COMBINED
PERFORMANCE AND
INFORMATION SYSTEMS AUDIT

DEPARTMENT OF TRANSPORTATION
TECHNOLOGY SYSTEMS

JUNE 1999

STATE OF NORTH CAROLINA
Office of the State Auditor

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AUDITOR'S TRANSMITTAL

June 15, 1999

The Honorable James B. Hunt, Jr., Governor
Secretary E. Norris Tolson, Department of Transportation
Members of the North Carolina General Assembly

Ladies and Gentlemen:

We are pleased to submit this performance audit of the *Department of Transportation, Technology Systems.* This audit resulted from a request by the North Carolina legislative leadership. The main objectives of the audit were: to ensure that adequate control measures are defined, implemented, and monitored; that the business requirements for information are met; and to review the Department's use of information system contractors and communication systems.

This report consists of an executive summary, program overview, and operational findings and recommendations. The Secretary of Transportation has reviewed a draft copy of this report. His written comments are included as Appendix B, page 43.

We wish to express our appreciation to Secretary Tolson and his staff for the courtesy, cooperation, and assistance provided us during this effort.

Respectfully submitted,

Ralph Campbell, Jr.
State Auditor

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EXECUTIVE SUMMARY

We have conducted a combined performance and information systems audit of the North Carolina Department of Transportation (Department) Technology Systems. This audit resulted from a request by the North Carolina legislative leadership. The main objectives of the audit were: to ensure that adequate control measures are defined, implemented, and monitored; that the business requirements for information are met; and to review the Department's use of information system contractors and communication systems.

The Information Systems Technology section (IST) and the Engineering Technology Systems section (ETS) are the location for 95% of the information technology processes in the Department. The audit focused on these two areas, however we also examined operations and functions in other units within the Department as necessary. During the audit, Department management made the decision to reorganize the information technology services for the Department. After reviewing the technology systems operations we noted some areas, listed below, in which operations could be further enhanced.

The Secretary of Transportation, as well as Department management, have reviewed the draft report. The Secretary's response is included as Appendix B, page 43.

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AUDIT OBJECTIVES, SCOPE, AND METHODOLOGY

North Carolina General Statute 147-64 empowers the State Auditor with authority to conduct audits of any State agency or program. Performance audits are reviews of activities and operations to determine whether resources are being used economically, efficiently, and effectively. Audits of information systems are designed to examine general and application controls of the data processing systems. This audit included both performance and information systems components.

An audit of the technology systems within the Department of Transportation (Department) was undertaken at the request of the legislative leadership. Using data provided by management, we determined that 95% of the information technology processes were located in the Information Systems Technology section[1] (IST) and the Engineering Technology Systems section (ETS)[2]. Therefore, this audit focuses on these two areas, but also examines operations and functions in other units within the Department as necessary.

During the audit, specific issues surrounding the coordination of communication and use and monitoring of contractors surfaced which further defined our initial scope. The specific objectives of the audit were to:

- Ensure that the business requirements for information are met, and that adequate control measures are defined, implemented, and monitored,
- Review the Department's use of information system contractors, and
- Review the Department's use of communication services.

During the period May 18, 1998 through November 30, 1998, we conducted the on-site fieldwork for the audit. To achieve the performance audit objectives, we employed various auditing techniques which adhere to the generally accepted standards as promulgated in *Government Auditing Standards* issued by the Comptroller General of the United States. We also employed the *Control Objectives for Information Technology* (COBIT), which are generally applicable and accepted standards for good practices for information technology control. These techniques included:

- Review of the Department/IST policies and procedures;
- In-depth interviews with Department staff, as well as interviews with persons external to the Department;
- Review of physical and logical security for the Department's systems;
- Review the management of application system projects;
- Comparison of user access rights to job duties;
- Survey of 160 contracted personnel as identified by IST management;
- Examination of Department information systems contractor files and lease agreements;
- Review of Department telephone lines and expenditures; and

[1] The Information Systems Technology section was formerly known as the Management Information Systems Division.

[2] The Engineering Technology Systems section was formerly known as the Engineering Automation Branch.

- Review of IST technology educational expenditures.

This report contains the results of the audit, as well as specific recommendations aimed at improving the operations of the IST section in terms of economy, efficiency, and effectiveness. Because of the test nature and other inherent limitations of an audit, together with the limitations of any system of internal and management controls, this audit would not necessarily disclose all weaknesses in the system or lack of compliance. Also, projection of any of the results contained in this report to future periods is subject to the risk that procedures may become inadequate due to changes in conditions and/or personnel, or that the effectiveness of the design and operation of the policies and procedures may deteriorate.

