revenues and Expenditures
- Transportation Improvement Program
- Key Measures

This overview establishes the framework for the performance review detailed in subsequent sections of this document.

BRIEF HISTORY

When the North Carolina General Assembly created the Highway Commission in 1915, a major part of the responsibility for roads resided at the county level. By 1921, the legislature took additional steps toward a unified statewide highway system by authorizing the State to take over 5,500 miles of county roads and approving a highway bond issue for a road system to connect each of the 100 county seats. These actions helped North Carolina earn its reputation as the "Good Roads State."

In the Depression of the early 1930s, the State assumed a greater role in the highway system, taking on responsibility for virtually all county roads. However, the Highway Fund—which provided a stable revenue source through gas taxes and highway bonds—became a tempting source of funds for other, unrelated purposes. In 1947, the General Assembly banned the further use of Highway Fund revenues for General Fund purposes.

Even with this dedicated revenue source, the State had to add a series of taxes and fees and issue additional bonds to keep up with the growing demand for highways. To address this long-term need, the Highway Trust Fund Act was passed by the General Assembly in 1989, providing billions of dollars for transportation projects through increased gas taxes and motor vehicle fees. These revenues help fund new and improved intrastate roads and urban "loops" around seven metropolitan areas. In November 1996, North Carolina voters approved a $950 million highway bond package, which included $500 million for accelerating construction of the seven urban loops.

CHALLENGES

Like all public agencies, the NCDOT is facing both increasing demands for services and an increasing need to prove its value to the public. Among its greatest challenges are the following:

Geography. North Carolina's widely varying terrain stretches for hundreds of miles, with coastal plains in the east and mountains to the west. Its population density varies greatly from major metropolitan areas to medium-sized emerging cities and rural communities. From a transportation point of view, these conditions pose challenges in engineering and securing public input; from a political point of view, the issues are about equity and getting a "fair share" of the State's transportation resources.

Economic growth. North Carolina's tremendous growth has outpaced projections, at times creating pressures which the transportation system was not designed to handle. There is increasing congestion in metropolitan areas, accompanied by the growing challenge of getting people to and from work. Some areas of North Carolina are expressing interest in enhancing public transit, while others are seeking additional highways to promote economic development and produce jobs. Recent accomplishments—such as the development of Global TransPark and the recent announcement of a new Federal Express hub in Greensboro—reflect the State's recognition of the close link between transportation and economic development.

Competing needs. The State is being forced to balance the demand for new highways and roads with the need to maintain and improve the existing system. There is also a need to accommodate and incorporate other modes of transportation (such as public transit, bicycle, and rail) into the State's overall transportation system.

Public controversy. Recent allegations have placed the NCDOT under the spotlight of media and public attention. Governor Hunt responded by appointing a new Secretary, Norris Tolson, and charging him to develop a plan for change within 45 days. The Secretary's plan, announced in March 1998, has already resulted in significant changes—in personnel, structure and priorities—and created a different environment within the Department. As additional changes are forthcoming, the NCDOT continues to be an organization in transition.

Changing expectations. NCDOT, like other public organizations across the State and the nation, is being asked to do more for less. Taxpayers are no longer willing to let government agencies make important transportation decisions on their own: the public wants to be involved in the process and to measure the results.

ORGANIZATION AND STAFFING

NCDOT is headed by a Secretary, appointed by the Governor; its operations are overseen by a 26-member Board of Transportation, which the Secretary chairs. In March 1998, the Department's organization changed. It is now organized into six major divisions:

- Transportation
- Motor Vehicles
- Planning and Environmental
- Fiscal

- Administration
- Personnel

The Transportation Division carries out the State's transportation program. In this capacity, it is responsible for the Division of Highways as well as rail, public transportation, bicycle and pedestrian, aviation, ferry and safety. The Division of Highways—by far the largest segment of the organization—manages the entire highway system, from design through construction and maintenance. It serves the State through a central office and 14 highway divisions. *(The Department's organization is further detailed in Chapter 3, Strategic Issues and Management.)*

Exhibit 2-1: NCDOT Divisions

Source: NCDOT

Three other divisions—Fiscal, Administration and Personnel—support these efforts, while the Planning and Environmental Division focuses on environmental and other public concerns. The Division of Motor Vehicles, which is responsible for licensing drivers and registering motor vehicles, was not included in the scope of our study.

The Department has over 12,000 full-time employees. A comparative analysis showed that this staffing level is comparable to other state transportation agencies charged with managing an extensive highway system.

REVENUES AND EXPENDITURES

NCDOT's budget is one of the largest and most complex in State government. In fiscal year 1998, revenues from federal, state and local sources amounted to approximately $2.8 billion. This section provides a high level view of where that money comes from and where it goes.

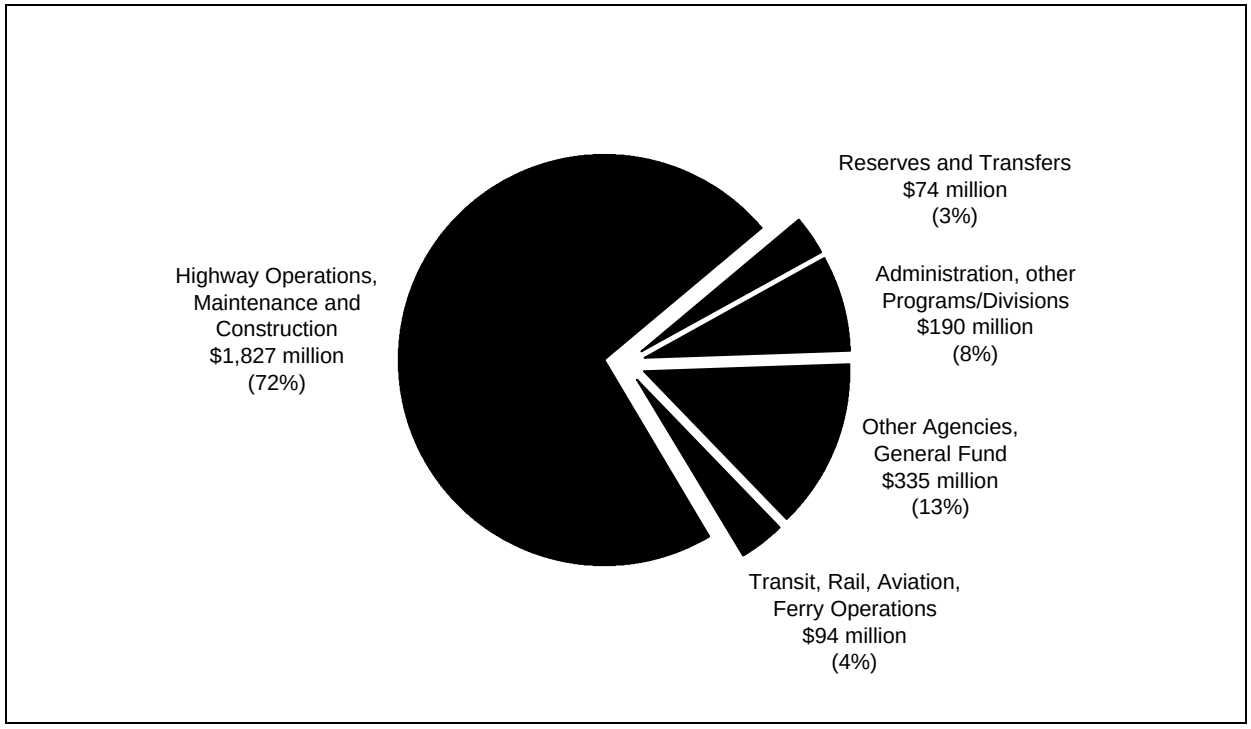
Revenues. Appropriations to the Department are made through the Highway Fund and the Highway Trust Fund. The majority of Highway Fund revenues (66 percent) are generated by the State's motor fuel tax, with additional monies from drivers' license fees and investment income. Nearly half of the Highway Trust Fund revenues are derived from a 3 percent highway use tax on motor vehicle sales, with the remainder coming from the State's motor fuel tax, titles, other fees and investment income. The State also receives federal aid apportionment, obligated by Congress from revenues generated from the federal motor fuel tax and other excise taxes.

Revenue Estimates. The first challenge is to estimate the state and federal revenues the Department expects to receive, so it can establish its program funding allocations for the next several years. These revenue forecasts—developed by the Office of State Budget and Management in cooperation with NCDOT and the General Assembly's Fiscal Research Division—are used to develop the Department's capital and operating budgets for each biennium.

NCDOT's Director of Budget and Planning coordinates the agency's budget development process, working closely with the Secretary of Transportation, Deputy Secretaries and Controller to establish the Department's funding priorities. Although components of this budget are developed by all NCDOT divisions, the Division of Highways functionally determines most of NCDOT's capital and operating needs.

Expenditures. In fiscal year 1998, NCDOT budgeted $2.52 billion to fund its operations and capital projects. As the chart shows, the large majority of this total—$1.83 billion or roughly 72.6 percent—is used to support highway operations, maintenance and construction activities. Other major budget allocations are directed to transit, rail, aviation and ferry operations; other agencies; other division operations; and reserves and transfers. The majority of these funding allocations are determined by specific federal and North Carolina laws. These statutory requirements, by earmarking revenues to prescribed purposes, restrict the ability of the Department to recommend or determine funding allocations.

Exhibit 2-2: NCDOT Budget Allocations (FY 1997-1998)



Source: NCDOT Fiscal Division, Office of the Controller

Maintenance Allocations. Highway maintenance allocations are appropriated through revenue transfers from North Carolina's Highway Fund. These allocations generally provide for routine maintenance and some minor construction contracting work on roads, bridges, weigh stations, rest areas and other similar facilities. They are distributed among the Department's 14 Highway Divisions according to various sub-allocation formulas, which combine uniform allocations and needs-based funding outlays.

The Department also allocates funding for an annual statewide contract resurfacing program. Each Division receives a percentage of the total allocation, based on its share of the State's maintenance needs, paved lane miles and population.

TIP Highway Construction Allocations. The State's Transportation Improvement Program (TIP) lists the schedules and funding sources for projects programmed over the next seven years. TIP construction allocations include funding for Federal-Aid Construction, North Carolina's Intrastate Highway Program and Urban Loops Program.

Federal-Aid Construction, typically the largest program area in North Carolina's capital budget, actually consists of a series of transportation funding categories—each with different limitations on spending, as illustrated in Exhibit 2-3.

Exhibit 2-3: Major Federal-Aid Construction Program Categories

Program Category	Funding Purpose
Interstate Maintenance	Preservation of the Interstate Highway System
National Highway System (NHS)	Improvements to routes on the National Highway System, as well as certain transit capital improvements and certain projects on non-NHS highways
Surface Transportation Program (STP)	To be used on any surface transportation infrastructure project, regardless of mode (excludes local streets and roads)
Highway Bridge Replacement and Rehabilitation Program (HBRRP)	Available for replacing or rehabilitating deficient highway bridges and undertaking preventive measures to prolong the lives of existing highway bridges
Congestion Mitigation and Air Quality Improvement Program (CMAQ)	Transportation programs and improvement projects designed to improve air quality and reduce transportation emissions in non-attainment and maintenance areas
Transportation Enhancements	Transportation-related activities designed to strengthen the cultural, aesthetic and environmental aspect of the nation's intermodal transportation system
Minimum Allocation	May be used for any project eligible for Interstate Maintenance, NHS, STP, HBRRP, CMAQ and other miscellaneous funds
Donor State Bonus	Partially compensates states that contribute more to the Highway Trust Fund than they receive in Federal-aid apportionment; available for obligation according to same criteria as for STP funds

Source: U.S. Department of Transportation

North Carolina's *Intrastate Highway Program* is funded to facilitate the completion of the State's proposed four-lane, 3,600-mile Intrastate Highway System, which is intended to bring 96 percent of North Carolina's population within ten miles of a major highway. Funds expended for Intrastate System projects are distributed according to an *equity formula*, which provides that until 90 percent of the mileage of the Intrastate System is complete, each of seven specified Distribution Regions shall receive an equitable share of the total annual program.

The *Urban Loop Program* is funded to complete the construction of a multi-lane connector road in Asheville and multi-lane beltways in Charlotte, Durham, Greensboro, Raleigh, Wilmington and Winston-Salem. Both the Intrastate Highway Program and the Urban Loop Program are funded through a combination of federal aid and funds transferred from North Carolina's Highway Trust Fund.

The Board of Transportation approves a variety of *other TIP projects* financed entirely from State funds. These include projects on the primary, urban, and secondary road systems funded from Highway Trust Fund revenues under the provisions of G.S. 136-176(c).

Other Highway Construction Allocations. Additional highway construction allocations amounting to more than $185 million in capital projects are funded entirely with State dollars and are not included in the TIP. These include:

- Secondary roads program
- Public service and access
- Spot safety program
- Small urban program
- Discretionary funds

All five of these programs are funded with revenues from the State's Highway Fund. A substantial portion of the funding for the secondary roads program also comes from the Highway Trust Fund.

Non-Highway Maintenance, Construction and Operations. Other non-highway allocations include funding for North Carolina's ferry operations, transit systems, railroads, airports, and bicycle and pedestrian facilities. NCDOT directly operates seven ferry routes along North Carolina's coast. Bicycle and pedestrian projects are either funded as stand-alone projects or are included in highway projects, while the other programs are funded through grants directly awarded by NCDOT or programmed as TIP projects.

TRANSPORTATION IMPROVEMENT PROGRAM

The Transportation Improvement Program documents the schedule and funding sources of transportation projects that are expected to be funded over the next seven years. The program, described in the TIP and updated annually, is multi-modal—that is, projects with highway, ferry, bicycle and pedestrian, transit, rail, and aviation features make up the program. Developing the TIP is a complex and lengthy process which includes:

- Receiving requests from the General Assembly, public, Metropolitan Planning Organizations (MPOs), local government, civic groups and special interest groups

- Collecting data—including cost, schedule and feasibility—through legislative review, NCDOT planning and engineering studies, public meetings and ongoing feedback

- Analyzing data to estimate federal funds, assess local and regional priorities, balance needs and resources, and make adjustments as necessary

- Documenting the results and gaining necessary approvals from the General Assembly, Board of Transportation, MPOs and NCDOT Secretary (on behalf of the Governor)

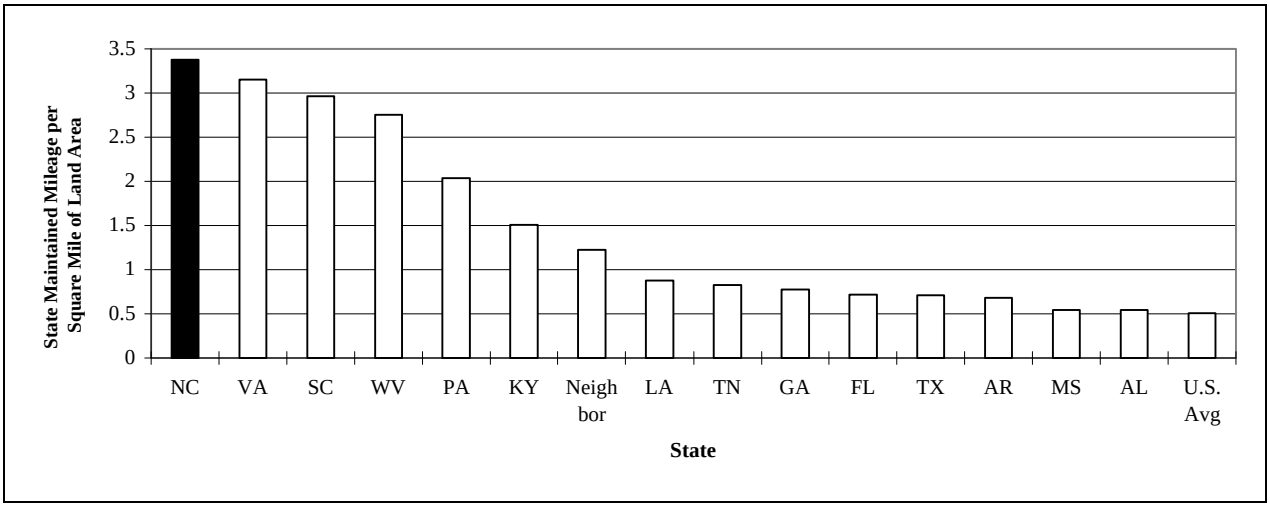
The current TIP includes construction of 2,620 projects with a total estimated future cost of $21 billion.

KEY MEASURES

How does NCDOT measure up in key areas? How does it compare to its neighboring states? We conducted a comparative assessment to find out, collecting information on other states and calculating regional and national averages. The results are intended to provide a high-level view of the Department and provide context for the findings and conclusions that make up the remainder of this document.

Large Highway System. NCDOT is responsible for maintaining a very large highway system, amounting to approximately 78,000 miles. According to the FHWA's *Highway Statistics 1996*, this places North Carolina third in the nation in state-administered lane-miles. As shown in Exhibit 2-4, the Department is responsible for more total state lane-mileage per square mile of land area than any of its neighboring states and is far above the U.S. average.

Exhibit 2-4: Total State Administered Mileage Per Square Mile of Land Area



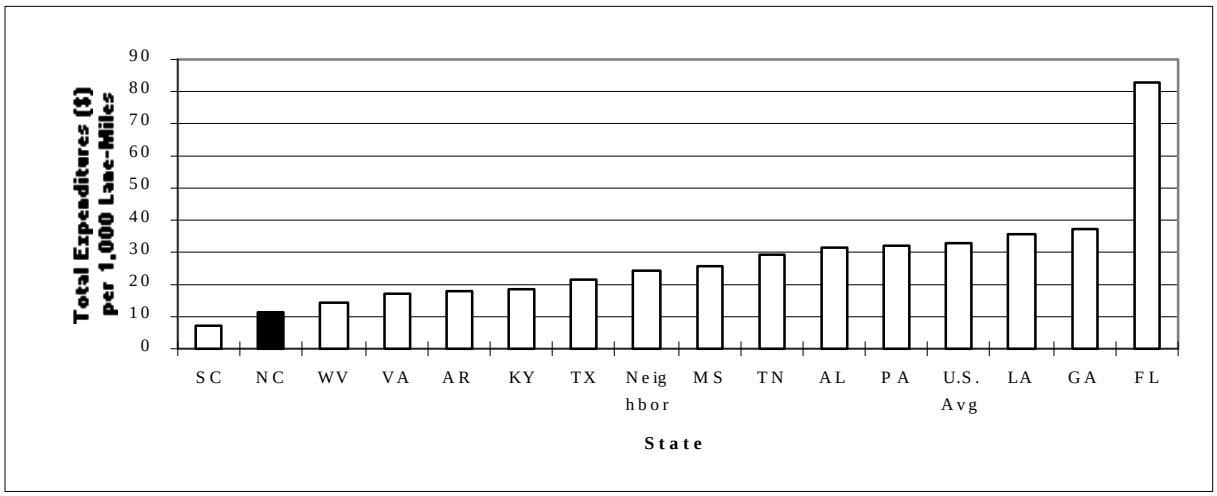
Source: FHWA Highway Statistics, 1996 Tables HM-81 and PS-1

The large size of the system drives many of the other elements considered in this analysis. Why? Compared to other states, NCDOT has more lane miles to take care of, which require more dollars to maintain.

Appropriate Staffing Levels. NCDOT's staffing level is comparable to other state departments of transportation, given its responsibilities. The three categories used to analyze the data were: number of full-time equivalent employees, staffing distribution by functional area and number of staff per 10,000 lane-miles.

Low Expenditures per Lane-Mile. North Carolina's expenditures per mile place the State among the five lowest in the nation. NCDOT's construction expenditure per mile is second lowest in the U.S., just behind neighbor South Carolina; its maintenance expenditure is third lowest, behind South Carolina and Mississippi. Considering construction, maintenance, administration, highway safety and bond retirement costs, the Department ranks third lowest in expenditures per lane mile.

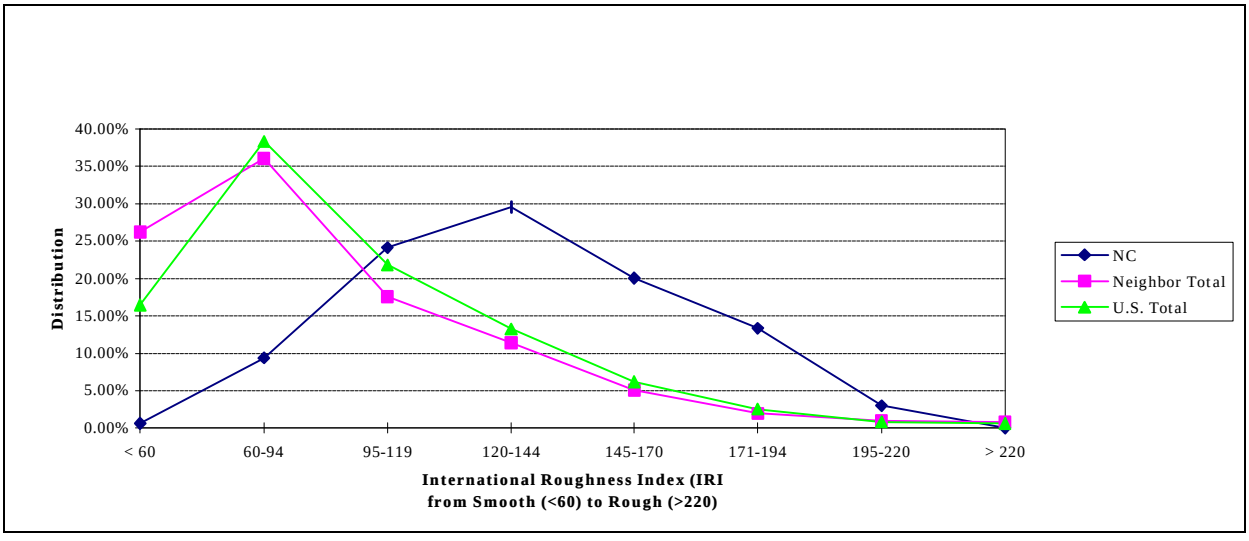
Exhibit 2-5: Total Expenditure per 1,000 Lane-Miles



Source: FHWA Highway Statistics, 1996 Tables HM-81 and SF-4

Deteriorating System Conditions. North Carolina's road conditions are deteriorating, threatening its reputation as the "Good Roads State." This study examined system conditions based on the International Roughness Index (IRI) for each state and the nation, using averages for rural and urban interstates. As Exhibit 2-6 shows, the neighboring states and the U.S. are very similar in interstate conditions, with the majority of their roads on the smoother (lower) end of the scale.

Exhibit 2-6: Distribution of Reported IRI for Rural Interstates

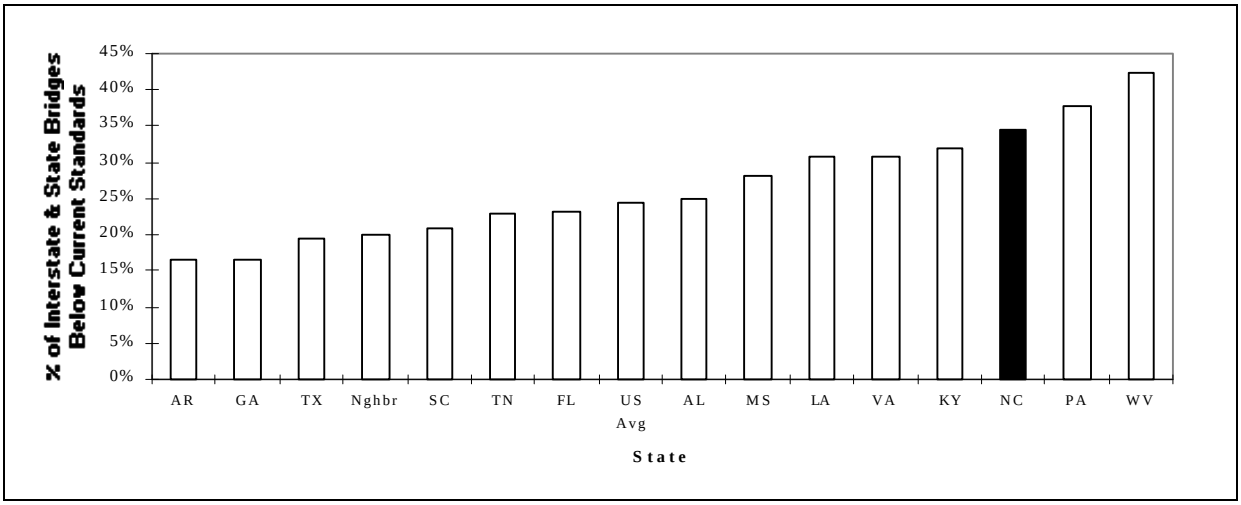


Source: FHWA Statistics, 1996 Table HM-64

North Carolina, on the other hand, has fewer interstates on either end of the scale and far more in the middle. Data comparing North Carolina's urban interstates presents a similar picture.

High Number of Bridges Below Current Standards. North Carolina exceeds the national and neighboring states' average of bridges rated below current standards by approximately 10 percent, as illustrated in Exhibit 2-7. A bridge considered below standard has been rated as either structurally deficient (in poor condition or having insufficient load-carrying capacity) or functionally obsolete (narrow, poorly aligned, inadequate or under clearance).

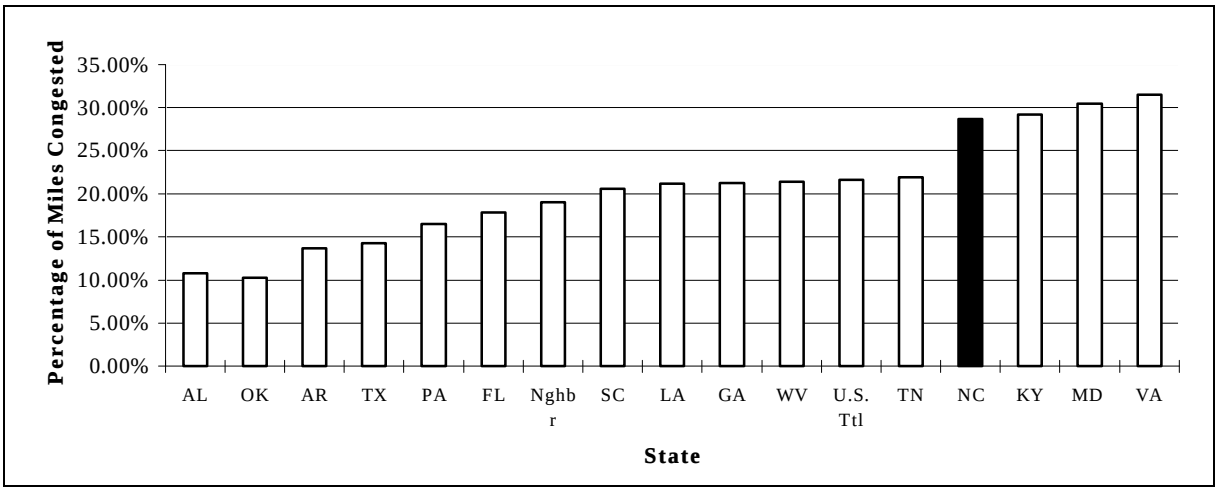
Exhibit 2-7: Percentage of Interstate and State Bridges that are Below Current Standards



Source: Better Roads Magazine 1997 Bridge Inventory (Note: Interstate and primary bridges are traditionally maintained by state DOTs)

Congestion. Congestion is a problem in most urban areas, and cities in North Carolina are no exception. North Carolina's level of congestion is higher than average, placing the State 43rd in the nation with over 28 percent of its road miles meeting a standard definition for congestion[1]. In part, the high level of congestion here reflects vibrant economic growth, as more people move and travel throughout the State.

Exhibit 2-8: Percentage of Miles Congested - Major Urban Roads

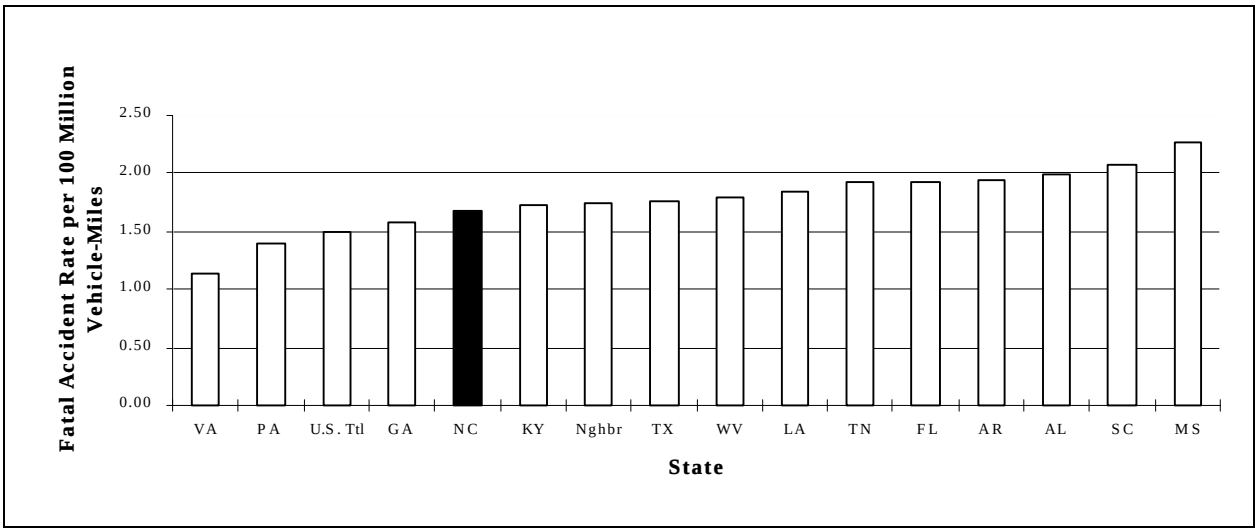


Source: FHWA Highway Statistics, 1996, Table HM-61 (Note: All 1996 data with the exception of Maryland data from 1995.)

[1] As defined in this analysis, congestion occurs when the volume of traffic to service-flow ratio exceeds 80 percent.

Safety. North Carolina's highway safety was analyzed according to rates of both fatal and non-fatal accidents. North Carolina ranks 31st in the nation with a rate of 1.68 fatalities per 100 million vehicle-miles of travel for fatal accidents. This rate is higher than the U.S. average, but lower than the average rate of neighboring states, as presented in Exhibit 2-9.

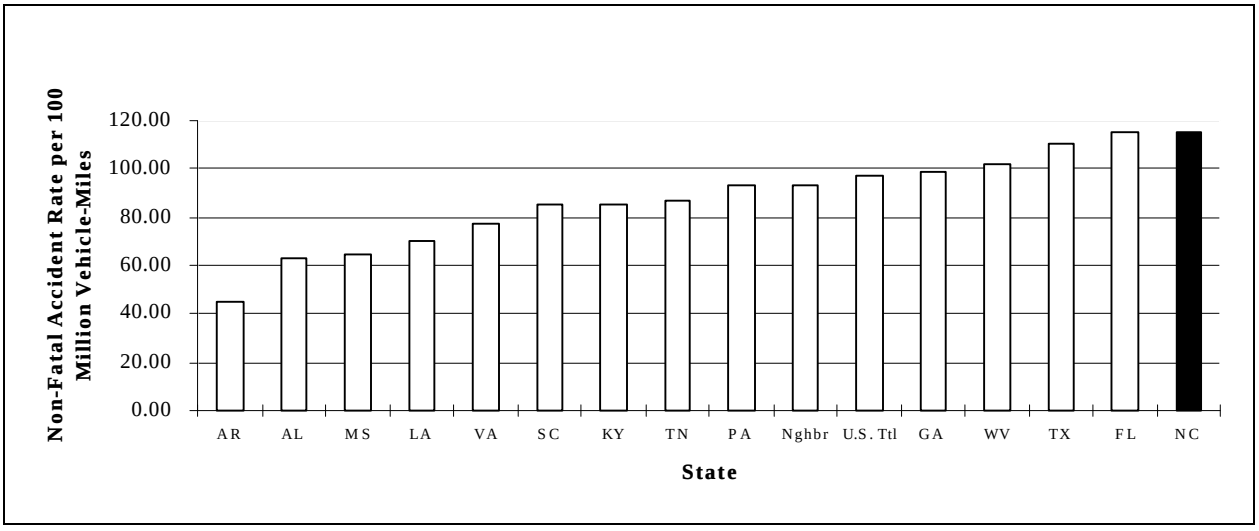
Exhibit 2-9: 1996 Fatal Accident Rate



Source: FHWA Highway Statistics, 1996, Table FI-3

North Carolina exceeds both the averages of neighboring states and the U.S. in general for non-fatal accidents. The State ranks 42nd in the nation with a non-fatal accident rate of 115.63, compared to the neighbor state average of 93.01 and the U.S. average of 97.12, as shown in Exhibit 2-10.

Exhibit 2-10: 1996 Non-Fatal Accident Rate



Source: FHWA Highway Statistics, 1996, Table FI-3

STRATEGIC ISSUES AND MANAGEMENT STRUCTURE

This section discusses strategic management practices, performance measurement, and overall management practices; customer service; and overall organizational structure.

STRATEGIC MANAGEMENT

NCDOT has established various types of long-range plans and evaluation tools. Development of a formal strategic plan began with preparation of "Department Plans, Outlook and Management Initiatives for 1995-2001" in response to requirements from the Office of State Planning and the State Budget Office. This was followed two years later with development of a Transportation Program Plan that supports the performance/program budget document for FY 1997-98/1998-99. The program plan includes a mission statement and the following goals:

- Plan, design, construct, repair and maintain roads and highways
- Expand, improve, and support alternative and non-highway modes of transportation
- Ensure safe transportation through education and regulation

For each goal, NCDOT established two to four programs with several subprograms. The purpose, expected outcomes, budget, background and trends were then defined for each subprogram. The plan for each subprogram is supported by two to six action-oriented objectives. Each objective is further defined by specifying the funds and organizational units contributing to the objective along with implementation strategies and activities, and innovative approaches to accomplishing the work. Two types of measures have been established to evaluate achievement of each objective. An outcome measure is used to assess overall accomplishment of the objective and several performance measures are used to present key volume data and/or accomplishments at the next lower level of detail.

MANAGEMENT SURVEY RESULTS

In the course of this study, a management survey was sent to every Department manager and supervisor with responsibilities relevant to the scope of this study. In all, 581 questionnaires were distributed and 519 responses were received for an 89 percent response rate.

Seventeen key questions in this survey addressed Department management practices and structure. Overall, respondents reacted positively to questions about the Department's management practices. For example, 94 percent responded that their unit's mission, goals and objectives are communicated clearly. More than 70 percent responded positively to questions regarding responsibilities and authority, policy and procedures, performance feedback, job skills, and training. The leading negative response was related to staffing— 39 percent of respondents indicated their unit does not have the appropriate number of staff to do its work. Exhibit 3-1 presents these survey results.

Exhibit 3-1: Responses to KPMG Survey Regarding Management Structure and Practices

SURVEY QUESTION	PERCENT AGREEMENT BY EMPLOYEE FUNCTION						
	Department	Executive Mgmt. Finance Administration	Planning Programming Environmental	Preconstruction	Right-of-Way	Construction	Division Engrs. Maintenance Operations
The mission, goals, and objectives of my unit are communicated clearly.	**94%**	91%	81%	92%	100%	96%	95%
There are up-to-date documented policies and procedures to guide me in my work.	**75%**	78%	58%	75%	90%	90%	72%
My responsibilities and authority are clear and appropriate.	**91%**	81%	68%	94%	98%	90%	92%
I receive periodic feedback about my performance from my superiors.	**93%**	88%	81%	98%	100%	90%	92%
My unit has the appropriate number of staff to do its work.	**39%**	53%	32%	42%	66%	41%	31%
My unit has the appropriate job skills to do its work.	**86%**	72%	77%	91%	88%	88%	86%
The work of my unit is planned and prioritized.	**83%**	91%	74%	84%	90%	90%	79%
I receive the appropriate amount and types of training to do my job.	**86%**	81%	61%	91%	78%	94%	87%
My unit has the right tools to do its work effectively and efficiently.	**70%**	69%	61%	73%	71%	63%	72%
My unit's performance measures are useful.	**81%**	88%	81%	84%	80%	75%	82%

Source: KPMG survey of 581 NCDOT employees

Exhibit 3-1: Responses to KPMG Survey Regarding Management Structure and Practices (continued)

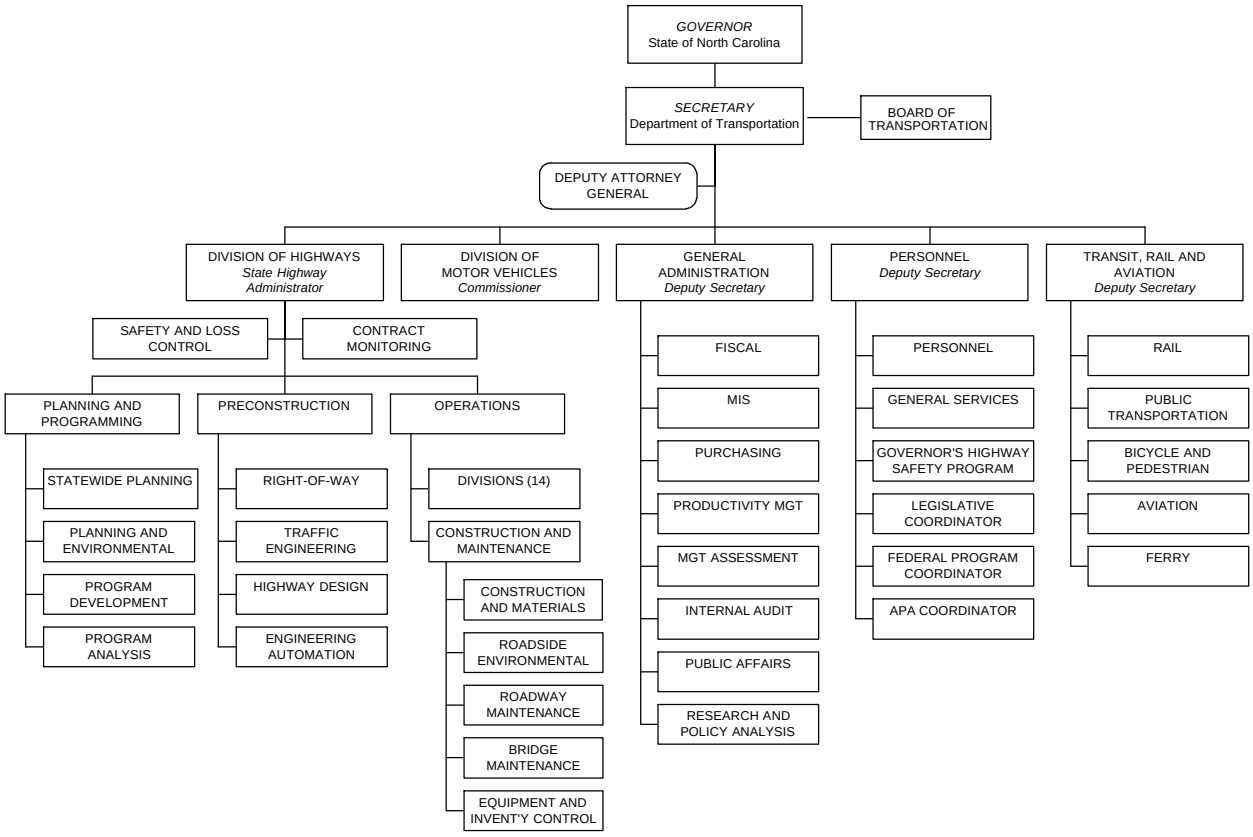
SURVEY QUESTION	PERCENT AGREEMENT BY EMPLOYEE FUNCTION						
	Department	**Executive Mgmt. Finance Administration**	**Planning Programming Environmental**	**Preconstruction**	**Right-of-Way**	**Construction**	**Division Engrs. Maintenance Operations**
My unit duplicates functions provided by other units.	**8%**	13%	6%	10%	10%	10%	6%
My unit performs functions that should be done by another unit.	**19%**	22%	23%	22%	29%	20%	15%
Other units perform functions that should be done by my unit.	**15%**	31%	16%	23%	5%	14%	10%
My unit would be more effective if it was combined with another organizational unit.	**8%**	16%	6%	16%	5%	10%	4%
Functions of my unit would be more effective if decentralized.	**16%**	3%	19%	12%	22%	22%	17%
Functions my unit would be more effective if centralized.	**29%**	47%	42%	51%	17%	16%	20%
My unit spends much of its time dealing with crisis situations.	**39%**	38%	77%	39%	37%	16%	40%

Source: KPMG survey of 581 NCDOT employees

ORGANIZATIONAL STRUCTURE

Exhibit 3-2 illustrates the organization structure of NCDOT when this study began in February 1998.

Exhibit 3-2: Department of Transportation Organization Structure Prior to March 2, 1998



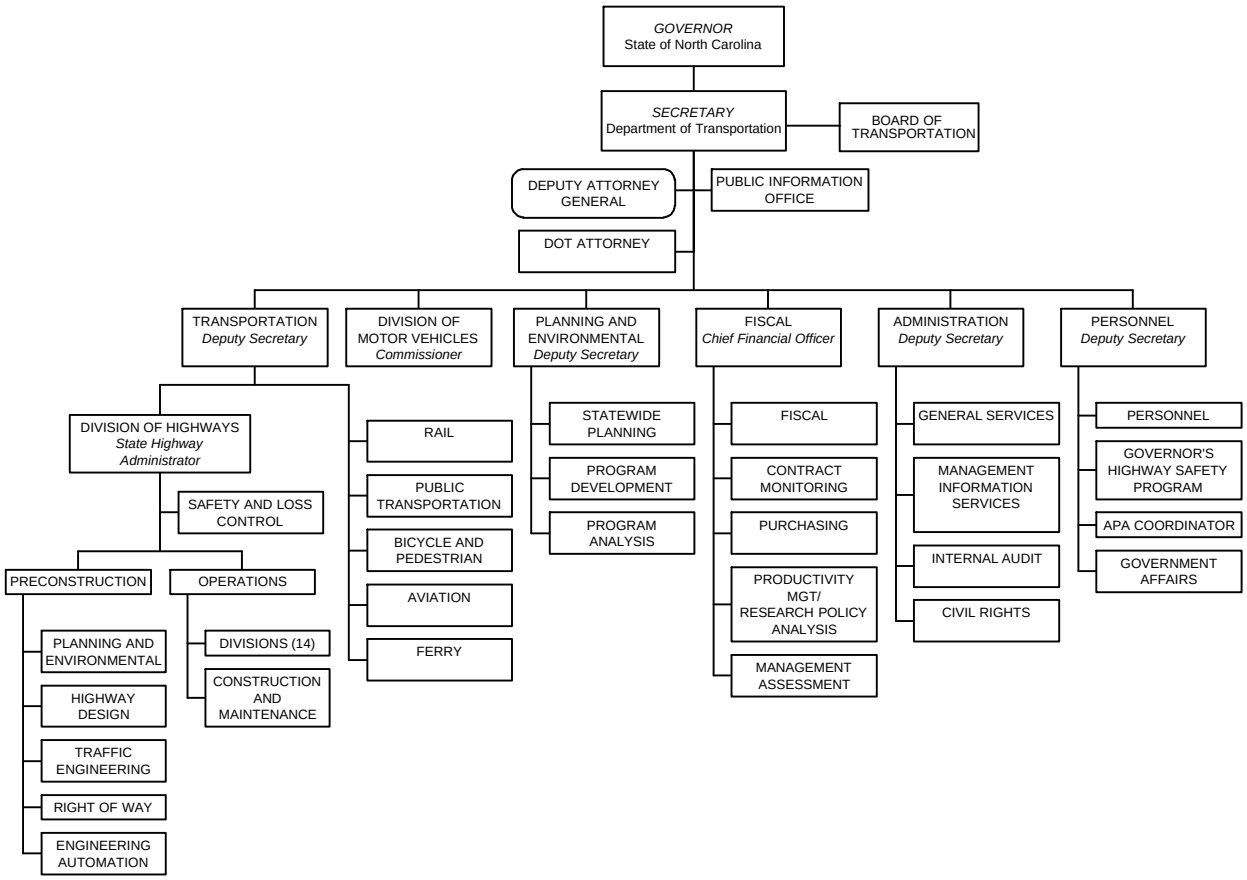
Source: NCDOT

This basic structure had been in place for many years. In March 1998, Secretary Tolson made several significant organizational changes, including these:

- An Office of Planning and Environment was established, headed by a Deputy Secretary and reporting to the Secretary.
- A Fiscal Office was established, headed by a Chief Financial Officer and reporting to the Secretary. The Office's primary sections are Fiscal and Purchasing plus certain functions from the Division of Highways, such as revenue projections, budgeting and contract monitoring.
- The Office of Administration and Office of Personnel functions were realigned, reflecting Fiscal Office transfers and shifts of certain units between Administration and Personnel.
- A Public Information Office, with a customer service section, was established, reporting to the Office of the Secretary.

Exhibit 3-3 illustrates the NCDOT organization structure effective on March 2, 1998.

Exhibit 3-3: Department of Transportation Organization Structure After March 2, 1998



Source: NCDOT

CUSTOMER SERVICE

Four years ago, NCDOT reformulated the Office of Research and Policy Analysis to increase attention to customer service. The mission of this office was to help units find out what their customers think about the services being provided. The assistance provided by this office is primarily market research – designing and executing customer surveys to collect information about service effectiveness and quality. The market research studies are voluntary, initiated in response to unit requests. About 12 studies have been completed, including some follow-up studies in areas such as ferry service.

In response to a State customer service initiative, NCDOT established a Customer Service Council in 1997 with representatives of most major units. Council members attended a workshop in June 1997 to orient them to customer service and to initiate development of customer service plans. Plans for 55 units were completed and approved by the Council in December 1997.

STRENGTHS

The new strategic planning process meets the requirements of the Office of State Planning and the State Budget Office. The Transportation Program Plan presents the Department's mission, goals, commitments, functions, trends and implications, and the objectives of each performance/program budget area.

New management improvement initiatives have been launched. Thirteen working groups were established in March 1998. Each group, composed of 7 to 20 managers from both field and central office units, have been charged with the task of identifying, analyzing and resolving problems within their assigned area:

- Enhancements
- Outsource/Privatize
- Personnel
- Training
- Communications
- Environmental
- Safety
- Maintenance
- Purchasing
- Intelligent Transportation Systems
- Truck Safety
- Work First
- Funding
- Decentralization

The Department's leadership has indicated that these groups are addressing numerous issues, including concerns identified in this report. Formation of these "participative management" groups is also reported to have a positive influence on employee morale.

Recent changes in organization structure are positive. Several organizational changes made in March 1998 provide an improved alignment of responsibilities and additional emphasis on key Department functions. For example, certain programming functions that had previously reported to the State Highway Administrator were moved into a separate Office of Planning and Programming, reporting directly to the Secretary. Another change moved the Public Information Office into the Secretary's Office, which demonstrates an enhanced commitment to inform and engage the public.

FINDINGS AND RECOMMENDATIONS

Finding: The Board and Department of Transportation lack an effective process for developing a transportation finance strategy.

NCDOT currently receives over $2 billion annually in state and federal funding – yet, this substantial yearly outlay is not sufficient to both meet North Carolina's growing transportation needs and to maintain its current transportation infrastructure. Our analysis indicates that:

- The State's current Transportation Improvement Program is underfunded by approximately $2.1 billion for the fiscal years 1998-2004
- Maintenance has not being funded adequately for years, resulting in a cumulative maintenance backlog of hundreds of millions of dollars

Our review found that the Board and Department of Transportation have no formal, documented methodology for considering overall construction and maintenance needs and translating these needs into a

viable financial strategy. Although the Board should be considering such matters as one of its primary responsibilities, the Board of Transportation is currently heavily focused on individual project selection and day-to-day operations of the Department. (These weaknesses were detailed in KPMG's April 1998 performance review of the North Carolina Board of Transportation.)

In developing its biennial budget, NCDOT presents annual funding allocation levels for each of the major transportation program categories, based on estimates of available State and federal funding sources. According to NCDOT, the Department's discretion concerning funding priorities is quite limited—well over half of the funding allocations are predetermined by specific State or federal law, or are required to fund legislatively mandated activities at current levels. As a result, program analysis and goal setting that could result in optimal use of funds is currently not performed.

Recommendation:	**Restructure the process for defining the State's maintenance and long-range transportation needs.**

The State must decide how to invest substantial but limited revenues to meet its transportation objectives. North Carolina's transportation program should be strategically managed—with performance measurement systems in place to evaluate whether specific funding allocations are effective in achieving goals and objectives related to factors such as economic development, mobility, system conditions, and safety.

The Board of Transportation and Department of Transportation could more effectively recommend to the Governor and General Assembly proposed funding allocations that address defined maintenance and long-term transportation needs. To accomplish this, the Board and Department should create an open, objective process to analyze alternative transportation investments. To accomplish this, NCDOT should:

- Establish desired levels of service for North Carolina's transportation network
- Collect current measurements of system conditions and operating characteristics (e.g., pavement or bridge conditions, volume-to-capacity ratios or delay-times on major corridors, accident data, etc.)
- Use this data to make funding recommendations that will help achieve desired goals, objectives and levels of service
- Validate these recommendations by presenting this information for public review and comment during the State's Transportation Improvement Program development process (biennially)
- Measure system conditions and operating characteristics annually to assess the degree to which funding allocations were successful in helping achieve transportation goals and objectives
- Adjust recommended funding allocations in subsequent years as necessary to meet goals and objectives, or evaluate means for acquiring additional revenues needed to meet goals and objectives

For this process to be effective, the Governor and the General Assembly will need to assess existing funding levels relative to NCDOT's recommended funding allocations. This may include reassessing the procedures and statutes that earmark funds for specific transportation purposes. These proposed changes

would provide the State with an improved ability to match its significant but limited transportation funding resources with maintenance and long-range transportation needs.

Finding: The Transportation Program Plan and the program/performance budget do not adequately address funding shortfalls or strategies for reducing unmet construction and maintenance needs.

The process for developing the Transportation Program Plan and the program/performance budget was first initiated at NCDOT in the fiscal year 1997-99 budget cycle. It was initiated late in the funding cycle and did not involve substantial participation from NCDOT managers. However, the process did establish baseline performance measures and met the State's requirements.

Because much of the Department's funding is earmarked by statute for specific uses, the ability to develop a meaningful linkage between funding and program objectives is limited. The current transportation program/performance budget reflects this—it does not quantify or address anticipated construction and maintenance needs, expected revenues, or funding shortfalls. For example:

- An outcome measure for major arterial highways is that 90 percent of planned projects in the Transportation Improvement Program will be programmed. However, no measure is established regarding the percentage that will actually be funded and completed.

- The program to "maintain and repair roads and highways" identifies a $260 million backlog of routine maintenance needs. The pavement resurfacing backlog is not quantified. Stated objectives are to reduce pavement resurfacing backlogs on a 10 year or 12 year cycle and to reduce the routine maintenance backlog by 10 percent annually. The supporting strategies for these objectives, however, are very broad and general. They do not adequately address how these backlogs will actually be reduced.

Recommendation:	**Use the Transportation Program Plan and the program/performance budget to address and document transportation financing and operating strategies.**

The process holds promise to become a mechanism for developing meaningful strategic plans linked to implementation resource requirements. To realize this potential, NCDOT will need to involve the Board of Transportation and key senior NCDOT managers in this process. The State's budget process will also need to rely on the information concerning goals, objectives, and measurable program outcomes to make transportation funding decisions.

Finding: The strategic planning process is not fully integrated with the Department's management practices and operations.

The long-range Statewide Transportation Plan, the information technology strategic plan, and Department operational plans are developed without integration or reference to the Transportation Program Plan. The program output measures and performance measures are not used to monitor and evaluate daily operations.

Results against the measures are reported only on an annual basis, as required for development of the next program/performance budget document.

Recommendation:	**Use the Transportation Program Plan to guide and monitor day-to-day operations of NCDOT.**

Each operating unit should use the relevant program objectives to guide and manage its operations. Current outcome and performance measures should be revised to be more meaningful and to facilitate tracking. Results should be reported to the Secretary and the Board of Transportation regularly. This will help focus operations on the Department's key goals and objectives and help refine the planning process and content.

Finding: The Department lacks an effective Department-wide information technology strategic planning process.

NCDOT has in place various procedures for planning and budgeting technology initiatives. The Management Information Systems unit coordinates many of these activities, including coordinating the development of the information technology budget and seeking approval from appropriate officials regarding major technology investments. Recently, Management Information Systems developed an information technology strategy document that maps out changing responsibilities and objectives over the next few years.

Although these efforts are commendable, they do not suffice. Specifically, NCDOT lacks a formal process led by senior management to consider and prioritize information technology initiatives with long-range, Department-wide implications. Instead, areas of NCDOT largely plan information technology initiatives separately, utilizing ordinary channels for decision-making and budgeting to seek approval and funding for their respective initiatives. This process fosters a reactive approach to technology planning and has led to inconsistency, duplication, and incompatibility in the Department's systems.

Note: The Office of State Auditor is currently conducting a detailed review of the Department's computer systems and information technology operations.

Recommendation:	**Create a Department-wide information technology strategic planning process.**

A cooperative effort across the Department and among other information technology units should be adopted to coordinate an effective strategic plan. This ongoing effort should be led by a Steering Committee of senior Department managers. Management Information Systems, Engineering Automation, and other technology driven units should be supporting participants in this process. A schedule of cyclical activities should be defined that includes: establishing and revising the information technology strategic plan; performing tactical (technical and business unit-level) planning activities; performing follow-up activities; and preparing inputs to the budgeting and operational planning processes. Outcomes of an information technology strategic plan institutionalization effort should include:

- Identification and alignment of strategic objectives
- Aligning Department-wide goals with the strategy
- Linking strategic objectives to long-term performance targets and annual budgets

- Obtaining feedback and buy-in from the user community to improve strategy
- Clearly communicating the information technology strategy and responsibilities
- Developing a formal information technology strategic plan
- Performing periodic and systematic strategy reviews
- Clarifying and gaining consensus to changes in NCDOT's strategy
- Regularly reporting progress to the Secretary of Transportation
- Regularly ensuring compliance with the adopted information technology strategic plan

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Finding: The customer service improvement initiative started last year has begun to deteriorate due to a lack of management support and attention.

The customer service plans were completed and approved in December 1997. Since that time no significant progress has been made. Department sources have indicated that plan implementation had been suspended because of management changes and other priorities.

Recommendation: Revitalize and refine the customer service improvement program.

The Department's customer service staff should be responsible for coordinating implementation of the program. The revitalization and refinement effort should include:

- Obtaining strong ongoing support from the Secretary
- Restructuring the Advisory Committee with the appropriate individuals
- Reviewing all previously approved plans and strengthening unit customer service initiatives
- Establishing specific implementation plans and schedules and a mechanism for evaluating progress and accomplishments

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Finding: The Department's organizational structure offers additional opportunities for improvement over the long term.

Secretary Tolson has taken several positive steps in improving the overall organizational structure of the Department. These improvements include more appropriate reporting relationships and groupings of responsibilities for the Public Information Office and the transportation program development function. However, several areas of concern remain:

- The concentration of authority in the State Highway Administrator position is substantial, even though planning and programming functions have been moved to another organizational unit.

- The span of control of the Deputy Secretary for Personnel is narrow; only one major unit (Personnel Office) reports to this position.

- Units with responsibility for various external relations functions are spread throughout the organization.