TECHNOLOGY ENVIRONMENT

The Department's technology environment consists of approximately 130 different application systems. The majority of these systems are maintained or secured by three groups within DOT. Two of these, Information Systems Technology section (IST) and Engineering Technology Systems section (ETS), are responsible for approximately 95% of the information systems function. The Management Assessment unit (MAU) and Information Systems Technology share the responsibility for securing these systems. Exhibit 1, page 6, shows the organizational placement for each of these groups.

INFORMATION SYSTEMS TECHNOLOGY (IST)

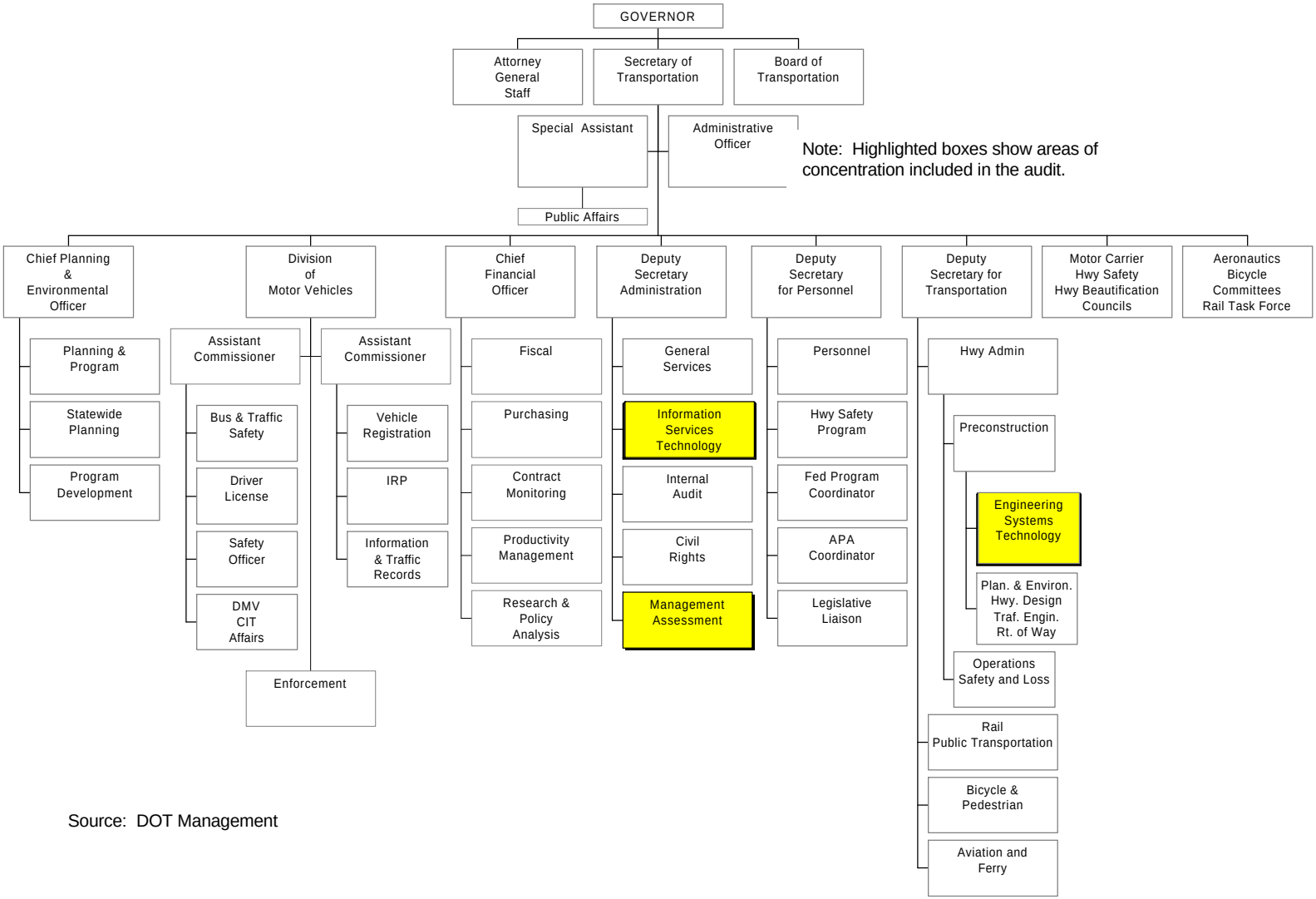
IST is primarily responsible for the development and support of the Department's operational and administrative systems. IST is composed of ten sections that support the major business systems and functions. Personnel consist of state employees and contractors, with contractors composing the majority of staff. Table 1 details the major functions of these sections.

TABLE 1
Department of Transportation
Information Technology Services

Section	Function	Section	Function
Division of Motor Vehicle (DMV) Systems	Develop, enhance, modify and maintain applications for the several DMV programs and systems such as: • Dealer system • High School Drop Out Program • Crash Reporting System • School Bus Traffic and Safety Program Emissions Project	Networking Administration	Management of local area networks and the connection to wide area networks through planning, installation, and maintenance
Year 2000	Inventory all the Department computer applications and systems to identify problems related to Year 2000 and determine if these need to be replaced, modified, or retired.	New Technology Engineering	Assess industry trends and evaluate new technology
Division of Highway Systems	Design of projects for client server development of information on highway construction specifications, proposals, estimates; cost of materials; and maintenance of highway projects.	Imaging Systems	Systems to improve document management for vehicle registration, medical evaluation for drivers' license, DMV emission inspections, invoices, and workers compensation information.
Administration and Multi-modal Systems	Develop, enhance, modify and maintain applications for programs related to: • Fiscal Division • Inventory and equipment • Purchasing • Payroll • Personnel • Budgeting • Contract coordination • Maintain supplies	DMV Liaison	Work with DMV and IST management to establish strategic plans, policies, and priorities related to information technology.
Database Administration	Provides technical support for the application development staff with emphasis on code modification; manage RACF computer security.	Client Services	Provide technology support through help desk assistance, installation, and troubleshooting for hardware and software.

Source: IST Management

EXHIBIT 1
DEPARTMENT OF TRANSPORTATION
ORGANIZATIONAL STRUCTURE
AUGUST 1998



Note: Highlighted boxes show areas of concentration included in the audit.

Source: DOT Management

ENGINEERING TECHNOLOGY SYSTEMS (ETS)

The Department's Division of Highways (DOH) has an information systems section designated as the **Engineering Technology Systems** section, previously called the Engineering Automation Branch. This group, located in the Preconstruction section of DOH, is responsible for providing computer and CADD (Computer Aided Drafting and Design) equipment, services, training, and engineering applications programming for the Division of Highways. ETS is composed of three teams of permanent state employees supporting the major DOH business systems and functions: Engineering Applications Development, Microcomputer Engineering Unit, and Network Installation and Support. Table 2 details the major functions of each team.

TABLE 2
Department of Transportation
Division of Highways Engineering Technology Systems Section

UNIT	FUNCTION
Engineering Applications Development	• Design computer and CADD programs • Direct the development of the DOH Intranet • Maintain DOH electronic mail server • Develop database applications for Bridge Maintenance and Right of Way Sections
Microcomputer Engineering Unit	• Computer purchasing, hardware operation and maintenance, systems and software support for DOH • Engineering software training • Scanning and converting photographs to digital format
Network Installation and Support	• Installation of computer networking technology in all DOH offices across the State

Source: Engineering Technology Systems

MANAGEMENT ASSESSMENT UNIT (MAU)