Recommendation:	**Consider additional changes to the organizational structure over the next two years.**

NCDOT was restructured in March 1998. The Department is also in the process of making numerous changes in management practices and operational procedures. Therefore, it could be disruptive to implement another reorganization at this time. However, the Department should establish a long-term plan to implement an organization over the next two years that reflects the following principles:

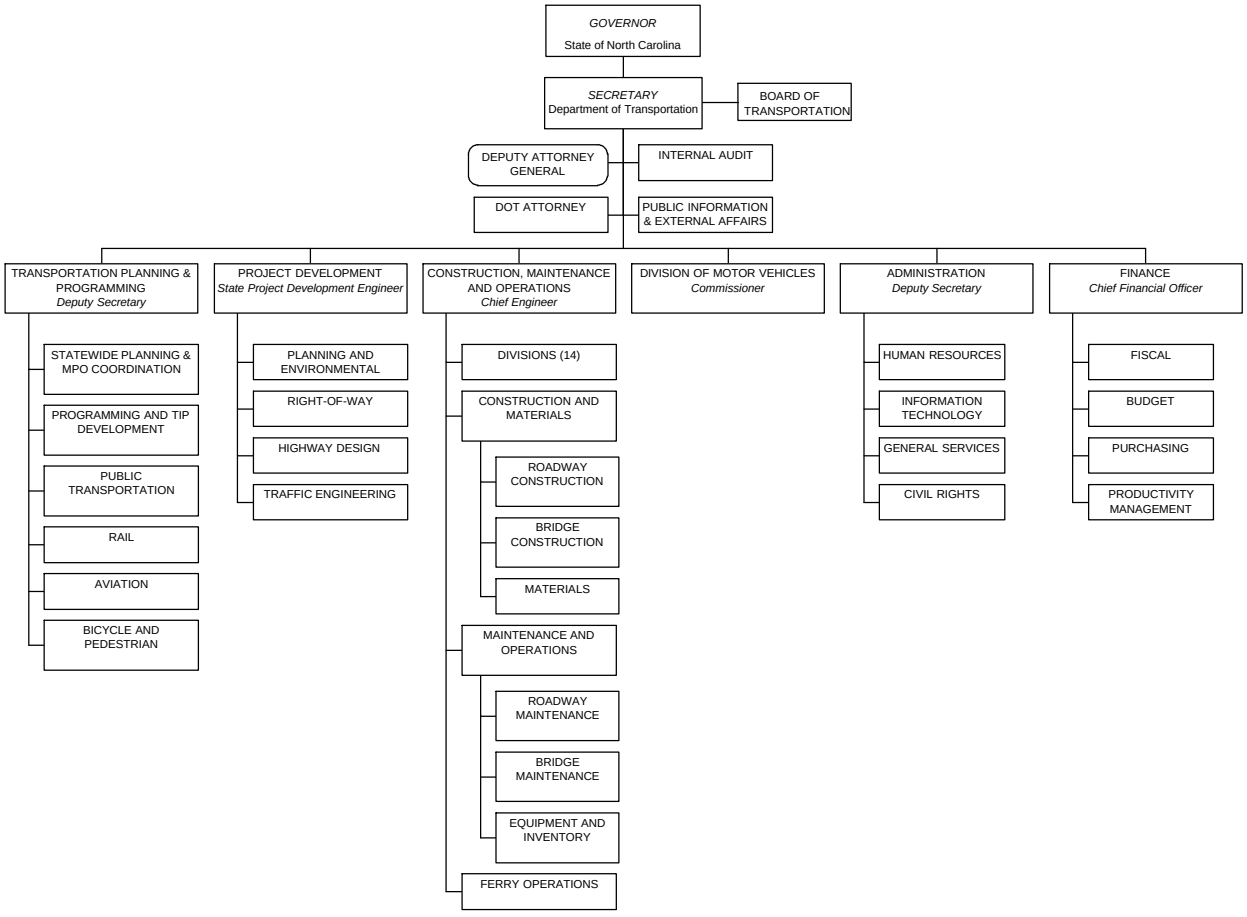
- Group closely-related functions within the same organizational entity

- Clearly define authorities and responsibilities to avoid duplications and to assure accountability

- Establish appropriate spans of control; the more complex and variable the functions, the narrower the span of control

Exhibit 3-4 illustrates one suggested organizational structure that reflects these principles.

Exhibit 3-4: A Suggested NCDOT Organization Structure for the Future



Source: KPMG/MGT of America

This suggested organizational structure includes the following changes relative to the March 1998 NCDOT organizational structure:

- Statewide transportation planning and transportation programming functions are combined with the public transportation, rail, aviation, bicycle, and pedestrian functions under a newly created Deputy Secretary for Transportation Planning and Programming position.

- An Office of Project Development is established under a newly created State Project Development Engineer position. This Office includes the following existing functions:

  - Project Planning and Environmental
  - Right-of-Way
  - Highway Design
  - Traffic Engineering

- Highway and ferry field operations are aligned under the existing Chief Engineer position. The units reporting directly to the Chief Engineer are:
  - Construction
  - Materials
  - Maintenance and Operations branch
  - Divisions (14)
  - Ferry Operations
- A newly created Budget Office is added under the existing Chief Financial Officer position.
- Internal Audit is realigned to report to the Secretary rather than to the Deputy Secretary for Administration.
- The existing Personnel Office is aligned under the Deputy Secretary for Administration.
- A Public Information and External Affairs Office is created and aligned within the Office of the Secretary. This office includes the Governor's Highway Safety Program, APA Coordinator, Public Information Office, Legislative Affairs and Customer Service functions.
- This proposed organizational structure replaces or eliminates the need for the following positions:
  - Deputy Secretary for Transportation
  - State Highway Administrator
  - Deputy Chief Engineer for Construction and Maintenance
  - Deputy Secretary for Personnel

4. STATEWIDE AND LONG-RANGE PLANNING

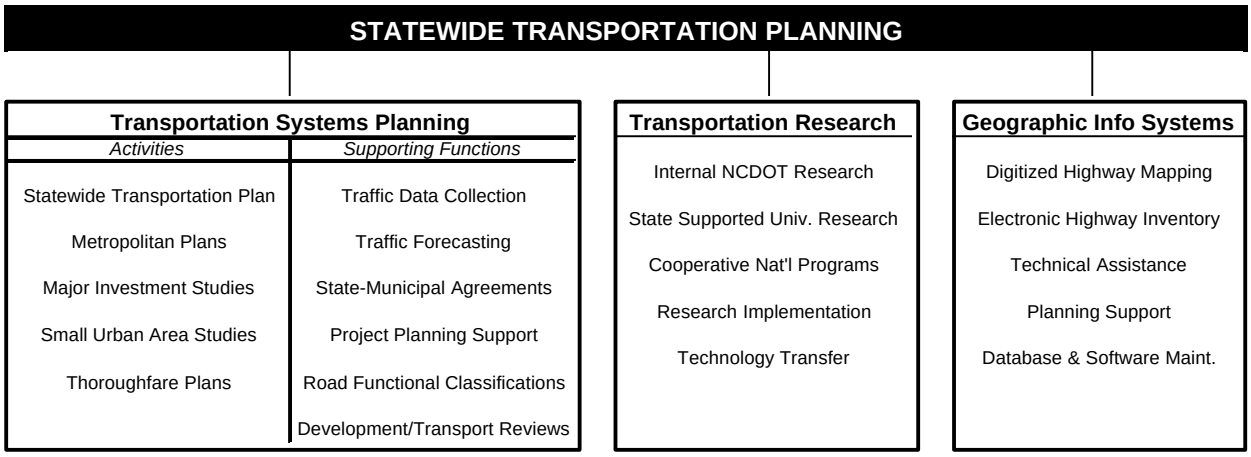
Statewide and long-range transportation planning includes all activities related to identifying long-range options for addressing transportation needs.

BACKGROUND

The Statewide Planning branch has responsibility for carrying out NCDOT's statewide and long-range planning activities. Prior to March 1998, this branch was located within Planning and Programming in the Division of Highways; it is now in the newly formed Office of Planning and Environment.

The Statewide Planning branch has responsibility for: transportation system planning, state highway research, and the Geographic Information System (GIS) program. Major functional responsibilities of Statewide Planning are shown in Exhibit 4-1.

Exhibit 4-1: Statewide Planning Branch Functional Responsibilities



Source: KPMG graphic based on NCDOT functional descriptions

Transportation System Planning Program

Transportation system planning is performed to identify long-range options for transportation spending and to anticipate long-range transportation needs. It results in identification and programming of defined projects in the project development life cycle. Transportation system planning activities include conducting statewide and urban area studies, collecting and analyzing base traffic data to identify transportation needs and fulfill federal reporting requirements, and conducting traffic forecasting.

Transportation System Planning Activities

The Statewide Planning branch is responsible for conducting long-range transportation planning for all areas of the State, including metropolitan areas, small urban areas, counties, and multi-county regions. In general, long-range plans project 20-30 years ahead to determine where transportation problems will occur and how to solve them. A typical long-range planning study involves several steps, including:

- Initial meetings with local citizens, staff and elected officials

- Data collection and analysis
- Discussions of findings with the local area
- Development of alternative future scenarios
- Public information workshops and public hearings
- Selection of the preferred plan.

Each long-range plan is mutually adopted by the State and appropriate localities to serve as a guide in the development of the transportation infrastructure. Adopted long-range plans are used by localities and regions of the state to develop their requests for project funding in the seven-year Transportation Improvement Program (TIP).

Transportation system planning includes numerous long-range planning activities and products, some of which are mandated by federal legislation under the Intermodal Surface Transportation Efficiency Act (ISTEA) or the Clean Air Act. Specific activities are discussed in the section below.

Statewide Transportation Plan. The Statewide Transportation Plan establishes the direction for the future development of the State's multi-modal transportation network through the use of major goals and objectives. These goals and objectives are used by policy makers to prioritize current and future transportation needs.

In response to the ISTEA's requirements for statewide planning, a Statewide Planning Task Force—consisting of the North Carolina Department of Transportation; the North Carolina Department of Commerce; the North Carolina Department of Environment and Natural Resources; the North Carolina State Ports Authority; four representative Metropolitan Planning Organizations; and the Federal Highway Administration—was established to develop the plan. The statewide planning process included:

- Documenting NCDOT's existing programs and processes and comparing them to ISTEA's 23 planning considerations to determine the Department's performance
- Publishing NCDOT's current practices for a 45-day public review and comment period
- Developing the plan's goals and objectives based on the Department's goals and commitments and input received from the public review period
- Developing specific strategies for improving current processes and achieving identified goals and objectives, based on input from the public review period and suggestions from each division and branch within NCDOT
- Developing a draft plan, which, together with public comments, provided the basis for developing a final plan

Transit 2001. In addition to the Statewide Transportation Plan, a separate transit-long-range plan was developed by NCDOT's Transit, Rail and Aviation Division. A special commission appointed by the Governor was given the responsibility to provide recommendations on improving public transportation. The 26-member commission was supported by a technical committee consisting of 29 transit industry professionals, as well as a joint NCDOT and consultant team. Through a number of public forums and the work of four sub-committees, the commission examined key issues: rural and human service transportation,

urban and regional transit, intercity passenger rail, and land use and development. Based on an analysis of these issues and an examination of the transportation challenges facing the State, the commission developed an action agenda to expand and enhance the State's public transportation in the near term and recommend long-term funding strategies.

Metropolitan Planning. ISTEA requires that transportation planning in urbanized areas be coordinated through a Metropolitan Planning Organization (MPO), which includes representatives of transportation agencies and local governments. There are MPOs in each of the 17 metropolitan areas in North Carolina with populations exceeding 50,000.

NCDOT plays a key role in MPO planning activities, working with the MPOs and providing technical assistance in the development of their plans. These services include traffic monitoring, traffic forecasting, data collection, alternatives development and evaluation, and public input, depending on the technical complexity of the metropolitan planning process and the availability of MPO resources. The activities that make up metropolitan planning are based primarily on requirements defined by federal statute (ISTEA).

- ***Long-range plans.*** Long-Range Plans developed by the MPOs serve as the official intermodal plan for transportation activities within their area, typically for a 20-year time horizon. For projects to be designed and constructed in MPO areas using federal funds, a previous Long-Range Plan must have identified the need for such projects. In compliance with ISTEA, Long-Range Plans are required to meet financial capacity requirements, demonstrating that projects included can be funded and financed from resources that can be reasonably expected. In general, these plans are updated through a consensus-building effort with involved local, federal, state agencies, NCDOT, and the public. The basis for the plans is projected transportation demand, which is developed using standard travel demand forecasting methodology. Where appropriate, transit demand is included in the modeling efforts.

- ***Air Quality Conformity.*** For regions not in compliance with Federal Clean Air Act requirements, each time the Long-Range Plan is adopted or amended, MPOs must demonstrate through air quality modeling that the proposed projects do not adversely impact regional air quality and do contribute to the region's ability to achieve federal clean air mandates.

- ***Major Investment Studies.*** Major Investment Studies are federally-required planning initiatives used to evaluate transportation options for any proposed projects that meet the following criteria: "a high-type highway or transit improvement of substantial cost that is expected to have a significant effect on capacity, traffic flow, level of service, or mode share at the transportation corridor or subarea scale" (23 CFR 450.104). NCDOT's Statewide Planning branch typically assumes the lead project management role for Major Investment Studies conducted in the state. However, large-scale transit-oriented studies typically are undertaken by the local transit agency or local department of transportation.

Small Urban Area Studies and Thoroughfare Plans. Although ISTEA does not require transportation plans for areas with populations under 50,000, North Carolina General Statutes 136-66 mandates the development of long-range thoroughfare plans for municipalities across the state. These plans are developed by NCDOT through community participation and consensus building. The Statewide Planning branch is responsible for: providing planning expertise to the municipalities; developing plans for

coordinated development of the road and highway system for counties, planning regions and the State; reviewing development plans as they relate to thoroughfare plans; and providing other planning assistance as needed.

Transportation Systems Planning Coordination

NCDOT must coordinate its transportation system planning activities with numerous other organizations and constituencies throughout the State. At the statewide level, NCDOT's Statewide Planning branch and the Transit, Rail and Aviation Division are responsible for ensuring that transportation system planning is carried out in accordance with a comprehensive set of intermodal planning principles as set forth by federal mandates. For the State's urbanized areas, NCDOT must coordinate its efforts with MPOs and other local officials to plan transportation systems that maximize the efficiency of the multi-modal transportation system. Through their participation in various forums, NCDOT, the MPOs and other local officials consider transportation solutions of various modalities, such as public transit, bicycle and pedestrian facilities, and highways. These forums also facilitate discussion among stakeholders of the controversial issues that can affect transportation system planning, such as land use, energy consumption and air quality, mobility, social equity and quality of life.

Transportation Systems Planning Supporting Functions

The Statewide Planning branch undertakes a number of special data collection, forecasting, analysis and local government/MPO coordination activities to support transportation system planning activities. These include:

- Collecting and disseminating all types of travel data on the State Highway System
- Providing traffic forecasts for project planning, highway and bridge design and pavement design
- Initiating and negotiating State-Municipal Agreements on street and highway system responsibility for areas that have mutually adopted thoroughfare plans as required by General Statutes 135-66
- Developing and maintaining the capability to report highway needs on a statewide basis, including both urban and rural needs
- Assisting the Program Development and Fund Administration branch and NCDOT administration in the evaluation of candidate projects for the Transportation Improvement Program; and assisting the Planning & Environmental branch in conducting project planning studies
- Assisting local governments in transportation plan implementation through reviewing proposed developments in terms of their relationship and impacts on transportation plans
- Periodically reviewing and coordinating with local governments changes in the functional classification of roads and highways

State Highway Research Program

The Research and Development Unit within the Statewide Planning branch is responsible for the State Highway Research Program. The unit is responsible for managing and directing formal research activities within the Division of Highways and placing specific research findings into NCDOT operations through technical reports, pilot demonstration projects, and special training projects. Such activities include contract research programs with state-supported universities; cooperative research programs with national organizations including the United States Department of Transportation, the Federal Highway Administration, and the Transportation Research Board; and research sponsored by other NCDOT divisions and branches.

The Research and Development unit annually reports on the implementation status of research initiatives to ensure that research, development and technology transfer products are being utilized in a timely and appropriate manner. The unit's January 1998 report identified the status of 27 projects. Most of the current research projects focus on improved highway design and construction techniques. However, three projects are oriented to improved highway operating techniques, while another is assessing the use of Geographic Information Systems for paratransit scheduling.

Geographic Information Systems Program

The Geographic Information Systems (GIS) unit within the Statewide Planning branch is responsible for the GIS program. The program includes:

- The production and maintenance of a set of digitized County Maintenance maps, which accurately depict the entire state-maintained road system and a set of digitized urban maps which accurately depict the road network for all municipalities of 5,000 or greater population
- Maintenance of an up-to-date computer file inventory system of the primary and secondary road system and selected data on municipal streets
- Maintenance of a complete and up-to-date history of all activities related to the entire secondary road system
- Maintenance of a reporting and analysis system for fatal accidents
- Establishment and maintenance of route numbering for U.S. and North Carolina routes
- Establishment and maintenance of American Association of State Highway and Transportation Officials route-numbering documentation
- Development and maintenance of software protocol for use of GIS techniques to provide improved project impact analysis and transportation planning capabilities
- Production of annual road inventory reports required by the Federal Highway Administration for the Federal-aid program
- Training programs in the use of GIS

- Development and coordination of useful GIS databases
- Participation in the development and coordination of GIS-related activities

Within NCDOT, the activities of the GIS unit are used to support NCDOT's systems planning, project planning, design, traffic engineering and pavement management functions. Outside of NCDOT, the unit's databases and geographic displays are used by MPOs, the State Highway Patrol and other state agencies and municipalities.

STRENGTHS

The Statewide Planning branch has a clear mission and goals. The mission statement establishes the framework that is used to guide the branch's planning, research and GIS activities. Goals are used to identify specific work responsibilities and to measure performance.

The Department's statewide planning process is well-defined. The Statewide Planning branch has an established process for undertaking long-range and transportation systems planning initiatives on a statewide and regional basis. The process is consistent with federal planning requirements mandated by the Intermodal Surface Transportation Efficiency Act and by North Carolina General Statute 136-66.

Statewide planning includes effective support functions. There are well-defined traffic counting, forecasting and GIS processes that support long-range and transportation systems planning functions.

The Statewide Planning branch has a commitment to using emerging technologies. The branch consistently fosters the development and use of new technologies to enhance transportation planning activities. The GIS program is providing the branch and the Department the capability to visually display and analyze the physical and operational characteristics of the highway network. This technology will ultimately provide both a centralized database of the State's highway network and a powerful tool for assessing the operating characteristics of the highway network, including traffic flows, congestion and accident and incident locations. The branch also endeavors to provide staff with computer hardware and software necessary to perform planning activities within the constraints of the budget.

The Statewide Planning branch is committed to enhancing project development and implementation techniques through its research program. In partnership with universities and other NCDOT units, the research program sponsors projects that promote the development of new construction materials, improved construction techniques, procedures for assessing road and bridge conditions, vehicle monitoring and traffic flow, environmental impact assessment and paratransit scheduling. The Statewide Planning branch has a well established reporting process that is used to assess the progress and implementation status of research efforts.

Finding: The goals set forth in the Statewide Transportation Plan are not formally and consistently measured.

NCDOT's Statewide Transportation Plan establishes a comprehensive set of strategies for meeting the plan's established goals. However, there is no consistent, formalized process for measuring how well the Department achieves the plan's goals.

Recommendation:	**Develop performance indicators for addressing how well NCDOT meets the goals and objectives of the Statewide Transportation Plan.**

As part of the transportation system planning process, the Department should establish a set of evaluation measures to assess performance. These measures can be used to assess where the Department is performing well relative to the plan and to identify potential deficiencies that require increased attention. The Florida Department of Transportation currently utilizes this approach. In addition to a long-range transportation plan, Florida Department of Transportation has a short-range plan component that covers the first 10 years of the present year-2020 planning horizon. The short-range component identifies strategies to be undertaken based on the long-range transportation plan and establishes performance measures and goals for assessing performance. For example, to meet the Department's safety goal, one of Florida Department of Transportation's commitments and measures of performance is to "keep the percentage of crashes on the State Highway System where road related conditions are a contributing factor below 1.0 percent."

Finding: The process for evaluating transportation research efforts is not linked sufficiently to statewide transportation planning.

NCDOT's current research program is based primarily on the solicitation of research topics from universities and NCDOT units. As a result, the goals of the Statewide Transportation Plan and other planning efforts are not key drivers in determining and evaluating transportation research topics. Also, while the current reporting structure for research efforts is adequate for tracking progress, it does not identify the expected or actual impact of research initiatives on transportation system planning and NCDOT operations. More specifically, there is not a clear, consistent process to measure the expected operating cost and/or capital cost savings associated with a research effort, or to ensure that outcome-based performance measures (such as improvements in customer service, safety, and the useful life of a capital asset) are evaluated and reported.

Recommendation:	**Enhance the research program by linking efforts to goals established in the Statewide Transportation Plan.**

NCDOT should enhance its current research process by establishing guidelines to assure that one part of the research efforts are geared toward meeting specific long-range plan goals and objectives, while the other part is open to original proposals from NCDOT and universities. This will allow NCDOT to develop a more strategic research program that complements and forwards the Department's priorities. In addition, Statewide Planning should establish a better process for measuring the benefits of research efforts. At key

points during research efforts, an enhanced research evaluation process should evaluate the merits of these efforts to determine they should continue. In addition, the research evaluation process should be used to assess the actual impacts of a project after implementation.

Finding: The statewide planning process does not devote sufficient resources to studying the external forces shaping travel and transportation needs.

Transportation plans developed as part of long-range transportation system planning are based mainly on identifying projected population, employment and land use changes on travel demand and assessing transportation strategies for addressing this demand. However, resources have not been devoted for studying the forces that are shaping population, employment, and land use.

Recommendation:	**Devote resources to understanding the external forces shaping travel and develop transportation strategies that address these forces.**

Projected changes in population, employment and land use are due to external factors that shape North Carolina's economy. These external forces include the effects of aging and retirement in the population, the price of motor vehicle fuel, and the growth of financial services industry, to name a few. Each of these forces impacts the number and location of trip origins and destinations. As part of NCDOT's long-range planning process, Statewide Planning should devote resources to identify those external forces that will likely shape travel demand, assess how the State's transportation network should address the resulting travel demand, and evaluate the State's role in meeting this travel demand.

Finding: The Statewide Planning branch has limited resources to carry out its mandated multi-modal planning activities.

Statewide Planning is faced with the challenge of meeting multi-modal responsibilities associated with the Intermodal Surface Transportation Efficiency Act within a constrained staff and resource budget. Historically, Statewide Planning efforts have been devoted primarily to long-range planning for the highway network. As a result of the multi-modal planning requirements of ISTEA, however, the Statewide Planning branch is increasingly involved in managing and participating in multi-modal planning efforts such as the 15-501 Major Investment Study, Regional Rail in the Triangle Area, and High Speed Rail. In its evolving role, the Statewide Planning branch is challenged to develop the specialized skills necessary to meet the planning needs of all transportation modes. For example, the branch may need increased skills in transit and rail planning techniques. This situation is similar to other NCDOT divisions and branches and at other transportation agencies. Constrained resources also have slowed the development of a new statewide travel forecasting model, the timely implementation of state-municipal agreements and some transportation systems planning analyses.

Recommendation:	**Consider providing additional resources to, and/or changing the responsibilities of, the Statewide Planning branch.**

The Statewide Planning branch needs increased resources and/or changes in responsibilities to carry out its increasing multi-modal planning responsibilities. To meet all the potential requests for multi-modal planning efforts, the branch will need to develop and implement guidelines that could be used to equitably balance the timing and scope of planning effort requests by the various modal divisions. In addition, the Department should consider various options for devoting additional resources for Statewide Planning. These resources could be provided by hiring additional staff and/or providing additional contractual resources. The Department should also consider eliminating or transferring certain non-core responsibilities out of Statewide Planning. For example, lead responsibility for state-municipal agreements could be transferred to another Department unit.

5. TRANSPORTATION PROGRAM DEVELOPMENT

Transportation program development is the process of establishing funding levels and determining project priorities in each of the state's major transportation program areas. This section presents an assessment of the processes NCDOT uses to set program allocations, establish project priorities and develop the TIP.

BACKGROUND

Transportation project priorities are identified in North Carolina's State Transportation Improvement Program (TIP[2]), a federally-mandated document that confirms the schedules and funding sources for those transportation projects that NCDOT plans to implement over the next seven years.

Program Overview

The current TIP document includes a total of 2,620 projects, with the total future construction and right-of-way costs estimated at approximately $21 billion in today's dollars. Of these 2,620 projects, 2,281 (87 percent) have received, or are scheduled to receive, some level of funding during the current planning period (FY 1998-2004). The remaining 339 projects, listed in the current TIP document as "identified future needs," are not scheduled to receive any funding during the current planning period.

Note: Projects funded by the Highway Trust Fund are a part of the State's Transportation Improvement Program. The Office of State Auditor is currently conducting a review of the Highway Trust Fund.

Exhibit 5-1 presents a summary of the program costs. The program cost estimates presented below are based on the current year estimates (1998) and do not include inflation.

Exhibit 5-1: Current State Transportation Improvement Program Overview

Funds Expended for Projects in the TIP	$ **5,680,940,000**	(100.0%)
Funding Needs for Projects in the TIP:		
FY 1998-2004 Allotments	$ 8,805,544,000	(41.8%)
Post FY2004 Allotments	6,010,684,000	(28.6%)
Identified Future Needs	6,237,578,000	(29.6%)
TOTAL TIP FUNDING NEEDS	**$21,053,806,000**	**(100.0%)**

Source: FY 1998-2004 Transportation Improvement Program and NCDOT Program Development branch.

[2] In this performance review, "TIP" refers to the North Carolina Statewide Transportation Improvement Program. It should be noted that a statewide transportation program can also be called a "STIP," this acronym is often used to avoid confusion with the transportation improvement program documents produced by Metropolitan Planning Organizations for their regions.

As shown here, a total of $8.8 billion is programmed as cost for the current planning period, and the remaining $12.2 billion is allotted for post-TIP ($6.0 billion) and identified future ($6.2 billion) needs.

Program Development Responsibilities

The Program Development branch and the Program Analysis unit are responsible for carrying out NCDOT's day-to-day transportation program development activities. Prior to March 1998, these units were located within Planning and Programming in the Division of Highways; they are now in the newly formed Office of Planning & Environment.

Program Analysis. The Program Analysis unit, staffed with four positions, has primary responsibility to monitor and evaluate the state and federal legislation that applies to NCDOT. Other responsibilities of the unit include:

- Examining discretionary project funding requests
- Implementing the State Infrastructure Bank program
- Performing special studies for the Department

Program Development. This branch is responsible for preparing and updating the TIP and completion of preliminary studies on TIP projects. As of January 1998, the Program Development branch had 43 positions divided into five functional groups.

- ***Transportation Improvement Program Development Unit.*** The TIP Development unit is responsible for scheduling, coordinating and facilitating public meetings and other forms of public outreach required as part of the TIP development process. This unit also maintains TIP project information on a mainframe computer program and supports a small CADD function used to develop graphics for program development purposes.

- ***Project Management and Scheduling Unit.*** This unit provides accountability to specific program funds, ensures the maximum utilization of funds available, and provides assurance that programs are administered in accordance with State and federal regulations and departmental guidelines. Responsibilities of this unit include implementing and maintaining the Project Management Scheduling System (PMSS). This unit also monitors and develops monthly reports on the status of the required project permits, right-of-way, and lettings.

- ***Agreements Coordination Unit.*** Responsibilities of this unit include administration of all types of agreements entered into by the Department, including property accounting functions, management and regulation of the Municipal Bridge Program, the Enhancement Program, and the Powell Bill Program. This program information is analyzed to set programmatic goals, organize and direct daily accounting operations and management functions, and ensure compliance with program objectives.

- ***Federal Aid Administration Unit.*** This unit acts as a communication conduit between the Department and the U.S. Department of Transportation (USDOT) relevant to pending transportation legislation and federal funding apportionment and reimbursement processes.

- ***Feasibility Studies Unit.*** This unit conducts engineering studies of highway projects that are being considered for funding in the TIP. These studies are needed to determine the type of improvement needed, and the scope, cost, and expected environmental impacts associated with each project. Recommendations from these studies are used by Board of Transportation members to make funding decisions. Additionally, special engineering studies requested by the General Assembly, Board of Transportation members and the Governor's Office are performed. Contracts with private engineering firms selected to perform large feasibility studies are also managed by this unit.

Program Development Process

NCDOT develops, modifies or updates the State's Transportation Improvement Program annually in response to evolving needs. Each year's TIP includes project priorities either confirmed or developed during the year through local and regional transportation planning processes. The TIP also reflects input received from individuals, civic groups, special interest groups, local elected officials and legislators.

The three phases of the TIP development process are data collection, data analysis and documentation and approval.

Data Collection. Data collection, the first of three phases in developing the TIP, is conducted in the fall of each year. NCDOT and the Fiscal Research branch of the North Carolina General Assembly examine the current TIP for overall content, intrastate and urban loop system projects, and equity funding distribution among the seven distribution regions of the State. NCDOT uses amendment proposals resulting from these reviews as input for updating the TIP.

Copies of the current TIP are also made available for public inspection at the Transportation Building in Raleigh, at all 14 NCDOT Highway Division offices, and at municipal and county government facilities throughout the State. After the TIP has been made available for review for several months, the Department schedules local public meetings in each of the 14 Highway Division offices. These meetings given the public an opportunity to dialogue with Board of Transportation members, NCDOT administration and staff engineers, and Division Engineers to review candidate projects, costs, regional funding and local needs and priorities.

During the data collection phase, NCDOT staff also monitor project schedules, update cost estimates for current projects, complete feasibility studies, and review cost estimates of projects already programmed in the current TIP.

Data Analysis. In the data analysis phase, NCDOT reviews data collected from each Highway Division office and considers public input received throughout the year -- including the annual Division public meetings.

NCDOT also reviews project priority recommendations submitted by the State's Metropolitan Planning Organizations (MPOs). In North Carolina's 17 "urbanized areas" (areas with population over 50,000), transportation project priorities are developed by the MPOs in conjunction with NCDOT's Statewide Planning branch. Each MPO is required under ISTEA to prepare its own Transportation Improvement Program -- a multi-year blueprint for financing all modes of surface transportation projects planned for implementation in the metropolitan area. Projects identified for inclusion in the MPO TIP are required to

be consistent with the organization's Long Range Plan (LRP). The MPO TIP typically covers a three-to-five year period and is updated annually to add new projects, modify existing projects and revise funding. Every federally-funded transportation project proposed for implementation in an MPO area must be included in the current MPO TIP.

In rural or urbanized areas without MPOs, NCDOT works with local government officials to determine regional project priorities.

During this analysis phase, NCDOT also reviews plans, projects and budgets for non-highway modes of transportation. In finalizing TIP program recommendations for non-highway modes, the Department reviews feasibility studies, analyzes preliminary priorities and balances proposed needs with available funding allocations.

Once all this information is collected and reviewed, NCDOT compiles a statewide list of candidate projects, which is then submitted to each Board of Transportation member. Through one-on-one sessions between Board members and Division Engineers, the Department determines regional project priorities. Before the draft TIP is produced, all available information is reviewed by the Governor in a reconciliation meeting with the State Highway Administrator and the Secretary of Transportation. Following this meeting, the Department revises and adjusts the draft TIP to reflect resulting program or funding changes.

Documentation and Approval. Documentation and approval is the final phase of the TIP development process. Once the draft TIP has been finalized, it is presented to the Board of Transportation and to the North Carolina General Assembly's Legislative Transportation Oversight Committee for review and approval. MPO supplements are distributed to each MPO.

The draft TIP is also presented for public review and comment at the Transportation Building in Raleigh and at each of the Highway Division offices for a period of at least 20 days prior to adoption by the Board of Transportation. Funding and program estimates are reviewed, revised and finalized. Project priorities are adjusted if warranted.

After the Board considers comments received during the public review period, it conducts final reviews, makes adjustments (if necessary) and adopts the final TIP. The Secretary of Transportation approves the adopted TIP and MPO TIP's on behalf of the Governor and formally submits these documents to the U.S. Department of Transportation. NCDOT must secure USDOT approval by October to ensure receipt of federal funds in the upcoming federal fiscal year.

STRENGTHS

NCDOT has been preparing an annual statewide Transportation Improvement Program each year since 1973. In 1973, the Department created its first TIP, long before the process became a federal requirement with the passage of the Intermodal Surface Transportation Efficiency Act of 1991.

The Department has developed a *Citizen's Guide to the Statewide Transportation Improvement Program (TIP)*. NCDOT has developed a concise, clearly written brochure that effectively describes the process the Department follows to develop its statewide TIP.

NCDOT provides extensive opportunities for public participation in the TIP development process. The Department welcomes and encourages public involvement as it develops its TIP by annually distributing copies of the current and draft TIP for review and inspection, conducting public meetings, soliciting written comments throughout the year, and participating in public outreach efforts held by North Carolina's MPOs.

Secretary Tolson has recently proposed improvements to the programming and project selection processes. These include converting the TIP development cycle from a one-year to a two-year process and developing an application process and guidelines for selecting and prioritizing projects to be financed with Small/Urban Funds, the Statewide Contingency Fund, Spot Safety Funds and Hazard Elimination Funds.

FINDINGS & RECOMMENDATIONS

Finding: We estimate a shortfall of over $2.1 billion for projects funded in the current FY 1998-2004 TIP.

For the period FY 1998-2004, the TIP identifies $8.8 billion in project needs. Over this same period, the Department expects to receive $8.2 billion in funding from federal[3] and state sources. At the current level, the programmed project needs during the current planning period exceed the estimated available funds by more than $554 million, as shown in Exhibit 5-3.

Exhibit 5-3: FY 1998-2004 Program Needs vs. Estimated Available Funds ($ million)

Estimates	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	Total
TIP Budget	1,200.39	1,217.44	1,190.06	1,116.84	1,146.12	1,175.00	1,205.48	8,251.33
TIP Costs	1,368.32	1,497.48	1,433.87	1,174.30	1,185.94	1,160.31	985.33	8,805.54
Variance	-167.93	-280.04	-243.81	-57.46	-39.82	14.69	220.16	-554.21

Source: FY 1998-2004 Transportation Improvement Program and NCDOT Program Development branch

This table, however, does not reflect the full magnitude of the shortfall for FY 1998-2004. While the available funds projected are based on the assumption that funding will continue to grow due to increased federal spending, inflation, and other factors, *program costs have not been adjusted for inflation or project growth*. This contrasts with the practices in place at numerous other state departments of transportation, as shown in Exhibit B-2, found in the Appendix B of this report.

If conservative inflation[4] and project growth[5] assumptions are factored into the current program costs, the estimated shortfall for FY 1998-2004 swells to over $2.1 billion, as shown in Exhibit 5-4.

[3] Federal transportation funding to North Carolina is expected to increase under legislation currently being considered by the U.S. Congress. The Department has estimated that this funding will increase from $530 million per year to $675 million per year for the period FY 1999-2005.

[4] For the purpose of this analysis, the project team has assumed an annual inflation rate of 3 percent for construction and right-of-way costs. Estimates of increases in construction, equipment, materials, right-of-way, labor and other costs over the past several years are averaging between 3 to 4 percent annually.

Exhibit 5-4: $2.1 Billion Shortfall Using 3% Inflation and 6% Project Growth Factors ($ million)

Estimates	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	Total
TIP Budget	1,200.39	1,217.44	1,190.06	1,116.84	1,146.12	1,175.00	1,205.48	8,251.33
TIP Costs	1,491.47	1,678.53	1,652.86	1,392.15	1,445.98	1,455.09	1,270.94	10,387.02
Variance	-291.08	-461.09	-462.80	-275.31	-299.86	-280.09	-65.46	-2,135.69

Source: FY 1998-2004 Transportation Improvement Program, NCDOT Program Development branch, and KPMG analysis.

Finding: To complete all the projects in the current TIP would require approximately 26 years at current funding levels.

The current TIP includes 2,620 projects with a total estimated future cost of over $21 billion. At current levels of funding ($1.2 billion annually), it would require 17 years to complete all of the projects in the program, but only if inflation and project growth are not considered. (This also assumes that no projects are added to or deleted from the TIP.)

When inflation and project growth assumptions are factored in (a more realistic scenario), the current TIP program costs swell to over $31 billion. Annual funding of $1.2 billion would be required for over 26 years to complete the projects in the current TIP.

Exhibit 5-5 presents a summary of estimated program costs and years it would take to complete the program when inflation and a one-time project growth factor are considered.

Exhibit 5-5: Estimated TIP Program Cost and Duration Under Various Scenarios

Program Scenario	Total Estimated Project Costs		Years of Funding Required ($1.2 billion/year)
	FY 1998-2004	Post-TIP Years + Identified Future Needs	
Current TIP	$8.80 billion	$12.25 billion	17 years
Adjusted for inflation	$9.85 billion	$19.93 billion	24 years
Adjusted for inflation & one-time project growth factor	$10.38 billion	$21.16 billion	26 years

Source: FY 1998-2004 Transportation Improvement Program, NCDOT Program Development branch, and KPMG analysis.

Recommendation: Develop, communicate and implement a strategy for addressing the TIP funding shortfall.

North Carolina should develop a strategy for addressing its long-term TIP funding shortfall.

[5] For the purpose of this analysis, we have assumed a one-time project growth factor of 6 percent (due to cost overruns, scope changes, etc.). Our assumptions for project growth are lower than the Department's cost overrun experience during the past several years, which is approximately 7 percent.

As a first step, the Department must reassess projected revenues and project needs, adjusting these items to reflect inflation and project growth assumptions.

Next, the Department and Board of Transportation need to reevaluate the current TIP to determine which projects meet the State's goals and objectives, in light of available funding. To do so, certain projects may need to be canceled or postponed. If current funding estimates are correct, at least $2 billion in programmed project costs must be cut from the TIP's seven-year planning period. The Department and Board should also strongly consider reducing the current $6.2 billion commitment to "identified future needs" projects, for which no funding has been programmed.

In conjunction with a reassessment of the projects in the TIP, the Department and the Board of Transportation should explore program funding and cost scenarios with the Governor and the General Assembly to determine whether the projected shortfall can or should be addressed through increases in revenue, removing projects from the TIP, or a combination of these strategies.

Developing this strategy will also require significant public involvement efforts and coordination with MPOs and local elected officials, among others.

Finding: North Carolina's cities, counties, and Metropolitan Planning Organizations are not sufficiently involved in the process for setting transportation priorities.

NCDOT's project selection and TIP development process include a well-defined strategy for soliciting and collecting public input. However, the current process does not provide North Carolina's cities, counties and MPOs with a significant opportunity to participate in the process of *evaluating and deciding* transportation priorities. This responsibility is left largely to the Board and the Department.

Recommendation:	**Evaluate the role of North Carolina's cities and counties in setting transportation priorities, and strengthen involvement with the Metropolitan Planning Organizations.**

North Carolina's cities and counties should have more direct involvement in setting transportation priorities and developing the Transportation Improvement Program. The Department should consider establishing an annual funding allocation for each county and city to determine how certain transportation construction funds should be spent. Each locality would adopt a resolution specifying how it wished to direct spending. The current Secondary Roads, Public Service Roads, and Small Urban Programs are candidate programs to include in such an allocation. To help localities make informed decisions, they would be provided with necessary information and advised by Department officials. Virginia currently carries out its Urban and Secondary Road Transportation Improvement Program elements in this manner.

The Department's processes for integrating MPO transportation improvement programs into the State's TIP include establishing clearly defined project evaluation criteria. The Department should work with the State's MPOs and other key groups and individuals to develop and clearly communicate a set of criteria that meet this objective.

Sample criteria might include impacts on:

- Travel time
- Transportation system preservation
- Air quality
- Existing land use considerations
- Quality of life in existing communities
- Intermodal linkages
- Safety
- Transportation system continuity
- Other environmental concerns
- Economic development and creation of jobs
- Transit services

Each MPO would be free to weigh these criteria differently to best reflect unique local or regional concerns. MPOs would present their regional TIPs to the Department in a fashion that communicates how the evaluation criteria were applied.

With a set of clearly defined evaluation criteria, the Department would have a more consistent basis for comparing projects regionally, as well as for determining statewide priorities. This would help the Board of Transportation in evaluating the TIP from a statewide perspective.

If the proposed process is implemented, NCDOT should work with the MPOs to develop a consistent format for presenting MPO TIPs. Once adopted, this format could be used to distribute, complete and submit MPO TIPs to the Department in digital form.

Finding: The Department has proposed switching from a one-year to a two-year TIP development cycle.

Until now, NCDOT has developed the state's Transportation Improvement Program (TIP) annually. Developing North Carolina's TIP on an annual cycle has been a challenging administrative task for the Department's Statewide Planning branch and each of NCDOT's Division offices. By the time it has completed its cycle of data collection, data analysis, documentation and approval, nearly a full year has passed. More importantly, an annual cycle has limited the time available for citizens, businesses, local elected officials, special interest groups and others to effectively participate in the public input and decisionmaking processes.

Secretary Tolson has recently proposed a two-year TIP development cycle, using the additional time to expand opportunities for local participation in the TIP development process.

Recommendation: Adopt a two-year TIP development cycle, as proposed by the Department.

The Intermodal Surface Transportation Efficiency Act permits states to develop their state TIPs on a biennial basis. By adopting this cycle, the Department can make more time available for public review of the draft TIP. NCDOT should also use this time extension to more fully involve citizens, business leaders, local planners, transportation professionals and elected officials in evaluating and deciding local project priorities.

6. PUBLIC INPUT

Public input is an essential component of planning, designing, constructing, and maintaining a transportation system. This section assesses NCDOT's public input activities.

BACKGROUND

Many units throughout the Department are involved in soliciting, considering, and disseminating public input. Two units that derive their primary responsibilities from these activities are the Citizens Participation unit and the Public Information Office.

Citizens Participation Unit. The Citizens Participation unit, which is located within the Highway Design unit of the Preconstruction branch of the Division of Highways, is responsible for acquiring sites, establishing dates and times, and conducting informational workshops and public hearings during project planning and preconstruction. Hearings are generally held in the evenings at a public building near the proposed project, to be convenient for the public. These hearings are often attended by hundreds of people who are concerned about how they will be affected by the project, especially those who own homes or property directly impacted by the proposed highway right of way. Hearing officers explain proposed highway projects and provide answers to many design, right of way, and relocation questions. After hearings, Hearing Officers meet with other staff engineers to address the comments and determine those that can be effectively incorporated into final project designs.

Public Information Office. This unit, which as of March 2, 1998 reports directly to the Secretary, carries out the general public affairs and public information activities for the Department, such as news releases, media relations, maps, pamphlets and brochures, and publicity for notable initiatives and events. The spokespeople for the Department are part of this unit. The Public Information Office also has responsibility for internal communications.

NCDOT has several formal and informal processes for soliciting input from the public. Input is sought from North Carolina residents, elected officials and local governments as part of the Transportation System Planning, the Transportation Improvement Program (TIP), Project Planning, and Project Design.

Two key documents provide and describe an overall framework for public input: the Current Planning Practices of NCDOT and the Draft Statewide Transportation Plan.

- ***Current Planning Practices of NCDOT.*** According to the Final Statewide Transportation Plan report, this document was released for public review in July and August 1994. The objective of the report was to provide the public with an overview of the Department's transportation planning and programming procedures. The public was asked to respond to the report by offering suggestions for changes and/or improvements. According to the Statewide Transportation Plan, 17 individuals and groups submitted over 100 individual comments. The comments were reviewed and considered as part of the development of the Draft Statewide Plan. Each individual/group commenting on the document received a written response from the Department.

- ***Statewide Transportation Plan.*** This document was released for public review in July and August 1995. It was used to develop the future vision of North Carolina's multi-modal transportation network through use of major goals and objectives. Similar to the Current Planning Practices document, draft plan comments were considered during the development of the final plan. Written responses from the Department were provided to those individuals and groups providing comments.

These two documents were distributed to NCDOT's 14 divisions for a 45-day public review and comment period. In addition, a statewide press release announcing the distribution of these documents was issued to over 750 newspapers, radio stations, and television stations. A public notice of the availability of the documents was placed in the North Carolina Environmental Bulletin, which reaches over 300 agencies and interest groups involved in environmental issues. The draft documents were mailed directly to a wide range of local government agencies, interest groups, citizen groups and military installations.

Transportation Systems Planning

NCDOT provides the following opportunities for public input to shape the development of long-range transportation systems plans. These include goals and objectives surveys, public information workshops, small group meetings, public hearings, and citizen correspondence.

Goals and Objectives Surveys. These are conducted at the beginning of long range transportation planning studies to identify a community's transportation priorities. The survey is also used as an educational tool for the community, providing insight into the interrelationships among transportation, economics, the environment and neighborhoods. The results of these surveys are used to guide the development of transportation strategies.

Public Information Workshops. These are informal one-on-one meetings conducted by NCDOT with citizens interested in long-range transportation plans in their area. The project engineer and a representative from the local area are available to explain the planning process, answer questions and receive input from the public. Facts sheets and background information on a project are made available to citizens for their information. Comment sheets are also made available so that citizens may provide their written comments and concerns to NCDOT. The number of workshops held depends upon the size of the planning area and the interest of the local community.

Small Group Meetings. These are special presentations given on request to local civic, business, neighborhood and special interest groups. Similar to the workshops, the planning process and transportation proposals for the area are typically discussed.

Public Hearings. One or more formal public hearings are held to receive input on each proposed transportation plan. The format typically includes a short presentation by the project engineer, followed by a citizen comment period.

Citizen Correspondence. During the systems planning process, citizens are encouraged to provide information or express concerns about proposed projects. Correspondence is responded to and considered throughout the planning and programming process.

Transportation Improvement Program

NCDOT seeks input into the development of the TIP from citizens, local governments and interest groups using several strategies, including public meetings, group meetings and draft document review.

Public Meetings. Each fall public meetings are held in each of NCDOT's 14 divisions for the purpose of soliciting input regarding the TIP. Input is typically received either in the form of a written statement or a presentation to NCDOT officials requesting funding for specific transportation related projects. Representatives from local city or county governments provide input for their areas. However, local citizens are encouraged to provide their input.

Public Involvement in Metropolitan Areas. The 17 MPOs in the State also provide opportunities for public involvement regarding proposed TIP projects within their geographic area. The draft local TIP is made available for public review and comment prior to its adoption by the MPO.

Citizen Correspondence. During the course of the TIP process, citizens are provided the opportunity to contact NCDOT at any time to ask questions, provide information, or express concerns related to the TIP. Citizen correspondence is responded to and considered as input into the next State TIP update.

Group Meetings and Other Public Forums. Presentations to local civic, business, neighborhood and special interest groups are given as requested to discuss specific concerns, or provide an overview of the TIP process. These meetings provide an opportunity for the exchange of ideas between NCDOT personnel and public groups.

Draft Document Review. The draft State TIP is distributed across the State each year for review and comment by local governments and the general public. Within the 17 MPO regions, draft local TIPs are concurrently released for review.

Project Planning and Design

NCDOT solicits public input and feedback regarding projects progressing from their concept phase through final design. In early stages of design, input received from the public typically is used to develop and evaluate additional alternatives, or to identify changes to proposed transportation strategies. Many of these processes are designed to address both North Carolina and federal environmental assessment requirements. (These are discussed in more detail in the Project Planning and Preconstruction section of this report.) As projects progress through the final design process, public hearings and reviews of plans are conducted to solicit and consider input.

Citizens' Informational Workshops. These are informal one-on-one meetings held by NCDOT with citizens who are interested in specific transportation projects in their areas. Fact sheets and background information are made available to citizens at these workshops. In addition, comment sheets are available for citizens to express comments and concerns. The number of workshops scheduled for a project depends upon the scope and anticipated impacts of the project.

Draft Document Review. Copies of environmental documents are available for public review at NCDOT's headquarters as well as at division offices in the project area, local government offices, local council of governments, the State Clearinghouse, and, in some instances, public libraries. A notice of the

document's availability is published in the North Carolina Environmental Bulletin. Upon request, NCDOT will provide copies of documents directly to the public.

Small Group Meetings. Presentations on specific projects are frequently given at the request of neighborhood associations or other interest groups. At these meetings, the project engineer is available to provide information and answer questions regarding the proposed project or the planning process.

Public Hearing. Corridor public hearings are held on each project for the public record. The hearing format typically involves a short presentation, followed by an opportunity for citizens to comment. At these hearings citizens can voice their support or express concerns about a project before a final decision has been made.

Newsletters. Newsletters are sent to residents and interest groups within a project corridor. Newsletters are used to describe the project, discuss the project's status, outline the alternatives being studied and present ways in which the public can get involved in the project. Newsletters also provide the public with a project contact where they can ask questions and request information.

Citizen Correspondence. This is used by NCDOT to encourage citizens to write NCDOT providing information, or expressing concerns about proposed improvements. Citizen correspondence is considered as part of the project planning process and is included as part of the project file.

Design Hearings. Design hearings are held on each project to show property owners how they would be impacted. The format typically involves a short presentation, followed by a period for citizen comment. At these hearings, citizens are provided the opportunity to voice their support for, or concerns about, a project before final project design.

Public Review of Plans. For projects in their final design stages, right of way plans are routinely made available for public inspection on request.

COMPARATIVE ASSESSMENT

In 1996, the United States Department of Transportation (USDOT) published a study[6] that identified and assessed public participation strategies employed by state and local transportation agencies. To assess NCDOT's approach to public participation, we compared its practices with the techniques identified in the USDOT report. Overall, the comparison shows that NCDOT utilizes many of the techniques employed by other transportation agencies. This comparison also indicates areas where NCDOT could further strengthen its public input process.

Exhibits 6-1 through 6-4 list the individual strategies and techniques and identifies whether they are currently conducted by NCDOT.

[6] *Public Involvement Techniques for Transportation Decision-making*, United States Department of Transportation, December 1996.

Exhibit 6-1: Public Participation Outreach Activities

Public Participation Strategy	Description	Done by NCDOT	Notes
Bringing A Core Participation Group Together			
Civic Advisory Committee	A representative group of stakeholders meeting regularly to discuss issues of common concern	Yes	Part of Long Range and Systems Planning
Citizens on Decision and Policy Bodies	Appointed community representatives charged with the responsibility to formulate policies and strategies	Yes	Part of Transit 2001 Study
Collaborative Task Forces	A group assigned a specific task for reaching conclusion on an issue, subject to ratification by official decision-makers	No	
Including People Who Are Underserved by Transportation			
Outreach to Ethnic, Minority and Low-Income Groups	Individuals from minority and ethnic groups and low-income households traditionally underserved by transportation	Yes	
Outreach to the Disabled	Outreach to and accommodations for disabled individuals	Yes	
Providing Substantive Information and Establishing Methods of Communication			
Mailing Lists	Contact names and addresses of individuals and organizations interested in project-specific or general transportation issues	Yes	
Public Information Materials	Printed materials that provide information about a transportation investment that is in the planning stage, or is underway.	Yes	
Key Person Interviews	One-on-one discussions about a specific topic with an individual recognized as a community leader	Yes	With Board members as part of the TIP development process; With citizens as part of project planning Citizen Information Workshops
Briefings	Information meetings with a community group or leader	Yes	
Video and Audio Techniques	Used to present information to the public primarily through tapes or laser disks	No	
Telephone Techniques	Strategies for providing information to the public and receiving opinions	Yes	Telephone hot lines to provide information and receives telephone calls from the public
Media Strategies	Use of newspaper, radio, television, outdoor advertising, newsletters, fliers, etc.	Yes	Public notices in newspapers and project newsletters and fliers
Speakers Bureaus	Groups of specially-trained representatives who are available to speak about a process, or program.	No	Not formally instituted, however, NCDOT project managers participate in public meetings

Source: Public Involvement Techniques for Transportation Decision-making*, United States Department of Transportation, December 1996 and KPMG assessment.*

Exhibit 6-2: Public Participation Meeting Forums

Public Participation Strategy	Description	Done by NCDOT	Notes
Public Meeting and Hearings	Public meetings present information to the public and provide an opportunity for the public to relay informal comments; public hearings have a more formal meeting structure	Yes	
Open Forum Hearings and Open Houses	An open house is an informal setting in which people get information about a project or a plan; an open forum hearing expands a public hearing to include elements of an open house	Yes	Although not referred to as an open house, or open forum hearing, NCDOT's workshops and small group meetings have similar characteristics
Conferences, Workshops and Retreats	Special meetings to inform people and solicit input on specific policy issues, plans and projects	Yes	Conducts work shops and small group meetings.
Selecting an Organizing Feature for a Meeting			
Brainstorming	A free-thinking forum used to generate ideas	No	Not formally done. However, work shops and small group meeting lend themselves to project brainstorming.
Charrette	A meeting to resolve a problem, or issue within a specified time period	No	
Visioning	A series of meetings focused on developing a goals statement for long range transportation issues	No	
Small Group Techniques	Small gatherings that offer opportunities for creative, flexible interchange of ideas and lively, meaningful participation	Yes	

Source: Public Involvement Techniques for Transportation Decision-making, *United States Department of Transportation, December 1996 and KPMG assessment.*

Exhibit 6-3: Public Participation Feedback Strategies

Public Participation Strategy	Description	Done by NCDOT	Notes
Establishing Places People Can Find Information And Interact			
On-Line Services	Provide communication through a computer network round-the-clock	Yes	NCDOT's home page lists public meeting dates and locations. Also, NCDOT and NC State University offer information on highway construction projects and ferry and train schedules.
Hotlines	Agency telephone lines that are used to receive inquiries from the public.	Yes	NCDOT has established a hotline for US 17 improvements project
Drop-in Center	A place for give and take exchange of transportation information within a neighborhood, or community.	No	
Designing Programs To Bring Out Community Viewpoints And Resolve Differences			
Focus Groups	A meeting with a limited number of participants to gauge public opinion on proposed transportation strategies	No	Not formally used. However, small group meetings have characteristics similar to a focus groups.
Public Opinion Surveys	A survey to gauge wide-spread public sentiment for a proposed transportation project	No	Periodic surveys to assess the potential demand for a transportation improvement; not typically used to gauge public opinions and preferences for proposed improvements
Facilitation	A tool to guide a group in a problem solving exercise	No	
Negotiation and Mediation	Alternative dispute resolution processes used to resolve a conflict between parties unable to reach agreement.	No	Limited application, generally used as part of municipal agreements, reconciliation with MPO's during TIP and long range plan development, and with affected landowners during right-of-way acquisition

Source: Public Involvement Techniques for Transportation Decision-making, *United States Department of Transportation, December 1996 and KPMG assessment.*

Exhibit 6-4: Special Techniques to Enhance Public Participation

Public Participation Strategy	Description	Done by NCDOT	Notes
Holding Special Events			
Transportation Fairs	Event used to interest community members in transportation issues and specific projects and programs	No	
Games and Contests	Strategies to attract and engage members of the public who might otherwise not participate.	No	Used by Triangle Transit Authority as a means to get community members to think about the relationship development density and transportation options.
Changing A Meeting Approach			
Improving Meeting Attendance	Strategies used to understand issues affecting low meeting attendance and to increase participation by demonstrating public input counts in the agency's decision-making	No	
Role Playing	Participants act out as characters in a pre-defined situation dealing with controversial aspects of transportation planning, or project development. Role playing is followed-up by an evaluation session.	No	
Site Visits	Organized trips taken by community residents, officials, agencies and consultants to a proposed project area.	No	Not typically undertaken for community residents
Non-Traditional Meeting Locations	Include shopping centers, elderly drop-in centers, county fairs, neighborhood fairs, block parties and sporting events	No	NCDOT typically utilizes local public buildings and civic meeting halls
Finding New Ways to Communicate			
Technology Applications	This includes the use of interactive television, displays and kiosks; computer presentations and simulations; and teleconferencing	No	

Source: Public Involvement Techniques for Transportation Decision-making, *United States Department of Transportation, December 1996 and KPMG assessment.*

STRENGTHS

NCDOT's policies and procedures for formal public input are generally consistent with North Carolina and federal requirements. NCDOT has formal, structured processes that provide citizens and elected officials with a number of opportunities to express comments and concerns as transportation projects and strategies progress through planning, design and implementation.

The Public Information Office has focused and strengthened its mission. Positive developments include the organizational move to directly report to the Secretary, a greater attention to customer service, and a newly developed communication plan. The Department is setting up a toll-free phone line to accept public input and has committed that inquiries to the Public Information Office will receive a response within three days of inquiry.

The Department has made commitments to improve its public input process. The Department's March 1998 reorganization plan included several key improvements to increase the effectiveness of public input. These include extending the public comment period when developing the Transportation Improvement Program by switching to a two-year cycle, and providing a greater focus during transportation system planning on community outreach and involvement, using strategies such as town meetings and annual forums. The Department is also committing to enhanced monitoring of high-profile, controversial projects.

FINDINGS AND RECOMMENDATIONS

Finding: Responsibility for managing and conducting public input procedures could be better coordinated.

The responsibility for public participation is divided among several branches within NCDOT. This limits NCDOT's ability to implement a more strategic public participation process and deliver a more consistent message about the Department's transportation priorities and strategies. Overall, individual branches are responsible for conducting public participation activities that are related to their area of expertise. At the initial long range and systems planning phase, the Statewide Planning Branch leads the public input process, while the Planning and Environmental Branch assumes responsibility as a project enters into project planning and environmental analysis. The Programming and TIP Branch handles public hearings for the inclusion of projects in the TIP. The Citizens Participation unit within Pre-Construction leads the public input process once a project is in the design phase. The Rail, Public Transportation, Aviation, Ferry and Bicycle Divisions lead activities for their own modal-specific projects. The Public Information Office is responsible for the Department's media relations and press releases, but is not directly involved in soliciting public input as part of the project development process.

With the exception of the Public Information Office and the Citizens Participation unit, public participation is not a primary responsibility for the groups handling this function. As a result, public participation competes with other activities for staff attention and resources. The persons conducting public participation activities are typically civil engineers by profession and typically have gained public participation skills through on-the-job-training.

Often the engineer managing a project will participate in or lead a public meeting. Overall this is beneficial to NCDOT and the citizens attending the meeting, because the project manager is most familiar with the issues affecting the project and can more readily address questions raised during the meeting. However, there have been instances where the project manager provides explanations that are too technically complex, or becomes defensive if it is perceived that a member of the public is questioning the manager's analyses or capabilities. To avoid potential conflicts and misunderstandings between project managers and citizens, NCDOT's Citizens Participation unit will hold pre-meetings with project managers to discuss responses to technical questions and to identify strategies for dealing with potentially difficult, or combative meeting attendees.

There is some informal coordination among the various NCDOT units responsible for public participation regarding citizen concerns and issues. However, there is no one group ultimately responsible for coordinating public participation activities and developing materials throughout the entire project development process. As a result, there is the potential that one NCDOT group may not be familiar with a particular public concern or issue that another group encountered in an earlier phase of the project development process. An NCDOT employee's unfamiliarity with an issue or concern discussed at a prior meeting is likely to be viewed unfavorably by those who raised that concern. Citizens may not realize that the NCDOT representative was simply not familiar with their issue, and perceive that the Department arbitrarily disregarded their issue.

Further, the division of public participation activities presents the potential for various NCDOT groups to deliver conflicting or confusing messages to the public. For example, one modal-specific projects (i.e., highway, rail, or transit) may be seen as competing with another for public support.

Recommendation:	**Expand the role of the Citizens Participation unit to coordinate all program and project-specific public involvement at NCDOT.**

The Department should expand the role of the Citizens Participation unit, which is currently located within the Highway Design branch of Preconstruction. This expanded unit should be vested with the responsibility for developing, coordinating and implementing NCDOT's formal public participation activities relating specifically to long-range planning, the Transportation Improvement Program, and highway projects in design and construction. This will provide the Department with one centralized unit staffed with hearing officers and related staff to shape a consistent public input process and be aware of the citizen issues affecting proposed transportation programs and projects.

In its expanded role, the Citizens Participation unit should be located elsewhere within the NCDOT organizational structure. Also, the expansion of the unit's responsibilities will likely require the addition of staff. The Citizens Participation unit is currently staffed with a manager and three professional staff. In addition, the Department should continue and expand opportunities for current Citizens Participation Unit staff to receive training on best practices in public input techniques.

The Citizens Participation unit should coordinate closely with the Public Information Office, but these units should remain separate, consistent with their distinct but complementary missions. The Citizens Participation unit should be primarily staffed with hearing officers trained and experienced in the TIP program development, project development and the extensive federal and North Carolina public

participation requirements. This unit should rely of the Public Information Office for support such as publicity and market research.

Finding: NCDOT must continue to increase its responsiveness to public concerns.

Like every state department of transportation, NCDOT faces a challenge in explaining the complex processes for developing projects and the manner in which public comments are considered and incorporated in the development of project strategies. These processes are not clear to many citizens. Also, NCDOT will always be faced with some constituencies that believe the Department is "unfair." If a group, or individual observes that NCDOT is not doing what it wants, then the group or individual could conclude that the Department is being unresponsive.

NCDOT's project planning and implementation processes are largely governed by federal and North Carolina statutes. Citizens affected by NCDOT proposals or participating in public meetings and hearings usually are not familiar with these requirements, which contributes to some public frustration. For example, property owners may not know whether NCDOT will require their parcels for a highway project for perhaps five to ten years once a potential corridor alignment is identified in a transportation system plan to the time a project enters the right of way acquisition phase.

Although there is an adequate foundation for soliciting and considering public input, some improvements could be made. For example, NCDOT provides written responses to citizens' letters requesting information or inquiring about a project. However, NCDOT typically has not responded to citizen letters that express an opinion or statement about a project. Similarly, NCDOT has not had a process for providing direct feedback to citizens expressing their opinions at public hearings and meetings. Unless specifically requesting a response, citizens likely do not know how NCDOT weighs their opinions in developing project strategies and recommendations. As a result, citizens could conclude that NCDOT is being unresponsive or insensitive in the development of a transportation strategy.

Recommendation:	**Enhance efforts to explain the various project development processes and expand the types of public input available.**

To improve its ability to engage and involve the public, NCDOT should more aggressively educate the public about the project planning, development and implementation processes. At present, the Department issues a citizens guide to the TIP development process. These efforts should be expanded to describe to the public their opportunities for input and to identify the various decision points in the project development process that may generally impact citizens and specific property owners.

Also, NCDOT can more proactively explain to the members of the public how the Department developed its transportation strategies and why the opinions of certain groups and individuals could not be addressed. Specifically, NCDOT could provide additional follow-up correspondence addressing written or verbal opinions. Alternatively, NCDOT could describe in news letters, fliers, web sites, or other media how public opinions were used in developing project decisions.

The Department also can expand its current efforts to more broadly solicit and address public opinions and concerns. For example:

- NCDOT currently advertises public meetings in local minority newspapers. This outreach could be expanded by informing civic and religious organizations serving minority communities about NCDOT projects and public meetings.

- The Department uses its Internet web site to post public meeting times, location and contact names with phone numbers, addresses and e-mail addresses. This activity could be expanded by establishing separate sites for large-scale efforts that would include project goals and objectives, alternatives under consideration, project status and options for persons accessing the site to provide opinions about the project.

- NCDOT extensively utilizes workshops and small group meetings to informally solicit public input. Depending on the complexity of a project, or the nature of public concern, NCDOT may consider the use of structured meeting techniques such as focus groups to solicit the opinions of meeting participants and build consensus for project alternatives and strategies.

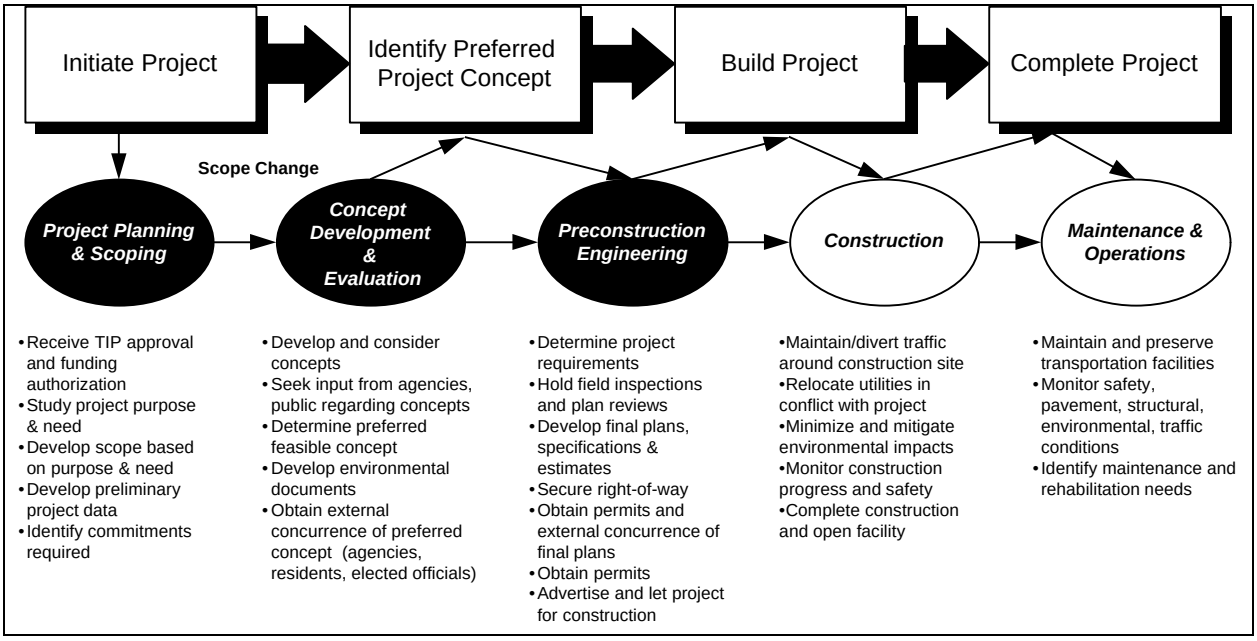
7. PROJECT PLANNING AND PRECONSTRUCTION

Project planning and preconstruction includes all planning, engineering, and technical activities that are required to develop a transportation project from its programming approval until it is ready for construction.

BACKGROUND

Exhibit 7-1, shown below, presents the transportation project life cycle, with project planning and preconstruction activities highlighted.

Exhibit 7-1: Project Planning and Preconstruction within the Transportation Project Life Cycle



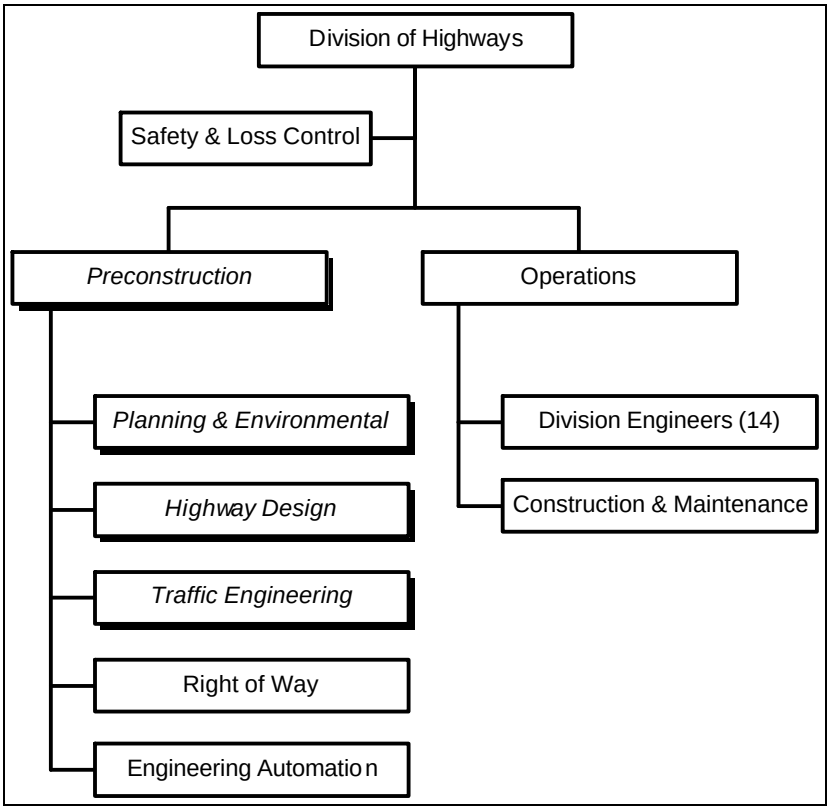
Source: KPMG

This section addresses NCDOT project planning and preconstruction units and functions, except for right of way, which is addressed in Chapter 8.

At NCDOT, projects in development have two distinct phases: (1) planning and environmental and (2) preconstruction engineering. Projects transition from their planning and environmental phase to their preconstruction engineering phase after a preferred project concept is selected and environmental assessment documents are approved.

Projects in their planning and environmental phase (i.e., project planning, scoping, concept development and evaluation, environmental impact assessment) are coordinated by the Planning and Environmental branch. Projects in the preconstruction engineering phase are coordinated by the Preconstruction branch. The units with primary responsibility for carrying out preconstruction activities are highlighted in Exhibit 7-2, shown below.

Exhibit 7-2: NCDOT Units with Project Planning and Preconstruction Responsibilities



Source: NCDOT

Planning and Environmental

The primary responsibilities of the Planning and Environmental branch are to:

- Develop and prepare planning/environmental impact studies for proposed highway projects
- Ensure that all environmental issues are addressed prior to letting a project out for construction
- Management and procurement of environmental permits required by NCDOT for the construction and maintenance of projects

Organization

The function is a centralized function with over 100 full-time positions. In addition to administrative staff that assist the branch management in day-to-day operations, the Planning and Environmental branch is comprised of the Project Planning Group and the Environmental Planning Group.

Project Planning Group. The Project Planning Group is comprised of eight units responsible for all planning and environmental activities studies of all highway projects included in the Department's Transportation Improvement Program. This group is responsible for ensuring that all proposed project actions have been evaluated in accordance with established engineering practices and the guidelines set forth in the National Environmental Policies Act (NEPA) and the North Carolina Environmental Policy Act. The following units are included within this group:

- ***Bridge Replacement Unit (1 Unit).*** This unit prepares all planning/environmental documents for all bridge replacement projects. It is also responsible for preparation of planning/environmental documents related to new bridges that are not included as part of other highway projects.

- ***Project Planning Unit (5 Units).*** These units conduct planning, engineering and environmental studies related to highway projects included in the Transportation Improvement Program. The unit is responsible for preparing all environmental documents like the Environmental Assessments and Environmental Impact Statements associated with projects. These environmental documents include all project information associated with engineering location and design alternatives, preliminary project cost estimates and the effects on the community and the environment as a result of a proposed project. In addition to project specific environmental documents, the unit also conducts special studies requested by the Governor, Secretary of Transportation, Board of Transportation Members and the State Highway Administrator.

- ***Consultant Coordination Unit (2 Units).*** These units administer all project planning/environmental studies related to highway projects that are conducted by private engineering firms. These studies include bridge replacements, and urban and highway projects that because of internal resource constraints, cannot be completed by internal staff. The units are responsible for all contract negotiations and other project management activities associated with ensuring that the private engineering firms prepare environmental documents that comply with the Department's needs.

Environmental Planning Group. The Environmental Planning Group is comprised of seven units responsible for ensuring that appropriate consideration is given to environmental matters during the planning of highway projects. This group provides technical support and other specialized data and analysis required for preparation of environmental documents produced by the Project Planning Group. This group is also responsible for procuring environmental permits required for the construction and maintenance of projects.

- ***Mitigation Bank and Water Quality Unit.*** Wetland mitigation staff within this unit provide specialized environmental engineering expertise in the areas of transportation design, hydrology, water quality and related disciplines. It includes specialists in the areas of biological, botanical, zoological, soils and marine sciences who have responsibility for assessing and analyzing environmental impacts of proposed transportation improvement projects and preparation, submittal and negotiation of wetland mitigation plans associated with these projects.

- ***Permits Unit.*** This unit is responsible for ensuring that appropriate consideration is given to State and Federal permit matters during the planning process. The permit staff coordinate with the regulatory agencies prior to and during the permitting process. The group is responsible for preparing permit applications and monitoring the status of the following permits:

  - U.S. Army Corps of Engineers Permits - Section 10 of the Rivers and Harbors Act of 1899, and Section 404 of the Federal Water Pollution Control Act

  - U.S. Coast Guard Permits - Section 9 of the Rivers and Harbors Act of 1899 , Section 401 Water Quality Certification Permits and National Pollutant Discharge Elimination System Permits

- U.S. Fish and Wildlife and U.S. Forest Service - Special Use Permits when required on specific projects

- North Carolina State Agency Permits - 401 Water Quality Certification, State Dredge and Fill Permits and Coastal Area Management Act Permits

- ***Ecology Unit.*** Staff within this unit provide specialized data on biological and natural resource related matters as applied to highway engineering and other transportation related projects. Their major responsibilities include identifying potential conflicts between wildlife and transportation facilities and developing feasible solutions to these problems.

- ***Noise and Air Unit.*** The noise and air staff provide specialized highway engineering expertise in the areas of highway traffic noise and air quality. They are responsible for compilation of noise and air quality data and preparation of relevant technical reports which then become part of the environmental document. This group is also responsible for recommendations regarding the design of noise attenuation devices.

- ***Archaeology Unit.*** The archaeology staff provide specialized archaeological data and related analysis for highway planning studies. They identify and evaluate archaeological resources within a potential area of impact of a proposed highway project. They are also responsible for compliance with State and federal environmental and historical preservation laws and regulations with respect to archaeological resources.

- ***Historic Preservation and Recreation Unit.*** This unit is responsible for conducting cultural resource surveys to identify historic buildings, structures, sites and other properties that are within a potential area of impact of a proposed highway project. They prepare technical reports containing the findings of the cultural resource survey, which becomes part of the environmental document.

- ***Land Use and Sociology Unit.*** This unit is responsible for analyzing and evaluating the social, economic and land use impacts of proposed highway improvement projects. Information on existing land use patterns; identification of prime and important farmland; evaluation of neighborhood characteristics; analyses of economic factors; identification of public facilities and analyses of social impacts are compiled for specific highway improvement projects. These analyses are included as part of environmental documents prepared in connection with proposed highway projects.

Key Activities

NCDOT's environmental processes involve all activities related to securing environmental clearances for a project and conforming with federal and State environmental laws and regulations. The major preconstruction environmental activities are the preparation of environmental documents and permits.

Preparation of Environmental Documents

The FHWA regulations describe the three classes of action and the appropriate level of environmental documentation required under the National Environmental Protection Act process for highway construction. The level of engineering and environmental assessment work required on any given project is driven by the environmental considerations that emerge from the proposed transportation improvement project. For federally funded projects, a three-tiered classification system based on the significance of known

environmental effects is used to classify projects. Known as Classes of Action, projects within each respective class must achieve prescribed levels of analysis, documentation and consensus regarding engineering and environmental factors. The three Classes of Action are as follows:

- **Class I, Environmental Impact Statement (EIS):** This type of project includes an extensive analysis of the potential environmental and engineering considerations posed by a project. To receive federal approval for final design of such a project, an EIS report must be produced. An EIS report is expected to include a full and fair discussion of significant environmental impacts as a result of the proposed project and should include information related to any reasonable alternatives that would avoid or minimize adverse impacts or enhance the quality of human environment. Throughout the development of the EIS, the public is given an opportunity to comment on the impact of the proposed project during public hearings that are held when the draft and final EIS documents are discussed. The process concludes with the issuance of a Record of Decision (ROD) from the FHWA signifying federal approval for final design of the project.

- **Class II, Categorical Exclusion (CE):** This is a classification given to projects that do not have a significant effect on the environment either individually or cumulatively. Once a CE is approved for a project, environmental clearance requirements of NEPA have been satisfied.

- **Class III, Environmental Assessment (EA):** This is a document prepared for federal actions that are not eligible for a categorical exclusion and do not appear to be of sufficient magnitude to require an EIS. The process concludes with the issuance of a Finding of a No Significant Impact (FONSI) from the FHWA indicating federal approval for final design of the project.

The Project Planning Group within the Planning and Environmental branch is responsible for preparation of all environmental documents. If consulting firms are involved, the products of their work are reviewed and monitored by staff within the Consultant Coordination unit within this group. All technical assistance required for preparation of these documents is provided by the staff within the Environmental Planning Group who function as a technical resource for the Project Planning Group.

Exhibit 7-3 summarizes the number of environmental documents processed by one of the Project Planning Groups within the Planning and Environmental branch. It represents a snapshot of the workload of this group during the fourth quarter of 1997 and represents the workload of 23 professionals.

Exhibit 7-3: Environmental Documents Processed (between October 1997 and December 1997)

	Pending	Underway	Completed
Categorical Exclusions	4	135	14
Environmental Assessments	31	37	2
Finding of No Significant Impact (FONSI)	36	8	-
Draft EIS	-	-	-
Final EIS	1	1	1

Source: NCDOT Planning and Environmental

Permitting

The permitting process includes the following elements:

- NCDOT must coordinate all activities related to determining the type of State and/or federal permit required. Considerations that determine appropriate permit requirements include the impact of a proposed project on existing water or wetlands and determination of the extent of the area that would be disturbed.

- NCDOT must acquire relevant permits once determinations about appropriate permits are made. As part of the permit acquisition process, NCDOT is required to provide information to State and/or federal permitting agencies to ensure adherence to appropriate procedures and policies. This includes acquisition of required permits by providing information to both State and/or federal environmental regulatory agencies as required.

- NCDOT must coordinate with involved agencies to resolve any permitting conflicts in a timely manner to avoid undue project delays.

- NCDOT must ensure that all commitments made during both the permit application and permit approval process are complied with during the construction phase of a project.

Permit applications are made based on available engineering information. For most projects, this information includes the completion of hydraulic designs. Complete hydraulic designs are required to assess impacts on existing wetlands and to determine appropriate wetland mitigation steps. Various permit applications are discussed during monthly Permit Review Agency Meetings. Agencies attending NCDOT's permit review meetings include the U.S. Army Corps of Engineers, U.S. Coast Guard, U.S. Fish and Wildlife Agency, U.S. Forest Service, and the North Carolina Department of Environment and Natural Resources. At these meetings, NCDOT Planning and Environmental staff discuss the status of pending permit applications and other issues related to various transportation improvement projects. There is also discussion regarding steps that NCDOT has taken or is taking in order to comply with the conditions under which permits were approved.

Recently, the permitting process has changed to allow applications to be made at the same time as environmental document review (This is referred to as the combined NEPA/404 process).

The following permit applications are usually required for transportation improvement projects:

- U.S. Army Corps of Engineers Permits - Section 10 of the Rivers and Harbors Act of 1899, and Section 404 of the Federal Water Pollution Control Act

- U.S. Coast Guard Permits - Section 9 of the Rivers and Harbors Act of 1899 , Section 401 Water Quality Certification Permits and National Pollutant Discharge Elimination System Permits[7]

- U.S. Fish and Wildlife and U.S. Forest Service - Special Use Permits when required on specific projects

[7] National Pollutant Discharge Elimination Permit (NPDES) responsibilities are expected to be delegated to NCDOT through a State-wide permit currently being finalized. NCDOT's responsibilities are expected to expand as a result of this change.

- North Carolina State Agency Permits - 401 Water Quality Certification, State Dredge and Fill Permits and Coastal Area Management Act Permits

Exhibit 7-4 represents the number of projects requiring permits based upon a 24 month tentative let list.

Exhibit 7-4: Projects Requiring Permits based upon a 24 Month Tentative Let List[8]

	Major Projects	Minor Projects	Total
12 Months ending January 1999			
Projects requiring permits	59	141	200
Number of Permit Specialists	5	5	5
Projects per specialist	11.8	28.2	40
Percentage Distribution	29.5%	70.5%	
12 Months ending January 2000			
Projects requiring permits	49	177	226
Number of Permit Specialists	5	5	5
Projects per specialist	9.8	35.4	45.2
Percentage Distribution	21.7%	78.3%	

Source: NCDOT (Note: Permit specialists include the Division 1 Environmental Officer)

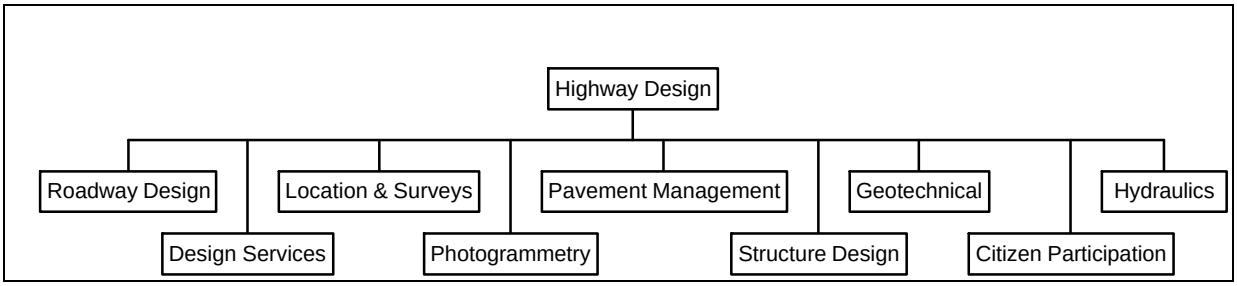
Highway Design

Highway design is the technical and design work needed to coordinate plan and proposal development for road and bridge projects throughout North Carolina. Primary responsibilities of the Preconstruction branch's Highway Design unit include identifying and obtaining engineering field data, designing and developing right-of-way acquisition plans, and preparing final highway and bridge construction plans. Other specific functions include aerial photography, topographic mapping, field surveying, geotechnical analysis, hydraulic design, pavement design, proposal and contract assembly, and the preparation of all roadway, bridge and culvert plans, specifications and estimates required for NCDOT bridge and road contracts. Highway Design also assesses the need for assistance from private engineering firms in the design of highway projects. These consultant selection responsibilities include review and selection of engineering firms, contract negotiations, agreement execution, coordination of all activities between the firms and NCDOT, and the monitoring of the firm performance. Highway Design also provides special design expertise to construction and maintenance operations, as well as sedimentation control and environmental protection design expertise for securing permits from local, State and federal agencies.

Highway Design currently is organized into nine units: Roadway Design, Design Services, Location and Surveys, Photogrammetry, Pavement Management, Structure Design, Geotechnical, Hydraulics, and Citizens Participation. Exhibit 7-5 illustrates the Highway Design branch organizational chart.

[8] A single project will require at least two permits: a "404 permit" from the U.S. Army Corps of Engineers and a "401 permit" from the North Carolina Division of Water Quality. In addition, some projects require multiple 404 permits, a Coastal Area Management Act permit and a U.S. Coast Guard permit. For a major project, obtaining the 404 and 401 permits can take from 6 to 12 months. In addition to the numbers shown, the permit specialists assist Divisions with permits applied for by Division staff and with permit modifications for projects already under construction.

Exhibit 7-5: Highway Design Organizational Structure



Source: NCDOT

The responsibilities of each Highway Design unit are described below.

Roadway Design. Roadway Design is responsible for the design and preparation of roadway plans and estimates of quantities needed for all roadway projects let to contract by the Department. Roadway Design project engineers have primary responsibility to coordinate plan development with other Preconstruction units and Division-based engineers. Roadway Design has its own CADD support team to assist in training and technical problems.

Structure Design. Structure Design is responsible for the design of structures for all highway projects. Structure Design prepares designs, plans, specifications and cost estimates for all bridges, retaining walls, pedestrian bridges, sign foundations, box and arch culverts and other major drainage structures. Structure Design also reviews and approves structural plans developed by others, such as railroad companies, municipalities, federal agencies, and private concerns, for structures to be constructed over or under roads on the system or to become part of the State Highway System.

Location and Surveys. Location and Surveys conducts route location surveys, right of way surveys, and obtains engineering data needed for project mapping, design, right-of-way acquisition, and highway construction. Route location surveys provide information for right-of-way lines, interchange alignments and at-grade intersections. Data gathered in the field is used to provide information such as horizontal alignment, field topography, vertical alignment and centerline profile, cross-sections and property ownership. Location and Surveys field offices create graphic files from data using CADD equipment.

Photogrammetry. Photogrammetry is the process of using aerial photographs to develop spatial data. The Photogrammetry unit coordinates aerial photography and produces topographic, planimetric, and cadastral maps, base plan sheets, digital terrain models, photo plan sheets, and aerial mosaics. These products are used in highway design, computing earthwork pay quantities, and the planning, designing, and maintaining of wetland mitigation sites. Photogrammetry includes a photo lab unit, automation unit, and a production unit.

Geotechnical. Geotechnical carries out roadway and structural subsurface investigations, conducts wetland mitigation and blast monitoring, evaluates underground storage tanks and hazardous materials issues related to highway projects, and manages the bridge scour program. The analysis provided by these investigations is utilized in pavement, structural, and foundation designs.

Hydraulics. Hydraulics is responsible for the broad range of activities that relate to hydraulic and surface drainage for all highway construction and maintenance contracts and activities. For projects in their planning stage, hydraulics provides preliminary designs for bridge and culvert drainage features and information on identifying wetlands, permit requirements and water quality. During final design, hydraulics design squads perform hydrologic/hydraulic studies needed to make detailed design recommendations for all hydraulic structures, include bridges, box culverts, pipes, ditches, channels and storm drainage systems. Hydraulics works on projects during construction to review and adjust drainage. Two regional hydraulic engineers assist division maintenance personnel with drainage-related issues, including technical recommendations and interpretation of drainage policy and regulations. Assistance also includes review of subdivision plans, proposed encroachments, driveway permits and other drainage proposals that may affect roads. Hydraulics also provides bridge maintenance staff with the engineering surveys and hydraulic design recommendations for bridge replacements. Other special responsibilities include maintaining historical data on project locations; bridge and culvert data, flood studies and records; and other surface water information, assisting the Ferry Division in basin and channel surveys and design, reviewing U.S. Army Corps of Engineers projects; preparing exhibits and court testimony for the North Carolina Attorney General's office in drainage related litigation; and review of drainage projects by others that may affect proposed or existing highways.

Design Services. Design Services provides specialized technical and design support during preconstruction in various areas, such as utility engineering and relocation design, lighting and electrical design, soils and foundations, and value management. Other responsibilities include highway project contracts and proposals and consultant engineering coordination. Each subunit's responsibilities are described below.

- ***Special Design*** gathers information on utilities (power, water, sewer, gas and telecommunications) that have to be moved to avoid conflicts with projects and prepares final construction plans to handle these conflicts. Special Design also prepares lighting and electrical designs for highways, rest areas, welcome centers, truck weigh stations and truck escape ramps. Other design responsibilities include designs for unusual projects and review of designs prepared by cities and developers for streets and highways that affect the State Highway System. Special Design also reviews and approves requests for encroachments on NCDOT right of way.

- ***Soils and Foundations*** reviews and designs roadway and structure foundations and slopes, and investigates soil stability issues such as landslides and embankment settlements related to highway construction and maintenance.

- ***Engineering Coordination*** negotiates and administers contractual agreements with consulting engineering firms retained to prepare highway design work.

- ***Value Management*** performs value engineering and other studies for projects in the preconstruction phase.

- ***Proposals and Contracts*** staff are responsible for the contents of each proposal and the contract for each project let. This group creates and incorporates provisions for special items and construction methods not covered by standard specifications, and prepares bid packages for contract letting. Bid

preparation responsibilities include reproduction of proposals, contracts and plan reduction. Their work also includes preparing working day estimates for construction contracts. A discussion of construction contracting is included under the Construction Contract Letting topic later in this section.

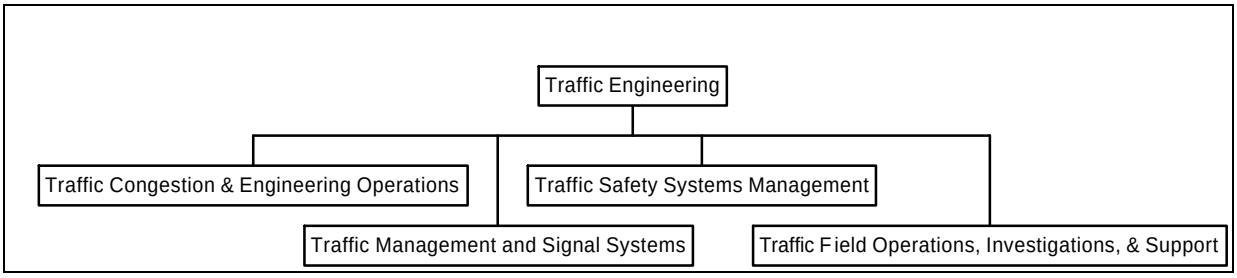
Citizens Participation. The Citizens Participation unit is staffed with hearing officers responsible for acquiring sites, establishing dates and times, and conducting informational workshops and public hearings during project planning and preconstruction.. Hearing officers explain proposed highway projects and help incorporate public input into project designs. (The responsibilities of the Citizens Participation unit are addressed in more detail in the Public Input section of this report.)

Pavement Management. Pavement Management is responsible for activities related to designing and maintaining pavement structures at an acceptable level. Pavement Management is responsible for preserving safety and the State's investment in pavement through cost-effective rehabilitation and maintenance activities. (Pavement Management functions are covered in the Maintenance section of this report.)

Traffic Engineering

Traffic Engineering is responsible for all traffic-related design and programmatic oversight activities for the NCDOT. Primary responsibilities of the Traffic Engineering branch include designing all freeway and isolated traffic signs and signals statewide, performing all repair work on traffic signals, managing the statewide traffic accident database, and performing detailed traffic analysis and recommendations for access for major developments. As shown in Exhibit 7-6, Traffic Engineering is organized into four units.

Exhibit 7-6: Traffic Engineering Organizational Structure



Source: NCDOT

Traffic Congestion and Engineering Operations. This unit is divided into three sections and provides traffic engineering methodologies, technical training, and state of the art equipment to the Department, contractors, utility companies, and developers. It is responsible for the production of traffic engineering plans, specifications, estimates, and installation of all traffic signals, pavement markings, and congestion management measures.

- ***Traffic Control Marking and Delineation.*** This section is responsible for overseeing the implementation of parts III (Pavement Marking) and parts VI (Work Zone Traffic Control) of the FHWA Manual on Uniform Traffic Control Devices. This section also tests and approves new traffic control devices and pavement marking materials.

- ***Signing.*** This section designs and selects the criteria for signs, sign support systems, changeable message signs, and overhead sign assemblies and lighting systems. This section also develops standard and special sign design standards and coordinates the manufacturing of signs, evaluates the quality of the final signing product, and tests and approves new products and concepts for signs.

- ***Congestion Management.*** The Congestion Management section explores and improves ways to apply congestion management techniques through operational and safety improvement strategies which mitigate traffic congestion to improve traffic safety and system efficiency. This section performs access studies, traffic engineering analysis studies and reports for small municipalities and proposed TIP projects, and studies possibilities for decreasing congestion within existing highway lane structures.

Traffic Management and Signal Systems. This unit is composed of three sections and is responsible for the engineering plans, specifications, estimates, and the successful installation, application, and maintenance of all traffic signals on the State Highway System.

- ***Signals and Geometrics Section.*** This section is responsible for all traffic signal preliminary specifications and estimates on all traffic signal system design for the State Highway System, approval of traffic signal plans performed by private firms for use on the State Highway System, and establishing the standards and procedures for traffic signal plans.

- ***Traffic Management Systems Section.*** This section handles all of the Intelligent Transport Systems (ITS) for the State such as fog detection equipment and camera placement for remote incident management. This section also performs contract management for large municipal signal systems contracts that are being done by private firms

- ***Signals Management Section.*** This section performs oversight functions related to signal equipment. This consists of developing the equipment specifications, providing al electrical details for traffic signal plans, and handling a major portion of the equipment repairs. This section also oversees the biennial bid process for the purchasing of new signal equipment.

Traffic Safety Systems Management. The Traffic Safety Systems Management unit is responsible for the planning, design, development, implementation, and evaluation of engineering strategies that address statewide traffic safety issues with the goal of reducing traffic accidents. This unit accomplishes these tasks through a cooperative effort between the four sections listed below.

- ***Highway Safety Management Section.*** This section is responsible for functions involving safety policies and procedures and safety systems control strategies, evaluation techniques, and determining research objectives. This section works to establish and implement safety policies and procedures through the research and development of new technologies that have been effective in improving public safety. Specifically, this section is responsible for the maintenance, implementation, and evaluation of such projects as the Highway Safety Information Management System that is used to help improve the efficiency and accuracy of statewide crash data collection.

- ***Traffic Safety Research Section.*** This section provides the basic research, developmental capabilities, technical expertise, evaluation criteria, operational policy, and procedural framework for safety

management systems that are designed to reduce accidents on North Carolina highways. The primary responsibility of this section is to provide the research and development required by the Traffic Safety Systems Management unit. This section provides the technical leadership, engineering expertise, and investigative support to determine the engineering requirements for system implementation, work tasks, evaluation criteria, operational policy and procedural framework, and future enhancements of the Highway Safety Management System as required by the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991.

- ***Traffic Safety Section.*** This section performs the day to day monitoring and data collection needed to maintain the Highway Safety Management Information System and establish accurate accident patterns and collision diagrams

- ***Railroad Highway Safety Management Section.*** This section is responsible for identifying and investigating hazardous or potentially hazardous railroad/highway grade crossing at any public crossing statewide. The responsibilities include the collection and maintenance of grade crossing and approach inventory data, responding to informational and investigative requests, and the monitoring and coordination of railroad construction activities.

Traffic Field Operations, Investigations, and Support. This unit is divided into five field operations areas. It is responsible for investigating locations of the highway system that are experiencing traffic operational problems and developing and funding safety improvement projects to address them. Other major responsibilities of the unit include the coordination of dimensioned vehicle access; maintaining and revising traffic ordinances for speed zones, no parking zones, and stop signs; collecting traffic count data for engineering safety studies; investigating fatal accidents for immediate safety improvements; investigating railway-highway grade crossings for signalization improvements; developing, maintaining, and interpreting the policies and procedures of the Traffic Engineering and Safety Systems branch on highway matters; and addressing requests from the general public or State and local officials regarding traffic operational concerns.

Construction Contract Letting

The construction contract letting process is the linkage between project design and construction. Construction contract letting includes preparation of bid packages, advertisement for construction bids, bid analysis, and construction contract award.

Responsibilities

The Proposal and Contracts unit of the Design Services unit within Highway Design and the Contract Monitoring unit have key responsibilities for carrying out construction contract letting activities.

Proposals and Contracts Office. This group has the primary responsibility for coordinating construction contract bidding and letting. Proposals and Contracts performs the following tasks associated with preparing contract documents for highway construction projects:

- Reviews plans, special provisions and quantity estimates prepared by Division offices and design units in the Highway Design branch

- Develops cost estimates, specifications, roadway standards and special roadway details
- Announces requests for bids and provides responses to prospective contractors from the time of project advertisement to the execution of a construction contract
- Tabulates bids and executes contracts for the Department's construction projects on behalf of the Secretary of Transportation

This unit includes a Plans and Standards unit, a Specifications and Proposals unit, and an Estimating unit.

Contract Monitoring. The Contract Monitoring unit supports the Department's commitment to establish a state-of-the-art bidrigging detection system. This unit monitors NCDOT's past and present construction contracts utilizing the Bid Analysis Management System, a widely utilized set of software products utilized by state transportation agencies around the country. Contract Monitoring prepares reports such as a monthly analysis of bids received and case studies of suspected collusion.

Process

Project engineers in the Department's Division offices and in various Preconstruction Division work units begin the construction contract letting process by submitting plans, specifications, special provisions and estimates to the Contracts and Proposal Office. The Plans and Standards unit inspects project plans for obvious errors and omissions and reviews them for general conformance with the Department's adopted plan format requirements. Plans requiring revisions are returned to the appropriate design project engineer.

In the Specifications and Proposals unit, the Department's Provisions Engineer reviews or develops all relevant special provisions and incorporates this information into the contract proposal document. Concurrently, the Specifications Engineer reviews project specifications for consistency, adding or modifying specification language as necessary. The Contract Time Engineer recommends contract completion dates, working closely with the project designer and Division construction, maintenance and operations personnel to set reasonable project schedules.

The Estimating unit prepares the engineer's estimate for each project using a cost-based estimating system and historic information compiled in NCDOT's mainframe computer system. Estimating unit staff confirm this estimate through field visits to the project site.

When all plans, specifications, special provisions, estimates and the proposal document are finalized for a project, the Proposals and Contracts office places an "Invitation to Bid" notice on the Internet and in a publication distributed each month to all contractors prequalified with the Department. This information is typically published on the third Tuesday of every month, approximately four weeks prior to a project's letting date.

The Proposals and Contracts Office addresses all contractor inquiries concerning the proposed work and associated bid documents -- from the time a project is advertised, until it is awarded. On complex projects, the Department will host pre-bid conferences to answer related questions and further clarify the information contained in these documents.

Ninety-five percent of all bids are submitted digitally. Typically, only newly prequalified contractors or contractors on small projects still submit bids manually. Bids are submitted by 10 a.m. on the designated letting date. At this time, bids are opened and the apparent low bidder is declared. The apparent low bidder's proposal is reviewed for fundamental flaws (e.g., missing sections, signatures), quantity errors, appropriate bid bond, problems with EEO compliance and other potential discrepancies.

If the bid is acceptable, the Contracts and Proposals Office prepares a series of documents and reports to confirm their tabulation to the Bid Review Committee and the Board of Transportation:

- Item "C" Report -- summary information for the Bid Review Committee and the Board of Transportation
- Bid tabulations summarizing information provided by each bidder (made available to all interested contractors)
- Comparison between the low bid amount and the engineer's estimate
- Bid analysis report (prepared by the Contract Monitoring unit)

The Department's Bid Review Committee, chaired by NCDOT's Operations Engineer and comprised of other key administrators in Planning, Preconstruction and Operations, recommends approval or rejection of bids. The Board of Transportation usually supports the Bid Review Committee's decisions.

The Proposals and Contracts Office officially executes an agreement with the contractor that submitted the lowest conforming bid (i.e., met all necessary requirements). The contractor posts a performance bond for the contract work and awaits an invitation from the Department's Construction Section to attend the requisite pre-construction conference.

STRENGTHS

The Planning and Environmental branch oversees an extensive environmental assessment workload. This unit is currently leading most states in the number of major environmental assessments being performed for transportation projects.

NCDOT and the Department of Environment and Natural Resources are working cooperatively to address environmental permitting issues. Their cooperation should assist in resolving the Department's recent challenges in securing timely environmental permits.

Preconstruction units cooperate effectively to complete design for hundreds of projects. The approach used to design projects provides flexibility, allows various approaches to be utilized for both complex and simple projects, and includes numerous quality control and assurance elements.

Traffic Engineering provides vital services design engineering and safety services. This branch is effectively structured to monitor traffic and safety on the State's extensive highway system, to support projects in development, and to assist in project construction issues.

Preconstruction units follow a clear project management structure. Roadway design units coordinate plan development activities and manage project schedules, while other units carry out their respective

functions in a coordinated fashion. The Project Management Schedule System (PMSS) is effectively utilized by preconstruction units. Project milestones are clearly communicated and understood by responsible parties and completion dates are regularly entered into the system.

Roadway and Structure Design units employ an effective resource allocation method which allows them to plan and manage the workload of their design squads and private consultants. Regular project status reports and workload projections are closely monitored and consistently updated for accuracy. These reports and projections are disseminated to unit staff to increase awareness of project flow and scheduling processes. Workload capacity levels are effectively managed to stay at a maximum level of operational efficiency.

The centralization and co-location of preconstruction units in a single Raleigh office campus fosters a highly collaborative and effective working environment. Communication and coordination is greatly enhanced by the existence of the Century Center complex. The ability to obtain quick answers to design questions and settle scheduling issues reduces the possibility of project delay.

NCDOT has a modern computer aided design and drafting (CADD) computing environment and provides extensive CADD application and systems training. Engineering Automation provides excellent support to Preconstruction units and staff. Engineering application development and training are effectively managed and delivered.

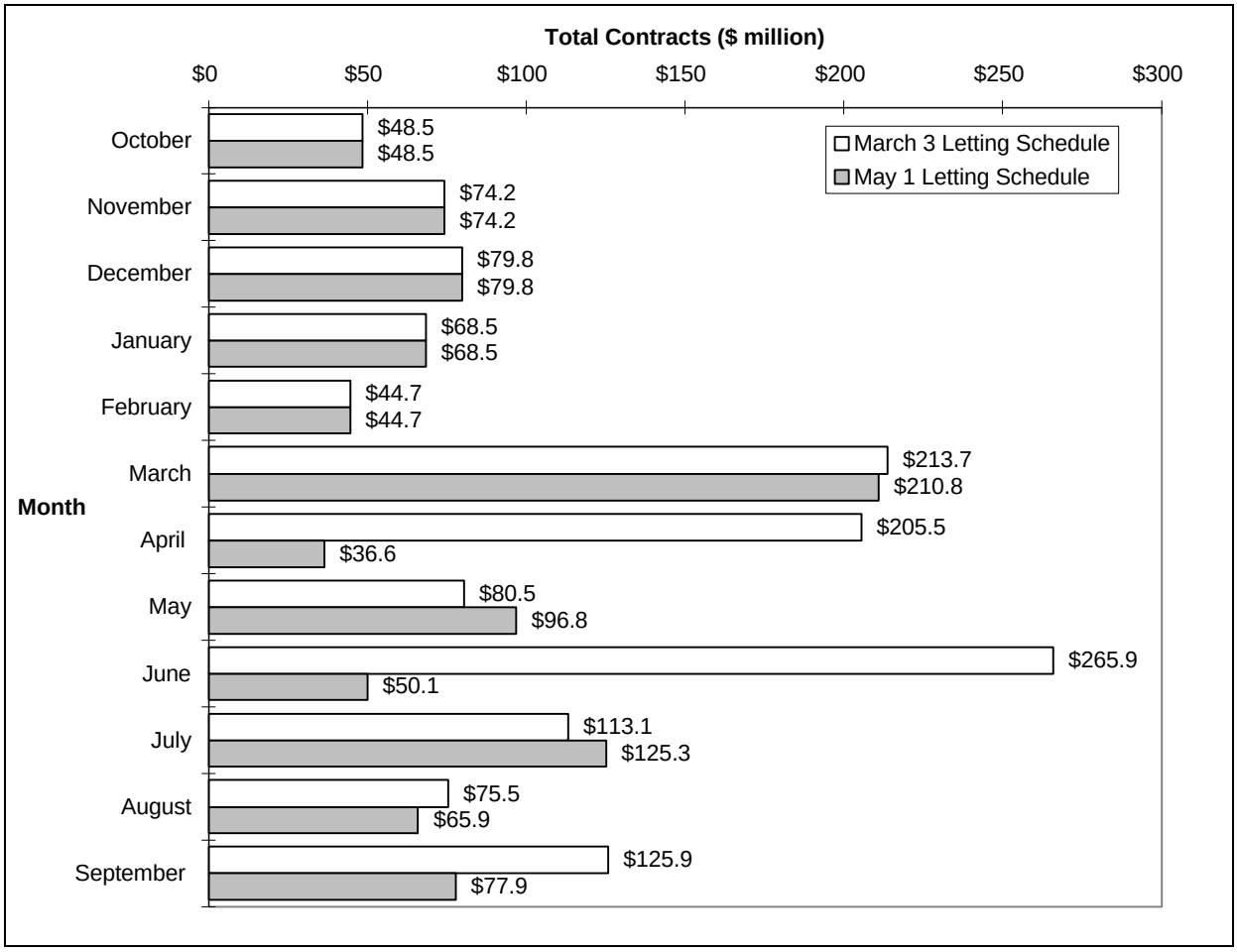
FINDINGS AND RECOMMENDATIONS

Finding: The Department is challenged to meet its ambitious letting schedule— over $400 million of projects were postponed this federal fiscal year.

On March 3, 1998, NCDOT estimated its total contract amounts awarded, estimated, and programmed for federal fiscal year (FFY) 1998 were $1.395 billion. As of May 1, 1998, this figure was reduced to $978 million— a $400 million decrease. The Department has cited that contract amounts were revised downward to reflect projects postponed due to environmental permitting and right of way delays. The change in the Department's letting schedule from March 3 to May 1 is shown in Exhibit 7-7.

Even with the reduction in this year's contract awards, lettings have increased significantly relative to prior years (NCDOT awarded $669.5 million in FFY 1997). Department and industry sources interviewed for this study indicated that contractors are finding it difficult to provide the skilled manpower and equipment required to meet NCDOT's growing construction program -- particularly in the extreme western and eastern part of the State, where there are fewer qualified contractors. The Department's large variability in monthly contract lettings exacerbates this problem -- it inhibits contractors from most efficiently allocating their limited resources to bid competitively on projects throughout the year. It also strains the resources of NCDOT's construction inspection staff.

Exhibit 7-7: NCDOT Monthly Contract Awards for Federal FY 1998



Source: NCDOT Division of Highways, Monthly Contract Total Reports Dated March 3, 1998 and May 1, 1998.

Recommendation:	**Continue to review and balance the Department's construction letting schedule.**

The Department should strive to develop an achievable and balanced letting schedule -- keeping programmed projects on tight schedules so that contractors and NCDOT's construction administration staff can adequately plan their staffing and resource needs throughout the year. To accomplish this objective, projects must be reasonably scheduled from the time they are initially programmed to account for realistic plan development schedules, environmental review periods and right-of-way clearance requirements.

NCDOT should also strive to determine how many projects it can reasonably administer in a single season -- weighing construction traffic congestion considerations and evaluating the availability of qualified contractors to perform the work and the capacity of the Department's construction project managers to properly oversee the work. This is especially critical when considering that the Department is to administer a construction program 2.5 times larger than it administered in FFY 1997, and twice as large (when accounting for inflation) as the program in managed in FFY 1996—without a corresponding increase in staff. If the Department's productive capacity exceeds what is programmed, many projects programmed in FFY 1998 may need to be deferred to help the Department ensure quality plans are developed and to deal with its construction administration staffing limitations.

Finding: NCDOT has had difficulty securing environmental permits on a timely basis.

Federal and State regulations require that NCDOT secure the relevant permits before commencement of construction. Specifically, as it relates to obtaining 401 and 404 permits, NCDOT is required to demonstrate that project design plans have avoided wetlands that fall within a proposed project's boundaries. Alternately, if avoidance of wetlands is not possible, NCDOT is required to develop mitigation steps that will be taken to address the impact on and the potential loss of wetlands as a result of the proposed projects. This requires NCDOT to demonstrate to the satisfaction of the regulatory agencies that the least environmentally damaging project alternative has been selected.

Department staff have indicated that permitting delays are the most prevalent reason that projects could not be let for construction on schedule. Delays have occurred for several reasons:

- ***Permitting issues not resolved early enough under previous procedures.*** According to agencies involved with issuing environmental permits, NCDOT has not addressed permit related issues sufficiently early in a project's development cycle under previous permitting procedures. However, the current combined NEPA/404 process is allowing permit applications to be made earlier.

- ***Project progress without sufficient "buy in" from permitting agencies.*** Permitting agencies have contended that by the time permit applications were submitted, key project related decisions were already made by NCDOT. Until recently, permitting agencies were not involved with project reviews until final design and right of way activities were completed. By this time, firm project let dates had already been determined, leaving insufficient time for a thorough external project review. This practice also has fostered permitting agencies viewing NCDOT's project alternatives with skepticism and withholding permit approval. The current combined NEPA/404 process is helping address this problem.

- ***NCDOT and permitting agencies have disagreed about necessary wetland mitigation steps.*** NCDOT has contended that when they are ready to address wetland mitigation prior to construction, conditions may have changed, precluding the Department from taking all mitigation steps necessary to satisfy the agencies. The regulatory agencies have contended that NCDOT deliberately does not address all wetland mitigation issues, particularly if it already has relevant permits. This situation has fostered mutual mistrust, which has impacted other projects and compounded the potential for delays.

Recommendation: Secure external agency approval earlier in the project development cycle.

The Department's revised permitting procedures should help secure buy-in for a project from the regulatory agencies early on in a project development life cycle. Ideally, the Department should strive to build consensus during the systems planning phase as part of the purpose and needs step in a project development life cycle.

Also, the Department should aggressively manage its project schedules to submit permit applications as soon as possible and continue to involve permitting agencies in key plan review meetings. If environmental issues are not resolved on a timely basis, the Department should reschedule project letting to allow sufficient time to address the concerns of permitting agencies. This process will foster a more collaborative approach and avoid having the Department's preconstruction units work on projects with unrealistic letting dates.

Recommendation:	**Improve the process for addressing mitigation commitments.**

The Department should work more closely with permitting agencies to ensure that mitigation commitments have been addressed to their mutual satisfaction. If site conditions change and the Department determines that it may not be possible to adhere to all mitigation commitments made to the permitting agencies, these changed field conditions should be brought to the attention of the permitting agencies. At that stage, the Department should work with the permitting agencies to explore any other alternatives that will fulfill the original commitments.

Recommendation:	**Develop a general memorandum of understanding between the Department and environmental agencies.**

A memorandum of understanding could help make the environmental assessment and permit approval processes more predictable. As a preliminary step, both the Department and regulatory agencies should outline their general areas of concern. Solutions to these concerns could be discussed and incorporated into a common memorandum of understanding which spells out specific action steps to be taken. This memorandum should also define further the roles and responsibilities of all parties in the environmental and permit approval processes.

Finding: Planning and Environmental staff lack appropriate project management authority.

Numerous Department sources have indicated that the staff in the Planning and Environmental branch lack the authority and information to effectively manage projects during their planning and environmental stage. For example, this study has documented that certain projects have experienced prolonged delays while staff await final decisions related to project alternatives. Department staff have also indicated that project communications from the regulatory agencies are not routed to project staff until well after their receipt by the Department.

Recommendation:	**Delegate project management responsibility to project planning staff.**

In order to empower project managers, project management responsibility should be delegated to the appropriate level within the branch. Project managers should be given the authority to communicate and correspond with their peers at the external agencies. Whenever possible, project management decisions should be resolved at the staff level. Only issues that cannot be resolved should be elevated for decision making to the executive level. This will ensure that project progress is not held back because of untimely decisions. It will also result in a better working relationship between the Department and the external agencies involved in the environmental process.

The Department has recently aligned its Planning and Environmental branch within the Preconstruction branch in the Division of Highways. This change enhances project continuity by creating an organizational unit which includes many key project planning and engineering units involved in designing projects. In other state departments of transportation, this alignment has fostered a project management approach where one project team is assigned to track a project from concept to construction. NCDOT has employed a project team concept on two projects and is currently evaluating its experience with this approach.

Finding: Planning and Environmental lacks a clear, concise policies and procedures manual.