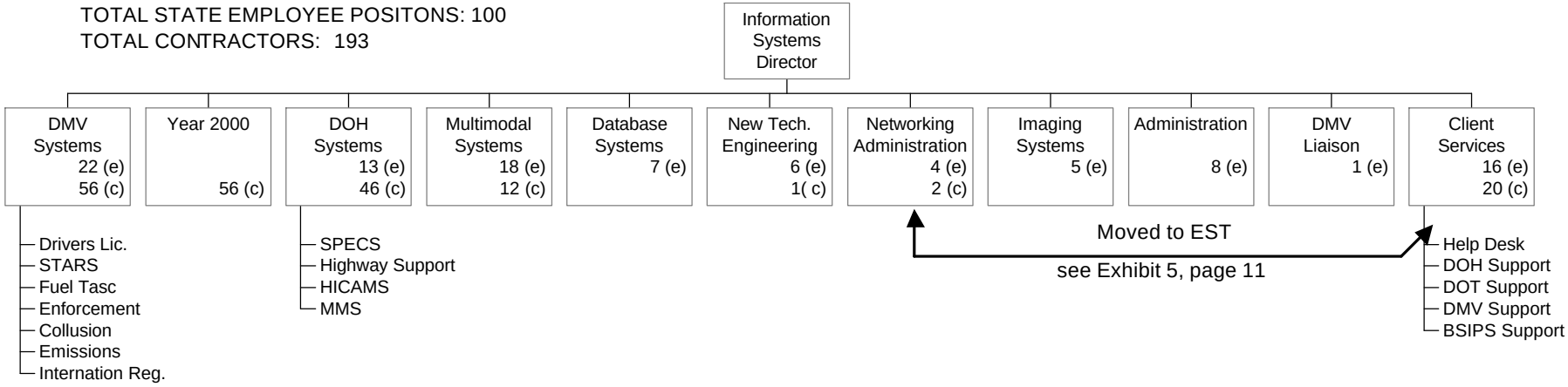
The Department's Administration Division has a section designated as the **Management Assessment Unit**. This unit is responsible for providing security to all buildings that are occupied by DOT personnel, security over telephones, loss prevention, reporting computer security vandalism, and administration of the Resource Access Control Facility (RACF) user ID and passwords. MAU is composed of one team of five permanent employees.

REORGANIZATION

Effective June 15, 1998, Department management made the decision to reorganize the information technology services for the Department. At that time, the Management Information Systems Section was renamed *Information Systems Technology*. The Engineering Automation section became *Engineering Technology Systems*. To better align functions**,** the IST Client Services and IST Network Administration units were moved to ETS to eliminate duplication of services and establish more efficient technology applications for the Department. Exhibit 2, page 8, shows the organizational structure in place at the time the audit began. Exhibit 3, page 9, shows the structure after reorganization in July 1998. Supervisory responsibilities also changed significantly for some personnel in this reorganization (see findings and recommendations p. 22). Exhibit 4, page 10, shows the organizational structure for ETS prior to the reorganization, with the structure after reorganization shown in Exhibit 5, page 11.

EXHIBIT 2
NCDOT-Management Information Systems
Organizational Chart
June, 1998

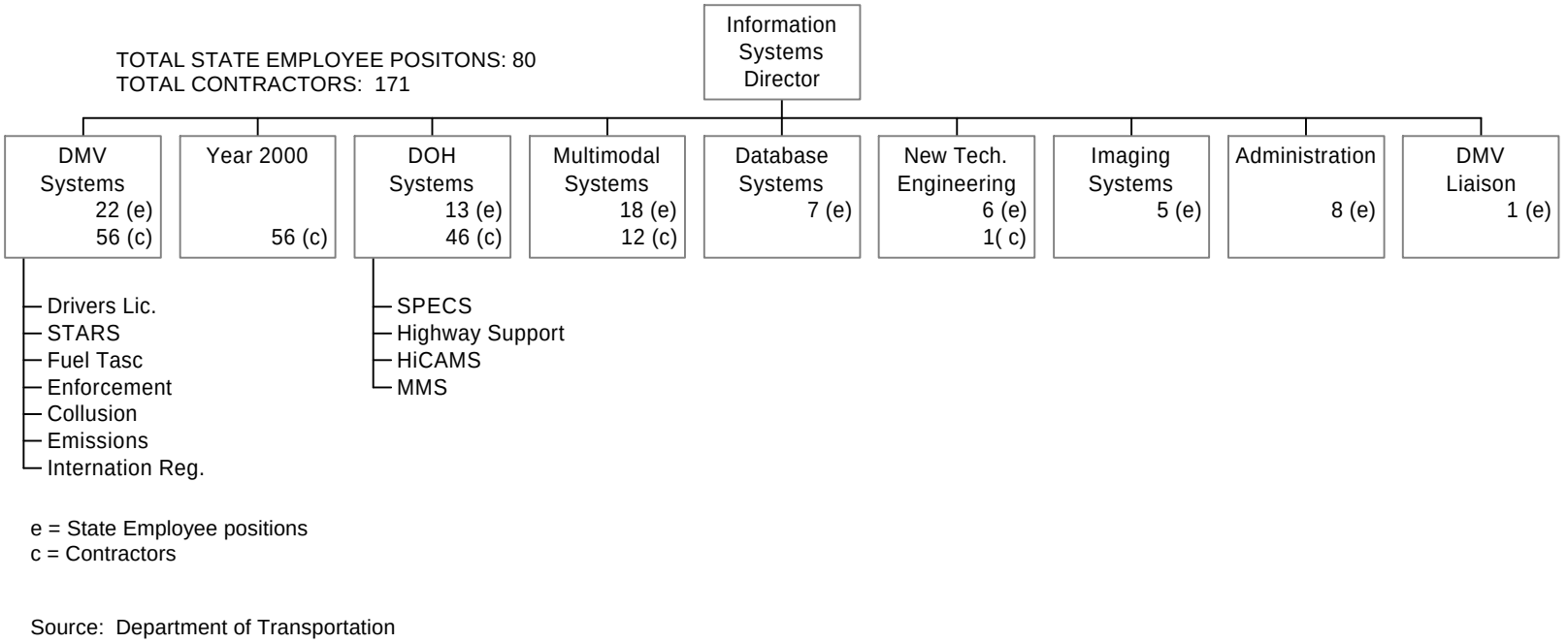
TOTAL STATE EMPLOYEE POSITONS: 100
TOTAL CONTRACTORS: 193



e = State Employee positions
c = Contractors

Source: Department of Transportation

EXHIBIT 3
NCDOT-Information Systems Technology
(Formerly Management Information Systems)
Organizational Chart
July 1998