Environmental regulations, particularly the processes required to conform with the National Environmental Policy Act, are very comprehensive and complex. These rules and regulations become difficult to understand in the absence of a clear interpretation of guidelines. A clear and concise environmental policies and procedures manual is required for the following reasons:

- To ensure compliance with environmental laws
- To improve communications between various units within Planning and Environmental, the regulatory agencies and the rest of NCDOT
- To ensure a consistent application of these laws in the development of environmental documents and the preparation of permit applications
- To ensure that environmental documents and permit applications leaving the Planning and Environmental branch are similar in style and based on the requirements of the regulatory agencies
- To serve as a guidebook to new staff within Planning and Environmental and as a reference resource for existing staff within the branch and the Department

Planning and Environmental branch management have recognized the need for an environmental policies and procedures manual. Accordingly, steps were taken to address this issue. After commencing some work on the development of the manual, this effort was abandoned due to resource constraints. Consequently, the existing manual is not thorough or up-to-date. Though it outlines some of the responsibilities of the various groups within the branch, it does not lay out in clear detail the processes associated with development of environmental documents and permit applications.

Recommendation:	**Complete development of an up-to-date environmental policies and procedures manual.**

The Department should complete developing an environmental policies and procedures manual that clearly describes the various environmental processes and the roles and responsibilities of all parties involved in these processes. At a minimum this manual should include the following:

- An introduction to the environmental process
- The relevant regulations that drive the development and preparation of environmental documents
- A high level process overview clearly distinguishing between process steps, consensus points, regulatory steps and public participation steps
- A brief description of what type of documentation is required to ensure that the steps have been completed

- A description of the three Classes of Action, representative projects within each class in order to demonstrate the appropriate type of environmental document that would be required
- The level of analysis, documentation and requirements for completion of environmental documents within each class
- The roles and responsibilities of Departmental staff and the various agencies at different points in the process
- The role of the public during the different stages of the environmental review and document preparation process
- A glossary that includes technical terminology used in the environmental document process

Recommendation: Develop an up-to-date environmental permits manual.

The Department should develop an environmental permits manual that clearly describes the permit determination and permit application process associated with a highway construction project. At a minimum this manual should include the following:

- An introduction to the permitting process including the purpose and need for the permit
- A list of the various permitting agencies including their responsibilities and the types of permits issued by these agencies
- A section describing the permit determination process, including a permit determination flowchart and answers to:
  - What is a permit determination
  - When is a permit determination required
  - How to obtain information for a permit determination
  - How to make a permit determination
  - Various permit determination forms
- A description of the Interagency Coordination process including the types of coordination that take place during various phases of a project
- Details associated with the permit application including:
  - Permit application instructions
  - What a permit application should include
  - Permit application forms
  - Permit drawing requirements
  - Wetland mitigation sketches
  - Permit application checklist

- A glossary that includes technical terminology used in the permit determination and permit application process

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Finding: The procurement of engineering consultants is not sufficiently coordinated.

An engineering consulting firm with several different areas of expertise must register separately with multiple contracting units, branches and divisions in NCDOT. Most of the information required by these NCDOT organizational units is the same or similar. This fragmentation of work is inefficient—administrative staff in at least six different units are performing the same basic work, collecting the same basic information. Additionally, NCDOT's ability to systematically monitor and measure consultant performance and workload is handicapped when information is maintained in so many different locations.

Recommendation:	**Consolidate procurement responsibilities for consultant engineering.**

The Department has considered consolidating the oversight of consultant procurement and consultant procurement recordkeeping. NCDOT should centralize responsibilities for procuring and maintaining the Department's records on engineering consulting firms, including:

- Prequalifying firms in each of the Department's required areas of engineering expertise (such as planning, environmental, structural, geotechnical, hydraulic, traffic, construction inspection)
- Keeping historic data, including:
  - Summary of the Department's evaluation of the consultant's performance in prior work
  - Cost and schedule information for prior consultant contracts, including summaries of pre-construction contract modifications and field changes resulting from consultant errors and omissions
  - Information on each consultant's current workload with the NCDOT

Finding: Technology is not being utilized fully within the Planning and Environmental branch.

The Planning and Environmental branch has had numerous serious technology challenges. Problems documented include: duplicative networking technologies; varying versions of software installed; not enough GIS software provided; staff lack equipment to print certain types of files; staff are not trained to use certain software. Though there is a technical working group within the branch that evaluates automation and makes appropriate recommendations, they are not in a position to resolve many of these issues.

Recommendation:	**Create an initiative to resolve technology issues in Planning and Environmental.**

The Planning and Environmental branch should work closely with Engineering Automation and Management Information Systems to identify and resolve the key technology issues facing this unit. The Department should ensure that appropriate funding and guidance is provided.

Finding: There are several units involved in surveying, mapping, and geographic information management.

Currently, the Location and Survey and Photogrammetry units of Highway Design both provide survey and mapping data. Other mapping groups, Statewide Mapping and Graphical Information Systems, are located in Statewide Planning. Although these units fulfill different roles, they need to work together to set mapping and survey standards, provide project data needs, and maintain consistent mapping and geographic information for various units of the Department.

Recommendation:	**Consider the combination of Location and Survey, Photogrammetry, and Graphical Information Systems (GIS) into one organizational unit.**

Combining these functions into one unit would enhance the coordination of the Department's geographic, survey, and mapping activities. For example, branches and units that require mapping information would have one location to request mapping services. Other potential benefits include the following:

- ***Facilitate updates to GIS databases.*** A combined unit could more readily update GIS databases as data is gathered by mapping units. Enhanced GIS databases would aid the U.S. Department of Transportation, NCDOT, and local governments in sharing GIS information to update State maps. Additionally, the GIS databases used for statewide planning would benefit from continual updates and accuracy improvement.

- ***Reduce duplication of effort.*** Currently, these units seek the same utility and property information at different times. Additionally, Location and Survey, Photogrammetry, and GIS all have separate relationships with the county tax offices and DOT division offices. If these units were located in one unit, the amount of information and number of contacts could be consolidated.

- ***Streamline workflow for projects.*** A combined unit with a coordinated scheduling process would allow for Location and Survey and Photogrammetry work to take place concurrently instead of consecutively. A combined unit could also place the supervision of related private engineering contracts into one location performing a function much like Design Services performs.

- ***Promote consistency and compatibility.*** The similar functions of these units translates to their equipment needs. While the equipment needs vary, many manufacturer and vendors are common. A combination of units could promote improved equipment budgeting, maintenance, evaluation, planning, and oversight.

Finding: The process for selecting and procuring technical equipment for the Location and Survey unit is too cumbersome.

The Location and Survey and Photogrammetry units have special equipment which requires regular updates and replacement. The evolving technology of this equipment creates frequent new opportunities for improvement to the efficiency and accuracy of data collection. Location and Survey cannot effectively purchase the equipment it requires because a sufficient annual budget does not exist for the maintenance

and purchasing of survey equipment. Instead, the Department charges back projects to cover some survey equipment and maintenance costs. Negative impacts include the following:

- Large amounts of money are spent on maintaining equipment that has been used beyond its life span
- Existing equipment is not upgradeable; therefore, Location and Survey is not able to utilize latest technologies for efficiency and accuracy
- Training impact of large new equipment purchases results in a substantial learning curve for effective utilization
- Past budgeted equipment dollars have not sufficiently covered maintenance expenses to vital communication equipment

Recommendation: Establish an annual equipment budget for the Location and Survey unit.

A survey equipment budget could be used to provide regular replacements and upgrades to existing survey and mapping equipment. An annual budget would provide the enhanced ability to replace the necessary equipment gradually while keeping up with the latest technology. The Department should also implement a process by which purchased survey equipment is charged back to projects using procedures similar to those used for construction and maintenance equipment.

Finding: Location and Survey unit does not have sufficient staff to cover Division 12.

Currently, the location and survey unit does not have personnel dedicated to the Division 12 area comprised of Cleveland, Gaston, Lincoln, Alexander, Iredell, and Catawba Counties . In addition to the routine Division 12 location and survey work required to support design, all control points and support for the Division Design and Construct (DDC) program are required. There is additional work required in Division 12 by the Federal Highway Administration, National Park Service, Department of Environment and Natural Resources, Highway Patrol, and the Department of Commerce.

There are four to five Location and Survey staff from Divisions 10, 13, and 14 traveling to Division 12 each week in order to provide quality control for consultant projects and the required division support. Additionally, there is a frequent need to return to specific work sites, including Division 12. This is especially difficult to perform in Division 12 where there is no permanent staff that can be quickly dispatched. The current process for supporting Division 12 has several negative impacts, the most notable being that the team requires a constant travel budget and that Division 12 is stretching the need for already over extended equipment and personnel from the surrounding Location and Survey field offices.

Recommendation: Establish a location field office in Division 12 with a staff of eight.

A Location and Survey field office in Division 12 would provide a continuity of service for the region that would not adversely impact the surrounding divisions in terms of man-hours or equipment needs. This request for a Division 12 staff has been made a priority by Location and Survey leadership in response to Secretary Tolson's request for staffing needs from NCDOT units.

Finding: The process for stamping plan sheets is too cumbersome.

NCDOT engineers are required to stamp *every page* of every set of plans. The Contracts unit consequently spends a great deal of time following up with consultants and in-house designers to address these omissions (this signature requirement can delay project letting by 1 day to 3 weeks). This requirement is promulgated by the State Board of Professional Registration.

Recommendation:	**Request the State Board of Professional Registration to change the procedure for stamping plan sheets.**

In many states, the engineer-of-record needs only to seal the title sheet on plans for transportation improvement -- a requirement that is less demanding, yet legally defensible. If the North Carolina State Board of Professional Registration would endorse this practice, NCDOT could improve the efficiency of its project letting process and avoid potential delays. The Department could also reduce the amount of time it expends trying to get each sheet stamped after plans have been submitted to the Department's Proposals and Contracts unit.

8. RIGHT OF WAY

This section addresses NCDOT's right of way units and functions. The right of way process includes all activities related to acquiring the property rights necessary for the construction and maintenance of public roads and highways of North Carolina. The utility relocation process includes all activities related to identifying the presence of a utility on a proposed highway, as well as the associated steps required to resolve such conflicts.

BACKGROUND

The Right of Way branch is comprised of the following units:

- Appraisal Unit
- Negotiation Unit
- Relocation and Property Management Unit
- Utility Unit
- Administrative Unit

The primary responsibilities of the Right of Way branch are:

- To acquire all rights of way for highway projects as shown on design plans and approved by the NCDOT
- To maintain adequate records on right of way and the associated costs in order to support right of way reimbursement claims to the Federal Highway Administration, or to secure reimbursement from cities and towns under municipal agreements
- To acquire all other lands or interest in lands needed by the NCDOT upon its authorization; such land may be acquired by the Department for various purposes such as material sites, storage areas, haul roads, shop sites, office sites
- To arrange for the sale and/or disposition of real property such as buildings or other land acquired in connection with right of way that is determined to be surplus and no longer necessary for highway use
- To furnish relocation assistance, including financial assistance, to persons displaced by right of way acquisition and to make payment for moving costs of personal property and other incidental costs related to right of way acquisition
- To arrange for the rental and management of property between the time of acquisition and the time that it is necessary to clear rights of way for construction
- To negotiate with utility owners for the removal of utilities in conflict with proposed highway construction

- To process encroachment contracts with the owners of encroaching utilities or structures after investigation and recommendations by the appropriate engineer personnel

- To administer the Highway Beautification Act to include sign removal, junkyard screening, and scenic easements

Appraisal. The Appraisal unit is responsible for establishing an equitable value for all rights of way acquired by the Department, and for providing estimates of right of way costs and property damage associated with proposed highway projects.

The appraisal function is a decentralized function; property appraisals are conducted by both staff appraisers (in-house resource) and fee-based appraisers. The unit is headed by the State Right of Way Appraiser, located in Raleigh, who is charged with the responsibility of obtaining and reviewing all appraisals. The work of the Appraisal unit is administered through five area appraisers, who report directly to the State Right of Way Appraiser. The area appraisers are located in field offices in Greenville, Raleigh, Winston-Salem, Charlotte and Asheville. Reporting to the area appraisers are staff appraisers and fee-based appraisers for that area.

Negotiation. The Negotiation unit is responsible for all negotiation and procurement of rights of way and other lands needed in the operation of the Department. The State Right of Way Negotiator has the ultimate responsibility of carrying out all negotiation functions with property owners. In addition, the State Right of Way Negotiator oversees the supervision of 14 Right of Way offices located in each of the engineering divisions. Reporting to the State Right of Way Negotiator are five area negotiators, each with responsibility for a group of Right of Way offices.

Area Negotiators. The area negotiators assist and advise the Division Right of Way personnel in the negotiation of difficult acquisitions. The area negotiator keeps in close and frequent contact with Division Right of Way personnel and keeps the central office informed of local conditions through periodic reports. The area negotiator is also responsible for ensuring that right of way acquisition schedules are maintained; this individual also reports to the central office on all claims where condemnation is anticipated. The Right of Way area negotiator territories are broken up as follows:

- Division 1 and 2
- Division 3, 6 and 8
- Divisions 4, 5 and 7
- Divisions 9, 13 and 14
- Divisions 10, 11 and 12

Division Right of Way Offices. The Division Right of Way offices are headed by a Division Right of Way Agent. This individual is responsible for carrying out all right of way functions, except the appraisal functions, within the Division and is assisted by one or more Right of Way agents. The Division Right of Way Agent has dual accountability, reporting both to the State Right of Way Negotiator and the Division

engineer. The Division Right of Way agent is expected to keep the Division engineer fully informed of the status of right of way acquisition within the division and to coordinate such acquisition with highway construction and maintenance operations. The Division Right of Way office is responsible for the following functions:

- Participate in on-the-ground plan inspections, to ensure that right of way issues that may adversely affect a project are satisfactorily addressed
- Negotiate for and conclude transactions for the procurement of right of way and other interests and lands required by the Department
- Collaboratively work with the Property Management unit and ensure that local assistance in the clearance of right of way is provided
- Provide local assistance to the Property Management unit in the disposal and rental of surplus property
- Assist the Relocation unit by making offers of additive housing payments when applicable
- Collaborate with Utility unit personnel in the relocation and adjustment of utilities
- Assist and collaborate with the Attorney General's Office in the prosecution of condemnation cases in litigation
- Investigate and adjust property damage claims brought about by construction or maintenance operations, and adjust all tort claims except claims by and against contractors
- Arrange for execution of agreements with municipalities for participation in right of way costs
- Investigate tort action claims, if requested by the Attorney General's Office

Relocation and Property Management. The Relocation and Property Management unit is responsible for:

- Managing property acquired during the right of way process
- Providing relocation assistance to those property owners displaced as a result of the proposed construction project (in accordance with federal and state guidelines related to providing relocation assistance to the displaced)
- Maintaining records of relocation activities and inventories and records of surplus property being held and disposed of by the Department

Relocation and some property management activities are administered through five area offices located in Greenville, Durham, Winston-Salem, Charlotte and Asheville. An area relocation agent and property manager is responsible for the administration of an area office. These offices are responsible for all

relocation activities, including the services provided to residential and business relocatees, the payment of moving costs for both residential and business moves, and supplemental payments to both owners and tenants to enable them to purchase or rent appropriate substitute properties.

Several of the property management functions, including the orderly disposal of surplus property, are handled by Division Right of Way agents within the Negotiations unit.

Utilities. The Utility unit is responsible for:

- Coordination of utility relocation activities with other phases of the right of way acquisition to ensure that all utilities are identified and removed or adjusted prior to construction in such a manner that they will not interfere with construction activities
- Maintaining good working relationships with utility owners, working in a spirit of mutual cooperation, and proactively identifying the locations of utilities in the path of proposed construction projects
- Determining the scope of utility relocation required and the party responsible for relocation of the utility
- Securing, reviewing, and processing plans, estimates and reimbursement agreements covering the relocation of conflicting utilities
- Participating in preconstruction conferences with contractors, construction engineers, and utility representatives to coordinate the utility relocation effort
- Conferring with utility companies and municipalities, particularly the smaller ones, to provide instruction and orientation in utility engineering and relocation policies and procedures
- Checking and processing the payment of statements for work performed by the utility owners
- Preparing and processing all agreements with municipalities covering municipal participation in right of way costs of highway projects within incorporated cities and towns, and administering the collection of funds under such agreements
- Processing and coordinating encroachment agreements through other branches of NCDOT, if and when necessary
- Handling the clearance of railroad-owned utilities and arranging for any necessary railroad adjustments

Other than the encroachment and clearance of railroad-owned utilities, all utility coordination and relocation functions are decentralized and are managed by four area supervisors, who have responsibility for utility coordination and relocation functions within their respective areas.

Administration. The Administrative unit is a centralized unit responsible for all administrative functions associated with procurement of right of way. These include:

- Maintaining records pertaining to right of way acquisition
- Preparing and coordinating all requests received from other parts of NCDOT for right of way cost estimates and utility cost estimates
- Coordinating and distributing right of way plans and revisions received from consultants and the in-house designers
- Checking all agreements, deeds, and leases against the plans to ensure technical accuracy
- Preparing progress and final vouchers for submission to the Federal Highway Administration for reimbursement of federal participation in right of way costs
- Conducting research related to old records and preparing right of way plans for recording
- Processing all right of way personnel and payroll transactions
- Processing requests for the purchase of specific parcels and advance requisitions
- Processing right of way costs for payment

Key Activities

The right of way process includes all activities related to acquiring the rights of way necessary for the construction and maintenance of public roads and highways in North Carolina. The major right of way activities are property appraisal, negotiations, relocation and property management. Right of way activities also include utility relocation work prior to construction.

Property Appraisal

Property appraisal is the first step in the right of way acquisition process. The NCDOT is required by law to reimburse each landowner from whom property is acquired for highway purposes to the extent of the difference, if any, between the fair market value of the entire tract before the taking and the fair market value of the remaining property immediately after the taking. The appraisers estimate this loss or gain in market value in accordance with state law and generally accepted appraisal techniques. These appraisals are used to support the Department's request for reimbursement of right of way costs from the Federal Highway Administration, as well as a basis for negotiations with the property owner. The appraisals serve as a starting point for negotiations between the NCDOT negotiators and property owners with the ultimate goal of acquiring the property for proposed highway construction.

According to guidelines promulgated by the Federal Highway Administration Office of Right of Way, it is the responsibility of the acquiring agency to review all appraisal and specialty reports of real property to be acquired in connection with Federal-aid programs or projects. The Department must also establish an amount which it believes to be just compensation for such acquisition before the initiation of negotiations or the exercise of eminent domain. Federal regulations (49 CFR Section 24.104) require the following:

- A qualified reviewing appraiser shall examine all appraisals to assure that they meet applicable appraisal requirements and shall, prior to acceptance, seek necessary corrections or revisions.

- If the reviewing appraiser is unable to approve or recommend approval of an appraisal as an adequate basis for the establishment of just compensation, and it is determined that it is not practical to obtain an additional appraisal, the reviewing appraiser may develop appraisal documentation to support an approved or recommended value.

The NCDOT Right of Way branch has developed "Uniform Appraisal Standards and General Legal Principles for Highway Right of Way Acquisitions" that are meant to guide its in-house and fee appraisers in the appraisal process. According to these guidelines, the appraisals must be reviewed both for mathematical accuracy and soundness of reason and logic as related to fair market value by NCDOT's Right of Way branch.

Currently, appraisals completed by in-house appraisers and fee-based appraisers hired by the Department are reviewed at various levels within the Appraisal Section of the Right of Way branch. Appraisals are reviewed by the State Appraiser in the Central Office, the five area appraisers and three reviewing appraisers in each of the five field offices throughout the State. In accordance with these procedures, the reviewing appraiser is expected to study the appraisal report after a staff person has checked the report for any mathematical errors or nonconformance to appraisal report formats. The reviewing appraiser is then expected to make a field inspection of the property and all sales listed as comparable in the appraisal report.

If the reviewer determines that the report requires correction due to erroneous information, mathematical errors or poor appraisal practices, the appraisal is returned to the original appraiser with a letter outlining the items deemed to be in error. The reviewing appraiser then completes a review summary documenting the process and any reasoning in estimating a different fair market value of the appraised property or justification for adjusting the appraisal report to more adequately represent fair market value in the opinion of the reviewer.

The following are the appraisal approval threshold authorities at NCDOT:

- Right of Way reviewers in the area offices (Right of Way Appraiser III's) - $250,000 per claim. This threshold has been increased from $50,000 per claim since September 1994. For claims greater than $250,000, reviewers in the area offices make recommendations and forward the claim for review and

approval to the area Right of Way appraisers. Typically a reviewer approves/or recommends $8-10 million annually for compensation in settlement of highway claims.

- Area Right of Way appraisers (Right of Way Appraiser IV's) - $500,000 per claim. This threshold has been increased from $100,000 per claim since September 1994. For claims greater than $500,000, the area appraisers make recommendations and forward the claim for review and approval to the State Appraiser. An area appraiser typically approves/or recommends between $25 million to $40 million annually for compensation in settlement of highway claims.

- State Appraiser (Right of Way Appraiser V) - The State Appraiser has the authority to approve, adjust or reject any appraisal report secured for highway purposes.

When unusual or complicated appraisal problems exist (either below or above the limits of authority for approval), the Reviewing Appraisers refer such problems to higher officials, if such an action is deemed appropriate.

Negotiations

Negotiations with a property owner comprise the next step in the right of way process. Once an appraisal of a property has been completed, a negotiator contacts the property owner and uses the appraisal to negotiate in good faith with the property owner. The negotiators are expected to arrive at a settlement with the property owners, based on the approved appraised value of the property.

Offers to property owners are made on the basis of appraisals conducted by the acquiring agency. Sometimes, when settlements cannot be reached through the negotiation process, it may become necessary for the acquiring agency to consider making an administrative settlement or a subsequent legal settlement. These types of settlements occur when public interest necessitates expeditious property acquisition in order to ensure timely project completion. An *administrative settlement* is any settlement made or authorized by an appropriate individual within the acquiring agency and is for a value in excess of the appraised value of the property. A *legal settlement* is any settlement made by the acquiring agency's legal representative. It is an attempt to reach a settlement after all reasonable efforts, including the attempts at an administrative settlement, have failed. If legal settlement fails, the acquiring agency works with its legal representatives and prepares for eventual condemnation of the property.

The key steps in the negotiation process include:

- **Preparation by negotiator.** As part of this activity, negotiators carefully study the appraisal and become familiar with any comparable sales that may have been used by the appraiser as the basis for determining the appraised value of the property. The negotiator also studies the property plans as well as the proposed highway plans to determine how the property in question will be affected.

- **Contact with the property owners.** As part of this activity, the negotiator contacts the property owner in person or by mail. The proposed construction and its effects on the property are explained to

the property owner. At this time, the negotiator also makes an offer based on the appraisal report and provides the property owner with a written statement and summary of the basis for the acquisition, a print of the plans outlining the areas to be acquired, and the applicable profile sheet(s).

- **Preparation of Negotiation Diary.** The negotiation diary includes a record of all contacts with the property owners, including the dates, time and places where the contact was made. It also summarizes the other aspects of the negotiation process, including a summary of the total number of appraisals prepared, who made them, the dates of valuation, and the considerations used for the valuations. The report includes sufficient detail to reflect and document the nature of the negotiations.

- **Settlement (property owner accepts NCDOT's offer).** If the property owner accepts NCDOT's offer, the settlement process begins and after the agreed upon settlement amount is accepted by a property owner, title to the property is formally conveyed to NCDOT.

- **Refusal (property owner does not accept NCDOT's offer).** If negotiations with a property owner have broken down, the negotiating agent documents this on a condemnation review form. The form is eventually sent to the Central Office with a recommendation that the property be condemned and money for the estimated value of the property be deposited in court, pending settlement of the claim.

The guidelines promulgated by the Office of Right of Way, Federal Highway Administration, U.S. Department of Transportation cover negotiating requirements necessary to comply with Federal Law. The property acquisition process is driven by the following federal regulations: 23 CFR Section 710.203 (e), (3) &4; 49 CFR Section 24.102; 49 CFR Section 24.106 and 49 CFR Section 24.203 (a) (3). These regulations require that in order to facilitate the construction of a public improvement, the rights of property owners should be fully respected. Obligations to property owners as part of this process include the following:

- The acquiring agency's representative (the Right of Way negotiator) should make all reasonable efforts to personally contact each resident property owner or the owner's designated representative.

- The negotiator should attempt to make the appointment at a convenient time and place.

- The property owner is entitled to receive an explanation of the right of way acquisition process, which may be provided by an acquisition brochure.

- Property owners must be given a written offer of the approved estimate of just compensation for the property to be acquired.

- Property owners should be provided with a summary statement for the basis of the offer.

- The property owner should be given reasonable time to consider the offer and to present information believed to be relevant in determining the value of the property, along with suggested modification in the proposed terms and conditions of the purchase. The acquiring agency must consider the owner's presentation; however, the acquiring agency is under no obligation to accept this presentation.

Relocation

Relocation of a property owner is the next step after the settlement occurs. The Relocation Program originally sponsored by the federal government required that relocation assistance be made available to families displaced by right of way acquisition on all highway projects in which federal funds were involved. Subsequently, the General Assembly enacted a law to authorize the Board of Transportation to pay compensation for moving costs associated with property owners displaced from their property as a result of highway construction. The relocation program is administered by the Relocation and Property Management unit of the Right of Way branch. The goals of the relocation program are to:

- To encourage and expedite the acquisition process by quickly arriving at settlements with property owners, minimizing litigation, relieving congestion in courts and prompting public confidence in state and federal assisted land acquisition programs
- To ensure that property owners displaced as a result of state and federally assisted highway projects are treated fairly and consistently and equitably
- To ensure that the program is administered in accordance with federal and state relocation statues in a manner that is efficient and cost effective

Property Management

Property Management includes those functions that are necessary to ensure that the State receives a maximum return on its investment of property acquired as part of the right of way process. Property Management can be broken down into three general categories as follows:

- **Advance Acquisitions.** Sometimes right of way is acquired well in advance of actual commencement of construction. In such instances, the property acquired has to be managed efficiently in order to maximize the State's return on its investment. If advance acquisition requires that the State hold the property for an extended time, it may become necessary to rent the property until construction.
- **Remainders and Surplus Properties.** Properties in this category usually involve the use or eventual disposal of real properties after completion of project construction.

Exhibit 8-1 summarizes the workload of the Right of Way branch in terms of the volume of claims settled, the number of condemnations, the number of jury verdicts. Exhibit 8-2 summarizes the total expenditures associated with acquiring right of way for fiscal year 1996-97.

Exhibit 8-1: Number of Right of Way Claims in Fiscal Year 1996-97

	Federal Aid Projects	State Aid Projects	Combined
Claims Settled for Appraisal	641	620	1,261
Claims Settled for Adjustment	997	891	1,888
Condemnations	228	183	411
Consent Judgments	115	167	282
Jury Verdicts	8	3	11
Total Claims Acquired	1,866	1,694	3,560
Total Claims Settled	1,761	1,681	3,442

Source: NCDOT Right of Way branch

Exhibit 8-2: Total Expenditures for Acquiring Right of Way in Fiscal Year 1996-97

	Federal Aid Projects	State Aid Projects	Combined
Dollar Value of Claims settled for Appraisal	$9,743,226	$22,961,689	$32,704,915
Dollar Value of Condemnations	$15,192,712	$12,106,155	$27,298,867
Administrative Settlements:			
• Total Appraisals	$25,851,744	$32,467,460	$58,319,204
• Total Settlements	$32,802,069	$40,760,691	$73,562,760
Consent Judgments:			
• Total Appraisals	$10,641,163	$7,845,405	$18,486,568
• Total Settlements	$16,622,105	$11,633,083	$28,255,188
Jury Verdicts:			
• Total Appraisals	$1,899,360	$76,350	$1,975,710
• Total Settlements	$5,892,369	$182,829	$6,075,198

Source: NCDOT Right of Way branch

Utility Relocation

Highway projects frequently require relocation or modifications of utility assets such as electric power lines, telephone power lines, and gas pipelines. The utility relocation clearance process consists of activities that occur from the time the presence of a utility asset in the area of a highway is determined, until the utility is cleared from the construction area. This includes all activities related to identifying the presence of a utility on a proposed highway, as well as the associated steps required to resolve conflicts.

NCDOT has set policies and procedures that govern the utility relocation process. The intent of these policies is to establish and administer reasonable, uniform utility accommodation practices in the interest of developing and preserving safe roadsides and minimizing impairment to the highway, its appearance, safe operation, and maintenance. The Department has entered into agreements with utility owners to accomplish the provisions of this policy. It has also entered agreements with some smaller municipalities, sanitary districts and water associations to ensure that the necessary engineering and utility engineering is accomplished by NCDOT on a reimbursable basis.

In those cases where no agreement can be reached with the utility owners, or in cases where the utility owner refuses to relocate or refuses to claim ownership, the Department can issue an order requiring the necessary adjustments. Upon failure of the utility company to comply with the order, all utility relocation work is included in the highway improvement contract. When the work is completed, the owner of the

utility is invoiced for the work performed. If the invoice is not paid, the Department refers the matter to the Office of the Attorney General for further action.

STRENGTHS

The Department has established clear guidelines related to the review of appraisals. According to these guidelines, all appraisals on each parcel to be acquired for right of way purposes must be reviewed. These guidelines are documented in the Right of Way Manual and have been periodically updated.

The Department actively participates in appraisal quality improvement initiatives. NCDOT's appraisal process, including all aspects related to review of appraisals, was reviewed by the Federal Highway Administration in 1997 as part of the *State-FHWA Appraisal Quality Improvement Initiative*. This was not a compliance review, but an effort to make North Carolina's right of way program more efficient—without jeopardizing property owner rights. Recommendations resulting from this review have been addressed or are being addressed by the Right of Way branch.

The Department has established clear guidelines related to the acquisition process. These guidelines are documented in the Right of Way Manual and various memoranda between the Right of Way branch and the FHWA seeking changes/modifications to the process when necessary.

The use of payment reports is an effective process. NCDOT Right of Way agents can establish payment reports on right of way claims for relatively small values of property. This process enables the Department to eliminate a formal appraisal and thus reduces the time required for the property acquisition. NCDOT has worked collaboratively with the FHWA to increase the limits of the Right of Way Claim Report, thereby increasing the efficiency of the acquisition process. The Department now has permission from the FHWA to use Right of Way Claim Reports for property values up to $10,000; this threshold was increased from the previous limit of $2,500.

The Department has worked collaboratively with the FHWA to increase the threshold values for administrative settlements. The threshold authority for administrative settlements has been increased for all levels of personnel within the Right of Way branch. These revised threshold values are shown in Exhibit 8-3.

Exhibit 8-3: Authority Levels for Administrative Settlements

Staff Level	Administrative Settlement Authority	Previous Policy
Right of Way Agent	$1,000	$1,000
Sr. Right of Way Agent	$4,500	$2,500
Div. Right of Way Agents	$5,000 on claims up to $20K; 20% on claims from $20K to $100K	$3,000 on claims up to $15K; 20% on claims from $15K to $30K; 10% on claims from $30K to $100K

Area Right of Way Negotiators	All right of way claims up to $50K; 20% on claims from $50K to $500K	All right of way claims up to $30K; 20% on claims from $30K to $200K; 10% on claims from $200K to $500K
State Right of Way Negotiator Asst. Mgr. Right of Way Manager Right of Way	Unlimited[9]	Unlimited

Source: NCDOT Right of Way branch

The negotiation process was reviewed by the FHWA in February 1996 as part of its State/FHWA Right of Way Negotiation Improvement Initiative. Again, this was an effort to make North Carolina's Right of Way program more efficient without jeopardizing the rights of property owners—not a compliance review. As a result of this review, the Department implemented several of the policy changes and increased approval levels associated with Right of Way payment reports and administrative settlements.

The Department's Internal Audit Section also worked collaboratively with the FHWA to complete an in-depth review of eight selected active Federal-aid Right of Way projects during the period September 5-12, 1995. These reviews—performed jointly by staff from the NCDOT Internal Audit Section and the FHWA Financial Management Section—concluded that the right of way project records were in conformance with governing NCDOT procedural guidelines, were uniform statewide, and were mathematically accurate.

FINDINGS AND RECOMMENDATIONS

Finding: A recent right of way claim settlement indicates the need to make changes in the settlement review process.

The Department has recently been criticized for settling a case for approximately $3.7 million, despite the fact that the professional appraisals conducted by the Department were all under $500,000. The criticism is based on the Department's decision to settle for a figure substantially above the appraised value. Critics believe that rather than settling for this amount, the Department would have been better off taking its chances and letting a jury decide the appropriate value at which the claim should be settled. Presented here is a brief description of events, based on interviews with Department staff and media reports.

Two independent appraisers—one an NCDOT employee and the other a fee-based appraiser—had conducted an appraisal of the property in question. Based on these appraisals, the negotiators commenced negotiations with the property owners to settle the claim. However, these negotiations failed and the Department was compelled to file for condemnation of the property.

In preparation for condemnation procedures, the Department conducted a third appraisal of the property. This appraisal, though slightly higher, was not completely out of line with the earlier appraisals. The Department continued to negotiate with the property owners in the hope of resolving the issue through an administrative settlement, but negotiations continued to flounder and attempts at a court ordered mediation were unsuccessful. The property owners were requesting a settlement of $4 million, substantially above the three appraisals conducted by the Department. At around this time, the property owners requested and

[9] NCDOT has taken steps to limit the amount of settlements at the Branch Manager level.

secured an audience with the Department— ostensibly for informational purposes only. However, immediately after this audience, the Department agreed to settle the claim with the property owners for $3.7 million.

Recommendation:	**Continue to take steps to strengthen the right of way settlement review process.**

NCDOT has taken some early steps to ensure that a similar situation does not occur in the future. Branch management (the State Right of Way Negotiator, Assistant Branch Manager and Branch Manager) within the Right of Way branch has authority to settle claims up to $500,000. For claims above $500,000, branch management is required to make its recommendations to a higher level within the Department— either the Right of Way Review Board or the Secretary of Transportation's Review Board.

The Right of Way Review Board is comprised of representatives from the Highway Administrator's Office and the transportation section of the Attorney General's Office, as well as the manager and assistant manager of the Right of Way branch, the State Right of Way Negotiator and the State Right of Way Appraiser. The Secretary's Review Board is a smaller group, composed of individuals from the Secretary of Transportation's Office, the Highway Administrator's Office, the transportation section of the Attorney General's Office, and the manager of the Right of Way branch. Recommendations for settlement of claims above $500,000 but less than $1 million are reviewed and decided on by the Right of Way Review Board; recommendations for settlement of claims above $1 million are reviewed and decided on by the Secretary of Transportation's Review Board.

Finding: The time allocated for right of way is inconsistent with Department guidelines.

The four leading causes of project design delays in state departments of transportation are delays in plan development, utility relocation, environmental approval, and/or right of way acquisition. At NCDOT, the leading cause of recent project delays has been environmental permits. As the Department is addressing its challenges in permit delays, other potential threats to timely project completion will surface. One potential threat to timely project completion is expected to be the right of way process.

NCDOT establishes and manages detailed project design schedules, which include the time required to complete right of way activities. The Right of Way branch has developed a formula, which calculates the estimated time required for completion of right of way and utility relocation activities. The formula, shown in Exhibit 8-4, is based on the magnitude and complexity of right of way requirements for a given project. Factors included are: the number of parcels to be acquired, the number of residential and businesses relocated, the project's impact on utilities (and consequently the extent of utility relocation), and the project's effect on railroad crossings. The number of months required is determined by the critical path activity duration: the activity that requires the greatest amount of time is the estimate of the total time required to complete right of way activities. This formula assumes that the plans received by Right of Way

personnel are complete and that all processes prior to right of way commencement have been completed within the allocated schedule.

Exhibit 8-4: Right of Way Estimated Time Requirements

Right of Way Activity	Unit Measure	Time Required
Parcels Acquisition	**Number of Parcels**	**Months**
	1-5	10
	6-30	12
	31-50	14
	51-100	18
	101-200	24
	201-300	27
Residential/Business Relocation	**Number of Relocations**	**Months**
	1-5	13
	6-10	16
	11-15	18
	16-20	20
	21-30	22
	31-40	24
	41-50	26
	51+	26 + 1 mo. for every 5 relo. > 50
Utility Relocation	**Level of Utilities Impact**	**Months**
	Low (L)	9
	Medium (M)	14
	High (H)	18
Railroad Impacts	**Type of Railroad Impact**	**Months**[10]
	RR Parallel Embankment	24
	RR Under Roadway	24
	RR Over Roadway	33

Source: NCDOT Right of Way branch

According to Department staff, when project design schedules are developed, the number of months allotted for right of way is usually less than indicated by this established formula. Also, as right of way takes place in the latter stages of project development, delays in earlier project activities must often be "made up" during the right of way process. The time required for completion of right of way activities is also impacted if design plans are not complete for the purposes of right of way.

On the other hand, although the time allotted for right of way is below established standards, right of way is usually completed in time for project letting. Department sources estimate that less than 10 percent of project letting dates are impacted due to untimely completion of right of way activities. This success rate is attributed to the use of contractual resources to overcome scheduling constraints. Two resourcing strategies used by the Department are: (1) increasing reliance on the use of fee appraisers to perform appraisal activities and (2) increasing use of right of way consultants who are responsible for all aspects of the right of way process for individual projects on a "turnkey" basis.

[10] Months required from the time the railroad agreement is sent to the railroad company to the time the agreement is received.

Recommendation:	**Continue to adjust project schedules to provide a more realistic estimate of time required for completion of right of way activities.**

The project schedules should be appropriately adjusted in order to allow sufficient time for right of way activities to be completed. This will result in lowering the percentage of projects that miss the let dates because right of way activities have not been fully completed. It will also reduce the reliance on fee-based appraisers and right of way consultants, thus lowering total project costs.

Finding: Many right of way procedures are paper intensive.

The right of way process is driven to a large extent by federal and state legislative mandates. These processes require the use of a number of forms to record and store information. Federal and state mandates also require that documents related to acquisition of right of way be maintained well after the acquisition process has been completed.

There appear to be many opportunities to use technology to eliminate some of these forms; transfer documents electronically; and eventually develop a paperless processing, filing and record keeping system within the branch. The present Right of Way system, developed over 14 years ago, is used by individual divisions within the Right of Way branch to track the status of their projects within their units. However, it does not include any features to electronically transfer, store and or retrieve documents within the branch.

At this time, the Right of Way branch also lacks the ability to electronically accept design plans produced by the designers. Consequently, plans have to be manually received and recorded centrally, after which they are then sent out to the field offices. Recognizing these problems, branch management has taken preliminary steps to address this issue and move towards an eventual paperless system. This initiative could be undertaken without necessarily violating federal and state legislative mandates and would offer important advantages:

- Eliminate the need to maintain voluminous documents, thereby freeing up valuable facility space for other purposes
- Improve the effectiveness, efficiency, and timely acquisition of rights of way by streamlining and/or minimizing the handling, processing and retention of paperwork
- Improve customer service, by providing access to information that would enable right of way staff to provide quick answers to queries from the public and other NCDOT personnel
- Reduce the workload of the Central Office Right of Way administrative personnel
- Improve the productivity of right of way personnel, by giving them electronic access to information and eliminating the need to laboriously sort through voluminous documents to retrieve information they require

Recommendation: Increase automation for right of way processes.

Automation in right of way should ensure that to the fullest extent possible, data will electronically flow among the forms, documents, activities and functions within the right of way process. An internal initiative involving the Right of Way branch and Engineering Automation has recommended the development of a relational database by taking advantage of the Department's wide area network.

In order for field offices within the Right of Way branch to electronically accept design plans, all field offices should be completely wired and linked to each other and to preconstruction units. In addition, all computers used by Right of Way personnel should have the appropriate CADD software installed, with staff appropriately trained.

9. DIVISIONS

This section provides an overview of the State's Highway Divisions. A Division is the organizational unit responsible for the field execution of the construction, maintenance, and operations of the roadway systems administered by the Department. Specific construction, maintenance, and operations functions and programs are addressed in subsequent sections of this report.

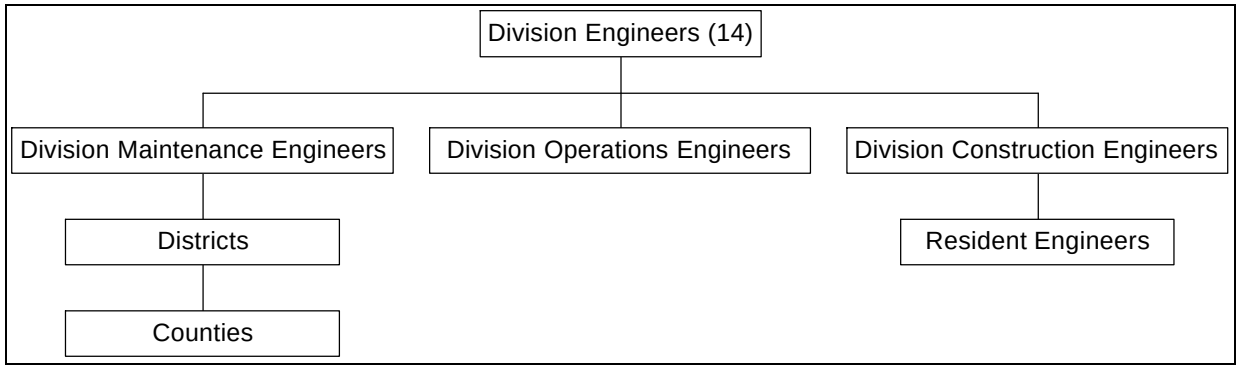
BACKGROUND

The Division is the primary group responsible for executing NCDOT"s extensive construction, maintenance, and operational programs in the field. There are 14 Highway Divisions, each with a Division Engineer who reports directly to the Chief Engineer of Operations. Each Division oversees five to 14 counties, depending on the geographical area and lane mileage. Typically each Division is responsible for 5,000-6,000 lane miles.

The staffing of the Divisions is significant. There are over 8,000 personnel in all 14 Divisions total—making up the majority of the Department's total workforce. To accomplish its mission, each Division is organized into three primary operational functions--construction, maintenance, and operations—with a business unit to handle the Division's accounting needs. To further manage the maintenance function, the Division has divided the counties into 39 district maintenance areas. Each of these districts is managed by a District Engineer who reports to the Division Maintenance Engineer.

Exhibit 9-1 depicts the current Highway Division organizational structure.

Exhibit 9-1: Division Level Organization Chart



Source: NCDOT

The Division Engineer is assisted by the Division Maintenance Engineer, Division Operations Engineer, and the Division Construction Engineer. Roadway maintenance functions are carried out by District and County maintenance forces. The District forces are under the supervision of the District Engineers who report directly to the Division Maintenance Engineer. Each of the counties has a County Maintenance Engineer who directly supervises the county's maintenance operations; these engineers may be responsible for more than one county, however.

Within each Division, the maintenance units report to the Division Maintenance Engineer, or in some cases, to the Division Operations Engineer. The reporting structure of Division maintenance and operational responsibilities is shown in Exhibit 9-2.

Exhibit 9-2: Reporting Structure by Function within each NCDOT Highway Division

	Divisions													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Traffic Services	M	O	O	O	O	O	O	O	O	O	O	O	O	O
District/County Maintenance	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Roadside Environmental	M	O	O	M	O	O	O	O	O	O	M	O	O	O
Bituminous Operations	M	C	M	M	M	O	O	O	M	O	O	O	O	M
Equipment Maintenance	M	M	M	O	M	M	O	M	M	O	M	M	M	O
Division Design & Construct	C	C	O	O	O	O	C	O	O	O	O	O	O	C
Incident Management	M	O	O	O	O	O	O	O	O	O	O	M	O	O
Safety	M	O	O	D	O	M	M	O	D	D	D	D	O	M

Key:
D = Division Engineer
C = Division Construction Engineer
M = Division Maintenance Engineer
O = Division Operations Engineer

Source: NCDOT Division of Highways

Major functional positions associated with the Divisions are:

- Chief Engineer
- Division Engineers
- Construction Engineers
- Maintenance Engineers
- Operations Engineers
- Business Officers
- Division Design and Construct

Chief Engineer. The Chief Engineer is responsible for the overall construction, maintenance, and operations functions executed by the Divisions. Each of the 14 Division Engineers reports directly to the Chief Engineer.

The Chief Engineer's key responsibilities include:

- Preparing annual maintenance budgets
- Recommending transfers of funds
- Approving plans and specifications
- Managing contractor claims

- Administering construction contracts
- Utilizing personnel and equipment

The Chief Engineer is also responsible for the Secondary Roads Office and the six centrally based operational units—Construction, Materials and Tests, Road Maintenance, Bridge Maintenance, Equipment and Inventory Control, and Roadside Environmental—which are under the Deputy Chief Engineer for construction and maintenance.

Division Engineers. The Division Engineers are responsible for the field implementation of construction, maintenance, and operation functions—and are ultimately held responsible for their Division's success or failure. Each Division acts with a good deal of autonomy, and Division Engineers are given considerable authority to structure, lead, and manage their organizations.

The Division Engineers receive more guidance, policies, and procedures from the central units associated with construction and materials than those of maintenance and operations. At the same time, the Division Engineers studied tended to concentrate more on the maintenance and operations functions of the organization.

Another important role for the Division Engineer is the interaction with appointed and elected officials, including the Division's Board of Transportation member in the execution of the small urban projects and programs. In addition, the Division Engineer is responsible for communicating and interacting with the media and public.

Division Engineers also supervise the Division construction, maintenance, and operation engineers.

Division Construction Engineer. The Division Construction Engineer is responsible for all major contract construction activities, including the Transportation Improvement Program. The construction engineer supervises all resident engineers to ensure that the projects are constructed in accordance with the plans and specifications. Responsibilities include the review of plans and specifications, project assignments, engineering decisions, contract administration and management, claims development, resident office staffing, review and audits of resident engineer records, coordination with other government agencies, public and media interface, and other administrative functions. (Construction is addressed in Chapter 10.)

Division Maintenance Engineer. The Division Maintenance Engineer assists the Division Engineer and is responsible for the Division's maintenance activities. The maintenance engineer supervises the District Engineers to ensure that all maintenance activities are executed properly. Responsibilities include the secondary roadway construction program, resurfacing program, general/planned maintenance, equipment maintenance, public and media interface, and various organizational administrative functions. (Maintenance is addressed in Chapter 11.)

Division Operations Engineer. The Division Operations Engineer is responsible for the Division's operational activities. The operations engineers supervise several staff elements to ensure that various

programs are being properly administered. These programs include the Roadside Environmental Program, Incident Management Program, Division Design and Construct Program, traffic services, and inventory control. As noted earlier, some functions are found in both the operations and maintenance organizations of the Division. (Operations is addressed in Chapter 12.)

Business Officer. The Business Officer is responsible for finance and accounting functions required for the funding and budgetary needs of the Division. This includes managing four construction funds—maintenance, secondary road, resurfacing, and small urban—managing the Division's administrative budget, processing purchase orders and requisitions for the Division's maintenance activities, and conducting an annual inventory of maintenance materials maintained by the Division.

Division Design and Construct. Division Design and Construct (DDC) is a developing program staffed and managed at the Division level. The DDC is a decentralized program, providing the Divisions with the capability to quickly design, contract, and construct projects. The Divisions are authorized to select, design, contract, and manage the construction contracts of small projects.

While most of the 14 Divisions have an active DDC program, they vary widely in magnitude, organizational structure, responsibilities and staffing. Since the central office has no DDC function and has not provided the Divisions with written policies or procedures, each Division has developed its own. For example, the DDC unit can be found under either the operations, construction, or maintenance functions within the Divisions. Staffing ranges from a low of one employee to a high of seven. Workloads are also significantly different: in FY 1997 one Division had approximately $20 million in DDC contract work, while another Division had none.

Typical projects and functions performed by DDC are outlined in Exhibit 9-3.

Exhibit 9-3: Representative Division Design & Construct Activities

Activity	Description
Project Design	Collecting data Designing plans and developing specifications Project stake-out
Contracting	Preparing and letting of Division contracts Developing Purchase Order contracts for DOT purchasing Preparing contract documents for statewide letting
Contract Administration	Managing Division and Purchase Order contracts Processing and resolving contractor claims
Construction Inspection	Inspecting for compliance with plans and specifications Testing and inspection of materials
Payments/Estimates	Developing and processing monthly pay estimates Developing and processing final pay estimates

Source: NCDOT

In addition to construction contract projects, some of the Divisions use the designs developed by the DDC unit to construct projects with in-house maintenance resources.

STRENGTHS

Many construction and maintenance activities are decentralized. Divisions are empowered to carry out many construction and maintenance activities with guidance from the central office.

The Division Design and Construct function is an innovative and effective approach to meet Division needs. The capability to address and execute selected projects that require quick design and construction is beneficial to the Department.

FINDINGS AND RECOMMENDATIONS

Finding: The organizational structure of the Divisions lacks consistency.

There is no typical Division organization for the Department. Functions such as Incident Management, Division Design and Construct, Roadside Environmental, Equipment Maintenance, and Traffic Services can be found reporting to the Division operations engineer, maintenance engineer or construction engineer. The Division's organizational structure for these functions appear to be in part based on a match with the experience and expertise of the Division's key leadership and management personnel and the operational philosophies of the Division Engineers and their managers.

Recommendation: Consider a more consistent Division organizational structure.

A more consistent Division organizational structure would promote stronger program coordination, support and oversight. The Department should therefore consider reorganizing its Divisions into a standard organizational structure. The direct reporting relationships to each Division Engineer (that is, the construction, operations, and maintenance engineers) would include the following units and functions:

Function	Reporting Relationship
Incident Management	Division Operations Engineer
Division Design Construct	Division Construction Engineer
Roadside Environmental	Division Maintenance Engineer
Bituminous (Road Oil)	Division Maintenance Engineer
Equipment and Maintenance	Division Maintenance Engineer
Traffic Engineering	Division Operations Engineer

Finding: The Division Design and Construct function is developing without adequate coordination and consistency.

The Divisions have been developing their DDC capabilities to varying degrees. Some Divisions have developed extensive capabilities and have produced millions of dollars of projects over the past several years. Other Divisions have very limited capabilities and have produced far less. The DDC staffing and costs associated with individual Division DDC workloads also vary widely. Overall, in FY1996-97 total

DDC costs were $69.6 million for design, administration, and construction contracts. FY1997-98 DDC costs across the Department are expected to be over $80.6 million.

The DDC function has developed independently in each Division and has not been closely coordinated by central office units. More specifically:

- No central office unit is charged with monitoring the volume, value, and quality of the projects being produced by the Division DDC units.
- There is no consistent procedure for DDC plan reviews and quality assurance reviews to insure adequacy and conformity with overall Department standards and practices.
- The quality of plans submitted to the Proposals and Contracts Office for statewide letting are reported by Department sources to be inconsistent with NCDOT plan sheet format standards and other requirements.

Recommendation:	**Provide enhanced monitoring and guidance for the Division Design and Construct function.**

As DDC capabilities continue to grow and evolve, they require a overall program framework to ensure consistency. Some steps should be taken to provide the appropriate level of oversight, while preserving flexibility and capabilities at the Division level. These include the following:

- DDC oversight should be run as a program reporting to the Chief Engineer. This staff function should develop key measures to be monitored so that the central office is informed of the activities of the DDC programs.
- Preconstruction and the Chief Engineer should develop guidelines for DDC-produced plan reviews for design adequacy and conformity with the Department's standards. During design, DDC should follow all preconstruction policies and procedures, except in those instances where there are special documented procedures developed for their work.
- The Chief Engineer should also ensure that the Division Construction Engineer is providing construction oversight for the projects administered by the DDC staff. This will ensure consistency in the construction management process.

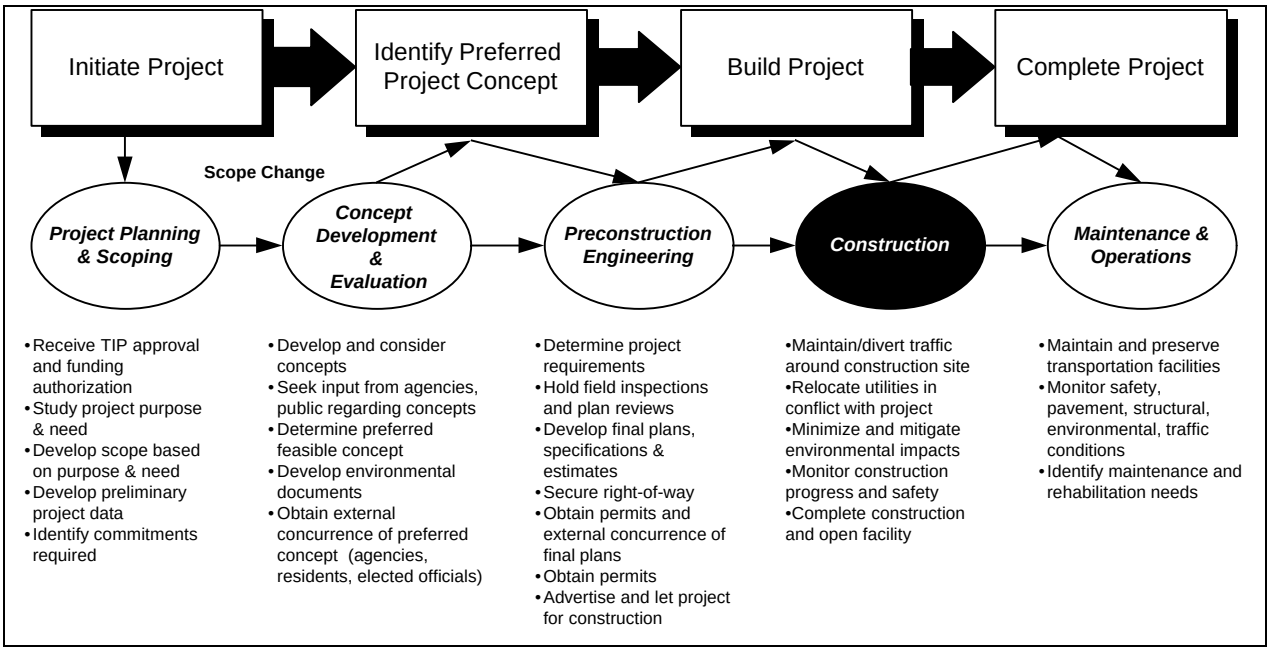
10. CONSTRUCTION

Construction includes all engineering and technical activities that are required to develop a transportation project from the letting of a construction contract until construction is completed.

BACKGROUND

Exhibit 10-1, shown below, highlights the construction phase of the transportation project life cycle.