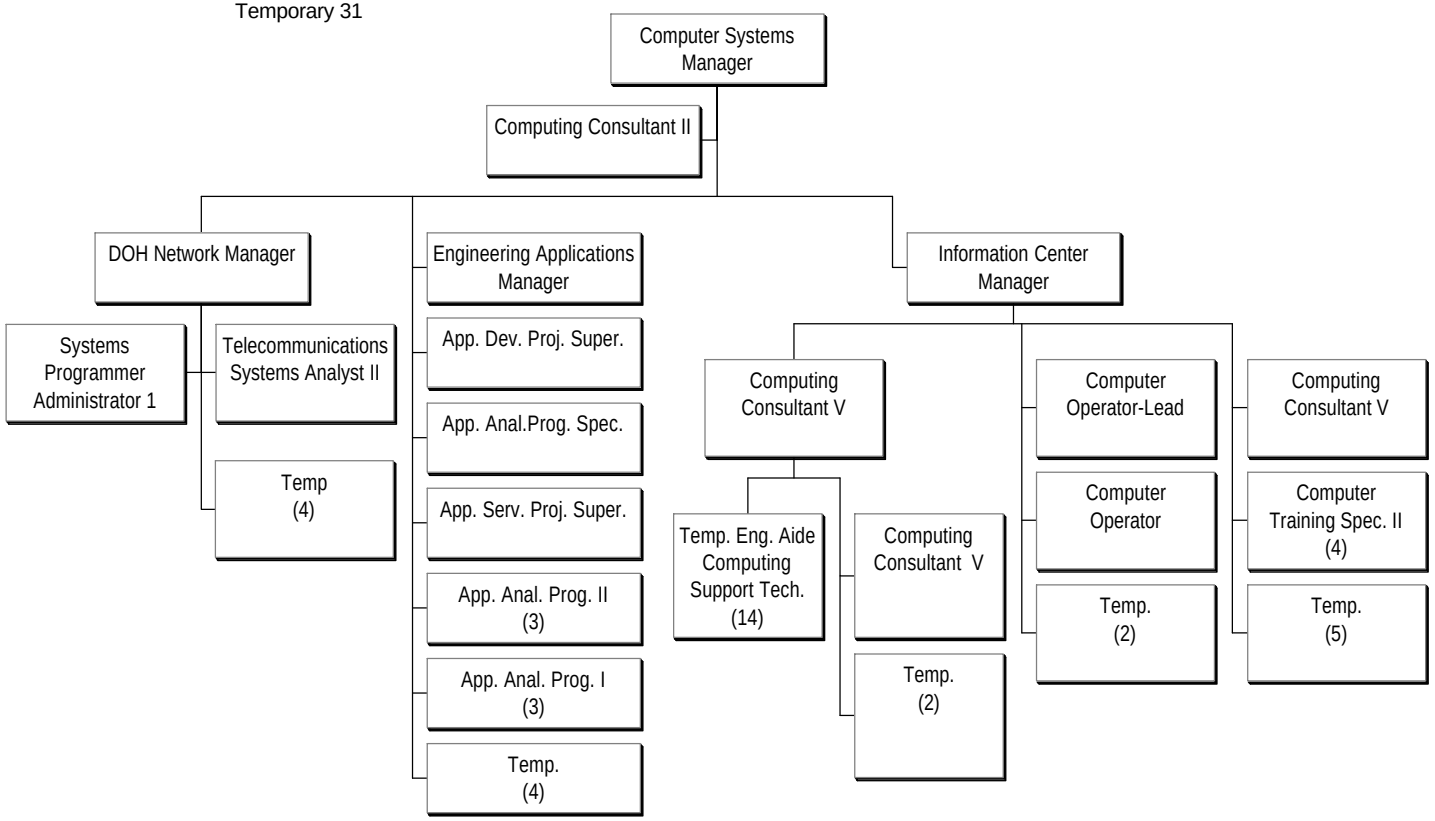


e = State Employee positions
c = Contractors

Source: Department of Transportation

EXHIBIT 4
Engineering Automation Branch
Organizational Structure
June 1998

Total State Employees - Permanent 25
Temporary 31

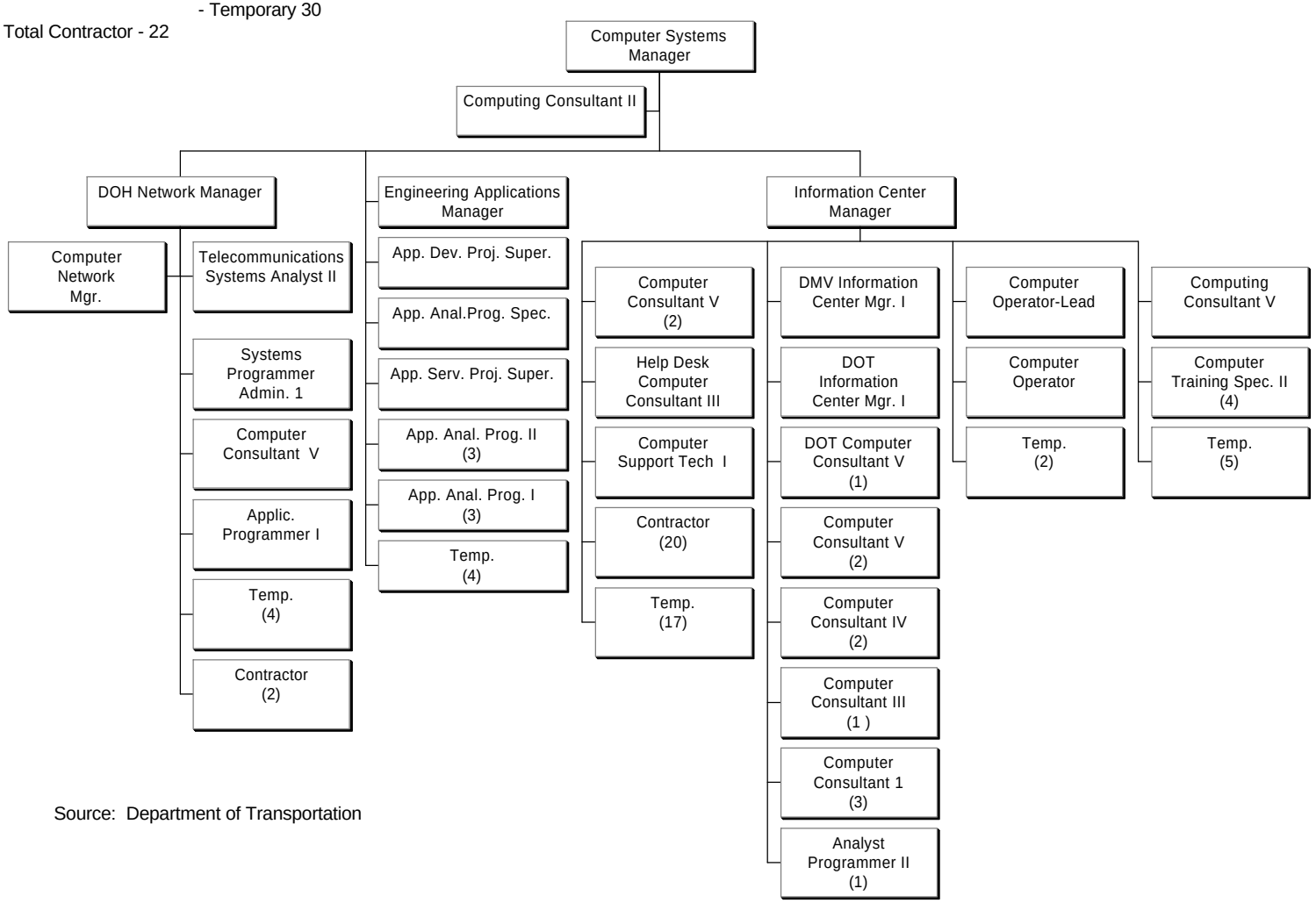


Source: Department of Transportation

EXHIBIT 5
Engineering Technology Systems
Organizational Structure
July 1998

Total State Employees - Permanent 42
- Temporary 30

Total Contractor - 22



Source: Department of Transportation

INFORMATION SYSTEM PROJECTS

IST is involved in the operations of several information system projects as shown in Table 3. Three of these projects are directly related to specific functions of other divisions within the Department. Within the Division of Highways unit of IST, there are two technology projects (SPECS and HICAMS) that are directed primarily by individuals within the Department's Division of Highways. The majority of the funding to support expenditures for these two projects comes from the budget of the Division of Highways. These two projects require the services of approximately 20% of the Department's information systems contracted personnel. Contracted personnel also perform the majority of the operations for the Business Systems Improvement Project (BSIP) directed and funded by the Department's Fiscal section. The goal of this project is to provide for the complete financial accounting and reporting requirements of the Department.

TABLE 3
Department of Transportation
Information System Projects
June 1998

PROJECT	PURPOSE	SECTION WITH SUPPORTING DOCUMENTATION FOR CONTRACTOR LABOR	DIVISION AUTHORIZING CONTRACTOR PAYMENT
IST			
Specifications, Proposals, Estimates, and Contract Systems (SPECS)	Develop automated programs for the SPECS of highway projects	IST	Highway
Highway Construction and Materials System (HiCAMS)	Automate the manual process to provide information on highway construction administration and materials testing	IST	Highway
Business Systems Improvement Project (BSIP)	Development of a system to provide for complete financial accounting and reporting requirements	Contractor	Fiscal
Endeavor Migration	Moving application systems into the endeavor librarian management system.	Contractor	IST
Year 2000	Correct applications systems to properly operate in year 2000 and beyond.	Contractor	IST
Customer Information Control System (CICS) Migration	Enables transactions entered at remote terminals to be processed concurrently with user-written application programs	Contractor	IST
Public Transportation Grants Administration Automated System(GAAS)	Application developed to assist Public Transportation (PT) in administration of grants ; project is to move application to new AS/400 Advanced Series (9402 Model), Mainframe, LAN-Based PC Platform (NT server).	IST	IST
ETS			
Electronic Mail and Calendar System	Provide one email and calendar system for DOT	N/A	N/A
Modernize DMV Computer Resources	Convert from prior (SNA network) to modern (TCP/IP network) technology	N/A	N/A
Establish Western Computer Support Center	To provide support and training	N/A	N/A
Network Installation	Installation in all maintenance and division offices and subshops(296 different offices)	N/A	N/A

N/A: Not applicable-no contractors in ETS
Source: IST Management

TABLE 4
Department of Transportation
Number of IST Employees and Contractors
June, 1998

IST PROJECTS/UNITS	Con-tractors	IST State Employees		
		Filled	Vacant	Total
DMV	56	18	4	22
DMV Liaison		1	0	1
Year 2000	56	0	0	0
Multimodal	12	12	4	16
DOH-Hi-CAMS	37	2	1	3
DOH-SPECS	3	2	0	2
DOH	6	3	5	8
Database System	0	6	1	7
New Technology	1	6	0	6
*Network Administration	2	3	1	4
Imaging System	0	3	2	5
*Client Services	20	16	0	16
Administration		7	1	8
SUBTOTAL	**193**	**79**	**19**	**98**
Other Information Systems/Units				
**BSIP	11	2	0	2
ETS	0	23	2	25
TOTAL	**204**	**104**	**21**	**125**

*Not under IST after reorganization
** State Employees borrowed from other IST units.

Source: Department Management

INFORMATION SYSTEMS STAFFING

The Department employs both State employees and contracted personnel to develop applications and maintain some operations for its information systems. IST utilizes approximately 95% of all information systems contractors on staff. The monitoring of contracted personnel has been assigned to the primary user of the system and not IST management. The processing of contractor documentation, such as for contractor reimbursement, is decentralized. Table 4 details the staffing during the audit.