Exhibit 10-1: Construction Processes within the Transportation Project Life Cycle



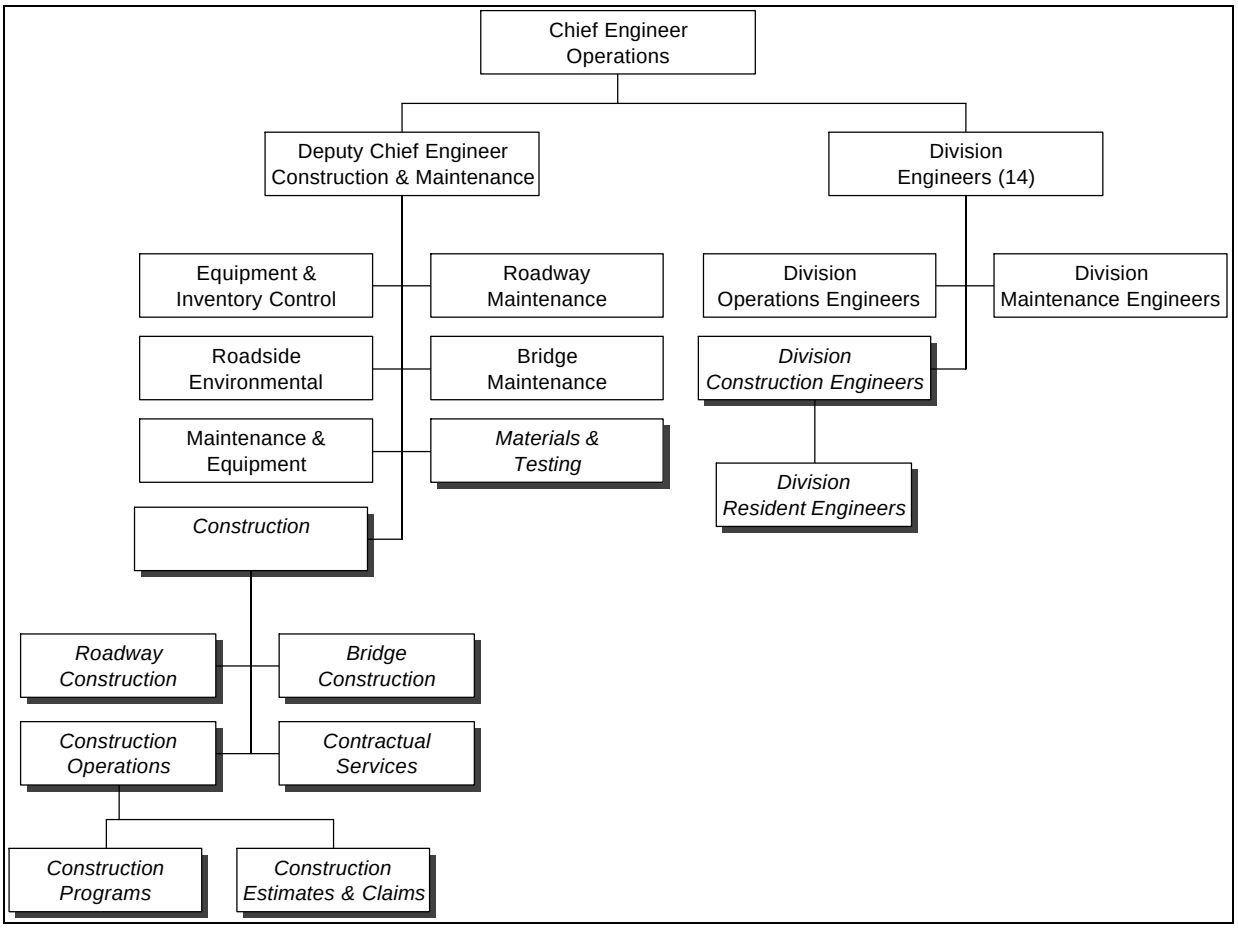
Source: KPMG

The primary responsibility of NCDOT construction staff is to manage and administer the construction of the State's roadway and bridge projects. Currently, the Department is managing over 287 construction projects with a contract value of over $1.7 billion.

The construction program of the NCDOT is a major responsibility of the Chief Engineer of Operations. Operations, contract management, administration, and field inspection are the responsibility of both the central office construction units and each of the 14 Divisions. Under the Deputy Chief Engineer of Construction and Maintenance, the Construction and Materials and Testing units provide support to the field division staff responsible for managing the construction program and contracts. Resident engineers, working under the supervision of the Division construction engineers and the Division Engineers, are responsible for construction projects. Both the Division Engineers and the Deputy Chief Engineer report to the Chief Engineer, who in turn reports to the State Highway Administrator.

Exhibit 10-2 highlights the units under the Chief Engineer with primary responsibility for carrying out construction activities.

Exhibit 10-2: NCDOT Units with Construction Responsibilities



Source: NCDOT

Construction. Program, policy, and contract administration guidance is the responsibility of the Construction Unit. The Department's detailed Construction Manual is developed and maintained by this unit. Additional responsibilities include:

- Reviewing payments to contractors and contract changes
- Recommending policy on all construction specifications
- Insuring active compliance with contracts and specifications
- Approving all recommendations for division construction personnel
- Providing all roadway and bridge construction final project inspections

The Construction Unit consists of 45 positions divided among four sub-units (Construction Operations, Roadway Construction, Bridge Construction, and Contractual Services) and one office management support group.

- ***Construction Operations.*** One important function of contract administration is the processing of claims during construction and final claims. This unit is charged with the development of claims data to be used in approval or denial of the claim, which involves working with field personnel to gather and document the data. Another key responsibility of this unit is processing the pay estimates received from the resident engineers. Upon the completion of work, this unit is also responsible for final pay estimates, and contract close-outs. This unit is also responsible for several Department-related programs including Partnering, the IMPACT Public Information Program and Incident Management. Partnering is a formalized process in which the resident engineers conduct a partnering workshop with the construction contractors, to develop better communication and relationships. This workshop provides the opportunity to initiate the key elements of equity, trust, and the development of mutual objectives needed for effective project management. The IMPACT Public Information Program is a joint venture between public affairs, construction, and traffic units to effectively deliver construction impact information to the public through different media. The Incident Management program is addressed in the operations chapter of this report.

- ***Roadway Construction and Bridge Construction.*** The State Roadway Construction and State Bridge Construction Engineers are supported by six roadway and six bridge construction engineers. These 12 engineers are the construction unit's field support to the 14 Divisions. They work closely with the 53 statewide resident engineers to provide technical support and ensure that contracts are executed and administered uniformly throughout the Department. The roadway and bridge construction engineers are responsible for preliminary and final field inspections. During contract administration, the roadway and bridge construction engineers have up to $50,000 approval for supplemental agreements to construction contracts. The Construction Manual and the Standard Specifications for Roads and Structures serve as the main references and are used to ensure uniformity in North Carolina's roadway and bridge construction.

- ***Contractual Services.*** This sub-unit is responsible for administration and maintenance of the prequalification list of prime contractors. Prime contractors who desire to bid on construction contracts must be included on this list in order to participate in the bid process. In addition, this unit reviews and approves the selection of subcontractors.

Materials and Tests. As of January 1998, the Materials and Tests unit had 168 positions. This unit establishes the criteria for materials and manufactured products used in construction, and assures that all materials and products used in the construction of North Carolina's roadways and bridges meet governing specifications and standards. This is accomplished through a cooperative effort between the central materials laboratories—chemical, physical, bituminous, and soils labs—and four regional testing laboratories in Fayetteville, Williamston, Asheville, and Statesville.

In addition to the field labs, Materials and Testing has field operations personnel located within geographically selected Division offices to provide materials and testing support. A structural group within Materials and Tests, available to provide needed specialized support and independent assurance, verifies

that the assurance process is being followed for proper federal compliance to testing guidelines. Materials and Testing personnel are also responsible for publishing a minimum sampling guide for field inspectors. The Materials and Tests unit has implemented a Quality Control/Quality Assurance (QC/QA) program for selected materials, which requires the producers to perform the quality control sampling, testing, and record keeping. The Department then performs quality assurance sampling and testing to confirm the performance of the producers' quality control plan.

Division Construction Engineers and Resident Engineers. The Division construction engineers supervise the resident engineers and are responsible for all the major construction contract activities of the Divisions. Resident engineers and their inspection staffs are responsible for the daily administration of construction contracts. There are 53 resident engineers across the state who serve as front line managers to administer construction contracts; work with contractors; interact with the public; and supervise assistant resident engineers, inspectors, and survey crews. The assistant resident engineers and inspectors are continually on site to inspect construction work, perform quality sampling, and document materials quality and quantity.

STRENGTHS

The Department has taken the initiative to identify and address areas to improve the construction program. The Construction Unit and the Divisions have identified areas for improvement, such as project completion, liquidated damages, consultant engineering inspection, and innovative contracting methods.

The Materials and Tests Unit has implemented an effective program of quality assurance and vendor quality control. This program promotes the State's role in construction management, while diminishing its involvement in areas more appropriately delegated to contractors. There is a plan for continued expansion and promotion of this program.

NCDOT has taken the initiative to obtain a construction and materials management system. A construction management system is a valuable tool to help facilitate the management of a large construction program. The Department has recognized this and has taken the initiative to identify the specific system requirements and needs.

FINDINGS AND RECOMMENDATIONS

Finding: The incentives for timely construction project completion need to be stronger.

The Department utilizes several measures to ensure that construction projects are completed on time, including assessing contractors for liquidated damages and taking administrative actions. Liquidated damages are payments made by the contractor to the State when the project is not completed on time. Administrative actions taken by construction management personnel include sending cure letters[11] to the

[11] A cure letter is a notice of contract deficiency. This letter is issued when a contractor has failed to perform up to the contract requirements. It may require the contractor to state in writing the reason for the deficiency and how

contractors, with notification to the bonding company. The Department also has employed various alternative contracting methods[12] (such as A+B bidding, incentive/disincentive specifications, and lane rental), which have been demonstrated in other states to promote the importance of project times and completion.

The Department has reported that over 31 percent of construction contracts in the last 10 years have resulted in liquidated damages due to untimely project completion. In some cases, contractors decide to pay liquidated damages on some NCDOT construction projects in order to maintain steady progress on others. To ensure that liquidated damage provide an effective disincentive for deliberate project delays, the Department has increased its liquidated damage amounts.

In addition to liquidated damages, contractors can be removed from the Department's prequalified bidders list if they fail to maintain adequate progress according to construction specifications. Once taken off the list, contractors cannot bid on future construction projects. However, the Department rarely resorts to removing contractors from the list.

Recommendation: Strengthen incentives for timely construction project completion.

NCDOT should continue to take steps to ensure more construction projects are completed on time, particularly in light of the multi-billion dollar construction program to be built over the next several years. Strategies to reduce project delays include:

- Continuing to aggressively manage the projects and elevate unresolved issues from the field offices to the central office as quickly as possible
- Utilizing the penalty provisions more frequently and removing non-responsive and habitually non-performing contractors from the prequalified list if they cannot meet stated schedules and progress requirements of construction contracts
- Continuing to identify candidate projects for the use of innovative contracting methods such as A+B bidding, incentive/disincentive specifications, and lane rental
- Developing formal project management plans for the Department's largest construction projects; such plans would include project organization charts, partnering agreements, project personnel contact lists and responsibilities, and strategies for addressing special project conditions or concerns

he plans to correct or "cure " the deficiency. A cure letter also serves to place the contractor on notice as to the contractual consequences for failure to correct the issue.

[12] Alternative contracting methods are discussed in Exhibit B-3 of Appendix B.

Finding: Construction project scheduling requirements need to be strengthened.

The progress schedule currently required from the contractor is a bar chart with a progress curve. These progress schedules are used to "... provide Department personnel with the Contractor's general plan, and to assist in determining whether the Contractor's progress is satisfactory or unsatisfactory." The schedule is prepared by the contractor and approved by the Division Engineer.

These reporting tools are not the most effective tools to establish and help keep the projects on schedule. The current schedules do not provide sufficient information to clearly identify the individual tasks and work items impacted by delays. For example, Department construction personnel have indicated that some contractors do not provide adequate levels of personnel and equipment to properly execute a given project. Moreover, the current schedules often do not provide sufficient task information to clearly identify task relationships and their impacts to overall project timeliness.

Recommendation:	**The Department and its construction contractors should adopt enhanced scheduling methods.**

The Department can improve the management of construction projects through the use of comprehensive scheduling methods such as the Critical Path Method (CPM). When appropriate, the use of CPM scheduling can provide an improved ability to manage project schedules and progress. More specifically, a well-developed CPM schedule can help identify and define the significant tasks associated with the project, identifying task dependencies and the critical path, and establishing the duration of the tasks.

NCDOT should consider the utilization of Critical Path Method (CPM) scheduling for complex projects and projects of significant duration and costs. Also, NCDOT should consider the use of CPM schedules for any project if requested by the contractor. Before the schedules are approved, Department staff should discuss task duration and resources with the contractors to confirm that the contractor intends to provide adequate staffing and equipment. The Department should also develop CPM scheduling guidelines and procedures based on the complexity of various project types schedules. Training should be provided to construction management personnel in CPM scheduling.

Finding: The Department lacks a standard set of construction program performance measures.

The Department delegates construction project execution to the Divisions. The Construction Unit in the Department's central office provides overall guidance, but does not consistently require project performance measurement data, such as schedule performance, progress, and supplemental agreement/change order data from the field. For example, performance data and statistics on partnering initiatives are not consistently collected and assessed to determine their success or failure. Although the construction program tracks and analyzes various types of information as needs arise, these performance measurement efforts could be further institutionalized.

Recommendation: Strengthen construction program performance measures.

The Construction Unit and Divisions should develop a consistent set of construction performance measures, such as project schedule performance, progress, quality, supplemental agreement/change orders data, budget data, and contract close-outs. These measures should be analyzed regularly to identify trends and systemic items of concern, such as the number of change orders or supplemental agreements due to change conditions or design error. Some of these measures may be more readily available once the Highway Construction and Materials System (HiCAMS) is fully implemented.

Finding: The Department has been developing its Highway Construction and Materials System (HiCAMS) since 1994.

The Department is utilizing a construction computer system that was developed in 1978. This system, along with other individual systems, provides minimal construction management functions and support. Department staff state that these systems are limited in their abilities, time consuming to use, costly to maintain, and are not compatible with other systems. NCDOT has taken several steps in response to these concerns. Working with other states and the American Association of State Highway Transportation Officials (AASHTO), the Department was involved in early efforts to develop construction management system software, known today as Site Manager. Like several other states, North Carolina determined that Site Manager would not meet its needs.

The Department initiated development of HiCAMS in 1994 to help improve management of the Department's construction program. This system is designed to integrate the various functions of the Construction and Materials Testing units into one accessible system. System features include payments to contractors; better access to construction claims data; construction contract administration;, compliance data; materials and testing data; and improved ability of construction management personnel to track, analyze, monitor, and report on key construction management items. Originally scheduled for full implementation in December 1995, HiCAMS still has not been fully implemented. Implementation of core functions has been through five releases; each release provides additional capabilities. Full implementation of the core functions is currently scheduled for October 1998.

Recommendation: Implement up-to-date construction management software as soon as possible.

An up-to-date construction management system is needed to streamline construction contract management at the Department. Construction management personnel interviewed for this study expect HiCAMS to provide the tools and ability to support the construction contract management function. Both central office and field personnel are awaiting the complete fielding of the system, so they can begin to use the data. The Department should strive to fully deploy this technology as soon as possible.

As part of the HiCAMS implementation effort, the Department should reassess whether Site Manager will meet its needs. The latest release of Site Manager is now available, while HiCAMS is not fully developed.

Site Manager has many features that are planned for HiCAMS. A rigorous, side-by-side product comparison should be conducted to determine the most timely, cost-effective approach for implementing the Department's construction management automation needs.

Finding: NCDOT lacks a formalized training plan to ensure that the future leaders and managers in construction are adequately trained, both professionally and technically.

The Department has a formal Transportation Engineer Associate (TEA) Program that allows entry level engineers to rotate and gain experience in different areas of the Department and a non-mandatory management program for employees. However, NCDOT has no established training requirement for key positions such as resident engineers. Furthermore, individual training programs are not required or developed.

Recommendation:	**Develop training plans and requirements for the professional and technical development of personnel for key construction positions.**

Formalized training programs and specific minimum training requirements for various construction positions are needed to help ensure consistency in the administration of the construction program. Managers and contract administrators need to receive consistent and adequate levels of training to enable them to properly manage the programs in accordance with the standards set by the Department. By implementing a structured training and professional development program, the Department can prepare now to ensure the leaders and managers of tomorrow are properly and consistently trained.

Minimum steps that should be taken to establish the training program include:

- Identifying training subjects/areas applicable to positions at each level of the organization
- Identifying specific training courses and activities that support the training subjects/areas
- Defining specific training courses and activities as requirements for the specific positions
- Developing and implementing individual training plans for employees based on their career track requirements and personal goals

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Finding: A majority of roadway and bridge construction stakeout surveys are being accomplished by NCDOT survey crews.

A majority of the construction stakeout survey work is being accomplished through state survey crews assigned to the Resident Offices. The remainder of the survey work is being performed as part of the construction contracts. Having both the state and contractors perform survey work is duplicative and not organizationally efficient. The work performed by the contractors has apparently been satisfactory and the Department continues to include this work in the contracts. There are currently approximately 115 survey

parties (75 in Construction, 38 in Maintenance, and two in Operations) assigned to the 14 Divisions. The average party size is four.

Recommendation: Incorporate construction stakeout surveys in construction contracts.

Incorporating the survey stakeout requirements into construction contracts will place the responsibility for this function with the contractor—a more appropriate and effective arrangement, since the contractor already has overall responsibility for project construction. This action will decrease NCDOT's operational role, while increasing its project management role. Positions impacted by this action should be made available for reassignment to other construction areas or eliminated. The Divisions should maintain minimum survey capabilities for work remaining in-house and for performing quality assurance on contractors.

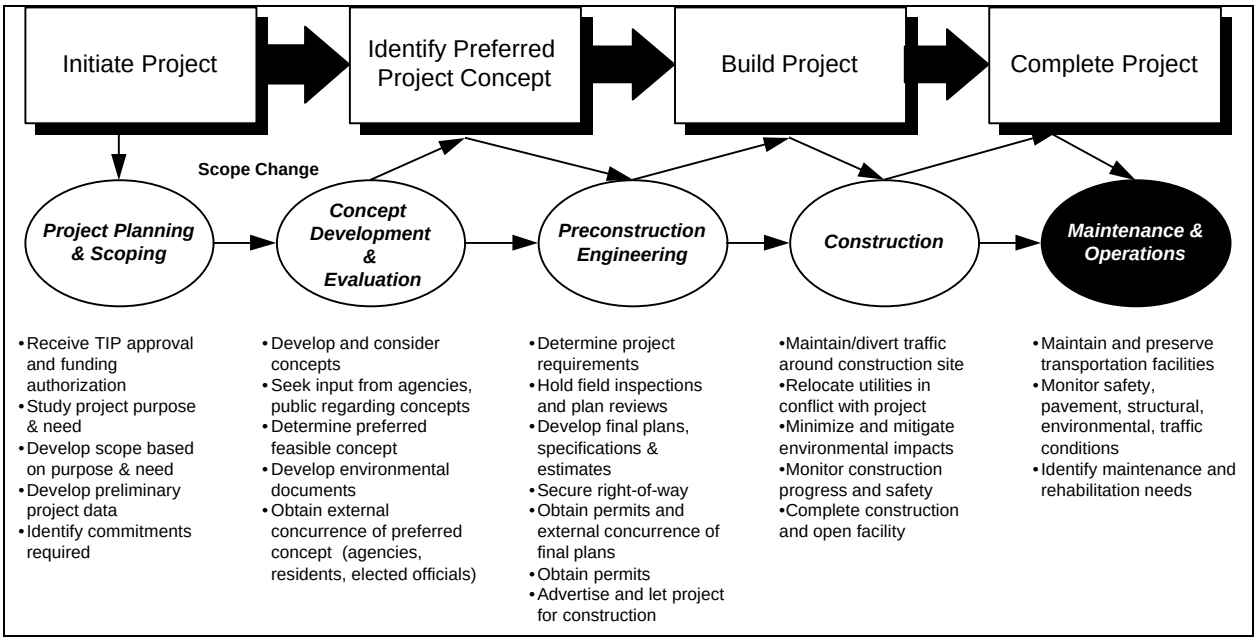
11. MAINTENANCE

This section provides an assessment of NCDOT maintenance functions, which include state road maintenance, bituminous operations, pavement management, bridge maintenance, and contract monitoring.

BACKGROUND

Exhibit 11-1, shown below, highlights the maintenance phase of the transportation project life cycle.

Exhibit 11-1: Maintenance Processes within the Transportation Project Life Cycle



Source: KPMG

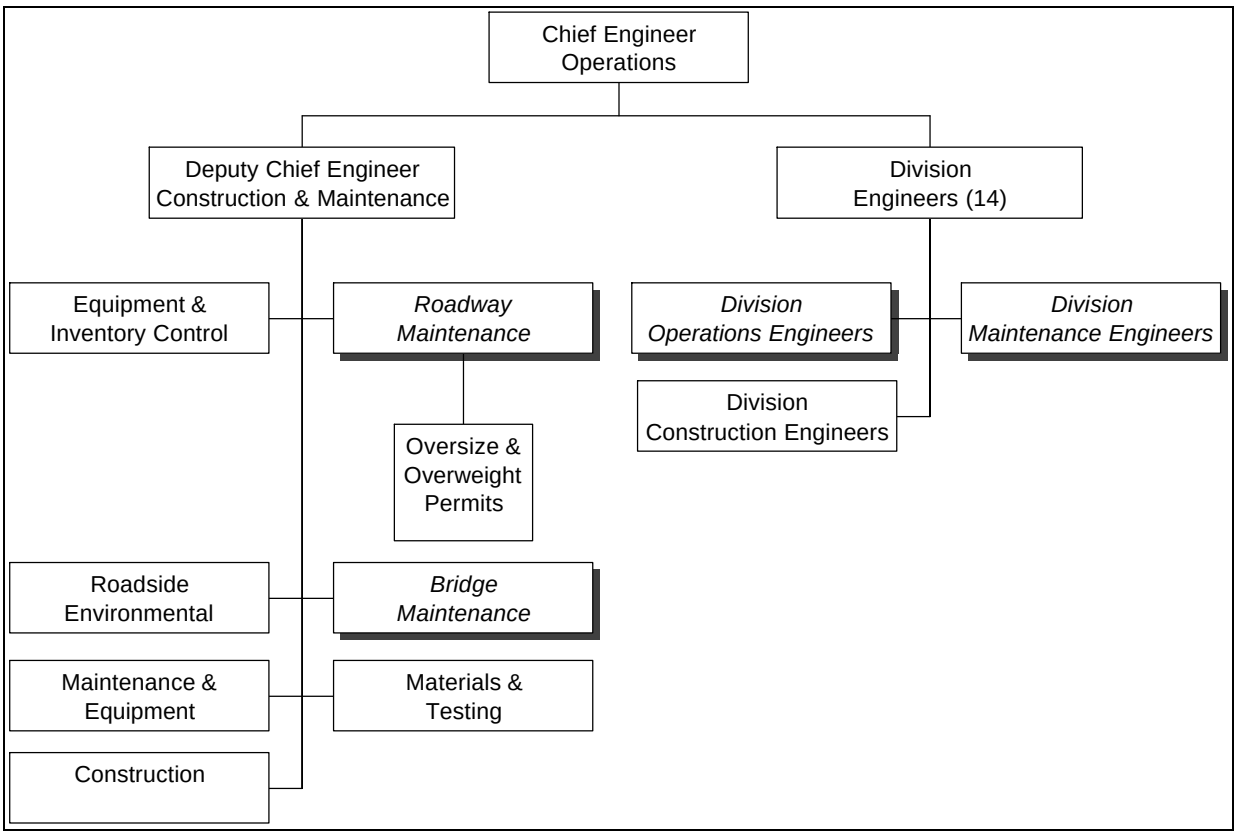
The primary responsibility of the NCDOT maintenance staff is to maintain the 77,750 miles of roadways and more than 17,000 bridges on the State Highway System. The Chief Engineer of Operations is responsible for construction, roadway maintenance, bridge maintenance, and operations functions for the Department.

The NCDOT Operations section includes the State's 14 Highway Divisions, the Secondary Roads Office, and six operational units. The 14 Highway Divisions, each headed by a Division Engineer, and the Secondary Roads Office report directly to the Chief Engineer of Operations. The six operational units—Construction, Roadway Maintenance, Bridge Maintenance, Materials and Tests, Roadway Environmental, and Equipment and Inventory Control Unit—are headed by the State Engineer, who reports to the Deputy Chief Engineer of Operations.

Each Highway Division has several support units, including the Division Bituminous unit, Equipment unit, Traffic Services unit, Roadside Environmental unit, and Design/Construct unit. The 14 Highway Divisions are supported by 8,176 employees.

The units under the Chief Engineer with primary responsibility for carrying out roadway and bridge maintenance activities are highlighted in Exhibit 11-2.

Exhibit 11-2: NCDOT Units with Maintenance Responsibilities



Source: NCDOT

State Roadway Maintenance

North Carolina is unique when it comes to owning and maintaining roads. For the large majority of states, the responsibility for owning and maintaining roadway system is divided among the state, county and city government. In North Carolina, however, county government has no jurisdiction over the owning or maintaining county roads. This arrangement is the result of decisions made in 1931, when North Carolina, like the rest of the nation, was in the midst of the depression. That year, the State Highway System expanded to 54,000 miles, when the legislature voted to take over and maintain 45,091 miles of secondary roads for all 100 counties.

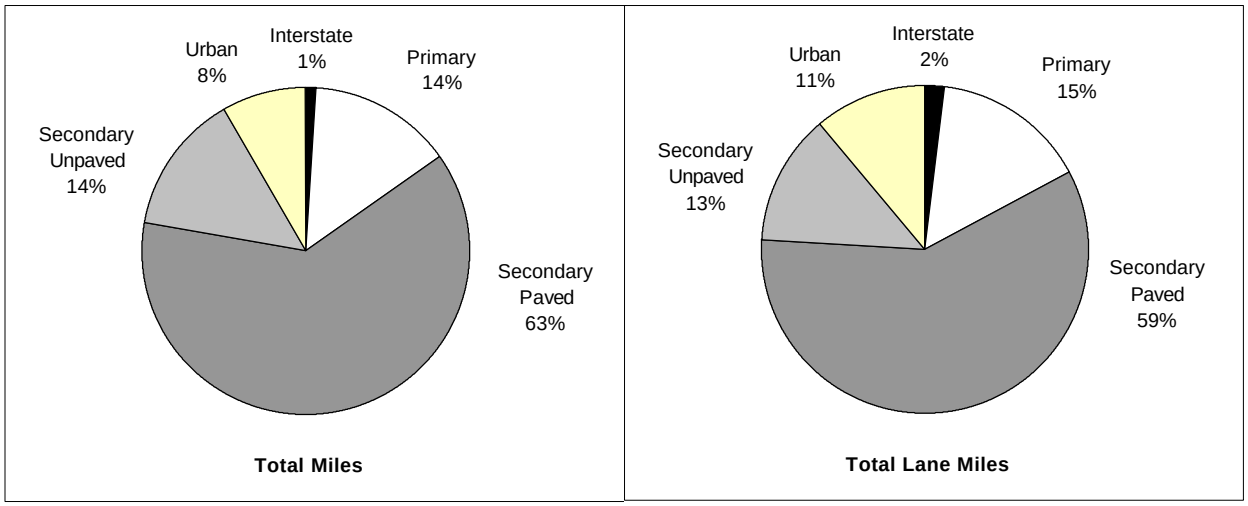
For fiscal year 1997-98, roadway maintenance has been allocated approximately $430 million in the maintenance (primary, secondary, and urban systems) and contract resurfacing budget. Under primary, secondary and urban systems, budgeted funds are appropriated to various activities such as road

maintenance, bridge maintenance, operations, railroad signals, weigh stations, inmate labor, historical markers, renovations of rest areas, training and other activities.

Presently, the Roadway Maintenance unit and 14 Highway Divisions together are responsible for maintaining over 160,000 lane miles of interstate, primary, secondary (paved and unpaved) and urban roadways.

Exhibit 11-3 provides a breakdown of the Department's highway system by total miles and total lane miles. "Total miles" are counted as if one mile of a four lane road were equal to one mile; one mile of four lane road would be counted as four "total lane miles."

Exhibit 11-3: North Carolina State Highway System



Source: NCDOT

Organization

Functionally, the responsibilities for maintaining the State Highway System is shared between the Roadway Maintenance unit, located in Raleigh, and the Highway Divisions across the State. The Pavement Management unit also has key responsibilities related to roadway maintenance.

Roadway Maintenance Unit. The Roadway Maintenance unit is primarily responsible for developing and formulating uniform highway maintenance policies and procedures and undertaking various maintenance training activities for statewide implementation. Additionally, the unit acts as the liaison between the Deputy Chief Engineer's office and Division offices, and recommends to the Deputy Chief Engineer all matters relating to the allocation of funds for roadway maintenance and contract resurfacing activities undertaken by the Divisions.

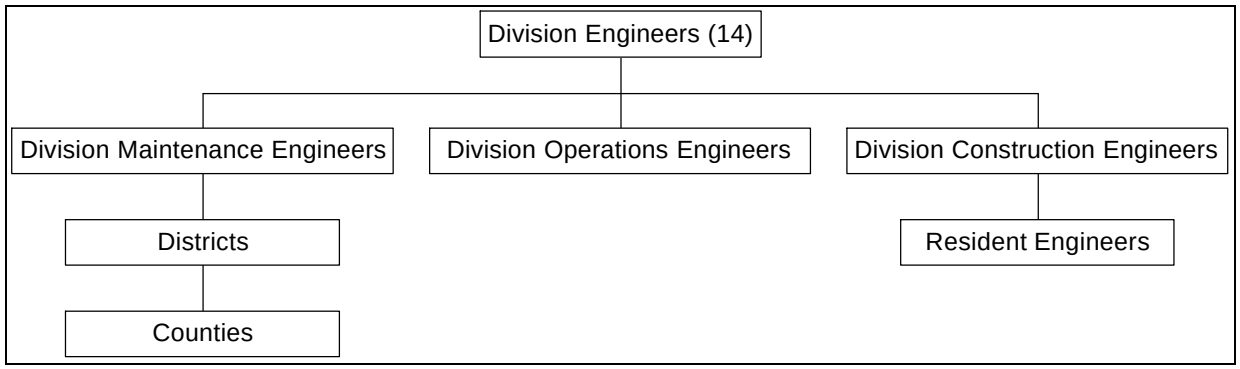
The primary functions/responsibilities of the Roadway Maintenance unit are to:

- Develop training manuals, videos, and other materials related to roadway maintenance and workplace safety
- Manage the current maintenance management system to guide funding allocation to various roadway maintenance activities
- Coordinate allocation of roadway maintenance funds—primary, secondary, urban, and contract resurfacing—based on established criteria
- Coordinate and perform roadway maintenance activities, such as pavement patching, resurfacing, snow and ice removal, drainage, shoulders and drop-off, and guard rails
- Coordinate with the Department of Correction for use of inmates for roadway maintenance activities (litter pickup, mowing, etc.)
- Administer the outdoor advertising and junkyard control programs
- Coordinate the maintenance and repair of all weigh stations between the Division of Highways and the Division of Motor Vehicles
- Address public inquiries and complaints

Divisions. The 14 Highway Divisions are responsible for administering large Transportation Improvement Program (TIP) construction contracts; performing routine and preventive roadway maintenance activities; maintaining all signs, pavement markings, and signals; maintaining the equipment fleet; managing the Secondary Road Construction Program; managing roadside vegetation; and responding to all types of emergencies. Highway Divisions are further divided into District maintenance areas; each Division has two or three Districts. Typically, each Highway Division is responsible for performing routine and preventive roadway maintenance activities for 5,000-6,000 miles of highway.

Exhibit 11-4 illustrates the Highway Division-level organization.

Exhibit 11-4: Highway Division Organization Chart



Source: NCDOT

The Division Engineer is assisted by the Division Maintenance Engineer, the Division Operations Engineer, and the Division Construction Engineer. Roadway maintenance functions are carried out by the District and county maintenance forces. The Districts are under the supervision of the District Engineers, who report directly to the Division Maintenance Engineer. Each of the counties has a County Maintenance Engineer who directly supervises the maintenance operations for that county. Some of the County Maintenance Engineers are responsible for more than one county.

Within each Division, there are district maintenance, county maintenance, and bituminous operation units. These units usually report to the Division Maintenance Engineer, but in some cases report to the Division Operations Engineer.

Division Bituminous Operations. Once a road is built or an existing road is resurfaced/rehabilitated, it begins to deteriorate. Eventually, it will show signs of distress due to traffic, weather and other fatiguing conditions or to the normal aging process of the pavement. Proper roadway maintenance can slow the process of premature pavement deterioration and can extend the useful life of the pavement. Each Division's Bituminous Operations unit performs routine roadway maintenance activities that extend the useful life of the pavement.

The Bituminous Operations unit is responsible for the retreatment of bituminous paved roads with various types of seals, such as sand seals, straight seals, drag seals, split seals, or mats and seals; resurfacing; and construction of secondary roads using force account. Typically, each Highway Division has one bituminous operations crew (also known as road oil crew), led by the Division Bituminous Engineer/Supervisor, who reports either to the Division Maintenance Engineer or, in some instances, to the Division Operations Engineer. The unit works closely with the Pavement Management unit to prepare the pavement condition rating for secondary and urban roadways. The pavement condition rating is utilized as a decision-making tool to determine where routine roadway maintenance is cost effective and when resurfacing or other major roadway rehabilitation may be required.

The primary functions/responsibilities of the Bituminous Operations units are to:

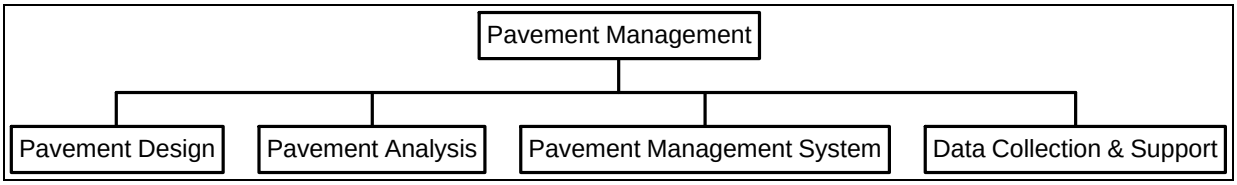
- Prepare and coordinate the paving program with the Division Maintenance Engineer and/or the Division Operations Engineer
- Apply surface treatment to improve overall condition of the pavement
  - Applying full depth patching and thick short overlays to increase the structural capacity of the section
  - Performing crack pouring, joint sealing and repairing
  - Doing manual patching, bituminous surface treatment (BST) patching, plant mix (PM) patching, and various seals (slurry, sand, straight, drag, split and mat seals)

- Conduct force account work to construct secondary roads and resurface existing roadways
- Conduct pavement condition rating survey for secondary and urban roadways
- Coordinate procurement of materials and inventory control

Pavement Management. The Pavement Management unit has a statewide responsibility for activities related to designing and maintaining pavement structures at an acceptable level. Additionally, the pavement management unit is responsible for preserving the State's investment in pavement through cost-effective rehabilitation and maintenance activities, and for ensuring the safety of the motoring public.

Exhibit 11-5 provides a high level organizational chart for the pavement management unit.

Exhibit 11-5: Pavement Management Unit Organizational Chart



Source: NCDOT

- ***Pavement Design.*** The pavement design group is primarily responsible for designing the pavement structures for the TIP projects that involve construction on new location or widening of existing roadways, Division Design Construct (DDC) and Bicycle Facility projects. In addition to preparing pavement designs, this group is also responsible for making edge drain recommendations for both flexible and rigid pavements.
- ***Pavement Analysis.*** The pavement analysis group is responsible for selecting treatment types for existing pavement rehabilitation including overlays, milling, full depth repairs, partial depth patching and reconstruction. The group performs Falling Weight Deflectometer (FWD) and Dynamic Cone Penetrometer (DCP) testing to obtain information regarding the existing pavement and the soil beneath. The pavement analysis group also conducts field investigation of pavement failures. Organizationally, the pavement analysis group is further divided into two regional sub-groups: east and west.
- ***Pavement Management System.*** The pavement management system group is mainly responsible for developing and implementing a pavement management system for North Carolina that meets the Federal Highway Administration (FHWA) guidelines. This group analyzes the information collected in the pavement condition survey. Pavements are rated based on various distresses that occur on each section of pavement. The group also evaluates past performance of pavement to estimate the remaining life of each pavement section.
- ***Data Collection and Support.*** The data collection and support group is responsible for collecting pavement condition/distress data and assisting Highway Division field personnel. Pavement condition survey is conducted using various equipment, including FWD to measure the structural strength of a

pavement, Skid Trailers to measure the skid resistance of pavements; Profilometer to measure roughness and rut depths for the National Highway System (NHS) and selected Highway Performance Monitoring System; and Ground Penetrating Radar to measure layer thickness in asphalt pavement. The four Pavement Coordinators located throughout the state are responsible for performing pavement condition surveys on the Interstate roadway system on a two year cycle. Highway Division personnel (mostly Bituminous Operations unit personnel) semiannually conduct pavement condition surveys on the primary and secondary roads.

The primary functions/responsibilities of the Pavement Management unit are to:

- Develop, maintain and manage the pavement management system in accordance with FHWA policies and procedures
- Provide statewide training to roadway maintenance field personnel for conducting pavement condition surveys
- Coordinate the pavement assessment data collection process with Highway Divisions
- Identify and provide Interstate pavement rehabilitation needs for an annual updating of the TIP
- Provide technical assistance for pavement-related research projects and pavement design methodology for rehabilitation, restoration and resurfacing of existing pavements
- Prepare management reports for the Department and other government agencies

Bridge Maintenance

The Bridge Maintenance unit is a statewide operational unit headed by the State Bridge Maintenance Engineer, who reports to the Deputy Chief Engineer of Operations. The unit has two primary responsibilities:

- To maintain more than 13,000 bridges and approximately 3,000 other structures, consisting of reinforced box culverts and pipe culverts that are 54 inches and larger in diameter, on the State Highway System
- To perform regular safety inspection on all bridges and all box and pipe culverts that are 20 feet and longer measured along the centerline of the roadway

The Overweight Permit Analysis section of the Bridge Maintenance unit provides technical assistance to the Oversize/Overweight Permit unit, by determining if a specific bridge can be safely crossed by vehicles exceeding North Carolina's legal maximum weight. In addition, the Bridge Maintenance Unit chairs the committee responsible for prioritizing and developing the bridge replacements on the TIP update each year.

Approximately 28 percent of the 2,325 NCDOT bridges on the National Highway System—and approximately 35 percent of the 14,793 bridges not on the system—have been found to be structurally deficient and/or functionally obsolete by the Department. The Department's preliminary estimates suggest that approximately $2.8 billion would be needed to replace/rehabilitate all structurally deficient and functionally obsolete bridges in the State.

The total number of posted bridges on the State Highway System has declined steadily from a high of 9,605 bridges (approximately 57 percent) in fiscal year 1982 to a low of 5,934 bridges (approximately 35 percent) for fiscal year 1997. At present, the Department has roughly 325 bridges posted on the primary roadways and about 5,600 bridges posted on the secondary roadways for inadequate safe load carrying capacity.

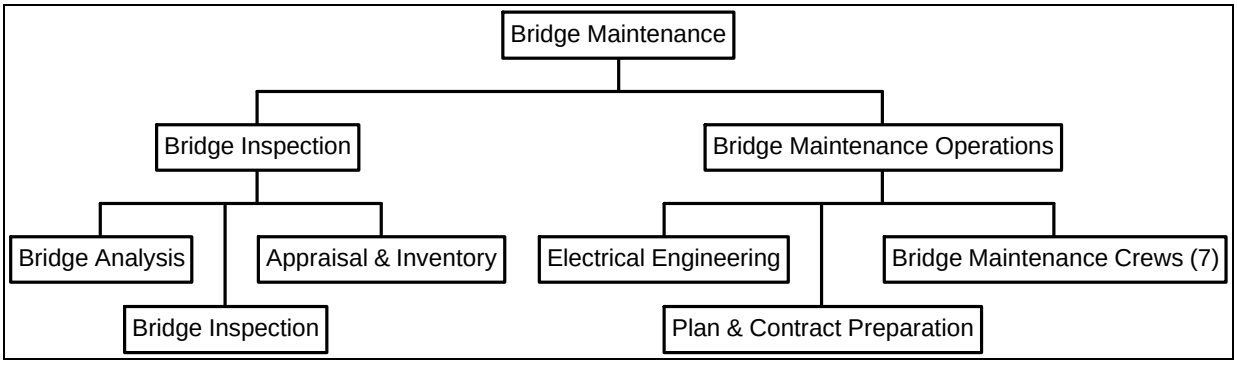
Using funds available from the federal bridge replacement program, Highway Trust Fund, and Interstate System, the unit has been able to replace old bridges and structures on the State Highway System. As a result, between fiscal years 1982 and 1997, the total number of posted bridges has decreased from 57 percent to 35 percent, the total number of deficient bridges on the State Highway System has decreased from 66 percent to 35 percent, and the total number of bridges with sufficiency rating of less than 50 has declined from 40 percent to 24 percent.

Organization

The Bridge Maintenance unit is led by the State Bridge Maintenance Engineer and supported by approximately 800 employees located throughout the state. The unit is organized into the Bridge Inspection unit and the Bridge Maintenance unit.

Exhibit 11-6 provides a high level organizational chart for the Bridge Maintenance unit

Exhibit 11-6: Bridge Maintenance Unit Organizational Chart



Source: NCDOT

The primary functions/responsibilities of the Bridge Maintenance unit are to:

- Perform field inspections on all bridges, reinforced box culverts and large pipe culverts in accordance with the FHWA requirements

- Perform underwater and special inspections on all bridges and other major sub-structures
- Maintain all state-owned bridges, reinforced box culverts and pipe culverts larger than 54 inches in diameter
- Perform repair/rehabilitation work on all bridges and other structures
- Procure bridge maintenance material and maintain materials inventory
- Coordinate equipment complements and procurement of new equipment
- Perform structural analyses to determine the safe load carrying capacities of all bridges in the State
- Assist the Hydraulics unit in conducting scour studies of existing bridges
- Maintain present condition ratings and sufficiency ratings for all State bridges
- Notify bridge positing and change bridge posting as determined necessary
- Maintain a computer database for maintenance needs and estimated funding requirements
- Provide technical assistance to the Oversize/Overweight Permit unit
- Prepare management reports for the Department and other government agencies

Bridge Inspection Unit. The Bridge Inspection unit is led by the Bridge Inspection Engineer, who reports to the State Bridge Maintenance Engineer. The bridge inspection unit is supported by approximately 90 employees. The unit is further divided into three sections: Bridge Inspection, Bridge Analysis, and Appraisal and Inventory.

- ***Bridge Inspection Section.*** The Bridge Inspection section has three regional field inspection groups and one statewide special inspections group. The field inspection groups are primarily responsible for inspecting each structure in detail at least once every two years, in accordance with the FHWA requirements. All field inspection work is carried out in accordance with the criteria established by the FHWA and NCDOT for bridge safety inspection.
    - Upon completion of a field inspection, the Bridge Maintenance Inspector prepares a bridge inspection report outlining present condition rating for deck, superstructure, substructure and channel. The report also outlines any repair or rehabilitation work that might be deemed necessary by the bridge inspector. A copy of the field inspection report is provided to the Bridge Analysis section, the Bridge Maintenance unit and the FHWA. The condition rating, along with sufficiency rating, is used to verify whether a bridge is structurally deficient and/or functionally obsolete. Structurally deficient bridges are those that are in relatively poor condition or have insufficient load carrying capacity. Functionally obsolete bridges are those which are narrow, have inadequate

under clearances, have insufficient load carrying capacity, or are poorly aligned with the roadway and can no longer adequately service today's traffic.

The statewide special inspection group is primarily responsible for conducting underwater bridge safety inspections and other specialized inspections such as drawbridge machinery and trunnion shafts, truss bridges, pin and hanger strap girders, cantilevered girders, deck truss pins, high mast light standards, cantilevered and rigid frame signs, and concrete deck evaluations, etc. All underwater bridge safety, cantilevered sign structures and high mast lights inspections are conducted on a four-year cycle. All span type sign structures are inspected every eight years. As part of the special inspection, the inspection teams gather condition data on bridge components, take precise measurements, make evaluations, and condition ratings using criteria established by the FHWA and NCDOT.

- ***Bridge Analysis Section.*** The Bridge Analysis section is mainly responsible for performing structural analysis to determine the safe load carrying capacity for all bridges in the State, issuing bridge posting notifications as determined necessary, providing technical assistance to the bridge maintenance unit for bridge repair/rehabilitation work, preparing engineering sketches for modifying existing bridges, providing technical assistance to the Oversize/Overweight Permit unit, managing scour studies for existing bridges, and formulating recommendations for improving public safety.

- ***Appraisal & Inventory Section.*** The Appraisal and Inventory Section is responsible for maintaining the physical bridge safety inspection record files for all bridges in the State, inputting field inspection data into a computer database, and preparing management reports for the Department. Each bridge record contains more than 200 items, far more than the minimum National Bridge Inventory record requirement of approximately 90 items. The unit coordinates submission of various reports to the FHWA and is responsible for maintaining the Bridge Management System (BMS). The Bridge Maintenance unit relies on the Bridge Management System to assess the optimum timing and selection among alternatives for maintenance, rehabilitation and replacement at the bridge level, and to predict system-wide funding needs on an annual basis. For fiscal year 1998, the Bridge Maintenance System has identified approximately $120 million in bridge maintenance needs/backlog.

Bridge Maintenance Operations Unit. The Bridge Maintenance Operations unit is a statewide operational unit responsible for the maintenance of all bridges, all reinforced box culverts, and all pipe culverts that are 54 inches and larger in diameter on the State Highway System.

- ***Bridge Maintenance Crews.*** Functionally, Bridge Maintenance Operations is divided into seven area groups, each responsible for two Highway Divisions. Each area group is lead by the Bridge Maintenance Superintendent and supported by one Transportation Technician V and eight to ten crews to carry out bridge maintenance activities. Key activities performed by this unit include the maintenance of bridge foundations, support piers, flooring, and rails in order to maintain structural integrity of the bridges. Crews also perform maintenance on ferry docks and are responsible for operating 15 drawbridges.

- ***Plan and Contract Preparation and Electrical Engineering.*** The Plan and Contract Preparation and Electrical Engineering groups, based in Raleigh, have statewide responsibilities. The Electrical Engineering group is primarily responsible for maintenance of electrical components on drawbridges, tunnel lighting, and electrical needs of the Department facilities. The Plan and Contract Preparation group (also known as the Purchase Order Contract section) is mainly responsible for preparing plans and contract documents for bridge replacement projects costing $500,000 or less through the Purchase Order Contract. Normally, the area bridge superintendents advises the plan and contract preparation group on bridges that require rehabilitation/replacements. The plan and contract preparation group then prepares plans and contract documents and awards the purchase order contract. On average, approximately 100 small bridges are replaced each year with large pipe, box culverts, or another bridge. Purchase order contracts are funded by maintenance and/or TIP funds.

Maintenance Contract Monitoring

Each year, the Department awards more than 1,500 small and large contracts. Typically, the Department relies on small contracts for maintenance activities such as small bridge replacement, landscape maintenance and planting, guardrail and fence installation, material hauling, mowing, unpaved road maintenance, widening and resurfacing, patching, shoulders and drainage, rest area, spot safety, markings and signals, fully operated rental equipment and other miscellaneous work.

To expedite the contract solicitation, selection and award process, the Secretary of Transportation, under General Statute 136-28.1, has delegated the authority to award highway construction and maintenance contracts up to $100,000 to the Division Engineer and up to $500,000 to the Department Purchasing Officer.

The following discussion provides a brief overview of the Division Contract, Purchase Order Contract and the Small Business Enterprise Program Contract.

Division Contract. The Division Engineer has the authority to award highway construction and maintenance contracts not to exceed $100,000. The Division Engineer, in accordance with General Statute 136-28.1, has the full and complete authority for writing specifications, accepting bids and awarding contracts. Each Highway Division maintains lists of contractors who have expertise in specific roadway construction and/or maintenance activities, and are interested in receiving contact solicitation information from the Highway Division. Typically, general specifications for the contract are developed by the Division, and written quotations are obtained from responsible bidders. Upon review, the Division Engineer awards the contract to the lowest responsible bidder.

Purchase Order Contract. The purchase order contract includes roadway construction and maintenance contracts valued at more than $100,000 and less than or equal to $500,000. The Department Purchasing Officer has the authority to award contracts of $500,000 or less that are solicited by informal bids. Typically, the plans and specifications for the contract are developed by the Division or the Bridge Maintenance unit and written quotations are obtained from a minimum of three responsible bidders. Upon

review and evaluation, the Division Engineer or the appropriate decision-maker will make a recommendation to the Department Purchasing Officer for the award of the contract. All purchase order contracts are awarded based on the lowest responsible bidder with consideration of quality, performance, and the time specified in the bids for the performance of the contract. Contracts valued at more than $500,000 must go through the formal bid process and are approved in public session by the Board of Transportation.

Both the Division and Purchase Order contracts require all participating contractors to be pre-qualified by the Department prior to submitting their bids. Both contracts have established policies and procedures outlining licensing and bonding requirements (bid bond, performance bond and payment bond) for contracts beyond certain dollar value and requirements for liquidated damages. Requirements related to Minority Business (MB), Women Business (WB), and Disadvantaged Business Enterprise (DBE) participation goals are established for specific contracts by the Division of Highways or the Bridge Maintenance unit.

Small Business Enterprise Program. The Small Business Enterprise (SBE) program allows small businesses to contract work with the Department through the Division and/or Purchase Order contracts. Businesses with a gross income of $1.2 million or less in the past year are eligible to participate in the SBE program. A minimum of three bids is solicited from SBE's; upon review, contract is awarded to the lowest responsible bidder. All requirements related to licensing and bonding are waived for the SBE contracts.

Maintenance Backlog

In 1990, the UNC Institute for Transportation Research and Education (ITRE) determined that an estimated $326 million was required annually for routine maintenance, and an estimated $305 million was needed to address deficiencies. In April 1994, the Department completed a report which updated the 1990 analysis. This "Highway Maintenance Needs Update" identified a $260 million maintenance backlog. The Department has been allocated funds to reduce this backlog. Exhibit 11-7 presents a summary of the maintenance backlog reduction schedule.

Exhibit 11-7: Maintenance Backlog Reduction Schedule

Maintenance Category	Total Backlog	Years to Complete	Cost per year 1995-1997	Cost per year 1998-1999	Cost per year 2000-2004	Backlog Balance 3/31/1997
Bridge Maintenance	$123,836,000	10	$12,383,600	$12,383,600	$12,383,600	$92,055,907
Pavement Maintenance	$58,424,000	10	$5,842,400	$5,842,400	$5,842,400	$30,963,996
Roadside Maintenance	$40,220,000	10	$4,022,000	$4,022,000	$4,022,000	$26,063,873
Drainage	$16,683,000	5	$3,336,600	$3,336,600	$0	$10,156,894
Pavement Marking/Striping	$7,484,000	3	$2,494,667	$0	$0	$2,059,361
Signs	$6,600,000	5	$1,320,000	$1,320,000	$0	$4,363,683
Signals	$5,500,000	3	$1,833,333	$0	$0	$3,321,687
Rest Area/Welcome Centers	$1,950,000	5	$390,000	$390,000	$0	$1,655,496
Total Maintenance Backlog	**$260,697,000**		**$31,622,600**	**$27,294,600**	**$22,248,000**	**170,640,897**

Source: NCDOT - TIP 1998-2004

STRENGTHS

- **The Roadway Maintenance and Bridge Maintenance units have appropriate procedures and policies in place for performing various maintenance activities.** Based on our review, these procedures and policies appear to be consistently followed by field crews at the Division level.

- **The coordination between maintenance headquarters and field functions appears effective.** The central office and Highway Divisions enjoy strong professional relationships with mutual respect and clear understanding of roles and responsibilities.

- **The Division of Highways has introduced several new programs and initiatives.** These include initiatives to improve public safety and protect the environment, such as incident management, sediment control, Adopt-a-Highway, and nighttime visibility efforts.

- **The Roadway Maintenance and Bridge Maintenance units effectively utilize services of private contractors to assist in-house staff with many maintenance activities.** These units' resourcing approach results in more efficient utilization of in-house resources, by ensuring that resources can be devoted to activities at the time they are needed.

- **Contracting for maintenance services appears to be effective.** The Bridge Maintenance unit and 14 Highway Divisions have a strong expertise for developing comprehensive bid specifications for contracting unique services, while protecting the Department's interest.

- **Several training efforts related to roadway and bridge maintenance are commendable.** The Roadway and Bridge Maintenance units have an effective training program to enhance workplace safety and employee productivity.

FINDINGS & RECOMMENDATIONS

Finding: The annual roadway maintenance funding allocation has not kept pace with the growth in maintenance responsibilities.

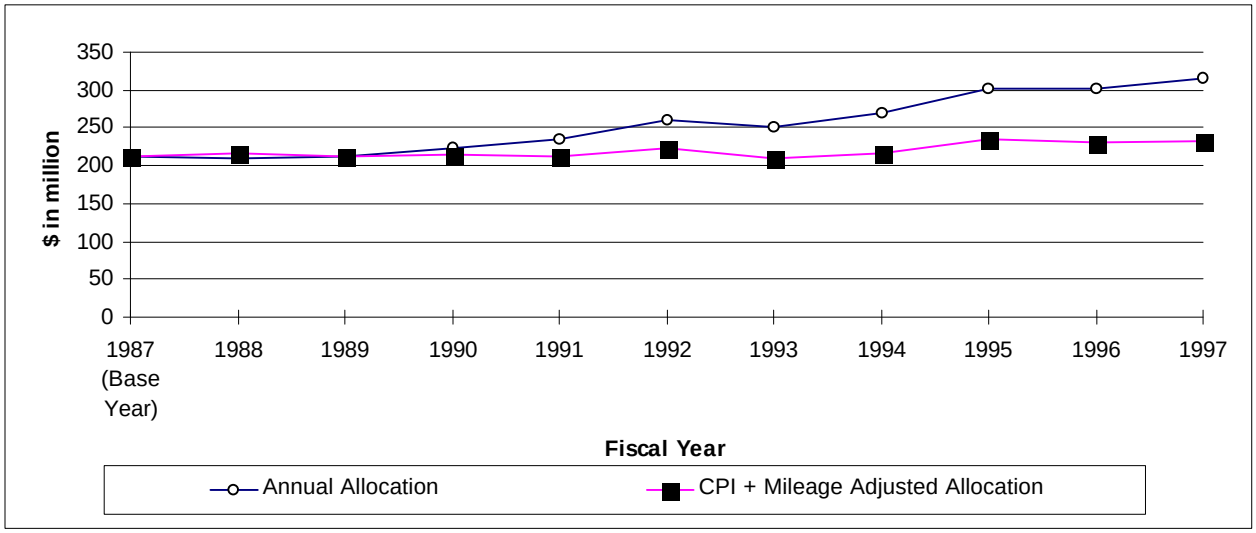
The Department has been expanding the network of interstate, primary, and secondary roads that need to be maintained. When adjusted for inflation and system growth, however, maintenance funds have not increased to meet these additional demands. This is occurring even though additional funding to address the Department's maintenance backlog has been provided since 1994, as shown Exhibit 11-7.

Exhibit 11-8 presents the actual and adjusted[13] funding allocations for roadway maintenance for fiscal years 1987 to 1997. The actual funding allocations were adjusted for inflation and growth in the total paved mileage to derive adjusted funding allocation. The inventory of total paved lane miles and the

[13] For the purpose of this analysis, we have assumed that maintenance funding allocation in fiscal year 1987 was adequate, therefore, considered fiscal year 1987 as a base year.

Consumer Price Index (CPI - inflation indicator) have increased approximately 13 percent and 37 percent, respectively, between fiscal years 1987 and 1997.

Exhibit 11-8: Roadway Maintenance Allocation Adjusted for Increase in Lane Miles and Inflation



Source: NCDOT and KPMG analysis

The Department has introduced several new maintenance programs and new initiatives, such as incident management, sediment control, Adopt-a-Highway, nighttime visibility, and improved public safety. The maintenance cost associated with these growing programs and initiatives is funded in part from the annual allocation for roadway maintenance. NCDOT maintenance funding has been, and continues to be the State's first resort for funds when emergency repairs are needed as a result of natural calamities. As a result, routine roadway maintenance activities have to compete with various new programs and initiatives for funding.

Finding: The current annual pavement resurfacing funding allocation represents a shortfall of approximately $95 million.

Each fiscal year, the Department allocates funding to the Highway Divisions and counties for pavement resurfacing, based on established criteria. The allocated funds are earmarked for performing activities, such as placement of plant mixed asphalt, bituminous surface treatment seal coats, and recycling of existing pavements.

The Department has developed a pavement maintenance strategy in order to preserve the structural integrity of roads and to provide a minimum acceptable level of service for the State Highway System. The pavement maintenance strategy calls for performing preventive maintenance overlays on a specific cycle for primary, secondary and urban highways. The Department has estimated that approximately $194 million would be needed each year to meet its annual pavement resurfacing goal. However, the average annual funding allocation for pavement resurfacing has remained steady at approximately $93 million between fiscal years 1990 to 1997.

Exhibit 11-9 summarizes the Department's pavement maintenance strategy by primary, secondary and urban roadways.

Exhibit 11-9: Annual Goal for Pavement Overlays

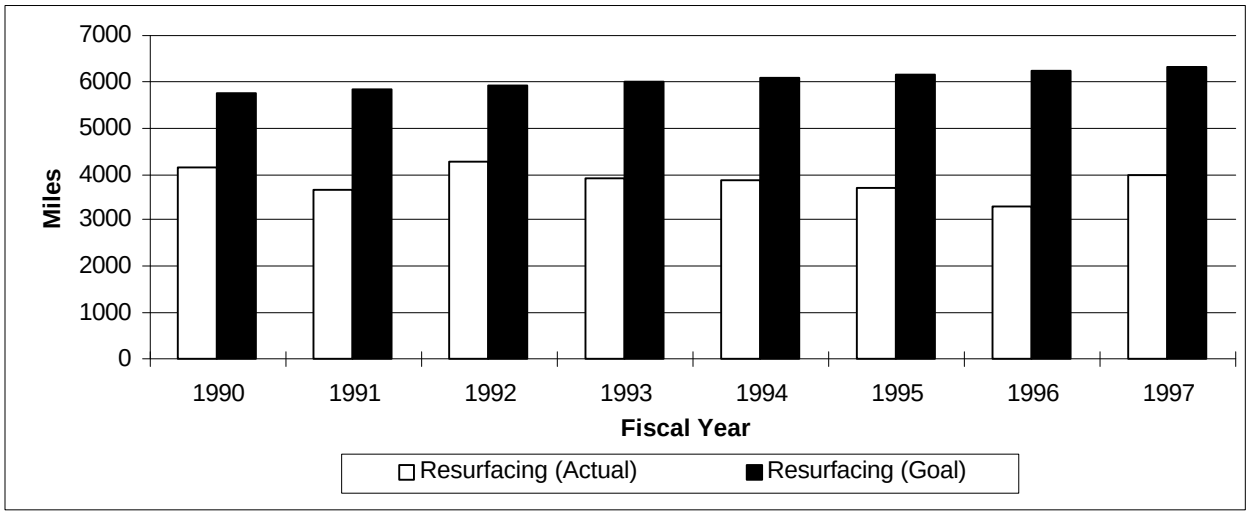
Roadways	Paved Miles	Overlays Cycle	Annual Goal
Interstate	983 miles	not applicable[14]	
Primary	11,177 miles	10 year cycle	1,117 miles
Urban	6,271 miles	12 year cycle	523 miles
Secondary - hot mix asphalt roads	29,506 miles	15 year cycle	1,967 miles
Secondary - bituminous surface treatment	19,026 miles	7 year cycle	2,718 miles
TOTAL	**66,963 miles**		**6,325 miles**

Source: NCDOT

As indicated above, to accomplish the pavement maintenance strategy's goal for pavement resurfacing, the Department would have to resurface approximately 6,300 miles of primary, urban and secondary roadways each year.

Exhibit 11-10 presents the Department's annual goal for pavement resurfacing and the actual pavement resurfacing miles accomplished for fiscal years 1990 to 1997.

Exhibit 11-10: Pavement Resurfacing Miles



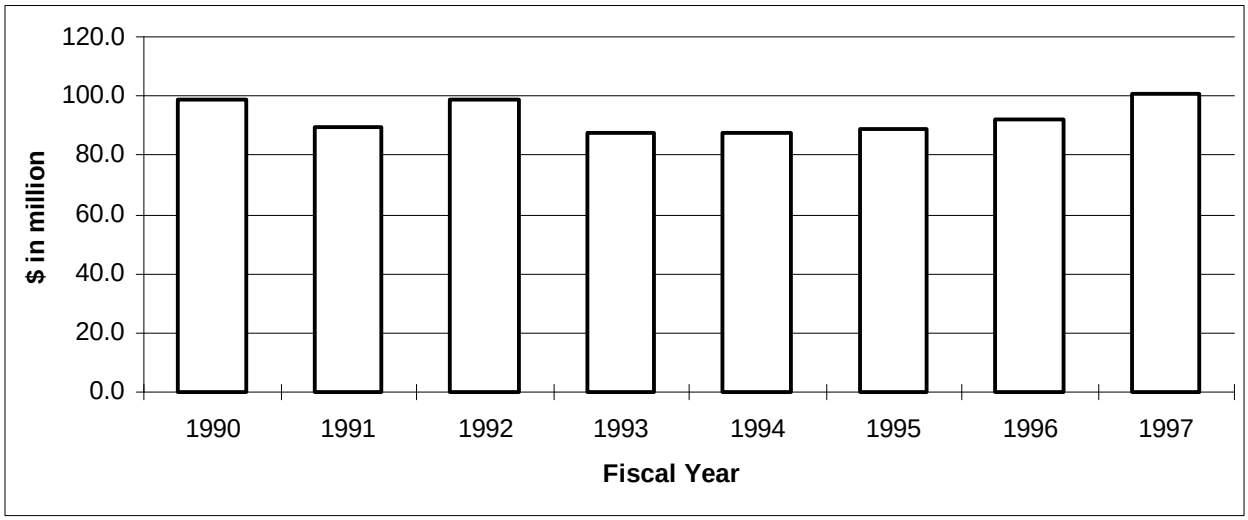
Source: NCDOT

[14] The annual pavement overlays goal of 6,325 miles does not include interstate system. Interstate resurfacing needs are addressed through the TIP.

Between fiscal years 1990 and 1997, the average annual pavement resurfacing miles has remained steady at roughly 3,900 miles, while the paved roadways inventory has increased from 60,858 miles for fiscal year 1990 to 66,963 miles for fiscal year 1997. Based on the average resurfacing cost per mile for fiscal year 1997, the Department has estimated that approximately $240 million would be needed each year to resurface 6,300 miles of primary, urban and secondary roadways. Taking into consideration that approximately 150 miles of primary and about 75 miles of urban roadways are paved each year using TIP funding, the net annual funding needs for pavement resurfacing is approximately $194 million.

Exhibit 11-11 presents the actual annual statewide funding allocation for pavement resurfacing for fiscal years 1990 to 1997.

Exhibit 11-11: Statewide Funding Allocation for Pavement Resurfacing



Source: NCDOT

As indicated above, the average annual funding allocation for pavement resurfacing has remained steady between fiscal years 1990 to 1997. At the current funding level, the Department would not be able to meet its annual pavement resurfacing goal.

Finding: Roadway condition is deteriorating.

Typically, when adequate maintenance funding is not available to perform preventive and routine roadway maintenance activities, the pavement condition rating drops and the costs associated with pavement patching increases. At NCDOT, the pavement condition rating for all systems has declined from a high of 88 in fiscal year 1990 to a low of 81 for fiscal year 1996. Also, the annual expenditures for pavement patching have increased from about $19.2 million in fiscal year 1992 to more than $38.5 million for fiscal year 1997—an increase of approximately 123 percent. Roadway maintenance needs identified by the pavement condition survey has gone up by approximately $80 million between fiscal years 1994 and 1996.

Finding: The current funding allocation for bridge maintenance has not been adequate to address bridge maintenance backlog.

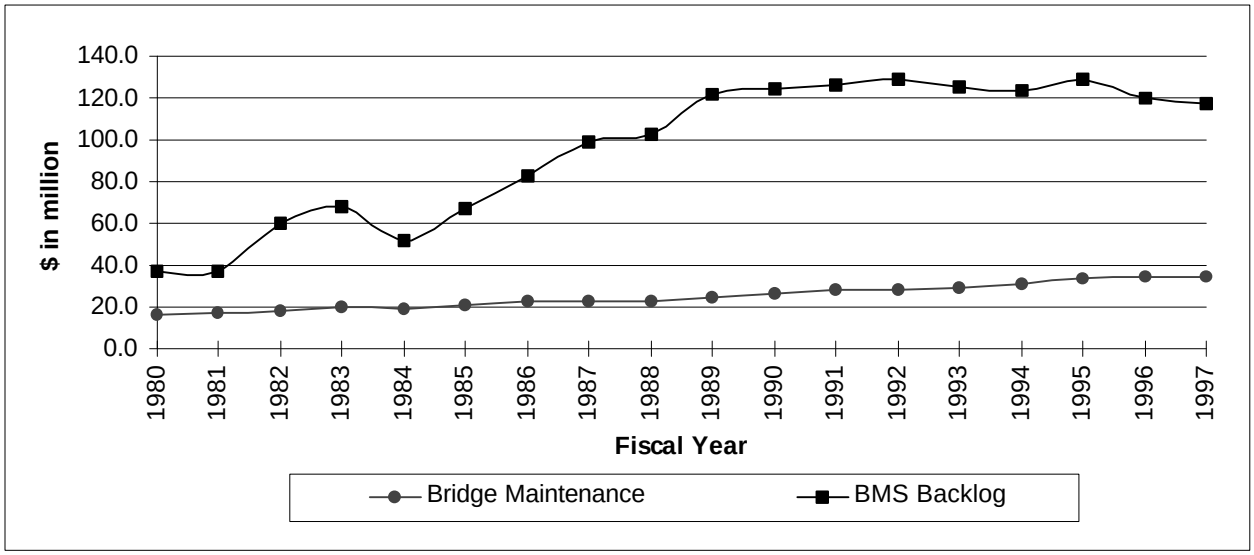
The Bridge Maintenance unit is responsible for inspecting and maintaining more than 17,000 bridges and other structures on the State Highway System. The unit relies on the Bridge Management System to estimate the bridge maintenance funding needs and to assess the optimum timing and best approach for performing bridge maintenance activities.

During the late 1970s, funds allocated for bridge maintenance were not sufficient to meet bridge maintenance needs, creating a bridge maintenance backlog consisting of structural steel painting, replacement of timber bridges, and repair/replacement of concrete decks. The bridge maintenance backlog continued to grow with the trend of insufficient funding for bridge maintenance between fiscal years 1984 to 1995. Between fiscal years 1980 to 1997, the total number of bridges on the State Highway System has increased by approximately 2 percent; however, the bridge deck area has increased by around 20 percent (about 11 million square feet) during the same period.

Over the past several years, the Bridge Maintenance unit has done a good job of maintaining the overall condition of bridges and structures at a reasonable level with limited maintenance funds. However, due to inadequate funding, the unit has not been able to address the maintenance backlog. The cumulative bridge maintenance backlog, as identified by the Bridge Management System, is now approximately $117 million.

Exhibit 11-12 indicates bridge maintenance backlog, as identified by the Bridge Management System, versus the actual bridge maintenance allocations for fiscal years 1980 to 1997.

Exhibit 11-12: Bridge Maintenance Funding Allocation vs. Maintenance Backlog



Source: NCDOT

Since fiscal year 1990, the maintenance backlog has remained stable primarily due to increased federal funding for bridge replacement. Federal funding for bridge replacement has increased from approximately

$30 million in fiscal year 1990 to more than $66 million for fiscal year 1997 (an increase of approximately 115 percent). The unit has acknowledged that additional maintenance funding would be necessary to reduce the maintenance backlog to a more manageable level.

Recommendation:	**Increase the funding allocation for maintenance to address routine maintenance needs and the maintenance backlog.**

Proper roadway and bridge maintenance is essential to ensure public safety, protect the environment, extend the useful life of the structures and pavement, and slow the process of premature deterioration. It is evident from the recent pavement condition surveys, roadway maintenance backlog, and bridge maintenance funding needs, that the current funding allocations for carrying out highway maintenance are insufficient.

Although it is beyond the scope of this study to quantify the annual maintenance needs and current maintenance backlog, an additional several hundred million dollars may be required for maintenance funding over the next five years.

Finding: Maintenance underfunding has impeded a strategic approach to maintenance.

At NCDOT, as in many other transportation agencies, the maintenance budget is developed based on a combination of available funding and minor adjustments to prior year funding. As discussed previously, over the past several years the maintenance funding allocations have generally been lower than maintenance needs identified by various management programs. Under these circumstances, it is extremely difficult for the Department to establish the maintenance program's priorities, measure performance, and maintain a minimum acceptable level of service.

Recommendation:	**Develop a strategic approach for maintenance.**

The process for developing a statewide maintenance budget should clearly link maintenance program objectives and priorities, the level of service commitment, and the actual accomplishment and performance. Using roadway, bridge and traffic maintenance requirements as identified by various management systems, the Department should establish a level of service that is consistent with the Department's vision, maintenance program objectives and life cycle costs.

The Department has several management programs/systems that identify maintenance needs by specific maintenance functions (e.g., pavement, roadway and bridge maintenance). The Traffic Services units at the Highway Division level determine maintenance needs for all pavement markings, signs, traffic signals, warning flashers, sign lighting and roadway lighting within the Division.

The Department should take a strategic approach to develop a statewide maintenance budget based on maintenance needs identified by these management programs, with consideration for program objectives and priorities, and level of service commitment.

Finding: The Roadway Maintenance unit lacks certain performance objectives/measures for core maintenance functions.

The responsibilities for maintaining the state roadway system are shared between the Raleigh-based Roadway Maintenance unit and 14 Highway Divisions. The Raleigh-based unit is primarily responsible for developing and implementing uniform highway maintenance policies and procedures, while the Highway Divisions are responsible for carrying out roadway maintenance activities. Several Highway Divisions have established performance objectives (cost-based indicators) for core roadway maintenance functions; however, the content and priorities of measures vary in consistency across the Highway Divisions.

Recommendation:	**The Roadway Maintenance unit should develop specific, measurable performance objectives for each core maintenance function.**

The Highway Divisions need to place greater emphasis on performance reporting for core roadway maintenance activities, such as pavement resurfacing, pavement patching and sealing, secondary road construction, and installation of traffic signals. The Roadway Maintenance unit should develop comprehensive performance measures to evaluate progress of the roadway maintenance compared to the private sector and quality standards of the Department. Once developed and implemented, the Department should use the performance measures and integrate them to enhance accountability in its planning, management, and personnel evaluations.

Finding: The Bridge Maintenance unit requires improved automation.

The Appraisal and Inventory Section within the Bridge Maintenance unit spends significant staff time on manually inputting data into a computer database and maintaining a physical inventory of records, plans, etc. The Appraisal and Inventory section is responsible for maintaining a computer database consisting of information gathered through field inspection reports and surveys conducted by other Department units. This section has approximately 10 full-time employees who spend much of their time manually inputting information into a computer database from field inspection reports and other database printouts, and maintaining inventory of physical records of bridge design, field inspection reports, bridge maintenance records and material used.

The Bridge Maintenance unit is in the process of implementing computerized field inspection reporting. Upon completion, the unit expects that field inspectors would be able to input inspection data as they perform their inspections; however, some manual data inputting will be required.

Recommendation: Enhance automation in the Bridge Maintenance unit.

The Bridge Maintenance unit should evaluate opportunities available to further extend the level of automation to improve efficient data sharing between various units. For example, information regarding the present condition of deck, superstructure, substructure, channel, bridge condition rating, and bridge sufficiency rating could be electronically transferred from the field inspection reports. Similarly, information regarding average daily traffic count (ADT), bridge location (longitude and latitude), functional classification, mile/kilometer point, and strategic highway designation could be retrieved electronically by establishing a link between various databases using a common field.

Additionally, the unit should evaluate the cost/benefits of electronically storing information—such as bridge design plans, maintenance records, material used, material testing results, as-built drawings—using a data imaging system. The key advantage of storing information electronically is that the information could be shared between units and divisions easily and quickly.

Finding: The bridge maintenance database needs to be expanded.

The Bridge Maintenance unit is responsible for inspecting all bridges and structures that are 20 feet and longer, measured along the centerline of the roadway, and for maintaining all bridges and structures 54 inches and larger in diameter in the State Highway System. The Bridge Maintenance unit maintains a database consisting of all bridges and structures that are 20 feet and longer. However, there are approximately 18,000 structures in the State Highway System that are 54 inches and larger in diameter, but less than 20 feet in length, that are not included in the database.

Recommendation: Expand the bridge maintenance database.

The Bridge Maintenance unit is responsible for maintaining approximately 18,000 structures that fall in this category. However, their physical location and condition is not always known, making the task of maintenance difficult.

During the past few months, there have been several incidents of structure failure on the State Highway System causing traffic interruptions and raising concerns about public safety. Additionally, recent changes in the National Pollution Discharge Elimination System (NPDES) regulations require the Department to monitor water quality at river/stream crossings.

The Department should develop a database for structures that are equal or larger than 54 inches in diameter, but are less than 20 feet in length, on the State Highway System. The Bridge Maintenance unit is in the process of collecting information about these structures. Once the process of collecting information is completed, the unit should develop a database listing all structures located on the State Highway System

that fall in this category. Upon completion, database could be used to verify whether or not these structures are regularly maintained.

Finding: Contract management training is needed at the Highway Division level.

Many Department staff contacted during this study indicated that additional contract management training is needed to ensure that the Division and Purchase Order contracts are managed consistently and effectively across all Highway Divisions. The general trend over the past several years have been that both the Division and the Purchase Order contracts continue to grow in number and value. In fiscal year 1997, 14 Highway Divisions and the Bridge Maintenance units together issued more than 1,400 purchase order contracts, valued in excess of $127 million[15].

Recommendation:	**The Department should provide contract management training at the Division level.**

The Department should develop a comprehensive training program for effectively managing the Division and Purchase Order contracts. A consistent approach to managing these contracts could result in higher efficiency and improved work quality.

[15] Purchase order contracts total includes all Division Contracts and all Purchase Order Contracts issued/originated by Highway Divisions and the Bridge Maintenance Unit, but does not include contract resurfacing purchase orders.

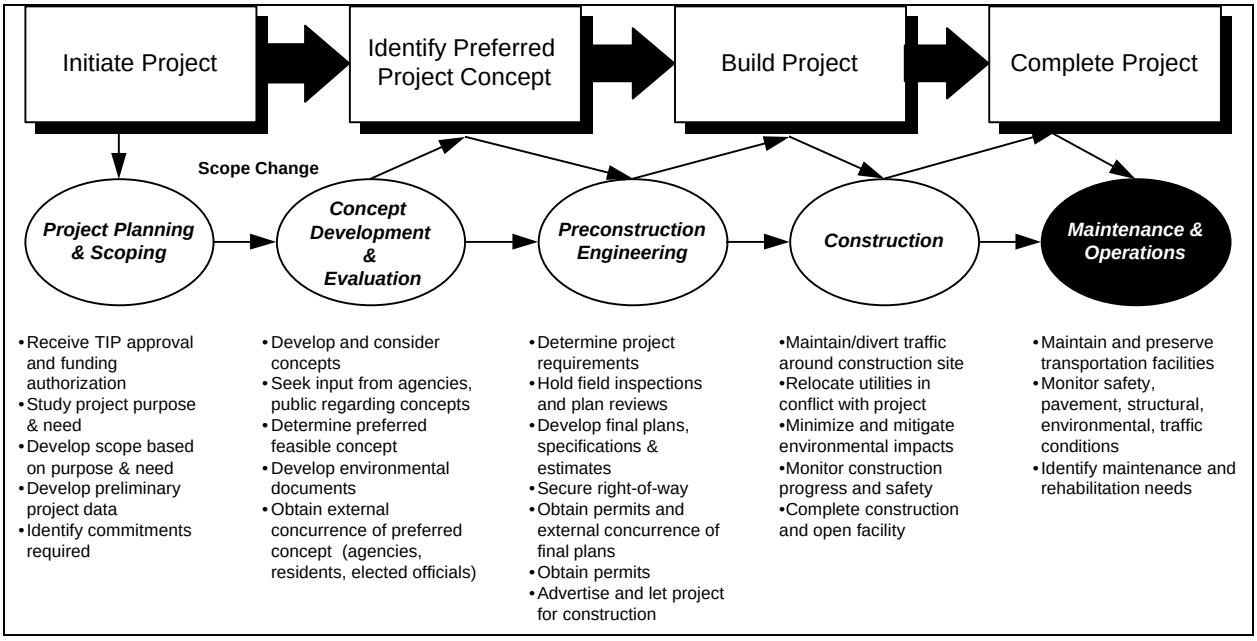
12. OPERATIONS

This section provides an assessment of NCDOT operations functions, which include the oversize/overweight permits office, equipment and inventory control unit, roadside environmental unit, division traffic services unit, and incident management unit.

BACKGROUND

Exhibit 12-1, shown below, highlights the operations phase of the transportation project life cycle.

Exhibit 12-1: Operations Processes within the Transportation Project Life Cycle

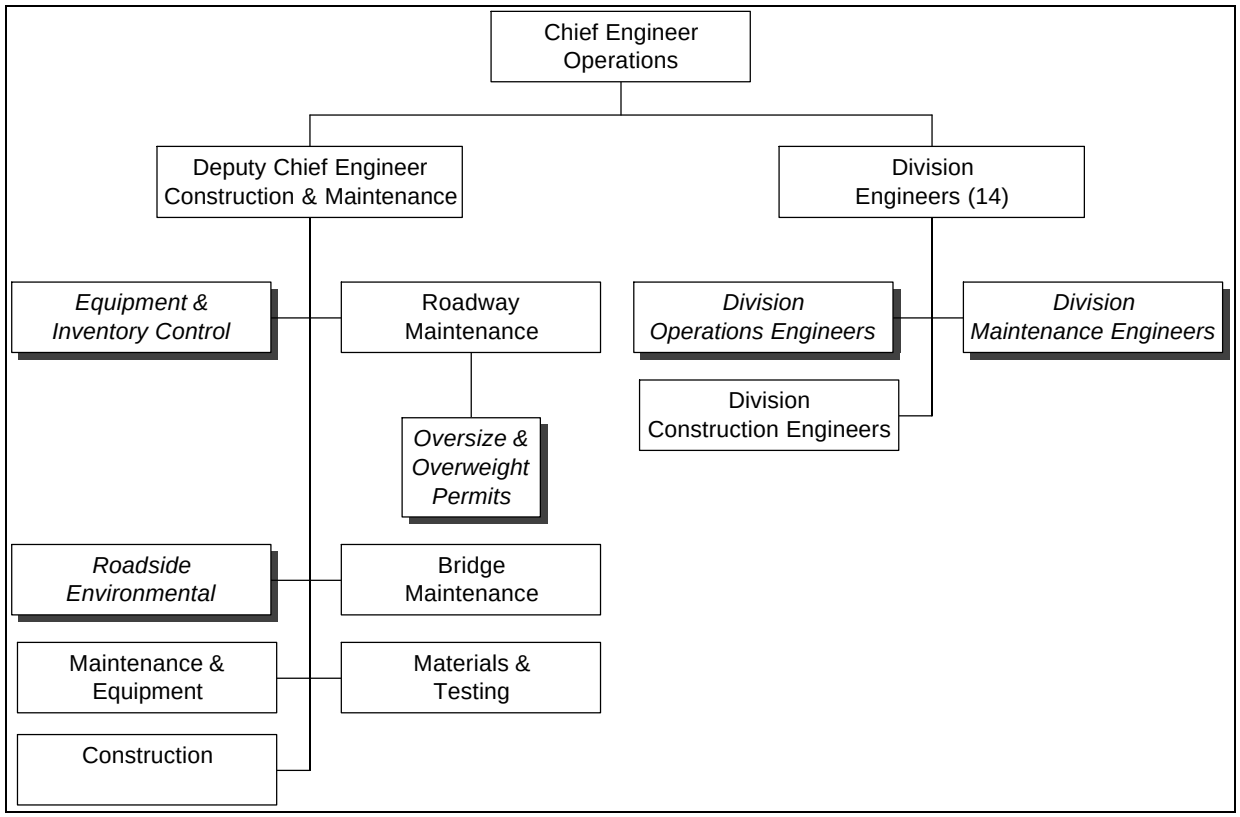


Source: KPMG

The primary responsibility of NCDOT operations staff is to maintain and preserve the State Highway System and ensure the safety of the motoring public. The operations staff is also responsible for monitoring the condition of roadway pavement and structure, complying with environmental regulations, traffic conditions, and identifying maintenance and rehabilitation needs. The Chief Engineer of Operations is responsible for construction, roadway maintenance, bridge maintenance, and operations functions for the Department.

The units under the Chief Engineer with primary responsibility for carrying out operations activities are highlighted in Exhibit 12-2.

Exhibit 12-2: NCDOT Units with Operations Responsibilities



Source: NCDOT organization charts

Equipment and Inventory Control

The equipment and inventory control function includes the following responsibilities:

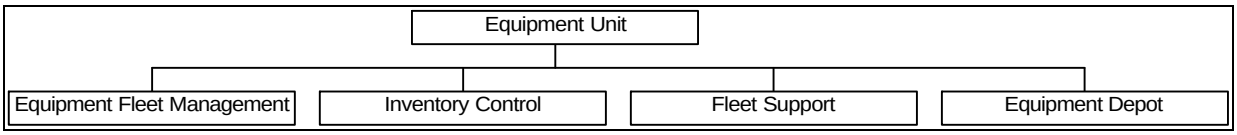
- Manage equipment rental service for the Department and other State agencies
- Manage more than 100 fuel stations throughout the State for the Department and other State agencies (joint function with Divisions)
- Provide equipment maintenance and repair service for more than 23,000 pieces of equipment at more than 100 equipment repair facilities located throughout the State (joint function with Divisions)
- Set appropriate rental rates and manage "equipment enterprise fund"
- Provide training on how to safely operate and maintain heavy equipment
- Maintain two-way radio communication system
- Manage materials inventory and inventory turnover
- Coordinate equipment replacement with Division Engineers and the Bridge Maintenance unit

- Prepare contract specification for equipment procurement and coordinate equipment and material procurement with State purchasing agents

Equipment and Inventory Control Unit. The Equipment and Inventory Control unit, which has a statewide responsibility for maintaining the equipment fleet needed for all of the various Division-based units, is essentially a service unit to all other elements of the Department. The unit is headed by the Unit Director, who reports to the Deputy Chief Engineer of Operations. Functionally, the unit's responsibilities are divided between the Equipment and Inventory Control unit located in Raleigh and the 14 Highway Divisions. The Raleigh-based Equipment and Inventory Control unit is organized into four sub-units: Equipment Fleet Management, Inventory Control, Fleet Support and Equipment Depot.

Exhibit 12-3 provides a high-level organization chart for this unit.

Exhibit 12-3: Equipment and Inventory Control Unit (Central Office)



Source: NCDOT

- ***Equipment Fleet Management.*** This group is primarily responsible for preparing specifications for equipment purchases, performing bid reviews, preparing draft recommendations for contract award, registering equipment with the Division of Motor Vehicles, assigning field equipment complements, establishing flat daily rental rates for various classes of equipment, maintaining a radio communication system, and managing the unit's budget allocation.

- ***Inventory Control.*** This group is responsible for managing the statewide inventory of small tools, parts and other supplies that are required for proper maintenance of State roadways, bridges, equipment and facilities. Additionally, the group is responsible for helping maintain more than 100 fuel stations throughout the State for the Department and other State agencies. The group also reviews and analyzes various areas of inventory stock to determine proper and timely utilization of inventory materials and provides guidance to Division Engineers on how to optimize inventory turnover rates. The group is responsible for managing one central inventory warehouse, located in Raleigh, and for coordinating with Divisions to manage approximately 300 small inventory yards located across the State. It manages approximately $65 million in materials inventory at any given point in time.

- ***Fleet Support.*** This group is charged with maintaining the Equipment Management System, including developing work standards; planning and scheduling practices; providing equipment maintenance training; and preparing management reports.

- ***Equipment Depot.*** The Raleigh-based Equipment Depot is primarily responsible for performing major repairs, including engine overhaul, major modification to equipment, body repairs and rebuilding

transmission and other major components for heavy equipment; mounting of truck bodies on chassis; preparing used equipment for sale; and maintaining records of new and turned-in equipment.

Division Equipment Unit. Among the 14 Highway Divisions, there are more than 100 equipment maintenance/repair shops. All equipment shops are under the supervision of the Division Equipment Superintendent, who reports to the Division Maintenance Engineer or the Division Operations Engineer. Typically, each Highway Division has one large equipment shop, known as the Division Equipment Shop, which performs major overhauls, engine repairs and other types of major repair work for equipment included in the Division complement. In addition to the Division Equipment Shop, each county within the Division has a smaller equipment maintenance shop that performs routine preventive maintenance work and smaller type repairs.

The Equipment and Inventory Control Unit is fully funded from a "revolving fund" generated by equipment rental charged to each Highway Division and the Bridge Maintenance unit, based on cost centers within the Department and funds generated by the sale of used equipment. Prior to the beginning of each fiscal year, the Bridge Maintenance unit and the Highway Divisions submit equipment complements for the upcoming fiscal year. The Equipment unit distributes available equipment based on complements and establishes a daily flat rental rate for each class of equipment. The daily flat rental rate includes direct labor and travel expenses, repair parts, tools, tires, lubricants, deprecations, overhead and all other expenses incurred by the unit.

All Highway Divisions and the Bridge Maintenance unit pay a daily flat rate for equipment rental for each class of rental equipment assigned in their individual equipment complement. If the equipment is down for repair or placed in storage, no rental rate is charged for that duration. At the end of each fiscal year, the equipment unit allocates a portion of the rent revenues (largely equipment depreciation costs) back to the Highway Divisions and the Bridge Maintenance unit, based on equipment complements. If the total amount of rent collected through the standard daily flat rental exceeds or is less than the Equipment unit's budget, an adjustment is made against all work orders within the reporting period.

Oversize/Overweight Permits

North Carolina Administrative Code Subchapter T19A:02D, Section .0600 requires the State Highway Administrator or his designee to issue oversize/overweight permits for qualifying vehicles. Permits may be issued for movements of loads that cannot be reasonably divided, dismantled or disassembled, or so loaded to meet legal requirements.

The NCDOT Permit office, a sub-unit within the Roadway Maintenance unit, is responsible for issuing oversize/overweight permits for the movement of vehicle and vehicle combinations with loads exceeding the legal dimensions and weights established by North Carolina law and in accordance with the referenced Administrative Code. The responsibilities of the Oversize/Overweight Permits unit are to:

- Assist persons, companies or organizations with special transportation needs involving excess size and/or weight
- Issue permits for the safe movement of oversize/overweight vehicles or vehicle combinations on State highways
- Collect permit fees to recover administrative and other impact costs
- Protect the motoring public from traffic hazards created by the movement of oversize/overweight vehicles on the State Highway System
- Protect the Department's investment in the State Highway System

The permit office issues two types of permits: single trip permit and annual (blanket) permits. A single trip permit is issued vehicle specific, not to exceed a width of 15 feet for all movements, unless authorized by the Permit office, at the cost of $10 per permit. An annual permit is issued vehicle specific not to exceed a maximum width of 12 feet, authorizing travel on all highways in North Carolina at the cost of $50 per permit. Presently, the Department is considering several legislative changes to the existing Motor Vehicle Law. The proposed changes include increasing the current permit fees for a single trip permit and an annual permit.

On average, the permit office issues more than 600 permits each working day. A large majority of these permits are issued on the same day of receiving an application. For permits that require a bridge engineering study or other special conditions, the office requires an application to be submitted at least 10 working days prior to date of the anticipated move. Prior to issuing permits, the permit office verifies all routes proposed by motor carriers using the bridge database (for safe load carrying capacity), the pavement database (for roadway width, shoulders, angles, etc.) and construction detour information to ensure that loads can be safely transported. Additionally, the permit office requires all permits to comply with permit conditions, such as State patrol or private escorts requirements, flags, signs, lights, and travel during low volume hours.

In fiscal year 1997, the permit office issued 152,125 single trip permits and 10,906 annual permits, collecting over $2 million in total permit fees. During the first half of fiscal year 1998, the Permit office has issued 75,356 single trip permits and 5,035 annual permits.

Application for obtaining an oversize/overweight permit is accepted at the central Permit Office, located in Raleigh, via mail, telephone, facsimile or in person—and in person at designated Highway Divisions or District Offices. The central permit office provides guidance to the personnel designated to issue permits in the Highway Division and District offices for movement of oversize/overweight vehicles and vehicle combinations. The Permit office accepts cash, check and credit card as a method of payment. To expedite permit issuance, the unit offers its regular customers a "Direct Fax" service. Direct Fax service requires participants to deposit a certain dollar value in an escrow account and authorizes the Permit office to

directly withdraw permit fees and other service cost from the applicant's account. Presently, there are approximately 1,000 participant in the Direct Fax service.

Roadside Environmental

The roadside environmental function includes the following activities:

- Monitor all roadway construction and maintenance projects to ensure compliance with sediment and erosion control provisions
- Prepare the planting and reforestation plans for roadway construction contracts and prepare construction plans and specifications for wetland mitigation
- Develop the site planning, preliminary engineering, and landscape plans for rest areas, welcome centers, visitor centers, overlooks, and ferry terminals
- Coordinate and administer the North Carolina Scenic Byway Program
- Develop the specifications and coordinate the purchase of vegetation materials, special equipment, and pesticides
- Coordinate environmental programs such as endangered species protection, wildlife habitats, composting, and harvesting of North Carolina wildflowers and grasses
- Oversee the Adopt-A-Highway program ,which consists of over 6,000 volunteers
- Maintain North Carolina's Keep America Beautiful Office
- Coordinate the public affairs actions for litter prevention, litter cleanup, and anti-litter programs

Roadside Environmental Unit. The Roadside Environmental unit is responsible for planning, designing, implementing, and maintaining the roadside elements of the State Highway System. The Raleigh-based Roadside Environmental unit is comprised of an administrative staff, soil and water engineering section, design section, rest area section, vegetation management section, field roadside engineers, and an Office of Beautification.

- ***Soil and Water Engineering.*** The soil and water engineering section designs sedimentation and erosion control plans for highway construction and maintenance projects. In addition, this group prepares plans and specifications for wetland mitigation projects.
- ***Design Section.*** The design section's major responsibility is preparing landscape architectural designs for all elements of the roadside environmental program, which includes the site plans for rest areas, welcome centers and visitor centers. The section also coordinates and administers the North Carolina Scenic Byway Program.

- ***Rest Area Section.*** The rest area section's responsibilities include planning, designing, and maintaining the statewide rest area system and associated welcome and visitor centers. Additionally, the section is responsible for preparing proposals for rest area maintenance by private contractors. Presently, there are 62 rest areas including eight welcome center/rest areas, eight visitor center/rest areas, and one visitor center. The group's oversight responsibilities include the environmental and public health issues of wastewater treatment permits and drinking water testing.

- ***Vegetation Management Section.*** The vegetation management section is responsible for developing programs for the establishment and maintenance of all roadside vegetation, including turf grasses and other ground covers for erosion control, ornamental plantings, and control of existing vegetation along highway right-of-way.

- ***Field/Area Engineers.*** The field/area engineers are primarily responsible for providing technical assistance to Division Roadside Environmental Units on sediment and erosion control matters. The field/area engineers also facilitate the implementation and maintenance of the various elements of the roadside environment program.

- ***Office of Beautification.*** This group is primarily responsible for establishing and maintaining effective litter cleanup and litter prevention programs, and increasing public support for the Wildflower Program. The group's goal is to serve the citizens by improving the appearance of North Carolina highways.

Division Roadside Environmental. The Division Roadside Environmental unit is under the supervision of the Division Roadside Environmental Engineer. This unit is primarily responsible for the Turf Management Program, which includes roadside vegetation maintenance and a variety of planting and beautification enhancement projects. The Division Roadside Environmental unit also has an extensive herbicide and pesticide program to control the growth of noxious plants and weeds.

Division Traffic Services

Each of the Department's 14 Highway Divisions staff a Traffic Services unit to address Division-wide traffic engineering and maintenance needs. The Division Traffic Engineer manages this unit under the direction of the Division Operations Engineer. The unit receives engineering assistance from Traffic Field Operations, Investigations and Support Unit (also known as the Area Traffic Engineering Offices) in the Traffic Engineering and Safety Systems branch of the Division of Highways. The Traffic Services unit is primarily responsible for the installation and maintenance of all pavement markings, signs, traffic signals, warning flashers, sign lighting and roadway lighting within the Division.

The primary responsibilities of the Traffic Services units are to:

- Conduct traffic engineering warrant studies for proposed signs, signals and pavement markings, and review speed zone changes
- Review plans for proposed new or altered access to residential, commercial, industrial or institutional facilities
- Review engineering plans and specifications for traffic control, signing, signals, lighting and pavement markings for various highway improvements
- Meet with citizens, businesses, public officials and other NCDOT staff to discuss, evaluate, recommend or communicate decisions concerning regional and/or statewide traffic engineering issues

Incident Management

The Incident Management Program in the NCDOT resulted from the impacts of eight-hour closure of northbound Interstate 77 in Charlotte in 1991 due to a materials spill incident. This event resulted in the examination of the effects associated with incidents and subsequently, the development of a Mecklenburg County Incident Management Plan. The Department, using the Mecklenburg plan as a basis, has since made incident management a statewide initiative.

Highway Divisions and counties, in cooperation with the Raleigh-based Construction unit, develop and implement geographic incident management plans. These plans and their utilization facilitate proactive responses to reduce the effects of roadway incidents. Currently, incident management plans are instituted in 44 counties across all 14 Highway Divisions. The Department has implemented, or is in the process of implementing, components of intelligent highway systems in three divisions to further enhance incident and congestion management capabilities. A $13 million traffic operations center is scheduled to be opened in Highway Division 10 by the end of the current fiscal year.

The following are five basic tasks that make up the foundation of incident management:

- Incident detection and verification - bringing the incident to the attention of the proper agencies and the determination of the precise location and nature of the incident, to include the communication of necessary information to appropriate agencies
- Incident Response - activation of appropriate personnel, equipment, and resources
- Incident Site Management - effective and efficient coordination of incident response at the scene
- Incident Clearance - safe and efficient removal of wreckage, debris, spilled material from travel lanes and shoulders
- Motorist Information - use of procedures and devices to provide information to motorists about traffic conditions

STRENGTHS

- **North Carolina's oversize/overweight permit program is comprehensive.** Routes proposed by motor carriers are checked against multiple sources of information to ensure that loads can be safely transported on the State Highway System.

- **The Equipment Enterprise Fund has enabled the Department to upgrade its equipment fleet while maintaining lower equipment rental rates.** Under the equipment enterprise fund system, the Department has been able to replace equipment at a much faster rate.

- **The Roadside Environmental Unit is well known for its innovative methods and approaches.** The Roadside Environmental Unit has received two awards of excellence from the U.S. Environmental Protection Agency (USEPA) for environmental enhancement projects.

- **In spite of a large roadway construction and maintenance program, the Department has successfully complied with sediment and erosion control requirements.** The Department has not had any Notices of Violation for sedimentation and erosion control from the Department of Environment and Natural Resources (DENR) during the past 15 months (November 1996 to March 1998).

- **The Incident Management Program has been very effective.** Since the implementation of the Incident Management Program, there have been reductions in accident duration, disabled vehicle duration, parked vehicle accidents, and accident rates in various counties.

FINDINGS & RECOMMENDATIONS

Finding: The Department does not have an effective inventory of installed traffic control devices.

The Department does not have a reliable method of recording some of the following parameters for the thousands of signs, signals and miles of pavement markings and highway lighting it maintains:

- Description of traffic control device, including age, make, operating characteristics, etc.
- Location
- Date of installation
- Date of last scheduled maintenance/repair
- Labor and material/equipment expense for installation, maintenance and repair

The Department can only estimate how many signalized intersections, signal heads, overhead signs, roadway mounted signs, pavement markings or lighting fixtures it maintains on this system. Without accurate information, NCDOT cannot efficiently and effectively schedule routine preventive maintenance for installed traffic devices, or forecast and prepare accurate budgets for meeting long-range traffic systems capital improvement needs. It also makes it difficult to prepare legal evidence in response to highway safety-related lawsuits brought against the State.

Recommendation:	**Develop an inventory and management system to monitor and maintain traffic control devices.**

The Department should develop a comprehensive, automated statewide traffic control device inventory and management system to monitor and maintain NCDOT's traffic control devices, pavement markings and highway lighting. This system should provide inventory, analysis and reporting capabilities.

Finding: Traffic signal systems and pavement markings are becoming more complex.

The design features of traffic control devices are becoming more sophisticated and the installation of traffic control systems—including pavement markings—is becoming more complex. Department sources indicate that both Department and contractor staff are challenged to keep up with the progress being made in traffic control device technologies. Many Department construction staff have not been trained in how to inspect or certify the installation of state-of-the-art traffic control equipment.

Recommendation:	**Establish stringent certification requirements for installing and repairing NCDOT's traffic control devices.**

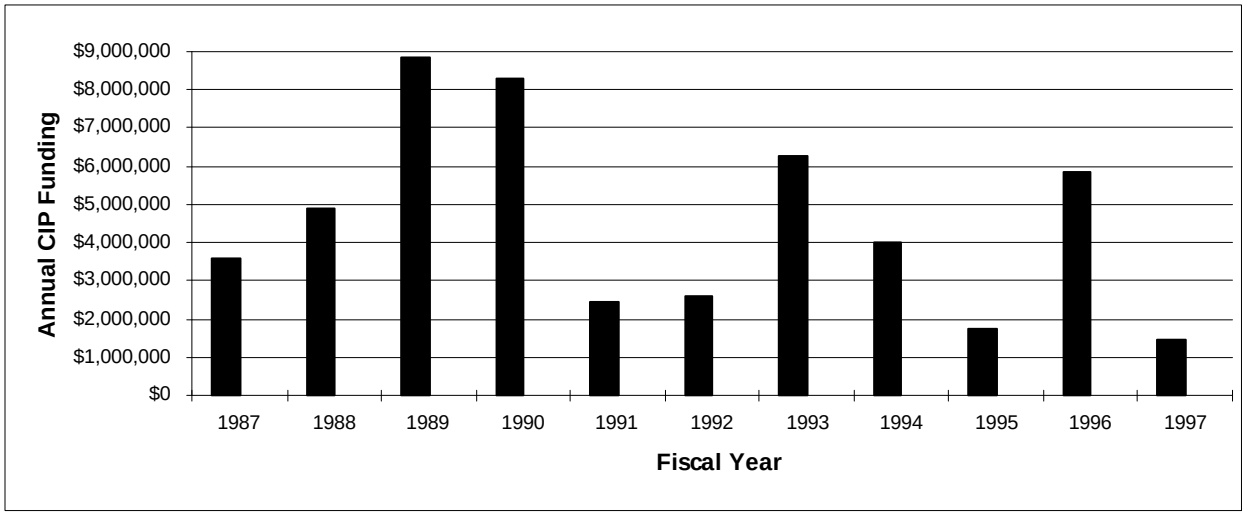
NCDOT should require that all traffic signal and pavement marking contract work be performed by technicians certified by the International Municipal Signal Association (IMSA) or other similar certifying organizations. The Department should also consider a requirement that its own construction inspectors -- whether provided in-house or by consultants -- maintain current and applicable certification by IMSA or other similar certifying organizations. These requirements should be phased in over a period of several years to allow contractors, consultants and NCDOT's own inspection personnel sufficient time to obtain necessary certifications.

Finding: Funding for the Division of Highway's buildings and facilities is inadequate.

Each fiscal year, the Division of Highways receives funding for the Capital Improvement Program (CIP), which is used for maintaining the Division of Highway's buildings and facilities. The Division of Highways estimates that approximately $12 million in CIP funding is needed annually to properly maintain buildings and facilities.

Exhibit 12-4 provides annual CIP funding for the Division of Highways for the period between fiscal years 1987 and 1997.

Exhibit 12-4: Capital Improvement Program Funding for Division of Highways



Source: NCDOT Division of Highways

The average CIP funding between fiscal years 1987 and 1997 has been approximately $4.5 million--significantly less than the $12 million in annual funding needs identified by the Division of Highways. Also, as shown above, for the past several years CIP funding has varied substantially from year to year. Department staff have indicated that NCDOT buildings, equipment shops, and materials inventory yards are deteriorating due to lack of adequate funding.

Recommendation:	**Request adequate funding for the Capital Improvement Program.**

Through the State's budget process, the Department should seek to provide adequate funding level for its CIP needs.

Finding: Procurement of specialty equipment takes too long.

At the end of each fiscal year, the Equipment unit allocates a portion of the rent revenues back to Highway Divisions and the Bridge Maintenance Unit based on their equipment complements. Highway Divisions and the Bridge Maintenance Unit use this allocation to buy a new or replace existing equipment. Once a decision is made on which equipment to replace, the Equipment Unit based in Raleigh prepares a contract for equipment procurement. Upon review of bids, contract is awarded to the lowest responsible bidder. Generally, the selected vendor requires lead time to furnish specialty equipment. There is often a lag of several months between the time equipment is ordered and the time it is delivered.

Recommendation:	**The planning for equipment procurement process should start early.**

The Equipment unit maintains a computer database, which includes information, including when particular equipment was placed in service, as well as its current book value, remaining life cycle, and annual

maintenance expenditures. Considering this information, the Equipment unit can identify, in advance, which equipment meets criteria for replacement.

The Equipment unit should identify which equipment qualifies for replacement during the next fiscal year and share this information, in advance, with Highway Divisions and the Bridge Maintenance unit. This approach could provide advance notice to the Equipment unit for equipment that could be replaced within next several months, and as a result, could save some time.

Finding: The current process for issuing oversize/overweight permits involves manual verification of the proposed routes.

The Oversize/Overweight Permit Office issues more than 600 permits each working day. A key element of issuing permits is verifying all routes proposed by motor carriers, using the information provided by the bridge database, the pavement database and construction detours to ensure that loads can be safely transported. Presently, the permitting staff rely on physical drawings and maps to verify whether or not vehicle or vehicle combinations, with loads exceeding the legal dimensions and weights established by North Carolina law, can be safely transported on the State Highway System. Information such as vertical clearance, horizontal clearance, safe load carrying capacity, construction detours is manually updated by the permitting staff on a routine basis.

Recommendation:	**The Oversize/Overweight Permit Office should evaluate an automated permit system implementation.**

Several state transportation agencies have implemented automated permit routing analysis systems to reliably and consistently process hauling permits that provide for the safe movement of oversize and overweight vehicle or vehicle combinations on the state's highways and bridges.

The Department should evaluate implementing a system to automate the process of issuing oversize/overweight permits. The automated permit system should be designed to let motor carriers and permit vendors connect to the system and electronically submit permit applications, check on their status, and validate an application's route against the NCDOT roadway and bridge information to ensure that proper tolerances and safety requirements are met for oversize and overweight vehicles.

Finding: A large majority of permits issued are manually faxed to applicants.

As mentioned earlier, the Permit Office issues more than 600 permits a day. A large majority of permit applicants want their permits to be faxed once issued. The current permit system is based on a mainframe computer and does not have the capability to fax a permit directly from the computer terminal. As a result, permits are faxed manually using several fax machines.

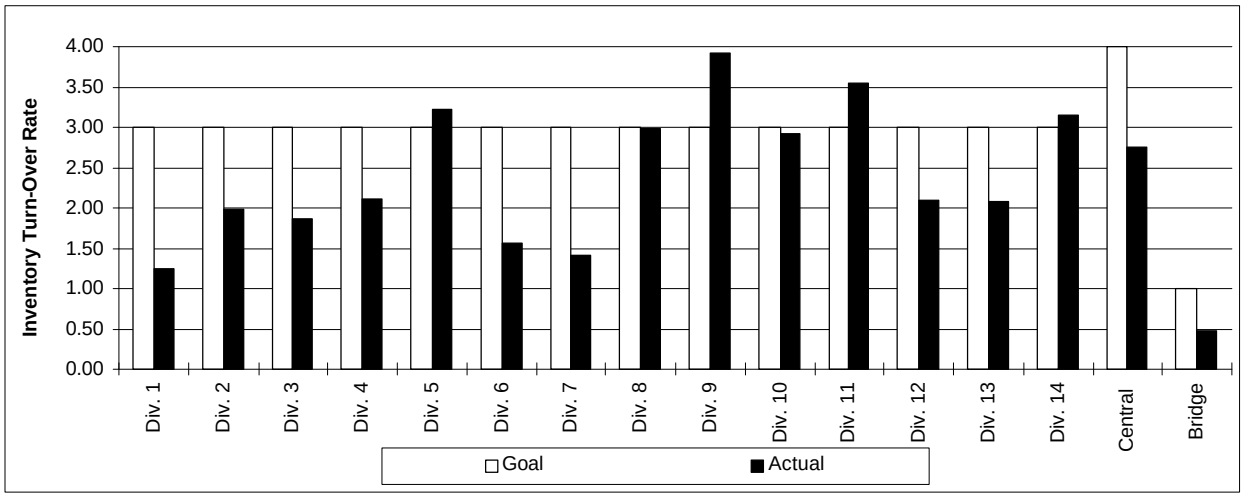
Recommendation:	**The current permit system should be upgraded to provide a direct fax capability.**

The Permit Office should work with the Department's Management Information Systems and Engineering Automation staff to modify the current permit system to provide a direct fax capability. Having the capability of faxing permits directly from a computer terminal will significantly enhance the Permit Office's ability to serve its customers and reduce costs.

Finding: The present inventory turnover rate does not meet the Department's goal.

The Department has established goals for inventory turnover in its efforts to reduce the current inventory level. Exhibit 12-5 graphically presents the Department's goal and the actual average inventory turnover rate for Highway Divisions, the central inventory yard, and the Bridge Maintenance unit for the 12-month period ending January 1, 1998.

Exhibit 12-5: Inventory Turnover Rate



Source: NCDOT Equipment & Inventory Control

As indicated above, Divisions 5, 8, 9, 11, and 14 either meet or exceed the Department's goal for inventory turnover. The remaining Divisions, the central inventory yard, and the Bridge Maintenance Unit do not meet the Department's goal.

Recommendation:	**Continue efforts to meet inventory turnover goals.**

The Equipment Unit monitors the inventory turnover rate on a monthly basis for all Divisions, the central inventory yard, and the Bridge Maintenance unit. The Equipment unit provides a monthly inventory turnover report to Division Engineers, Bridge Maintenance Engineer and the Inventory Control Manager. The Department should hold Divisions and the Bridge Maintenance unit responsible for meeting their goal for inventory turnover.

13. PERSONNEL

This section reviews and evaluates the personnel functions of NCDOT and the effectiveness of current personnel policies and procedures.

BACKGROUND

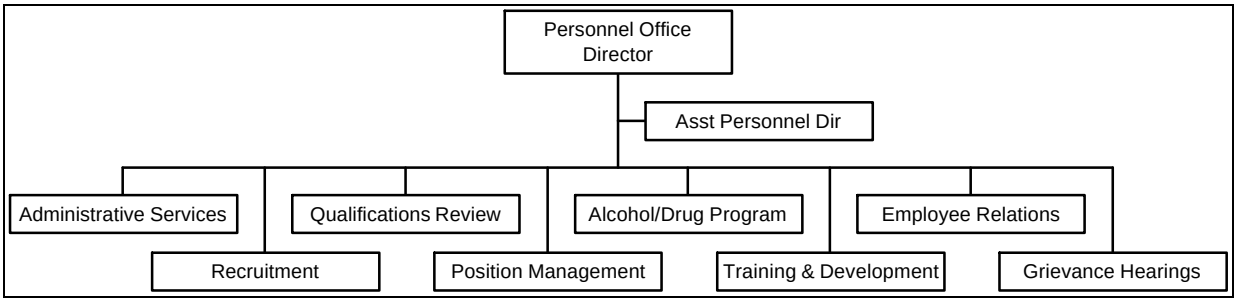
The Department of Transportation's Personnel Office shares responsibility with the Office of State Personnel (OSP) in the administration of personnel functions within NCDOT. Responsibilities are shared as follows:

- The DOT Personnel Office provides input into the development of policies, requests exceptions to statewide policies as needed, and provides information to OSP regarding personnel actions.
- OSP provides broad training to state employees, while the DOT Personnel Office provides specialized training to the Department's employees.
- OSP provides overall advice and technical assistance on various human resources matters and monitors various programs, while DOT Personnel Office has primary responsibility in most human resource areas, including the administration of policies and rules that are not in violation of laws.
- The DOT Personnel Office will input data on personnel transactions, while OSP provides system development, maintenance and requested reports.
- OSP delegates position management authority to DOT Personnel Office, including salary administration authority for over 13,000 employees and 96 percent of the approximately 532 classes within the DOT classification structure.

Personnel Office Organization

As of March 1998, the Personnel Office had 66 positions. This level of staffing has been consistent over the past several years. The organizational structure of the Personnel Office is organized as shown in Exhibit 13-1.

Exhibit 13-1: NCDOT Personnel Office Organizational Structure



Source: NCDOT

Administrative Services Section. This section is responsible for various duties such as maintaining personnel files for DOT employees; processing forms related to hiring, promotion, and separation; and for providing interpretations of personnel policies to managers and supervisors. This section also administers the Volunteer Shared Leave Program, distributes revisions of policies approved by the State Personnel Commission, ensures that selection procedures are followed according to policy, and verifies payroll changes due to personnel actions. This section makes limited use of scanning and electronic transmission of documents. The Administrative Services and Position Management sections work closely together, sharing documentation with the Qualifications Review section.

Recruitment Section. Responsibilities of the section include functions related to the recruitment of candidates for positions within DOT, such as administering the Transportation Engineering Associate (TEA) Program, recruiting and assigning civil engineering students to fill temporary summer positions (Engineering Assistants Program), attempting to generate interest in civil engineering curriculum by reaching students in grades K-12 (Civil Engineering Awareness Program), coordinating with the Office of State Personnel on the Model Cooperative Education Program, and coordinating the Employee Suggestion Program. Service is primarily to internal (DOT) customers including the division field units and pre-construction offices in Raleigh.

Qualifications Review Section. This is a recently created section designed in response to the merit-based hiring policy established by an amendment of Chapter 126 of the General Statutes. Some functions assigned to this section (handling vacancy postings, retirement and benefits) had previously been assigned to Selection and Recruitment section and Employee Relations section. Responsibilities include processing and disseminating approved vacancy postings; interpreting and administering the merit-based hiring program for managers and supervisors; reviewing all applications and establishing the level of qualification (not qualified, qualified, highly qualified); providing employees with information regarding retirement planning; and coordinating the reduction in force policy.

Position Management Section. Primary responsibilities of this section include administering the classification system for DOT, processing classification actions, conducting classification studies for units and individual positions, updating classification specifications and organization charts, assisting managers and supervisors regarding position management, and monitoring the Skill-Based Pay Program.

Alcohol/Drug Program Section. This section is composed of three employees who are directed by a Personnel Analyst III position. Duties include administering the Drug Free Workplace policy and coordinating alcohol and drug testing for employees with commercial drivers licenses. Over 200 employees are referred to the Employee Assistance Program each fiscal year. This section had previously been located in the Employee Relations section.

Training and Development Section. This section is responsible for providing curriculum design for various courses, workshops and seminars; conducting in-house training for DOT employees; and monitoring the Performance Management system. In addition, this unit is responsible for instituting a formal career development counseling program, implementing a monthly assessment center for management

skills for engineers, providing educational materials to employees, generating a semi-annual inventory of human resource development needs, and developing modules for the Skill-Based Pay program.

Employee Relations Section. This section's current responsibilities include ensuring that appropriate affirmative action practices are followed, providing problem resolution through counseling and policy interpretations, providing referrals to Employee Assistance Program personnel where appropriate, coordinating and responding to employee charges filed with the Equal Employment Opportunity Commission, and administering the Violence in the Workplace Policy. This section formerly provided retirement and benefits assistance to employees.

Grievance Hearings Section. This section's primary responsibilities include ensuring a fair and impartial hearings process for employee grievances, and scheduling internal grievances, appeals, and performance management hearings. Hearings are conducted before a departmental employee relations committee.

Merit-Based Hiring Program

Executive Order Number 113, signed June 12, 1997 by Governor Hunt, established the basis for a merit-based hiring process. The intent of the executive order was to create a system that would result in the hiring of the most qualified people into state government. The order required agencies to submit a plan for implementation that would include procedures in the areas of recruitment, evaluation of applications, and selection based on merit. Successful applicants, according to the executive order, must be selected from the pool of most highly qualified applicants. The executive order therefore required the agencies, in the evaluation and categorization of applications, to identify the most qualified applicants and to send only that pool to the selection supervisor or manager for consideration. The selection supervisor or manager is not to participate in the determination of the pool of most highly qualified applicants, and all state and federal laws and rules must be observed.

Senate Bill 886 was enacted September 9, 1997, as a follow-up to the executive order to provide for the open, fair and nonpolitical selection of the most qualified persons for state government employment. The law requires that agencies select from the pool of the most qualified persons, based upon job-related qualifications using fair and valid selection criteria. This is to be done without regard to political affiliation or political influence. In the law, the most qualified persons are defined as those who: 1) have applied in a timely fashion; 2) have met the essential (or minimum) qualifications for the position; and 3) are determined to be substantially more qualified than other applicants for the position.

To implement Senate Bill 886, each agency was required to establish a plan to ensure that the law is properly followed. NCDOT's plan, approved by the State Personnel Commission effective October 15, 1997, is consistent with the plans established by other agencies. The responsibility for reviewing applications is given to the Qualifications Review Section and EEO staff. Implementation includes the following major procedures:

- The hiring manager works with the Personnel Office staff to identify any additional job qualifications that may be necessary beyond those identified by the Office of State Personnel.

- Position management is consulted regarding minimum qualifications.

- Vacancies are posted.

- Applications are received and reviewed for their status—not qualified, qualified, or highly qualified—by the Qualifications Review section. (Applicants for the Transportation Worker classification are separated only by "not qualified" or "qualified".) The distinction between qualified and highly qualified has been determined to be one years' additional experience beyond the minimum qualifications for the position. This is done to ensure the broadest pool of qualified applicants is made available to the hiring managers.

  During the first six months of experience, 5,964 applicants were categorized in the categories of highly qualified, qualified, and not qualified; 59 percent rated as highly qualified and 14 percent rated as qualified. The remaining applicants were not qualified.

- A "package" is sent to the hiring manager which includes all applications (including the information regarding ethnicity and sex), along with a cover memo indicating applicants' names, race, sex, qualification status, and whether any additional considerations exist such as promotional priority or veterans preference.

- The hiring managers interview applicants and make a selection. If the candidate is not within the highly qualified group, then a supporting letter of explanation must be provided.

- The package is returned to the Personnel Office for salary administration review and to ensure that merit-based hiring procedures are followed.

- The package is provided to Employee Relations to record equal employment data.

- The DOT Personnel Director reviews the selection and must provide approval.

STRENGTHS

NCDOT's personnel policies and practices are generally consistent with state personnel policies. Our review of policies and practices, both written and practiced, does not indicate any substantive variance with the intent of the policies established at the state level. The Office of State Personnel, in its effort to delegate authority for the position management and salary administration functions, appears to be working appropriately with NCDOT.

The Department's Skill-Based Pay Program provides an effective method for rewarding additional skills developed by department employees. The program is well-conceived and provides specific amounts of compensation based upon specific skills and knowledge obtained while on the job. Employees

recognize that in order to receive additional compensation under the program, specific certifications, courses, or training must be completed. Skills-based pay is particularly effective for certain positions, such as those in the field, where it is important that skills are current. This type of program enables the Department to develop and recognize those skills needed to advance the objectives of NCDOT.

The Department's training activities are diverse and highly regarded. A variety of courses, workshops and seminars are conducted in-house for DOT employees. In addition, there is a formal career development counseling program and a monthly assessment center for management skills for engineers. The Department's most innovative programs have emerged from the training section, which is staffed principally by professionals with master's degrees and college degrees. The most recent employee survey indicates strong support for the training being done within the Department.

The development of specific recruitment programs is a positive recruitment strategy. Specific programs for recruitment have been developed in recent years to reflect the special needs of the Department. The Transportation Engineering Associate (TEA) Program, the Engineering Assistants Program, and the Civil Engineering Awareness Program are examples of specific strategies designed to attract engineers to careers in the Department.

FINDINGS AND RECOMMENDATIONS

Finding: The current performance appraisal system is not effective.

NCDOT uses the State-mandated performance management system. Based on interviews and surveys conducted for this audit, this performance appraisal system is not highly regarded internally by NCDOT managers and supervisors. The lack of salary increases and other incentives tied to the performance appraisal process have been cited as leading reasons for the system's lack of effectiveness. Many Department managers have indicated that there is no ability to distinguish between levels of performance of incumbents through the evaluation system. Results related to performance evaluation from the 1996-97 Annual State Employee Survey, as shown in Exhibit 13-4, support the conclusions developed during this performance review.

Exhibit 13-4: Selected Results from the 1996-97 Annual State Employee Survey

Statement	Favorable Responses (%)	
	NCDOT	Statewide
The performance rating system used by my agency/university is satisfactory	42%	47%
I am satisfied with the way my pay is related to my job performance	12%	16%
Hard work is rewarded by my agency/university	17%	17%
Employees are promoted based on qualifications	21%	26%
The In-Range Salary Adjustment Policy provides an effective way to recognize the value of my work	14%	17%

Source: 1996-97 Annual State Employee Survey

Recommendation:	**Consider ways to increase the effectiveness and credibility of the performance appraisal system.**

The Department is limited in its ability to improve the effectiveness and credibility of its performance management system. The Department should request the Office of State Personnel to help it develop strategies to improve the performance appraisal system.

Finding: The Department is being increasingly challenged to retain engineering and technical staff.

Department managers and staff interviewed for this study believe it is becoming increasingly difficult to retain engineering and technical staff. For example, in the Division of Highways, numerous managers cited that engineers with five years of experience tend to leave the Department as soon as they become registered (i.e., receive a Professional Engineer designation). The availability of higher paying jobs in the private sector is cited as a leading reason that engineers leave the Department. The last salary study for engineering positions was done in 1991.

Recommendation:	**Increase efforts to retain engineering and technical staff.**

The Department must continue to respond to the challenge of retaining highly qualified engineers after they have successfully completed several years on the job. The Department should build on its current recruiting efforts to more aggressively analyze and address the challenges associated with retaining key engineering and technical staff. This should be done by working with the Office of State Personnel to conduct more frequent salary surveys and developing more attractive mid-career opportunities for engineers and engineering technicians.

Finding: The current approach for providing hiring managers with information regarding applicant ethnicity is excessive and inappropriate.

The information provided to hiring managers exceeds that which is necessary—and is in conflict with the intent of Executive Order 113 and traditional personnel management practices. Currently, the Personnel Office, through the Qualifications Review section, provides the entire "package" of applicants to hiring managers. This includes all of the applications (at all levels of qualification) and a forwarding memo that indicates ethnicity, sex, level of qualification, and any priority status that has been given, such as promotional or veterans status. This practice of providing all applications is not consistent with the Executive Order 113 (Section 3, b, (2)), which provides that only the most qualified applicants are to be forwarded to the hiring managers. The Department has explained that this is done so that the application package does not need to be reassembled after the hiring manager makes a selection, due to the time and effort required.

In addition, the Personnel Office forwards the tear-off portion of the applications, which includes equal opportunity information. The tear-off sheet indicates in bold letters that "to be considered for state employment, you must answer all questions and complete all sections of this application form." The form further states that the EEO information will in no way affect the person as an applicant, and that its sole use is to see how well recruitment efforts are succeeding in reaching all segments of the population. If this is true, then there is no need to include the EEO tear-off sheet with the information provided to hiring managers. Furthermore, this practice is inconsistent with intended EEO reporting policies and is irregular compared to the practices of other state and federal agencies.

Recommendation:	**Discontinue providing information regarding applicant ethnicity to hiring managers.**

Any forwarding memo to hiring managers should not include the EEO tear-off portion of the application, or any information regarding race, sex, or ethnicity. The internal objection to this approach is the issue of keeping the packages together. That argument is insufficient relative to the issue of being responsive to the intent of the executive order as well as potential exposure to challenges to the Department's hiring practices.

Finding: The Personnel Office is excessively involved in the process for routine reorganization of Departmental units.

The Position Management section of the Personnel Office is responsible for conducting job analysis and classification reviews, as well as ensuring that descriptions of jobs are accurate and current. The Position Management section is also charged with reviewing classifications for possible change during internal unit reorganizations. Managers submit reorganization plans and this section reviews them for appropriateness and proper fit within the classification structure; approval is necessary to move forward with organization adjustments.

Recommendation:	**Refocus the Position Management section on updating the Department's position classifications and descriptions.**

The Position Management section should not be involved in the approval of internal reorganizations. Instead, this section should focus on ensuring that position classifications and descriptions are up-to-date and relevant. When an internal reorganization is proposed, Position Management should assist with evaluation of the levels of positions that would be required for the reorganized unit(s). Personnel would remain responsible for identifying the nature of the work and the essential functions of the positions.

Sources in the Department estimate that approximately one-half of the position descriptions are not current and accurate. These descriptions of work—including essential tasks, education and experience requirements, and knowledge, skills, and abilities—are important to assuring an effective human resource

management system. It is also critical that the Department has documentation that is consistent with the demands of the Americans with Disabilities Act.

Finding: The Personnel Office has two vacant positions that could be eliminated.

The Assistant Personnel Director position has been vacant since October 1997. The Chief - Internal EEO position has also been vacant for several months. The current Personnel Director position functions effectively without an Assistant. The Employee Relations Manager position has been effectively taking on the duties previously assigned to the Chief - Internal EEO. In both cases, if either vacant position were filled, it would create a one-on-one reporting relationship in the respective areas of responsibility. This span of control is not consistent with traditional management principles.

Recommendation:	**Consider eliminating or reallocating the two vacant positions in the Personnel Office.**

The responsibilities defined for both of these positions, Assistant Personnel Director and Chief - Internal EEO, can continue to be carried out effectively by other staff, as is the case currently. If these positions were eliminated, the Department could reduce its overall staffing complement or allocate these positions to Department units with more critical staffing needs.

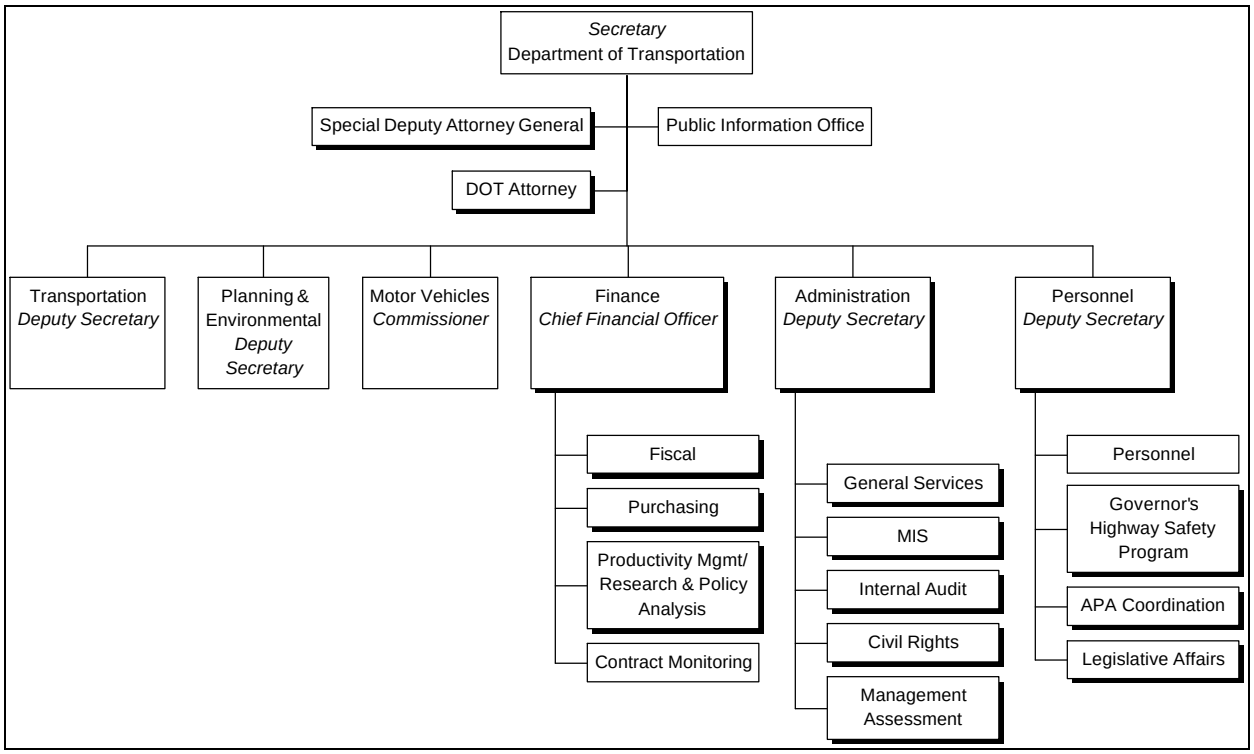
14. FINANCE AND ADMINISTRATION

Finance and administration are critical support functions that help the Department carry out its responsibilities to the traveling public.

BACKGROUND

Finance and administration units report to the Secretary, the Deputy Secretary for Administration, the Deputy Secretary for Personnel, and the Chief Financial Officer, as shown in Exhibit 14-1.

Exhibit 14-1: Finance and Administration Organizational Units and Positions[16]



Source: NCDOT

These functions include:

- Fiscal
- Purchasing
- Productivity Management
- Research and Policy Analysis
- Governor's Highway Safety Program
- Administrative Procedures Act Coordinator
- General Services
- Management Information Systems
- Internal Audit
- Civil Rights
- Management Assessment
- Special Deputy Attorney General

[16] The Public Information Office is addressed under the Public Input section of this report. The Personnel Office is addressed under the Personnel section of this report. The Contract Monitoring unit is addressed under the Construction section of this report.

- Legislative Affairs
- DOT Attorney

Fiscal. The Fiscal section, with 136 positions, is responsible for budget planning and control, collecting and recording revenues, paying the Department's financial obligations and recording these expenditures, and producing financial reports for internal and external customers. Accounting systems include both a traditional general ledger system as well as a highly detailed work order system for recording project budgets and expenditures. Approximately 20,000 work orders are open at any one time.

Under the new organizational structure, Fiscal reports to the Chief Financial Officer. The branches within the Fiscal section and their functions are summarized below:

- Third Party Payments processes payments for construction, consulting, utility and railroad contracts; administers the Workers' Compensation program payments for medical services and lost work time; and processes payments for purchasing invoices, utility bills, employee travel advances and expense reimbursements, vehicle rentals, and other miscellaneous commercial payment obligations.

- Funds Management has a Federal Funds Management unit that processes billings to the FHWA for expenditures on federal-aid projects. The Work Order unit establishes work orders, accounts for subsequent expenditures and projects future cash flows. The Budget unit develops the continuation budget and monitors expenditures against allocations.

- Accounting Operation/Reporting includes: General Accounting, which produces all department financial reports; Payroll; Accounts Receivable, which collects payments from cities and other state agencies; Insurance, which collects the employee portion of insurance benefits premiums; and Division of Motor Vehicles Revenue Reporting. The branch also has two compensation consultants.

- Accounting Systems maintains the Department's chart of accounts, function codes and object codes for the automated fiscal system and serves as the liaison with Management Information Systems.

- External Audit audits consultant contracts to assure that the hours, hourly rates and overhead rates charged are appropriate. They also audit railroad and utilities charges for work performed by these organizations on NCDOT projects and monitors compliance with the Single Audit Act.

- Within the Fiscal Section's Controller's Office, there are two positions responsible for developing the biennial plan and the performance/program budget for the state transportation program, preparing expansion and supplemental budget requests, analyzing revenue estimates versus actual receipts, and reviewing and approving all requests for budget adjustments. (The biennial continuation budget is developed by the Budget unit in the Funds Management branch.)

Purchasing. Purchasing is responsible for procuring goods and services for the Department. The four units within the section are Purchasing which procures goods and services; Order, which inputs and

converts requisitions to purchase orders; Invoice Approval which audits, verifies and approves invoices for payment; and the Mail Room, which receives, distributes and forwards documents.

Purchasing processes 56,000 purchase orders per year, for $455 million in goods and services. Most procurements are made against statewide contracts or are processed in accordance with competitive bidding guidelines. These guidelines specify whether price quotations or formal bids are required, based on the amount of the purchase. For example, requests exceeding $10,000 require preparation of formal bid packages that are forwarded to the Division of Purchase and Contract in the Department of Administration for approval and processing. Exceptions include highway repairs and construction procurements of less than $500,000, which are processed by NCDOT. Divisions are authorized to purchase goods or services up to $100,000 if the procurement is against a statewide contract. For procurements over $100,000, the Purchasing Section is responsible for processing. If the dollar amount is over $500,000 the procurement must be approved by the Board of Transportation. Exceptions to the competitive bidding guidelines are also made for emergency and small, imprest cash purchases.

Productivity Management. This internal consulting group performs studies and projects for any unit in the Department. It is also responsible for assuring Department compliance with the Americans with Disabilities Act.

Research and Policy Analysis. This is a small unit of three professionals and one support staff person, which provides market research assistance to organizational units throughout the Department. The purpose of this research is to help units determine what customers think about their work and the services they provide. This unit was also the focal point for initiation of a Department-wide customer service planning effort during the last half of 1997.

General Services. The General Services Division consists of three sections with a total of 114 positions. The Facilities Design, Construction and Maintenance section is responsible for planning and implementing the facilities capital improvement program and for maintaining NCDOT facilities. Most construction and maintenance is performed by private firms under contract, but the section does have a small maintenance staff for facilities in the Raleigh area. The Leases, Property Acquisitions and Fixed Asset (Property Management) Division maintains an inventory of the Department's 2,900 buildings and is responsible for property leases, sales, acquisitions and allocations. The Support Services Division includes mail, stockroom, and reproduction operations at the Highway Building, Century Center, and Motor Vehicle facilities.

Management Information Systems. The Management Information Systems (MIS) unit, which provides information technology needs to the NCDOT, reports to the Deputy Secretary of General Administration. MIS is divided into four major groups—Division of Motor Vehicle Systems, Department of Highway Systems, Multimodal Systems, and Client Services—and four more specialized groups to serve the needs of the entire department (Database Systems, New Technology Engineering, Network Support, and Imaging Systems). These groups are supported by an administrative support section. All groups within MIS have a direct reporting relationship with the Director of MIS.

Internal Audit. The Internal Audit section is responsible for conducting a wide variety of audits throughout NCDOT. These include audits of federal aid projects conducted for the Federal Highway Administration, payroll processing, project cost records, construction and non-construction contracts, and project funds management. Internal Audit also conducts financial audits or reviews of budgets, payroll, travel, fixed assets (including inventories), imprest accounts, and utility accounts. These reviews are conducted on two-year cycles, to the extent possible. In addition, the unit conducts special, limited-scope studies and financial and/or compliance audits, as requested.

Civil Rights and Business Development. This unit's Compliance staff is responsible for ensuring that contractors and subcontractors on Federal-aid projects comply with all EEO provisions in their contracts and for certifying Disadvantaged Business Enterprises (DBEs). The on-the-job training coordinator and assistant monitor training programs approved for Federal-aid construction projects. The Title VI officer conducts compliance reviews for Federal-aid projects as well as eight major internal program areas, including Planning, Research, Design, Construction, and Maintenance. The Minority Business (MB) and Womens Business (WB) Development unit serve as coaches to disadvantaged business enterprises; a private firm is retained to provide technical assistance to these companies.

Management Assessment. The Management Assessment unit has five diverse functions. Information Security investigates unauthorized access to and/or abuse of personal computers. Parking and Central Files administers the Department's employee vehicle parking program and maintains all State and federal highway construction project records. Security is responsible for physical security and loss prevention. Telecommunications verifies unit compliance with the Department's telecommunications policy and identifies employee abuse/misuse and billing errors. Records management functions, performed by the unit's administrative assistant, primarily involve coordination of records retention schedules and records storage, inventory and disposal activities with the Records Services branch of the Department of Cultural Resources.

Governor's Highway Safety Program. The mission of this unit, which is primarily federally funded, is to reduce deaths and injuries on the highways by focusing on drivers and driver actions, as opposed to roadway conditions. Functions within the unit include public affairs, grants award and evaluation, and external affairs to promote/support various public safety campaigns.

Administrative Procedures Act Coordinator. This one-person unit coordinates NCDOT rule making with the State Office of Administrative Hearings.

Legislative Affairs. This one-person unit is the Department's liaison with the General Assembly. Functions include attending all legislative sessions and committee/commission meetings that involve appropriations, as well as discussions and/or potential legislation that could affect NCDOT. All legislative requests for information and implementation of approved legislation are coordinated through this unit.

Legal. Legal services for all state agencies, including NCDOT, are provided by staff from the State Attorney General's Office. The Transportation Section of the Department of Justice, with 25 attorneys and 17 support positions, handles all legal services needed by NCDOT (except for tort claims which are handled by a centralized Department of Justice section). The Lands Section, with 13 attorneys in Raleigh and three attorneys in the Asheville Office, are involved in right-of-way land acquisition cases. The other unit, Contract Claims and Administration, with eight attorneys, assists with construction contractor "verified claims" for additional contract time and/or compensation as well as all other legal issues. The Department's Division of Motor Vehicles is served by a separate section of the Department of Justice. The NCDOT attorney position (Agency Legal Specialist) in the new organization structure is comparable to similar positions in most other state agencies. The purpose of this position is to provide in-house legal advice to agency management. This position was added to NCDOT upon recommendation of the State Attorney General, with approval of the Governor.

STRENGTHS

The Field Fiscal Procedures Manual has recently been updated and installed on the NCDOT web page, facilitating easy access to the manual from anywhere in the State. Future updates can be made easily and are then instantly available to all users.

Important steps have been made to increase management controls within Management Information Systems. Attention has been focused on reporting relationships and flattening the organizational structure. Other aspects of this program include initial efforts towards requirements management, project planning, project tracking and oversight, subcontract management, quality assurance, and configuration management.

NCDOT is addressing its Year 2000 issues. MIS has established clearly understood guidelines, timelines, and sets of responsibilities to handle the Department's Year 2000 issues.

The Workers' Compensation unit received an excellent evaluation from the Office of State Personnel, enabling NCDOT to become one of the few state agencies exempted from the proposed third-party administrator program.

NCDOT is one of only 10 state transportation agencies that elected not to set a maximum overhead rate for engineering consulting firms. By auditing each engineering firm's specific rate, overhead charges are lower than they would be using the maximum rate approach.

Market research studies on customer satisfaction conducted by Research and Policy Analysis are well focused, comprehensive and useful. The studies typically include development of a survey questionnaire that is disseminated to customers, collected, tabulated and statistically analyzed. The results are reported in narrative as well as in numerous tables, charts and graphs. Surveys have been performed for the Ferry Division, the Division of Motor Vehicles, Materials and Tests, Management Information Systems, and several other units.

The Governor's Highway Safety Program has developed several model programs that are having positive effects on highway safety. The nationally recognized "Click It or Ticket," "Booze It or Lose It" and "Graduated Drivers Licensing" programs are being used as models for other states. A 15 percent reduction in deaths and disabilities due to drunk driving and lack of seat belt use has been attributed to these programs.

Federal-aid audits completed by the Internal Audit Section for the Federal Highway Administration are meeting requirements. Evidence of this satisfaction is demonstrated by the FHWA's continuing delegation of responsibility for this work to the Department.

FINDINGS AND RECOMMENDATIONS

Finding: Budgets are developed with limited involvement by NCDOT operating management.

The Department's continuation, expansion and capital budget requests are developed by two units within the Fiscal section. These requests are reviewed and approved by the Chief Financial Officer and the Secretary, and then submitted to the Office of State Budget and Management. While one or more Deputy Secretaries may be consulted or make suggestions regarding the budget request, very little input is solicited or received from the operating units. NCDOT managers are seldom asked to identify their needs and, when a request is made, the usual response is negative. The budget "process" is characterized as a "numbers exercise" that focuses on continuation of the *status quo* rather than on development of budgets that reflect actual needs within the Department.

Recommendation:	**Create a Budget Office responsible for establishing and managing a budget development process that is founded on resource requests from operating units.**

The Budget Office should include the five positions currently involved in preparing plans and budgets for the Department and, possibly, one to three additional positions to help expand the scope and quality of the planning and budgeting processes. The Office should report directly to the Chief Financial Officer. Their responsibilities should include developing and implementing a budgeting process that ensures input from those who must use and control the requested funds—that is, the operating units. This process would typically include establishment of budget request criteria and forms by the Budget Office, preparation of requests and supporting justification by the units, evaluation and reconciliation of the requests, and preparation of draft budgets for review and approval by Department management.

Finding: The Department lacks an effective customer service structure for management information systems issues.

Two lead units for information systems, Management Information Systems (which is in Administration) and Engineering Automation (which is under the Division of Highways) have duplicative roles and lack clearly defined sets of responsibilities.

For example, responsibility for providing local area network and desktop support is shared between MIS and the Engineering Automation unit. Engineering Automation is responsible for providing computer and Computer Aided Drafting and Design (CADD) equipment, services, training, and engineering applications programming for the Division of Highways. MIS is responsible for the same services for the department as a whole, with the exception of CADD and other Division of Highway engineering specific application development and maintenance.

Both MIS and Engineering Automation also have responsibility for computer training. This separation of training responsibilities was initially established along functional lines. Engineering Automation would supply Division of Highway staff with CADD training while MIS would train all of NCDOT on all other PC training. As recently as early 1993, Engineering Automation was only performing CADD training with a staff of two. Soon after this, MIS decided to decrease their training staff to concentrate on development efforts. As a result, Engineering Automation has assumed the responsibility for training in PC based applications in addition to CADD training. In 1997, Engineering Automation trained approximately 250 people in CADD and 3,200 in PC software packages.

The duplicative and unclear responsibilities for computer support has led to confusion and frustration among Department staff. Compounded by the presence of two different network platforms (Windows NT/Novell Netware), department staff have two sources for help desk support with some employees running in a Windows NT environment being supported by Engineering Automation and the Novell Netware environment being supported by MIS. Currently, employees are unsure who to contact when they need support.

Note: The Office of State Auditor is currently conducting a detailed review of the Department's computer systems and information technology operations.

Recommendation:	**Consolidate the responsibilities for networking and information systems training.**

Network installation and maintenance, training and general PC help desk support should be a centralized function that services all of NCDOT. Over the next two years, the Department should consolidate these information systems responsibilities. This should be done in a manner that does not disrupt current information systems availability and support.

Finding: The current automated fiscal systems have limited capabilities for producing ad hoc reports requested by managers.

The Fiscal section's automated systems process monthly financial reports that are voluminous. Managers within the Department have varying needs for financial and management information; some are quite satisfied with the complete reports currently provided, while others have different information needs or would like the data summarized in different ways. Staff reported that the programming language used in the current system makes it difficult to obtain special ad hoc reports. Usually, requests must be satisfied by an internal computer consultant.

Recommendation:	**Continue to modify and improve the current fiscal system until the new system is implemented.**

The Department has identified short-term changes that can improve utility of the current system until the new system is implemented (which is projected for 2003). These improvement efforts should continue.

Finding: Functions related to worker safety and injury compensation are organizationally separated and misplaced.

The functions of the Workers' Compensation unit in the Fiscal section evolved from paying workers' compensation bills to operating a injury reduction and treatment intervention program. The Safety and Loss Prevention unit in the Division of Highways focuses on safety training, injury prevention, and the return of employees to their normal duties. The unit works with all NCDOT employees, whether or not they are in the Division of Highways.

Recommendation:	**Establish a new Workers' Safety unit within the Personnel section by merging the Workers' Compensation and Safety and Loss Prevention units.**

The unit should have Department-wide responsibility for encouraging workers' safety through training and other promotional techniques, administering the Workers' Compensation program, managing treatment intervention, and encouraging the return of injured workers to their normal duties as soon as possible.

Finding: Research and Policy Analysis functions are limited to customer-satisfaction market research studies.

The unit does not perform policy analysis nor does it conduct any other types of research. Studies are performed only in response to requests from other units within the Department. There is no proactive program to identify and correct customer satisfaction problems. Although the unit is the focus of NCDOT's customer service program, the staff does not include customer service professionals, nor does it coordinate its efforts with other units in the Department that focus on external relations matters.

Recommendation:	**Reformulate the Research and Policy Analysis unit so that it becomes a Department-wide resource for improved customer service.**

The Research and Policy Analysis unit should become part of the Office of Public Affairs and External Relations, and the name should be changed to the "Customer Service Unit." The unit should be headed by a customer service professional and staffed with customer service and market research specialists, rather than planners. Responsibilities should include coordinating implementation of the customer service plans approved last December, and developing and implementing a comprehensive, proactive market research study program that focuses on areas with the greatest needs throughout the Department.

Finding: Internal Audit reports to the Deputy Secretary for Administration.

The Internal Audit function must be totally independent and objective to properly carry out its responsibilities. To maintain this independence, the Internal Audit section should not report to the same executive directly responsible for a function that is, or could be, audited.

Recommendation:	**Establish Internal Audit as a staff function reporting directly to the NCDOT Secretary.**

By reporting directly to the Secretary, Internal Audit can be totally independent and objective.

Finding: Only FHWA-mandated audits and certain other financial audits of the highest priority are currently being performed.

Financial and compliance audits are performed on an as needed/as requested basis rather than as part of a comprehensive audit program. Unit management indicated that annual audit programs were established in the past but, a lack of staffing in recent years has prevented them from carrying out these comprehensive programs. The unit has not conducted operational audits for many years, due to a lack of sufficient staffing.

Recommendation:	**Establish a comprehensive internal audit program, consisting of financial, compliance and operational audits.**

The Director estimated that at least three to four more auditors would be needed to properly implement a comprehensive internal audit program. This estimate should be refined by developing a detailed audit program that includes all necessary financial and operational elements, at reasonable audit frequencies. It appears that unit management can then develop reasonable estimates of the manpower required to properly carry out this program, based on the breadth and depth of their experience. The unit's staffing plan should also consider the large number of retirements that will be occurring within this unit over the next several years.

Finding: The Management Assessment unit consists of five dissimilar functions.

Most of this unit's functions are similar to, or coordinate with, other units within the department. There are few, if any, advantages to grouping these functions within a single unit. The overhead of a director and an assistant is not necessary.

Recommendation:	**Eliminate the Management Assessment unit and transfer the functions to other units.**

The information security (computer abuse investigation) function should be transferred to Management Information Systems, where alleged abuses are currently referred. The telecommunications (telephone abuse investigation) function should be combined with the function in the Third Party Payments unit of the Fiscal section that is analyzing telecommunications bills. The parking permits, central files, records management and security (facility access) functions should be transferred to General Services. These transfers would eliminate the need for the Management Assessment director and administrative assistant positions.

Finding: Contractor EEO compliance problems are not identified while construction projects are in process so that corrective actions can be taken.

Goals for contractor Disadvantaged Business Enterprise participation are set by the Civil Rights Compliance unit prior to project letting, and are then compared to the contractor submittals. Reports on actual participation, however, are not submitted until the project has been completed. If the contractor does not meet the planned percentages, it is too late for corrective action.

Recommendation:	**Require monthly reports from contractors of actual EEO participation.**

The reports should be submitted to and analyzed by the Compliance unit in the Civil Rights and Business Development section. The reports should identify submitted participation dollar volumes and percentages, actual dollars and percentages to date, plans for the remainder of the project and expected total results upon project completion. If the total expected results vary materially from the initial submittal, or if the plan for the remainder of the project are not realistic, the Compliance unit should require that the contractor take corrective actions and to reflect these actions in a revised plan.

Finding: Purchasing processes payment approval requests for imprest cash and transmittal emergency purchases even though payment has already been made.

The Fiscal section processes payment of these two types of reimbursement requests before forwarding them to Purchasing for approval. Two employees within the Invoice Approval unit spend most of their time reviewing and approving these items.

Recommendation: Streamline the imprest cash and transmittal emergency purchases approval.

Review and approval of imprest cash and transmittal emergency requests does not involve the matching of invoices and purchase orders, due to the nature of these expenditures. The process would therefore be more effective, efficient and timely if the review and approval function for these reimbursement requests were eliminated. The two affected positions could be eliminated or reallocated elsewhere in the Department.

A. COMPARATIVE ANALYSIS

To provide a framework within which to evaluate NCDOT's operations, a comparative analysis was completed as a part of this study. To make relevant comparisons, information was collected on states that neighbor North Carolina. For each category of information collected, both the neighboring states average and the U.S. average are calculated and presented. States selected for this comparative analysis include:

- Alabama
- Arkansas
- Florida
- Georgia
- Louisiana
- Kentucky
- Mississippi
- Pennsylvania
- South Carolina
- Tennessee
- Texas
- Virginia
- West Virginia

Based on information obtained from the Federal Highway Administration (FHWA), these states ranked close to North Carolina in several categories. With the exception of Texas and Pennsylvania, all other states constitute AASHTO's Southeast Region. Texas and Pennsylvania were included in this study due to their similarity to NCDOT in many of the relevant categories.

Sources used for the comparative analysis include:

- U.S. Department of Transportation Federal Highway Administration, *Federal Highway Statistics 1996*
- Better Roads Magazine, November 1997
- Interviews with DOT personnel from all 13 participating states

The results have been organized into six categories. These categories include:

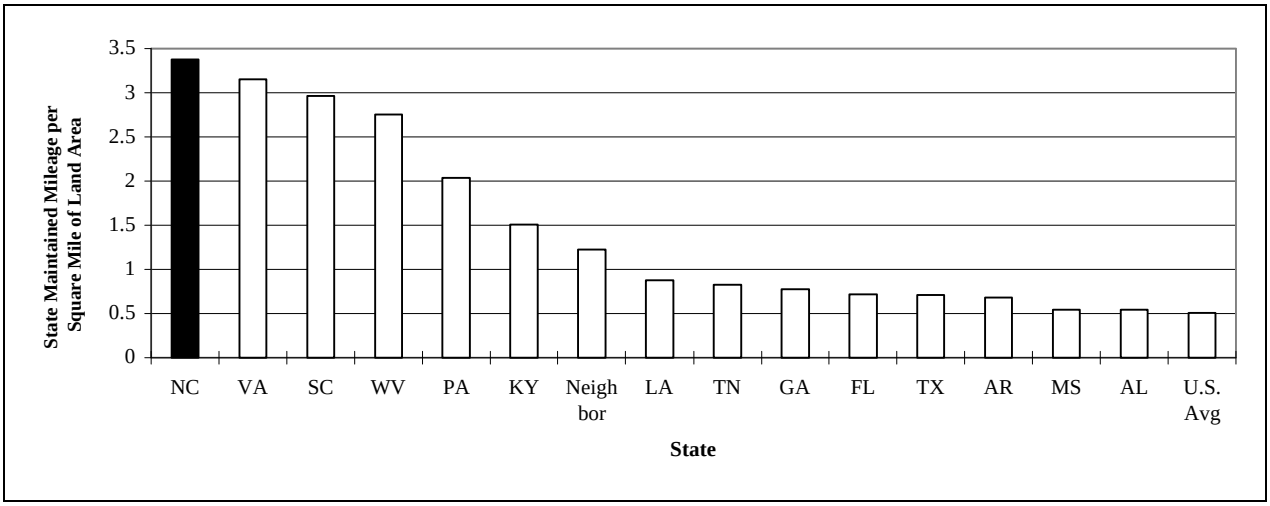
- Highway System Size
- Expenditures
- Staffing
- System Conditions
- Congestion
- Safety

HIGHWAY SYSTEM SIZE

This comparison shows how North Carolina relates to neighboring states and the U.S. average in terms of the level of service provided according to the size of the highway system administered.

According to *Highway Statistics 1996*, North Carolina ranks 3rd in the U.S. in state administered lane-miles. As shown in Exhibit A-1, NCDOT is responsible for more total state lane-mileage per square mile of land area than any of its neighboring states.

Exhibit A-1: Total State Administered Mileage (Lane Miles) Per Square Mile of Land Area

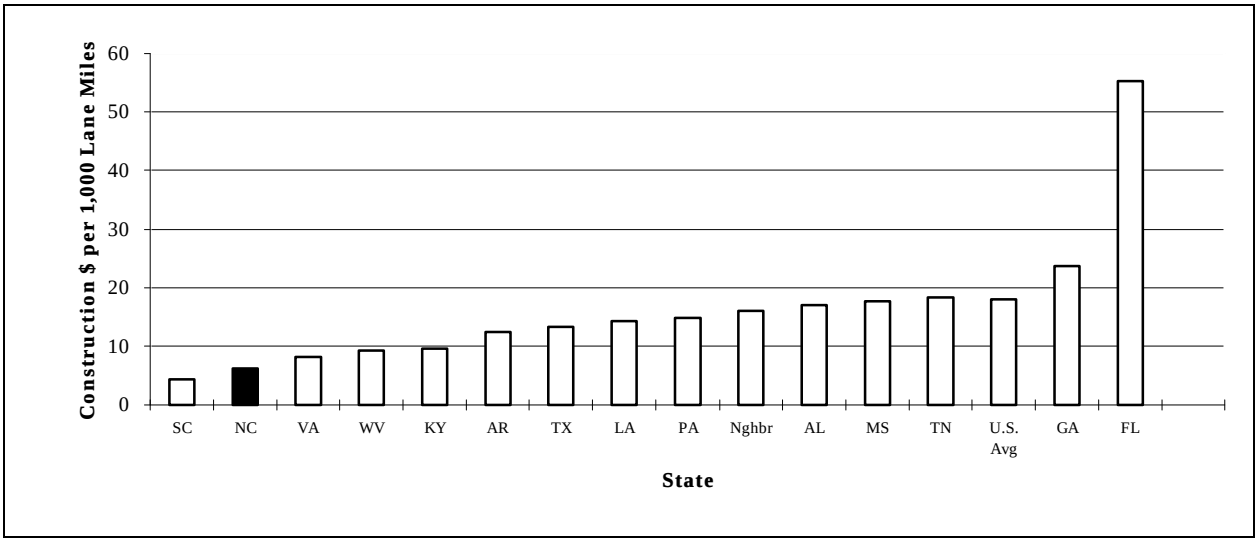


Source: FHWA Highway Statistics, 1996 Tables HM-81 and PS-1

EXPENDITURES

Analyses conducted on expenditure data included calculations of construction expenditures per mile, maintenance expenditures per mile, and total expenditures per mile for North Carolina, each of its neighboring states, and the U.S. average. NCDOT's construction maintenance per mile is second in the U.S. This is second only to South Carolina by a two dollar differential, as presented in Exhibit A-2.

Exhibit A-2: Construction Expenditures Per 1,000 Lane-Miles



Source: FHWA Highway Statistics, 1996 Tables SF-4 and HM-81

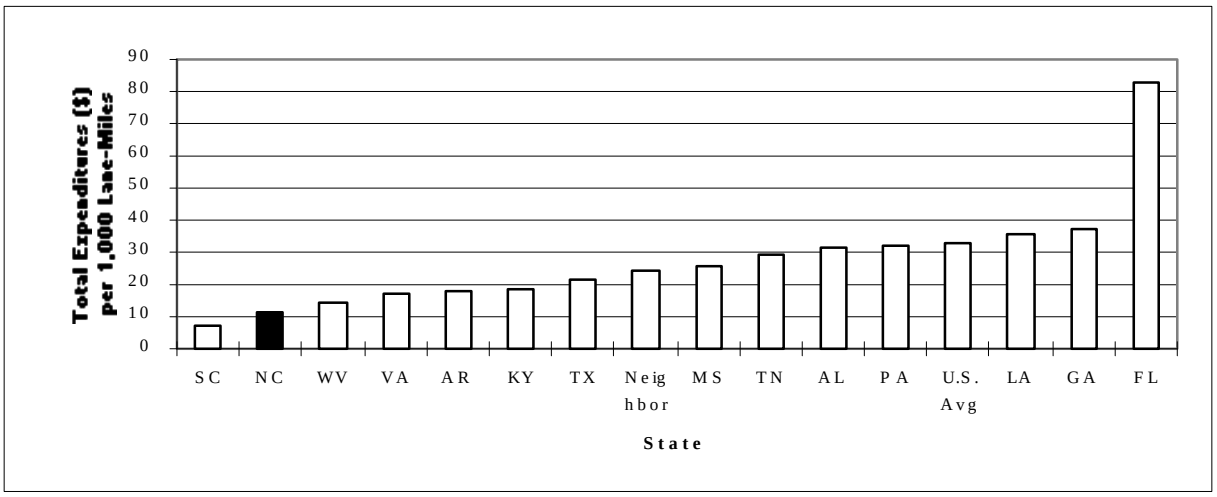
North Carolina ranks fifth in the nation for having low *maintenance* expenditures per mile, as presented in Exhibit A-3.

Exhibit A-3: Maintenance Expenditure per 1,000 Lane-Miles

Source: FHWA Highway Statistics 1996, Tables HM-81 and SF-4

In this analysis, total expenditures include construction and maintenance costs, as well as administration, highway safety, debt service costs, and bond retirement costs for all states. Overall, NCDOT ranks third in the nation, as suggested in Exhibit A-4. This exhibit shows the comparison between North Carolina's total expenditures per 1,000 lane miles to that of its neighboring states and the national average.

Exhibit A-4: Total Expenditure per 1,000 Lane-Miles



Source: FHWA Highway Statistics, 1996 Tables HM-81 and SF-4

STAFFING

Telephone and facsimile surveys were conducted to produce a staffing comparison. All neighboring states were contacted and data from those that responded are included in the tables. The three categories used to

analyze the data gathered were: number of full-time equivalent employees (FTEs), the staffing distribution by functional area, and the number of staff per 10,000 lane-miles, as shown in Exhibit A-5.

Exhibit A-5: Staffing Comparison by Functional Area[17]

Full-Time Equivalent Employees FY 1996-97

Function	NC	Nghbr. Avg.	AR	FL	GA	LA	SC	PA	TN
Planning	191	129	96	263	30	116	69	101	231
Engineering	1,673	945	390	3,570	290	382	340	1,134	510
Right of Way	319	218	78	767	196	76	98	113	196
Traffic Engineering	212	103	9	212	162	131	76	126	6
Materials & Research	171	187	67	488	371	124	88	64	105
Construction	2,356	830	544	1,141	531	827	626	798	1340
Maintenance	6,916	3,129	2,315	2,930	2,706	2,355	3,356	6,311	1929
Administration									
Personnel	62	43	6	107	67	17	26	54	21
Legal Services	44	40	16	94	4	39	25	90	9
Information Technology	99	97	50	215	40	73	99	141	60
Fiscal Services	134	70	31	191	72	54	60	16	64
Public Information	17	14	7	15	12	4	10	43	4
Minority Affairs	8	13	6	21	3	12	10	17	21
Building Maintenance	23	31	9	25	14	48	10	105	3
Other	234	856	197	0	1,402	1,201	416	2,395	379
Total Agency Staff	**12,459**	**6,702**	**3,821**	**10,039**	**5,900**	**5,459**	**5,309**	**11,508**	**4,878**

Staffing Distribution by Function

Function	NC	Nghbr. Avg.	AR	FL	GA	LA	SC	PA	TN
Planning	1.5%	1.9%	2.5%	2.6%	0.5%	2.1%	1.3%	0.9%	4.7%
Engineering	13.4%	14.1%	10.2%	35.6%	4.9%	7.0%	6.4%	9.9%	10.5%
Right of Way	2.6%	3.2%	2.0%	7.6%	3.3%	1.4%	1.8%	1.0%	4.0%
Traffic Engineering	1.7%	1.5%	0.2%	2.1%	2.7%	2.4%	1.4%	1.1%	0.1%
Materials & Research	1.4%	2.8%	1.8%	4.9%	6.3%	2.3%	1.7%	0.6%	2.2%
Construction	18.9%	12.4%	14.2%	11.4%	9.0%	15.1%	11.8%	6.9%	27.5%
Maintenance	55.5%	46.7%	60.6%	29.2%	45.9%	43.1%	63.2%	54.8%	39.5%
Administration									
Personnel	0.5%	0.6%	0.2%	1.1%	1.1%	0.3%	0.5%	0.5%	0.4%
Legal Services	0.4%	0.6%	0.4%	0.9%	0.1%	0.7%	0.5%	0.8%	0.2%
Information Technology	0.8%	1.4%	1.3%	2.1%	0.7%	1.3%	1.9%	1.2%	1.2%
Fiscal Services	1.1%	1.0%	0.8%	1.9%	1.2%	1.0%	1.1%	0.1%	1.3%
Public Information	0.1%	0.2%	0.2%	0.1%	0.2%	0.1%	0.2%	0.4%	0.1%
Minority Affairs	0.1%	0.2%	0.2%	0.2%	0.1%	0.2%	0.2%	0.1%	0.4%
Building Maintenance	0.2%	0.5%	0.2%	0.2%	0.2%	0.9%	0.2%	0.9%	0.1%
Other	1.9%	12.8%	5.2%	0.0%	23.8%	22.0%	7.8%	20.8%	7.8%
Total Agency Staff	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

[17] Neighbor average indicates average of only those neighboring states whose data is listed above.

FTEs Per 10,000 Lane Miles

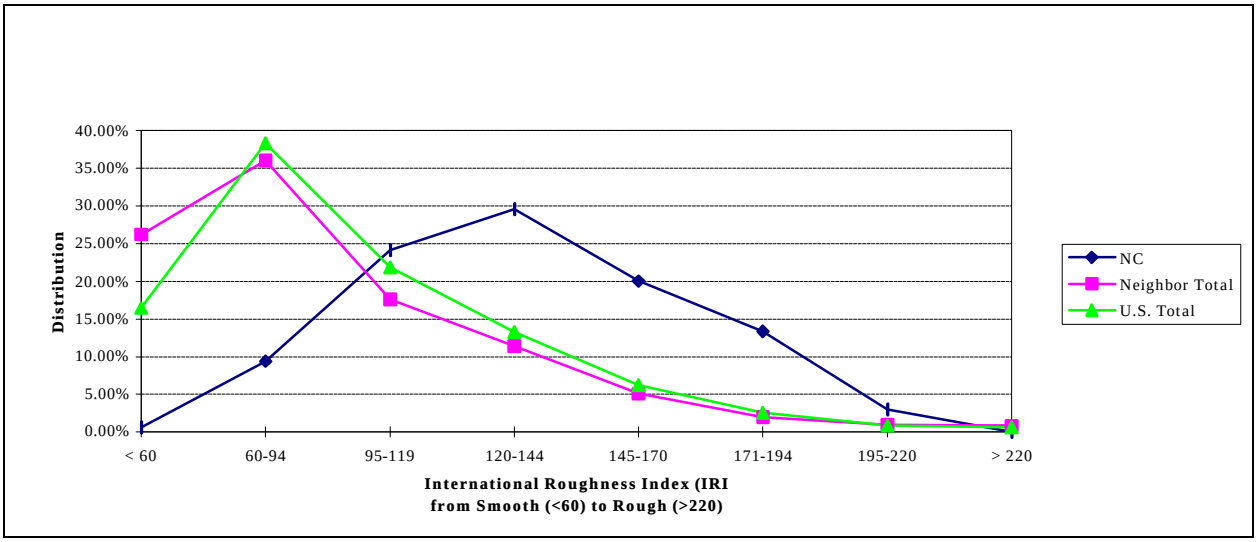
Function	NC	Nghbr. Avg.	AR	FL	GA	LA	SC	PA	TN
Planning	11.6	24.4	27.2	67.9	6.7	30.4	7.7	11.1	67.7
Engineering	101.8	178.0	110.5	921.9	64.4	100.2	38.2	124.4	149.4
Right of Way	19.4	41.0	22.1	198.1	43.5	19.9	11.0	12.4	57.4
Traffic Engineering	12.9	19.4	2.5	54.7	36.0	34.4	8.5	13.8	1.8
Materials & Research	10.4	35.2	19.0	126.0	82.4	32.5	9.9	7.0	30.8
Construction	143.4	156.3	154.1	294.7	117.9	217.0	70.2	87.5	392.4
Maintenance	421.0	589.4	655.7	756.7	600.8	617.9	376.6	692.3	564.9
Administration									
Personnel	3.8	8.0	1.7	27.6	14.9	4.5	2.9	5.9	6.2
Legal Services	2.7	7.5	4.5	24.3	0.9	10.2	2.8	9.9	2.6
Information Technology	6.0	18.2	14.2	55.5	8.9	19.2	11.1	15.5	17.6
Fiscal Services	8.2	13.1	8.8	49.3	16.0	14.2	6.7	1.8	18.7
Public Information	1.0	2.6	2.0	3.9	2.7	1.0	1.1	4.7	1.2
Minority Affairs	0.5	2.4	1.7	5.4	0.7	3.1	1.1	1.9	6.2
Building Maintenance	1.4	5.8	2.5	6.5	3.1	12.6	1.1	11.5	0.9
Other	14.2	161.2	55.8	0.0	311.3	315.1	46.7	262.7	111.0
Total Agency Staff	**758.4**	**1869.3**	**1082.3**	**2592.5**	**1309.9**	**1432.4**	**595.7**	**1262.4**	**1428.6**

Source: KPMG survey of state DOTs

SYSTEM CONDITIONS

In order to determine the system conditions, International Roughness Index (IRI) information was obtained for each state and the U.S. average for rural and urban interstates. The smaller the IRI, the smoother the road. Exhibit A-6 demonstrates how North Carolina compares to the U.S. and its neighboring states in its distribution of reported IRI.

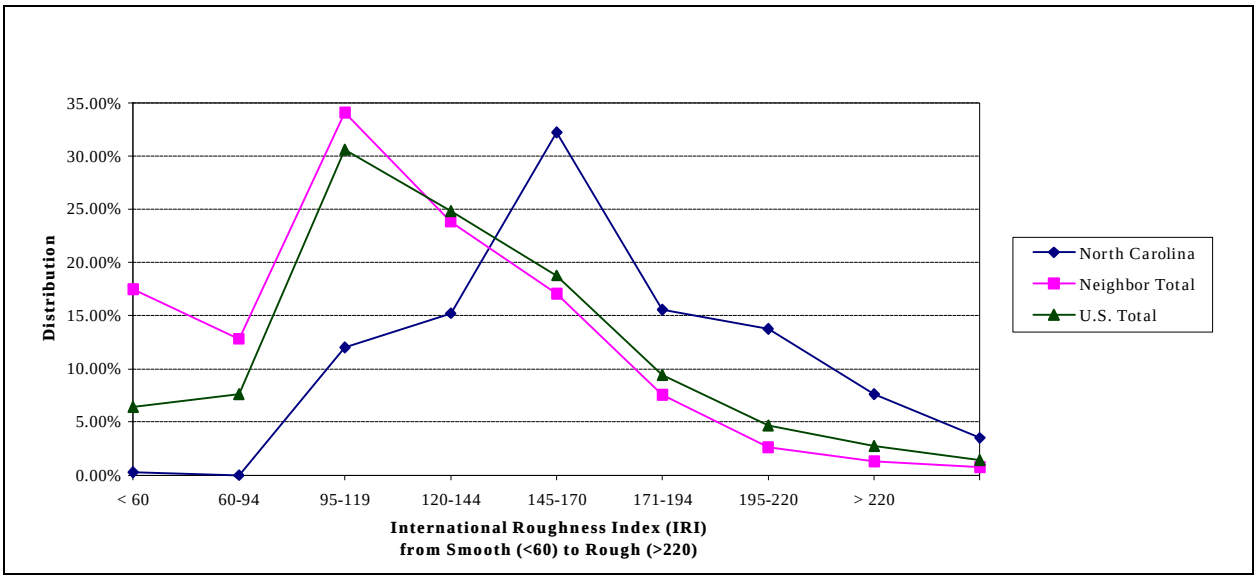
Exhibit A-6: Distribution of Reported IRI for Rural Interstates



Source: FHWA Statistics, 1996 Table HM-64

Information gathered for the urban interstate comparison presents similar data and scales, as shown in Exhibit A-7.

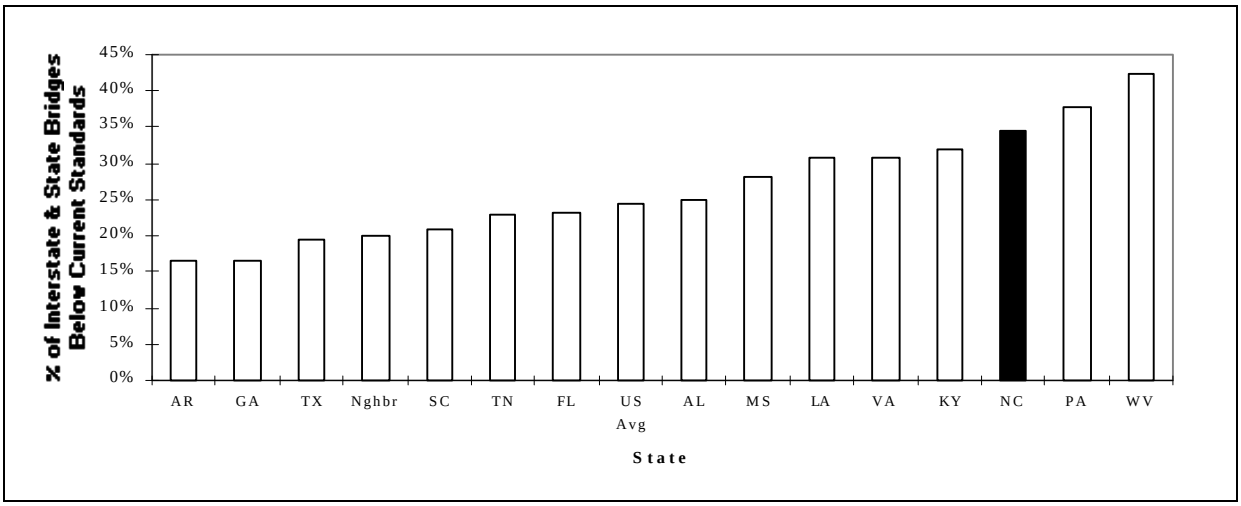
Exhibit A-7: Distribution of Reported IRI for Urban Interstates



Source: FHWA Highway Statistics, 1996 Table HM-64

Bridge conditions were compared using data on the percentage of interstate and state bridges that were considered below standard (see note following Exhibit A-8). This data was originally compiled by Better Roads Magazine for their annual bridge inventory of 1997. According to this data, North Carolina ranks 46th in the nation in terms of bridge condition. Exhibit A-8 illustrates this comparison.

Exhibit A-8: Percentage of Interstate and State Bridges that are Below Current Standards[18]



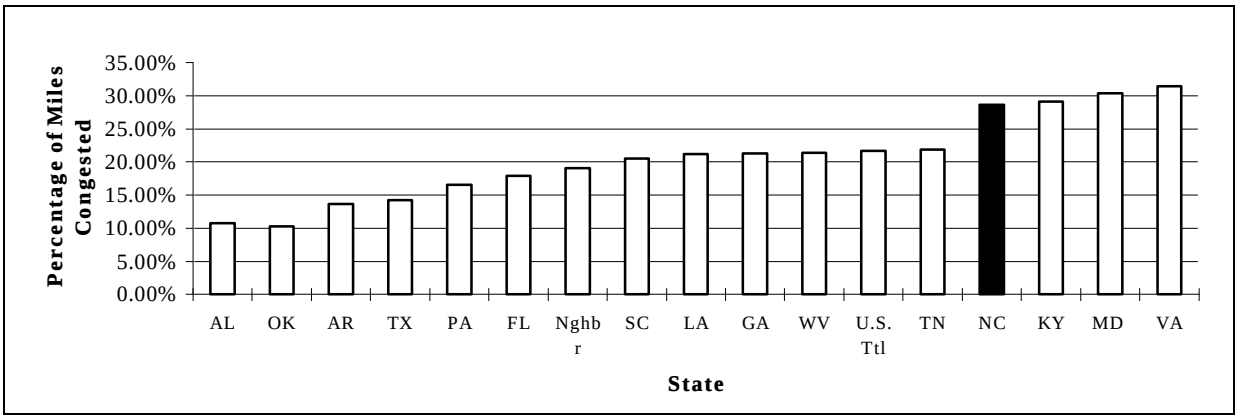
Source: Better Roads Magazine 1997 Bridge Inventory

CONGESTION

As defined in our analysis, congestion occurs when the volume of traffic to service-flow ratio exceeds 80 percent. As shown in Exhibit A-9, North Carolina ranked 43rd in the nation.

[18] Interstate and primary bridges are traditionally maintained by state DOTs across the country. Bridges below current standards are those classified as either structurally deficient or functionally obsolete. Structurally deficient is defined as those bridges that are in poor condition or have insufficient load carrying capacity. Those defined as functionally obsolete are those which may be narrow, poorly aligned, inadequate or under clearance. The Better Roads Magazine obtains their data through interviews with each state's DOT.

Exhibit A-9: Congestion - Percentage of Major Urban Roads[19]

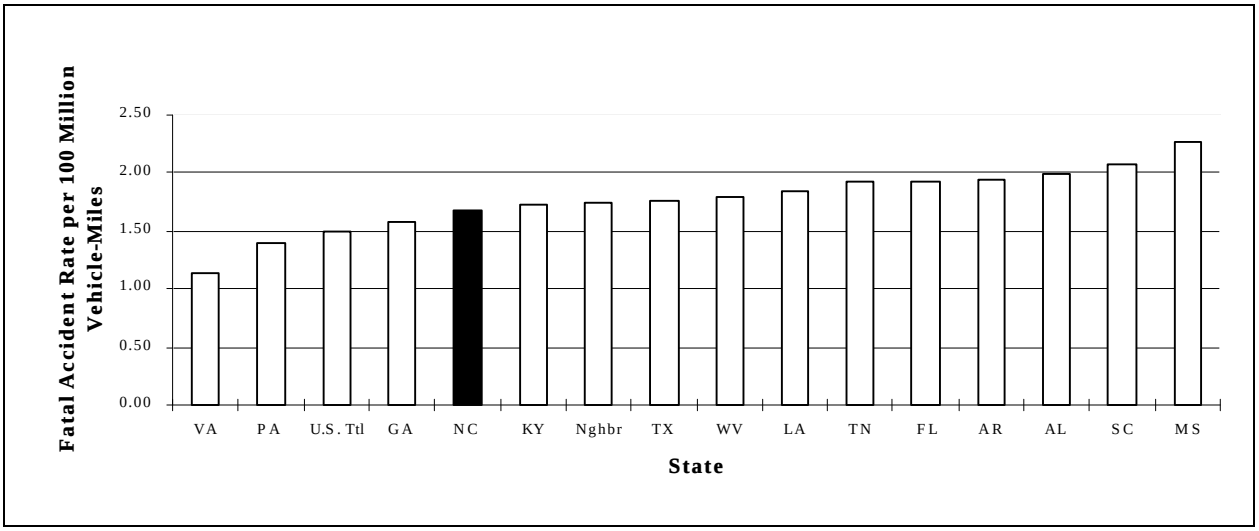


Source: FHWA Highway Statistics, 1996, Table HM-61

SAFETY

Safety of states roads was determined by calculating rates of both fatal and non-fatal accidents. For fatal accidents, North Carolina ranks 31st in the nation. This comparison is shown in Exhibit A-10.

Exhibit A-10: 1996 Fatal Accident Rate

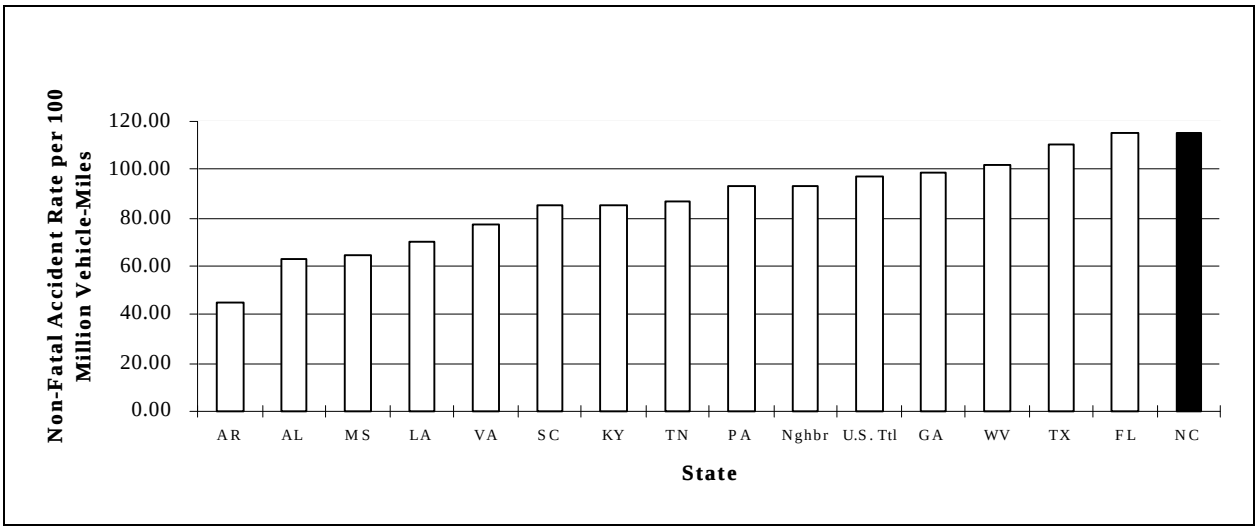


Source: FHWA Highway Statistics, 1996, Table FI-3

As for non-fatal accident rates, North Carolina ranks 42nd in the nation. Averages for neighboring states and the U.S. are lower, as shown in Exhibit A-11.

[19] Note: All 1996 data with the exception of Maryland data from 1995.

Exhibit A-11: 1996 Non-Fatal Accident Rate



Source: FHWA Highway Statistics, 1996, Table FI-3

TOTAL DISBURSEMENTS FOR NEIGHBORING STATES & U.S. RANKINGS

Data used to Determine Total Expenditures per Mile

STATE	CAPITAL OUTLAY FOR ROADS AND BRIDGES 2/	MAINTENANCE AND HIGHWAY SERVICES 2/	ADMINISTRATION, RESEARCH AND PLANNING 2/	HIGHWAY LAW ENFORCEMENT AND SAFETY	INTEREST	BOND RETIREMENT 3/	TOTAL DISBURSEMENTS	TOTAL RURAL & URBAN LANE-MILES 4/	TOTAL EXPENDITURE PER 1000 LANE MILES	US RANK
SC	386,001	139,534	44,895	61,842	684	0	632,956	89,115	7	1
NC	**1,021,271**	**447,497**	**136,527**	**200,471**	**584**	**24,550**	**1,830,900**	**164,287**	**11**	**3**
WV	608,595	196,566	56,640	19,385	15,199	39,020	935,405	66,295	14	4
VA	1,019,907	654,685	154,097	112,219	55,005	134,930	2,130,843	124,819	17	7
AR	439,680	121,943	19,531	37,916	0	0	619,070	35,304	18	10
KY	576,251	187,779	102,966	53,472	78,846	99,570	1,098,884	60,009	18	10
TX	2,458,767	773,737	348,275	343,368	37,475	7,250	3,968,872	184,840	21	13
Neighbor	12,144,247	4,366,516	1,477,874	1,439,753	736,271	944,795	21,109,456	860,683	25	17
MS	453,949	66,227	34,355	47,361	319	65,636	667,847	25,648	26	19
TN	627,635	216,049	94,431	68,673	149	2,540	1,009,477	34,145	30	23
AL	469,574	239,188	67,160	72,301	3,006	18,030	869,259	27,467	32	27
PA	1,351,022	875,269	119,866	291,558	136,292	168,158	2,942,165	91,163	32	27
U.S. Avg	32,228,647	10,999,740	4,763,849	4,806,812	2,180,432	3,956,771	58,936,251	1,805,679	33	29
LA	544,885	150,169	134,878	89,563	142,673	308,704	1,370,872	38,112	36	32
GA	1,067,286	281,872	107,136	83,742	64,124	63,432	1,667,592	45,043	37	34
FL	2,140,695	463,498	193,644	158,353	202,499	37,525	3,196,214	38,723	83	45

1/ Tables SF-3 and SF-4 summarize receipts and disbursements for State-administered roads and all States because of indeterminate amounts charged to construction and maintenance bridges. See general note on Table SF-3 for details. See Table SF-21 for general note on SF series projects. This table is compiled from reports of State authorities.

2/ The classification of administration and miscellaneous expenditures is not uniform for

3/ Includes redemption by refunding. See Table SB-2 for details.

4/ Per the HM-81 table detailing "state hwy agency-administered public roads for 1996"

Source: U. S. Department of Transportation

TOTAL STATE ADMINISTERED MILEAGE PER SQUARE MILE OF LAND AREA FOR PEER STATES, NC AND THE US

Data used for Determining Highway System Size

NOVEMBER 1997

STATE	GENERAL MEASURES			Table HM-81	Table PS-1
	NET LAND AREA 1/ (SQUARE MILES)				
	RURAL	URBAN	TOTAL LAND AREA	LANE-MILES	TOTAL ST. MILEAGE PER SQ. MILE OF LAND AREA
NC	**45,468**	**3,229**	**48,697**	**164,287**	**3.3737**
VA	37,118	2,480	39,598	124,819	3.1522
SC	28,686	1,425	30,111	89,115	2.9595
WV	23,656	431	24,087	66,295	2.7523
PA	40,869	3,951	44,820	91,163	2.034
KY	38,339	1,393	39,732	60,009	1.5103
Neighbor	792,431	43,102	835,533	1,024,970	1.2267
LA	41,969	1,597	43,566	38,112	0.8748
TN	38,484	2,735	41,219	34,145	0.8284
GA	54,389	3,667	58,056	45,043	0.7759
FL	45,490	8,505	53,995	38,723	0.7172
TX	253,449	8,465	261,914	184,840	0.7057
AR	51,096	979	52,075	35,304	0.6779
MS	45,856	1,058	46,914	25,648	0.5467
AL	47,562	3,187	50,749	27,467	0.5412
U.S. Avg	3,431,856	105,570	3,537,426	1,805,679	0.5104

Source: U. S. Department of Transportation

CONSTRUCTION DISBURSEMENTS FOR STATE-ADMINISTERED HIGHWAYS - 1996 1/

Data used to Determine Construction and Maintenance Expenditures per Mile

OCTOBER 1997 "TABLE SF-4

STATE	CAPITAL OUTLAY FOR ROADS AND BRIDGES 2/	TOTAL RURAL & URBAN LANE-MILES 4/	TOTAL CONSTRUCTION EXPENDITURES PER 1,000 LANE MILES	U S RANK
SC	386,001	89,115	4.3	1
NC	***1,021,271***	***164,287***	***6.2***	***2***
VA	1,019,907	124,819	8.2	4
WV	608,595	66,295	9.2	5
KY	576,251	60,009	9.6	7
AR	439,680	35,304	12.5	11
TX	2,458,767	184,840	13.3	13
LA	544,885	38,112	14.3	17
PA	1,351,022	91,163	14.8	19
Nghbr	45,394,165	2,830,649	16.0	
AL	469,574	27,467	17.1	24
MS	453,949	25,648	17.7	25
TN	627,635	34,145	18.4	25
U.S. Avg	32,228,647	1,805,679	18.0	
GA	1,067,286	45,043	23.7	35
FL	2,140,695	38,723	55.3	45

MAINTENANCE DISBURSEMENTS FOR STATE ADMINISTERED HIGHWAYS

STATE	MAINTENANCE AND HIGHWAY SERVICES 2/	TOTAL RURAL & URBAN LANE-MILES	TOTAL MAINTENANCE EXPENDITURE PER 1,000 LANE MILES	US RANK
SC	139,534	89,115	1.6	1
MS	66,227	25,648	2.6	5
NC	***447,497***	***164,287***	***2.7***	***5***
WV	196,566	66,295	3.0	5
KY	187,779	60,009	3.1	5
AR	121,943	35,304	3.5	5
LA	150,169	38,112	3.9	11
TX	773,737	184,840	4.2	11
Neighbr	4,814,013	1,024,970	4.7	18
VA	654,685	124,819	5.2	18
U.S. Avg	10,999,740	1,805,679	6.1	25
GA	281,872	45,043	6.3	25
TN	216,049	34,145	6.3	25
AL	239,188	27,467	8.7	37
PA	875,269	91,163	9.6	39
FL	463,498	38,723	12.0	43

1: Tables SF-3 and SF-4 summarize receipts and disbursements for State-administered roads and bridges. See general note on Table SF-3 for details. See Table SF-21 for general note on SF serie This table is compiled from reports of State authorities.

2: The classification of administration and miscellaneous expenditures is not uniform for all States.

Source: U. S. Department of Transportation

1997 BRIDGE INVENTORY

Source: Better Roads Magazine

	Total Interstate & State Bridges	Total Substandard	% Substandard	Total Township/ City/County Bridges	Total Substandard	% Substandard	Combined Total All Bridges	% Substandard	Total Substandard
Alabama	5,508	1,375	25%	10,084	3,346	33%	15,592	4,721	30%
Alaska	781	174	22%	135	46	34%	916	220	24%
Arizona	4,222	164	4%	2,361	236	10%	6,583	400	6%
Arkansas	6,882	1,134	16%	5,470	2,158	39%	12,352	3,292	27%
California	12,711	1,624	13%	12,136	2,602	21%	24,847	4,226	17%
Colorado	3,701	600	16%	4,461	848	19%	8,162	1,448	18%
Connecticut	2,904	176	6%	1,227	220	18%	4,131	396	10%
Delaware	771	152	20%	8	2	25%	779	154	20%
Dist.Columbia	202	74	37%	12	7	58%	214	81	38%
Florida	6,230	1,440	23%	4,713	1,371	29%	10,943	2,811	26%
Georgia	5,825	969	17%	8,528	2,568	30%	14,353	3,537	25%
Hawaii	733	370	50%	402	170	42%	1,135	540	48%
Idaho	1,327	240	18%	2,419	372	15%	3,746	612	16%
Illinois	8,051	2,214	27%	17,543	3,780	22%	25,594	5,994	23%
Indiana	5,597	924	17%	12,386	3,792	31%	17,983	4,716	26%
Iowa	3,998	483	12%	21,190	6,697	32%	25,188	7,180	29%
Kansas	5,152	1,118	22%	20,869	6,256	30%	26,021	7,374	28%
Kentucky	8,991	2,860	32%	4,587	1,866	41%	13,578	4,726	35%
Louisiana	7,924	2,437	31%	5,818	2,605	45%	13,742	5,042	37%
Maine	1,927	576	30%	329	186	57%	2,256	762	34%
Maryland	2,742	693	25%	2,041	776	38%	4,783	1,469	31%
Massachusetts	3470	1,352	39%	1,548	687	44%	5,018	2,039	41%
Michigan	4,252	1,444	34%	6,399	2,942	46%	10,651	4,386	41%
Minnesota	3,446	436	13%	9,217	1,788	19%	12,663	2,224	18%
Mississippi	5246	1,475	28%	11,206	5,914	53%	16,452	7,389	45%
Missouri	9,575	2,711	28%	13,357	6,412	48%	22,932	9,123	40%
Montana	2,541	310	12%	1,841	621	34%	4,382	931	21%
Nebraska	3,454	321	9%	12,314	4,616	37%	15,768	4,937	31%
Nevada	1,002	43	4%	358	51	14%	1,360	94	7%
NewHampshire	1,419	354	25%	918	475	52%	2,337	829	35%
New Jersey	2,381	569	24%	3,910	1,413	36%	6,291	1,982	32%
New Mexico	2,952	980	33%	629	266	42%	3,581	1,246	35%
New York	7,774	2,311	30%	11,733	5,685	48%	19,507	7,996	41%
North Carolina	**17,077**	**5,918**	**35%**	**621**	**187**	**30%**	**17,698**	**6,105**	**34%**
North Dakota	1,085	80	7%	3,464	1,204	35%	4,549	1,284	28%
Ohio	11,515	3,527	31%	18,668	8,946	48%	30,183	12,473	41%
Oklahoma	7,384	1,531	21%	15,556	8,020	52%	22,940	9,551	42%
Oregon	2,638	520	20%	3,827	783	20%	6,465	1,303	20%
Pennsylvania	16,306	6,174	38%	6,882	3,130	45%	23,188	9,304	40%
Rhode Island	602	357	59%	140	95	68%	742	452	61%
South Carolina	8,174	1,679	21%	838	367	44%	9,012	2,046	23%
South Dakota	1,788	148	8%	4,417	1,431	32%	6,205	1,579	25%
Tennessee	7,347	1,682	23%	11,822	3,304	28%	19,169	4,986	26%
Texas	33,228	6,465	19%	15,600	7,374	47%	48,828	13,839	28%
Utah	1,724	565	33%	923	403	44%	2,647	968	37%
Vermont	1,071	334	31%	1,578	727	46%	2,649	1,061	40%
Virginia	11,200	3,450	31%	1,089	415	38%	12,289	3,865	31%
Washington	3,013	750	25%	4,044	918	23%	7,057	1,668	24%
West Virginia	6,388	2,707	42%	156	116	74%	6,544	2,823	43%
Wisconsin	4,727	703	15%	8,515	2,110	25%	13,242	2,813	21%
Wyoming	1,940	117	6%	853	341	40%	2,793	458	16%
TOTALS	280,898	68,810	24%	309,142	110,645	36%	590,040	179,455	30%

1997 STATE RANKINGS FOR BRIDGE CONDITIONS

	% Substd. Bridges	U.S. Rank
AZ	4	1
NV	4	1
CT	6	3
WY	6	3
ND	7	5
NE	8	6
SD	8	6
IA	12	8
MT	12	8
CA	13	10
MN	13	10
WI	15	13
AK	16	14
CO	16	14
GA	17	16
IN	17	16
ID	18	18
TX	19	19
DE	20	20
OR	20	20
OK	21	22
SC	21	22
AK	22	24
KS	22	24
FL	23	26
TN	23	26
NJ	24	28
AL	25	29
MD	25	29
NH	25	29
WA	25	29
IL	27	33
MS	28	34
MO	28	34
ME	30	36
NY	30	36
LA	31	38
OH	31	38
VT	31	38
VA	31	38
KY	32	42
NM	33	43
UT	33	43
MI	34	45
NC	***35***	***46***
DC	37	47
PA	38	48
MA	39	48
WV	42	50
HI	50	51
RI	59	52

Source: 1997 Bridge Inventory - Better Roads Magazine

FUNCTIONAL SYSTEM LENGTH-1996
MILES BY MEASURED PAVEMENT ROUGHNESS-URBAN
Data used to Determine Distribution of IRI

STATE	International Roughness Index (IRI) Urban Interstates								
	< 60	60-94	95-119	120-144	145-170	171-194	195-220	> 220	TOTAL REPORTED
AL	18	129	72	45	36	5	0	0	305
AR	4	9	25	28	35	17	11	6	135
FL	40	147	72	116	20	6	1	3	405
GA	47	59	4	0	0	0	0	0	110
KY	36	74	45	36	27	7	1	0	226
LA	6	71	83	89	13	8	6	6	282
MS	0	9	28	61	19	7	2	1	127
NC	**0**	**41**	**52**	**110**	**53**	**47**	**26**	**12**	**341**
PA	3	126	162	116	62	28	16	8	521
SC	6	87	36	19	6	1	0	0	155
TN	5	44	28	12	10	3	3	2	107
TX	297	464	199	37	27	3	1	0	1,028
VA	2	94	156	95	30	8	7	3	395
WV	35	13	16	9	9	8	1	0	91
Neighbor Total	499	1,326	926	663	294	101	49	29	3,887
U.S. Total	944	3,802	3,082	2,331	1,168	579	338	175	12,419

DISTRIBUTION OF REPORTED IRI FOR NEIGHBORING STATES, NC AND THE US

STATE	<60	60-94	95-119	120-144	145-170	171-194	195-220	>220	Total
AL	5.90%	42.30%	23.61%	14.75%	11.80%	1.64%	0.00%	0.00%	100.00%
AR	2.96%	6.67%	18.52%	20.74%	25.93%	12.59%	8.15%	4.44%	100.00%
FL	9.88%	36.30%	17.78%	28.64%	4.94%	1.48%	0.25%	0.74%	100.00%
GA	42.73%	53.64%	3.64%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
KY	15.93%	32.74%	19.91%	15.93%	11.95%	3.10%	0.44%	0.00%	100.00%
LA	2.13%	25.18%	29.43%	31.56%	4.61%	2.84%	2.13%	2.13%	100.00%
MS	0.00%	7.09%	22.05%	48.03%	14.96%	5.51%	1.57%	0.79%	100.00%
NC	**0.00%**	**12.02%**	**15.25%**	**32.26%**	**15.54%**	**13.78%**	**7.62%**	**3.52%**	**100.00%**
PA	0.58%	24.18%	31.09%	22.26%	11.90%	5.37%	3.07%	1.54%	100.00%
SC	3.87%	56.13%	23.23%	12.26%	3.87%	0.65%	0.00%	0.00%	100.00%
TN	4.67%	41.12%	26.17%	11.21%	9.35%	2.80%	2.80%	1.87%	100.00%
TX	28.89%	45.14%	19.36%	3.60%	2.63%	0.29%	0.10%	0.00%	100.00%
VA	0.51%	23.80%	39.49%	24.05%	7.59%	2.03%	1.77%	0.76%	100.00%
WV	38.46%	14.29%	17.58%	9.89%	9.89%	8.79%	1.10%	0.00%	100.00%
Neighbor Total	12.84%	34.11%	23.82%	17.06%	7.56%	2.60%	1.26%	0.75%	100.00%
U.S. Total	7.60%	30.61%	24.82%	18.77%	9.40%	4.66%	2.72%	1.41%	100.00%

Source: U. S. Department of Transportation

FUNCTIONAL SYSTEM LENGTH - 1996
MILES BY MEASURED PAVEMENT ROUGHNESS - RURAL
FOR THE NEIGHBORING STATES, NC AND THE US
Data used in Determining Distribution of IRI

STATE	INTERNATIONAL ROUGHNESS INDEX (IRI) 1/ INTERSTATE								
	< 60	60-94	95-119	120-144	145-170	171-194	195-220	> 220	TOTAL REPORTED
AL	67	373	96	42	21	0	0	0	599
AR	0	52	44	85	88	55	45	22	391
FL	138	227	171	224	9	3	0	0	772
GA	90	98	13	1	0	0	0	0	202
KY	173	172	56	85	50	0	0	0	536
LA	15	255	162	72	83	17	6	1	611
MS	11	232	141	69	75	20	5	5	558
NC	**4**	**60**	**154**	**189**	**128**	**85**	**19**	**0**	**639**
PA	63	456	308	193	77	42	28	35	1,202
SC	114	305	172	69	8	0	0	0	668
TN	20	54	12	12	0	0	0	0	98
TX	1,601	528	48	14	1	0	0	12	2,204
VA	6	360	280	54	9	3	0	0	712
WV	66	136	80	110	34	32	1	0	459
Nghbr Total	2,364	3,248	1,583	1,030	455	172	85	75	9,012
U.S. Total	5,147	12,017	6,835	4,156	1,929	784	245	185	31,298

DISTRIBUTION OF REPORTED IRI FOR NEIGHBORING STATES, NC AND THE US

STATE	INTERNATIONAL ROUGHNESS INDEX (IRI) 1/ INTERSTATE								
	< 60	60-94	95-119	120-144	145-170	171-194	195-220	> 220	TOTAL
AL	11.19%	62.27%	16.03%	7.01%	3.51%	0.00%	0.00%	0.00%	100.00%
AR	0.00%	13.30%	11.25%	21.74%	22.51%	14.07%	11.51%	5.63%	100.00%
FL	17.88%	29.40%	22.15%	29.02%	1.17%	0.39%	0.00%	0.00%	100.00%
GA	44.55%	48.51%	6.44%	0.50%	0.00%	0.00%	0.00%	0.00%	100.00%
KY	32.28%	32.09%	10.45%	15.86%	9.33%	0.00%	0.00%	0.00%	100.00%
LA	2.45%	41.73%	26.51%	11.78%	13.58%	2.78%	0.98%	0.16%	100.00%
MS	1.97%	41.58%	25.27%	12.37%	13.44%	3.58%	0.90%	0.90%	100.00%
NC	**0.63%**	**9.39%**	**24.10%**	**29.58%**	**20.03%**	**13.30%**	**2.97%**	**0.00%**	**100.00%**
PA	5.24%	37.94%	25.62%	16.06%	6.41%	3.49%	2.33%	2.91%	100.00%
SC	17.07%	45.66%	25.75%	10.33%	1.20%	0.00%	0.00%	0.00%	100.00%
TN	20.41%	55.10%	12.24%	12.24%	0.00%	0.00%	0.00%	0.00%	100.00%
TX	72.64%	23.96%	2.18%	0.64%	0.05%	0.00%	0.00%	0.54%	100.00%
VA	0.84%	50.56%	39.33%	7.58%	1.26%	0.42%	0.00%	0.00%	100.00%
WV	14.38%	29.63%	17.43%	23.97%	7.41%	6.97%	0.22%	0.00%	100.00%
Nghbr Total	26.23%	36.04%	17.57%	11.43%	5.05%	1.91%	0.94%	0.83%	100.00%
U.S. Total	16.45%	38.40%	21.84%	13.28%	6.16%	2.50%	0.78%	0.59%	100.00%

Source: U. S. Department of Transportation

FUNCTIONAL SYSTEM LENGTH - 1996
MILES BY VOLUME - SERVICE FLOW RATIO - URBAN

TABLE HM-61
OCTOBER 1997 SHEET 3 OF 4

STATE	Interstate		Other Free. & Express		Other. Prin. Arteria		Total Miles Congested	Total # of Road Miles	% Miles Congested	U.S. Ranking
	0.80-0.95	> 0.95	0.80-0.95	> 0.95	0.80-0.95	> 0.95				
Wyoming	0	0	0	0	3	1	4	295	1.36%	1
Montana	0	0	0	0	5	4	9	227	3.96%	2
North Dakota	0	0	0	0	3	6	9	204	4.41%	3
Iowa	12	9	0	0	6	16	43	854	5.04%	4
Kansas	12	5	3	3	18	25	66	952	6.93%	5
Utah	5	10	0	3	9	11	38	445	8.54%	6
Mississippi	19	5	0	0	24	21	69	801	8.61%	7
South Dakota	0	0	0	2	9	5	16	166	9.64%	8
Alaska	2	1	0	0	3	5	11	109	10.09%	9
Oklahoma	29	13	6	20	19	31	118	1,146	10.30%	10
Alabama	41	16	6	1	42	35	141	1,309	10.77%	11
Nebraska	8	1	0	3	15	33	60	479	12.53%	12
Idaho	6	0	0	0	16	16	38	301	12.62%	13
New Mexico	7	10	0	0	42	25	84	630	13.33%	14
Arkansas	7	25	2	10	30	40	114	833	13.69%	15
Texas	210	80	114	83	324	211	1,022	7,178	14.24%	16
Arizona	11	7	7	12	76	87	200	1,292	15.48%	17
Nevada	9	8	4	7	7	21	56	355	15.77%	18
Vermont	0	0	1	1	14	9	25	156	16.03%	19
Oregon	37	31	7	19	12	28	134	827	16.20%	20
Pennsylvania	29	72	13	29	146	254	543	3,287	16.52%	21
Delaware	4	8	0	0	15	6	33	187	17.65%	22
Missouri	69	43	22	9	101	70	314	1,772	17.72%	23
Florida	62	175	23	46	182	149	637	3,565	17.87%	24
Rhode Island	7	12	7	4	18	35	83	447	18.57%	25
New Hampshire	7	6	4	4	7	21	49	260	18.85%	26
Wisconsin	35	30	12	1	128	108	314	1,660	18.92%	27
Maine	3	1	0	1	18	26	49	246	19.92%	28
South Carolina	33	12	4	19	48	74	190	924	20.56%	29
Louisiana	16	33	3	12	97	87	248	1,172	21.16%	30
Georgia	90	182	13	38	83	94	500	2,349	21.29%	31
West Virginia	8	4	0	0	25	28	65	304	21.38%	32
Tennessee	43	98	20	7	102	109	379	1,730	21.91%	33
Michigan	81	92	26	17	174	203	593	2,694	22.01%	34
Ohio	136	175	29	10	151	209	710	3,112	22.81%	35
Massachusetts	57	48	19	12	145	219	500	2,159	23.16%	36
Connecticut	50	27	16	29	41	86	249	1,045	23.83%	37
Washington	41	46	36	38	85	153	399	1,666	23.95%	38
Illinois	93	178	10	2	284	236	803	3,319	24.19%	39
Colorado	23	41	40	20	58	127	309	1,240	24.92%	40
Indiana	20	21	2	11	176	273	503	2,002	25.12%	41
California	318	285	314	269	555	483	2,224	8,267	26.90%	42
North Carolina	***51***	***72***	***28***	***38***	***182***	***195***	***566***	***1,974***	***28.67%***	***43***
Kentucky	52	42	7	3	71	103	278	953	29.17%	44
Maryland	60	53	31	16	139	109	408	1,341	30.43%	45
Virginia	71	87	29	58	54	255	554	1,761	31.46%	46
New York	100	120	68	191	331	468	1,278	4,042	31.62%	47
Minnesota	56	77	18	43	52	65	311	932	33.37%	48
Hawaii	8	8	14	5	24	15	74	212	34.91%	49
New Jersey	48	70	41	57	110	478	804	1,920	41.88%	50
Dist. of Columbia	6	2	9	3	19	18	57	112	50.89%	51
U.S. Total	2,092	2,341	1,008	1,156	4,298	5,386	16,281	75,213	21.65%	

Source: U. S. Department of Transportation

MOTOR VEHICLE TRAFFIC FATALITIES AND INJURIES - 1996
TOTAL - RURAL AND URBAN
Data used for 1996 Fatal and Non-Fatal Accident Rates

OCTOBER 1997

STATE	FATAL RATE	US RANK
Massachusetts	0.78	1
Rhode Island	0.91	2
Connecticut	1.05	3
Minnesota	1.13	4
Virginia	1.13	5
New Hampshire	1.14	6
Vermont	1.16	7
North Dakota	1.19	8
New York	1.20	9
Maryland	1.21	10
Ohio	1.21	10
New Jersey	1.21	10
Maine	1.22	13
Wisconsin	1.25	14
California	1.29	15
Washington	1.30	16
Indiana	1.32	17
Illinois	1.36	18
Delaware	1.37	19
Pennsylvania	1.40	20
Utah	1.45	21
Nebraska	1.48	22
Michigan	1.48	22
U.S. Total	1.50	
Oregon	1.52	24
Iowa	1.53	25
Colorado	1.54	26
Georgia	1.57	27
Wyoming	1.64	28
Missouri	1.64	28
Hawaii	1.67	30
North Carolina	***1.68***	***31***
Oklahoma	1.70	32
Kansas	1.71	33
Kentucky	1.72	34
Alaska	1.73	35
Nghbr Ttl	1.74	
Dist. of Columbia	1.75	36
Texas	1.75	36
Idaho	1.76	38
West Virginia	1.80	39
South Dakota	1.82	40
Louisiana	1.84	41
Montana	1.89	42
New Mexico	1.92	43
Tennessee	1.92	43
Florida	1.92	43
Arkansas	1.94	46
Alabama	1.99	47
Arizona	2.03	48
South Carolina	2.07	49
Nevada	2.22	50
Mississippi	2.27	51

OCTOBER 1997

STATE	NONFATAL RATE	US RANK
Vermont	34.89	1
Arkansas	45.17	2
Wyoming	57.46	3
North Dakota	61.12	4
Alabama	62.98	5
Maryland	64.34	6
Mississippi	64.61	7
Idaho	68.68	8
California	69.70	9
Colorado	69.91	10
Louisiana	70.06	11
South Dakota	72.32	12
Montana	73.88	13
Minnesota	74.40	14
Virginia	77.39	15
Iowa	78.38	16
Kansas	79.23	17
Oregon	80.24	18
Delaware	80.64	19
Indiana	81.54	20
Wisconsin	82.93	21
Oklahoma	83.43	22
South Carolina	85.51	23
Kentucky	85.58	24
Tennessee	86.76	25
New Mexico	91.59	26
Massachusetts	91.89	27
Hawaii	92.19	28
Maine	92.37	29
Missouri	92.45	30
Pennsylvania	92.83	31
Nghbr Ttl	93.01	
Alaska	96.57	32
Illinois	97.09	33
U.S. Total	97.12	
Georgia	98.64	34
West Virginia	101.88	35
Arizona	102.83	36
Michigan	106.89	37
Nevada	108.66	38
Texas	110.38	39
Washington	114.16	40
Florida	114.95	41
North Carolina	***115.63***	***42***
Connecticut	117.17	43
Rhode Island	117.36	44
Nebraska	120.50	45
Ohio	130.44	46
New Jersey	132.41	47
New York	159.47	48
New Hampshire	175.92	49
Utah	178.45	50
Dist. of Columbia	398.28	51

1/ Annual average daily traffic.
2/ Pedestrians injured are included. Most serious injuries are those categorized as incapacitating.
3/ Numbers adjusted to agree with State totals obtained from the Fatal Analysis Reporting System (FARS) as of June 1, 1997.

Source: U. S. Department of Transportation

B. SELECTED DATA

This Appendix B presents selected data utilized for this performance review.

Exhibit B-1: North Carolina Department of Transportation Budget - Earmarked and Non-Earmarked Funds ($ millions)

TOTAL 1997-98 NCDOT BUDGET	$ 2,521.0	
ITEMS EARMARKED BY STATUTES		
STATE TIP CONSTRUCTION	548.4	21.8%
FEDERAL AID FOR HIGHWAY CONST.	480.6	19.1%
FEDERAL AID, OTHER	26.7	1.1%
HIGHWAY FUND TO TRUST FUND	38.0	1.5%
SECONDARY CONSTRUCTION	150.1	6.0%
MUNICIPAL AID	118.7	4.7%
GASOLINE INSPECTION FEE	12.4	0.5%
TRUST FUND PAYMENT TO GENERAL FUND	170.0	6.7%
TRUST FUND ADMINISTRATION	25.9	1.0%
AVIATION (GENERAL FUN EARMARKED)	10.6	0.4%
	1,581.4	62.7%
ITEMS OUTSIDE DOT CONTROL		
EARMARKED RESERVES	36.9	1.5%
HIGHWAY PATROL	116.8	4.6%
DRIVER EDUCAION	22.4	0.9%
SALES TAX PAYMENT	13.0	0.5%
	189.1	7.5%
TOTAL EARMARKED FUNDING	1,770.5	70.2%
NON EARMARKED FUNDING		
"DISCRETIONARY" CONSTRUCTION	35.1	1.4%
HIGHWAY MAINTENANCE	453.2	18.0%
FERRY OPERATIONS	18.1	0.7%
TRANSIT	24.0	1.0%
RAIL	18.8	0.7%
CAPITAL OUTLAY	12.1	0.5%
DMV	95.3	3.8%
DOH ADMINISTRATION	35.4	1.4%
DOT ADMINISTRATION	58.5	2.3%
TOTAL NON EARMARKED FUNDING	750.5	29.8%

Source: NCDOT

Exhibit B-2: Construction Inflation and Project Growth Factors Used by State DOTs

Alabama	• 5% annually, estimates revised when new information warrants. • 5 year specific, 20 year overall.
Arizona	• Inflation not applied to program but estimates revised in STIP annually. • 6 year STIP, 20 year overall.
Arkansas	• 3 Year Program: Add 10% one time (3.33%/yr) to cost estimate.
Colorado	• Inflation not applied to program but estimates revised in STIP annually. • 6 year STIP, 20 year overall.
Connecticut	• No factor applied, revise estimates only as needed. • 3 year project specific, 10 year master, 20 year overall.
Florida	• Annually updates growth factor: • 1998 2.3%, 1999 3.7%, 2000 3.6%, 2001-2007 3.3% • Revise estimates as scope changes. • 5 year plan project specific, LRP through 2020
Illinois	• 3% on 5 Year Program plus or minus scope or design change updated yearly.
Iowa	• 3% on 5 Year Program plus or minus scope or design change updated yearly
Kansas	• 5.2% on 10 Year Program. • Use McGraw Hill DRI CPI + 1
Kentucky	• No growth factor, costs updated at plan update. Estimates continuously reviewed and allow 15% increase; over that seek legislative approval. • 6 year plan updated every 2 years.
Maine	• Growth factor varies, finance section determines. • Applied on an as needed basis. Estimates are revised continually. • 2 year program going to a 6 year program.
Maryland	• 3.5% for Construction and design, 5.25 % for R/W applied. • Estimates are revised yearly.
Michigan	• Use CPI on annual basis. • Estimates revised annually. • 3 year short term, 20 year plan.
Minnesota	• Add contingency of 5 to 10% to estimate to cover inflation and other unexpected costs. If estimate is over 5 years old it is reviewed
Nebraska	• 3.5% on Long Range Projections (20 Year) plus or minus scope or design changes.
Nevada	• No growth factor. • 10 year plan with 1 year element and 3 year element but revise project estimates every year.
New Hampshire	• 10-year program estimates updated every 2 years.
New Mexico	• No longer put in growth factors but update 6 year program and project estimates every year.
North Carolina	• **Annual update of estimates to 7 year program.**
Oklahoma	• 5 year program updated every 6 months, no growth factors. • Projects revised with STIP every other year.
Pennsylvania	• 4% (do not discount 1st 4 years). Update 12 year program estimates every 2 years
Rhode Island	• Growth factor applied every year. • Project estimates revised annually. • Program updated every 2 years, TIPs every 3 years.
South Carolina	• 3.5% on 5 year STIP. • Estimates revised every year.
Tennessee	• 4%/year on 3 Year TIP.
Texas	• 5.5% on 10 Year Forecasts.
Vermont	• 5%/year on upcoming year and the next 5 years compounded yearly. • Large projects revised every 2 years, small projects every 3 years.
Washington	• 3.5% and use FHWA const. index update every two years. • Continuously revise estimates. • Budget 2 years, update every 2 years.
Washington DC	• No growth factor applied. • Revises estimates at various stages of project development. • 24 year project specific.
West Virginia	• Growth factor applied every year, is a function of the total revenue and operating costs. • Multi-year plan project estimates revised yearly.
Wisconsin	• Adjust entire 10-year program every 2 years based on Consumer Price Index (CPI).
Wyoming	• Use inflation index. • Estimates revised periodically. • 6 year program

Source: Primer on 1992 15-Year Highway Plan and the Total Transportation Commission Report (July 22, 1997), State of Missouri

Exhibit B-3: Alternate Construction Contracting Methods

Traditionally, construction contracts include provisions for liquidated damages in the event that a project is delayed. There are several alternate contracting methods that provide contractors with incentives to finish projects in a timely manner. State departments of transportation (DOT) are utilizing these methods with increasing frequency. The common premise with these alternate contract methods is that contractors are less likely to file claims when they finish projects on schedule. Each of these methods recognizes a cost to the public for the inconvenience of a transportation facility that is either out of service or functioning at a reduced capacity. This is referred to as the Daily Road User Cost (DRUC).

- **Incentive/Disincentive (I/D) contracts.** This method provides for additional payment to the contractor for each unit of time that the contractor completes the project ahead of a DOT's fixed date, as well as additional cost to the contractor for each unit of time that it completes the project beyond a DOT's fixed date. The I/D concept is best suited to projects and tasks where the owner has limited its risk for delay claims.

- **Cost Plus Time contracts (A+B).** With this method, a DOT furnishes the DRUC and each contractor determines the number of days it requires to complete the project. Each contractor computes its bid by multiplying its number of days by the DRUC and adding the result to the construction cost.

- **Lane rental contracts.** With this method, a DOT defines a fee schedule for lane closures for various times of day and days of the week that is based on traffic studies. Bidders submit their cost to perform the work, in addition to the estimated time required for lane closures, during each rental fee period. A department of transportation determines the low bidder by adding its estimated total lane rental cost to each bid submitted. The successful contractor pays a DOT for lane closures in accordance with the predetermined rental fee schedule. The contractor receives any remaining lane rental funds at the end of the project, and the owner receives credits for lane rental costs that exceed the budget.

North Carolina Department of Transportation
Transportation Improvement Program Funding Needs
(FY 1998 - FY 2004)

Program	Number of Projects	Total Estimated Project Costs ($1998)	Prior Year Expenditures	Total Funding Needs	Programmed Expenditures FY 1998	Programmed Expenditures FY 1999	Programmed Expenditures FY 2000	Programmed Expenditures FY 2001	Programmed Expenditures FY 2002
Congestion Mitigation	16	$91,114,000	$21,024,000	$70,090,000	$10,090,000	$10,000,000	$10,000,000	$10,000,000	$10,000,000
Enhancement Program	104	$81,704,000	$48,774,000	$32,930,000	$9,035,000	$7,965,000	$7,965,000	$7,965,000	$0
Federal Bridge	978	$1,116,482,000	$363,761,000	$752,721,000	$118,334,000	$112,394,000	$84,988,000	$75,895,000	$76,311,000
Ferry	14	$52,552,000	$18,902,000	$33,650,000	$8,000,000	$8,250,000	$2,750,000	$4,200,000	$5,000,000
High Hazard	77	$74,516,000	$9,963,000	$64,553,000	$10,085,000	$7,900,000	$7,000,000	$7,000,000	$7,000,000
Interstate Roadways	78	$2,385,654,000	$637,613,000	$1,748,041,000	$231,313,000	$109,951,000	$149,558,000	$144,475,000	$140,633,000
Municipal Bridge	41	$23,571,000	$6,396,000	$17,175,000	$3,575,000	$4,615,000	$1,600,000	$900,000	$60,000
Passenger Rail	66	$847,224,000	$39,203,000	$808,021,000	$99,599,000	$135,797,000	$127,725,000	$129,700,000	$129,700,000
Rail	410	$53,823,000	$29,041,000	$24,782,000	$7,125,000	$883,000	$1,362,000	$1,462,000	$4,400,000
Rural Roadways	421	$16,760,477,000	$3,742,805,000	$13,017,672,000	$685,823,000	$828,178,000	$812,838,000	$632,023,000	$641,332,000
Scenic Landscape & Rest Area	28	$25,467,000	$10,012,000	$15,455,000	$2,895,000	$2,295,000	$5,470,000	$2,795,000	$2,000,000
Urban Roadways	387	$5,222,162,000	$753,446,000	$4,468,716,000	$182,443,000	$269,253,000	$222,614,000	$157,887,000	$169,499,000
TOTAL PROGRAM COST	**2,620**	**$26,734,746,000**	**$5,680,940,000**	**$21,053,806,000**	**$1,368,317,000**	**$1,497,481,000**	**$1,433,870,000**	**$1,174,302,000**	**$1,185,935,000**

Source: NCDOT

Notes:
[1] Project Costs are in $1998 - not adjusted for inflation.
[2] Post TIP funding needs includes $6,237,578,000 for projects that are categorized as "Identified Future Needs".

North Carolina Department of Transportation
Transportation Improvement Program Funding Needs
(Adjusted for Inflation and Estimated Project Cost-Overrun)
(FY 1998 - FY 2004)

Program	Number of Projects	Total Estimated Project Costs ($1998)	Prior Year Expenditures	Total Funding Needs	Programmed Expenditures FY 1998	Programmed Expenditures FY 1999	Programmed Expenditures FY 2000	Programmed Expenditures FY 2001	Programmed Expenditures FY 2002
Congestion Mitigation	16	$104,245,460	$21,024,000	$83,221,460	$10,998,100	$11,209,000	$11,527,270	$11,855,088	$12,192,741
Enhancement Program	104	$86,174,167	$48,774,000	$37,400,167	$9,848,150	$8,927,969	$9,181,471	$9,442,578	$0
Federal Bridge	978	$1,269,364,237	$363,761,000	$905,603,237	$128,984,060	$125,982,435	$97,967,962	$89,974,191	$93,044,024
Ferry	14	$58,345,829	$18,902,000	$39,443,829	$8,720,000	$9,247,425	$3,169,999	$4,979,137	$6,096,370
High Hazard	77	$87,868,889	$9,963,000	$77,905,889	$10,992,650	$8,855,110	$8,069,089	$8,298,562	$8,534,919
Interstate Roadways	78	$2,806,126,711	$637,613,000	$2,168,513,711	$252,131,170	$123,244,076	$172,399,545	$171,276,385	$171,470,171
Municipal Bridge	41	$26,709,519	$6,396,000	$20,313,519	$3,896,750	$5,172,954	$1,844,363	$1,066,958	$73,156
Passenger Rail	66	$995,144,454	$39,203,000	$955,941,454	$108,562,910	$152,214,857	$147,232,056	$153,760,493	$158,139,847
Rail	410	$58,653,391	$29,041,000	$29,612,391	$7,766,250	$989,755	$1,570,014	$1,733,214	$5,364,806
Rural Roadways	421	$20,315,169,093	$3,742,805,000	$16,572,364,093	$747,547,070	$928,304,720	$936,980,309	$749,268,835	$781,959,481
Scenic Landscape & Rest Area	28	$27,797,477	$10,012,000	$17,785,477	$3,155,550	$2,572,466	$6,305,417	$3,313,497	$2,438,548
Urban Roadways	387	$6,482,985,560	$753,446,000	$5,729,539,560	$198,862,870	$301,805,688	$256,613,168	$187,176,429	$206,665,736
TOTAL PROGRAM COST	**2,620**	**$32,318,584,786**	**$5,680,940,000**	**$26,637,644,786**	**$1,491,465,530**	**$1,678,526,453**	**$1,652,860,663**	**$1,392,145,367**	**$1,445,979,799**

Source: NCDOT

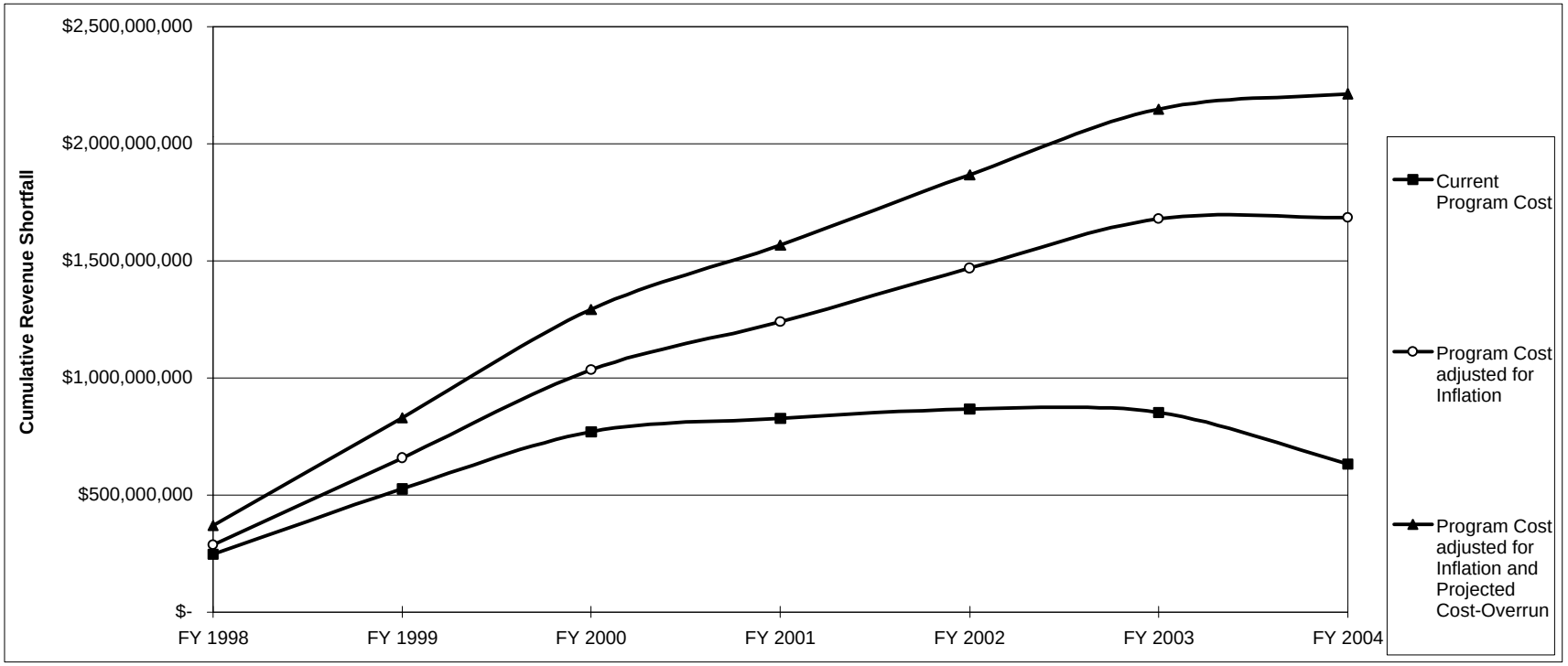
Notes:
[1] An annual cost inflation rate of 3.0% is assumed.
[2] One time project cost over-run of 6.0% is assumed.

North Carolina Department of Transportation
Transportation Improvement Program Revenue Projection
(FY 1998 - FY 2004)

	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	TOTAL
Trust Fund Allocations								
Interstate	$401,980,000	$377,380,000	$397,700,000	$416,120,000	$436,100,000	$455,790,000	$476,610,000	$2,961,680,000
Loops	$162,550,000	$152,600,000	$160,810,000	$168,260,000	$176,340,000	$184,300,000	$192,720,000	$1,197,580,000
Less Federal Match from TF	($99,350,000)	($168,750,000)	($168,750,000)	($168,750,000)	($168,750,000)	($168,750,000)	($168,750,000)	($1,111,850,000)
								$0
Net Trust Fund Availability	$465,180,000	$361,230,000	$389,760,000	$415,630,000	$443,690,000	$471,340,000	$500,580,000	$3,047,410,000
Less Safety	($10,000,000)	($10,000,000)	($10,000,000)	($10,000,000)	($10,000,000)	($10,000,000)	($10,000,000)	($70,000,000)
Bond Proceeds-Interstate*	$100,000,000	$134,000,000	$90,000,000	$0	$0	$0	$0	$324,000,000
Less Debt Service-Interstate	$0	($16,540,000)	($28,460,000)	($37,550,000)	($36,320,000)	($35,090,000)	($33,860,000)	($187,820,000)
Federal Aid	$530,000,000	$675,000,000	$675,000,000	$675,000,000	$675,000,000	$675,000,000	$675,000,000	$4,580,000,000
Required State Match:								$0
Legislative Authorization	$33,150,000	$0	$0	$0	$0	$0	$0	$33,150,000
Trust Fund	$99,350,000	$168,750,000	$168,750,000	$168,750,000	$168,750,000	$168,750,000	$168,750,000	$1,111,850,000
Sub Total	$1,217,680,000	$1,312,440,000	$1,285,050,000	$1,211,830,000	$1,241,120,000	$1,270,000,000	$1,300,470,000	$8,838,590,000
Less Planning & Design	($95,000,000)	($95,000,000)	($95,000,000)	($95,000,000)	($95,000,000)	($95,000,000)	($95,000,000)	($665,000,000)
ROW & Construction Subtotal	**$1,122,680,000**	**$1,217,440,000**	**$1,190,050,000**	**$1,116,830,000**	**$1,146,120,000**	**$1,175,000,000**	**$1,205,470,000**	**$8,173,590,000**

Source: NCDOT

North Carolina Department of Transportation
Transportation Improvement Program Projected Funding Shortfall
(FY 1998 - FY 2004)



Source: NCDOT

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

JAMES B. HUNT JR.
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

E. NORRIS TOLSON
SECRETARY

May 11, 1998

The Honorable Ralph Campbell, Jr.
State Auditor
300 North Salisbury Street
Raleigh, North Carolina 27603-5903

Dear Ralph:

I have read your draft audit of the North Carolina Department of Transportation and I believe the KPMG Peat Marwick team has identified the same key issues facing the department, the legislature and the citizens of North Carolina that we have discovered during the past four months.

As you pointed out in the audit, we have begun to address these issues by over-hauling the way we conduct the public's transportation business.

Soon after Governor Hunt sent me to the department in January, we realized the cost of the projects in the Transportation Improvement Program outweighed the amount of money available -- and we shared that with the citizens of North Carolina. We also have committed to increasing the need for maintaining our current road system and for giving our citizens a stronger voice in the transportation decisions that impact their lives. I am glad to see the audit confirms this as well.

As you mention, the first step we have taken to revamp the TIP process is to take it to a two-year cycle -- to allow more time for public input. I also have appointed a committee from the Board of Transportation, along with DOT staff, to re-evaluate the TIP and identify a way to match projects with funds available. We have identified 14 work groups to deal with major issues facing the department. Those groups include maintenance, funding, safety, public input and customer service. This month, our Public Information Office will bring on line a Customer Service Section with a toll-free line so citizens can get quick answers to transportation-related questions.

PHONE (919) 733-2520 FAX (919) 733-9150

Many of the audit's findings and recommendations would be easily managed with additional resources -- both staff and funds. But we are operating in a time when taxpayers expect government to do more with less money, so we will continue to focus on our employee improvement efforts to increase productivity and efficiency.

What we have learned during my four months in this department, and what this audit confirms, is that we have to get back to basics. We have to set priorities for the amount of money available. I believe those priorities are safety, maintenance and overall transportation needs now and for the future. We also need to involve the citizens of North Carolina in setting those priorities.

This audit comes at a time when we are continuing our reform of the Department of Transportation, and it will serve as a guide to help us improve efficiency and be more responsive to our citizens. We are grateful for the work of your staff and the KPMG Peat Marwick team.

Sincerely,

E. Norris Tolson