IST FINANCIAL INFORMATION

Table 5, page 14, summarizes the expenditures of IST. Significant increases in annual contractor expenditures are mainly attributed to the Year 2000 project and the growth of the other technology projects. The Year 2000 project represented 51% ($5,110,298) of the total IST contractor expenditures of fiscal year 1997-98. Contractor expenditures for fiscal years 1995-96 through 1997-98 have equaled approximately 23% of the total as shown in Table 5, with these expenditures continuing to increase. For fiscal year 1997-98, contractor expenditures represented 30% of total expenditures. Table 6, page 14, shows expenditures for the ETS section. ETS's primary function is to perform services for specific projects or divisions within the Department. Costs associated with these services are directly allocated to that project or division. These costs, therefore, are not reflected in the expenditures illustrated in Table 6.

TABLE 5
Department of Transportation
Information Systems Technology Section (IST)
Summary of Expenditures

	Fiscal Year		
	1995-96	**1996-97**	**1997-98**
Salary	$4,603,634	$4,622,438	$5,759,609
Training	55,289	121,023	83,353
Education	46,841	36,773	13,651
Travel	50,779	66,352	60,397
Contractor Fees	**4,500,424**	**7,116,858**	**10,022,852**
Utilities	2,446,418	4,689,238	3,568,637
Rent	113,867	192,362	172,475
Repairs	366,593	215,321	96,647
Other Agency Payments	12,605,451	10,205,588	11,628,103
Supplies	28,038	42,948	70,325
Software	371,855	396,911	462,681
Data Processing Equip	4,462,701	1,792,615	1,594,352
Furniture and Equip.	18,462	181,916	92,886
Equipment Rental	122,164	69,645	46,607
Other Expenses	29,008	82,868	45,919
TOTAL	**$29,821,524**	**$29,832,856**	**$33,718,494**

Source: DOT Fiscal Division

TABLE 6
Department of Transportation
Division Of Highways Engineering Technology Systems (ETS)
Summary of Administrative Expenditures*

	Fiscal Year		
	1995-96	**1996-97**	**1997-98**
Salary	$211,185	$219,337	$229,469
Data Processing	7,447	6,014	6,166
Travel and Subsistence	5,728	10,045	13,029
Utilities	3,844	4,409	2,747
Other Expenses	4,866	93	324
TOTAL	**$233,070**	**$239,898**	**$251,735**

*Does not include expenditures from projects worked on by ETS for other divisions.

Source: DOT Fiscal Division

COMMUNICATION SERVICES

The Department's communication services, like its other information technology services, are decentralized. An employee in the Design Services Section, within the Division of Highways, is responsible for coordinating the installation of Department telephone systems throughout the State. She is responsible for new construction, office relocation, and the

replacement of existing systems. This employee also serves as the liaison between ITS[3] and divisions within the Department that wish to obtain service, although many times divisions contact ITS directly. After installation, the responsibility for coordination of maintenance or telephone system upgrades shifts to each division.

Although all regular telephone service for the Department is processed through ITS, all cellular telephone service is not. At the time of the audit, ITS was contracting for cellular service to 95 of 100 counties within North Carolina. State divisions located in the remaining counties obtain service directly from private companies operating in their area. In regard to pager service, ITS has contracts with two private companies to provide this service throughout the State. Department personnel are responsible for contacting either of these pager companies directly to obtain service.

Payment procedures for communication services are concentrated in the Department's Fiscal section. Responsibility for processing invoices is divided between two positions. One position is responsible for all telephone and cellular telephone invoices processed through ITS, and the other is responsible for cellular telephones and pagers serviced by private companies. Invoices are reviewed for any unusual or improper charges, payment is made and a copy is forwarded to each division for further review. Any adjustments noted by the division are processed during the following month.

[3] ITS (formerly SIPS) is designated as the State's coordinating authority for telecommunication services for all State agencies, including cellular telephones and pagers.

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INFORMATION TECHNOLOGY CONTROL ENVIRONMENT

Overall Objective:	*To ensure that the business requirements for information are met, and that adequate control measures are defined, implemented, and monitored.*

We employed *Control Objectives for Information Technology* (COBIT), as well as generally accepted performance auditing techniques, to assess business requirements and the effectiveness of the Department's controls for information technology. COBIT is a set of generally applicable and accepted standards for good practices for information technology control delineated in four domains: Planning and Organization, Delivery and Support, Acquisition and Implementation, and Monitoring. In order to assess the business requirements and control measures, we obtained an understanding by interviewing personnel, obtaining relevant documentation, examining policies and procedures, and having staff complete questionnaires. We evaluated the controls against the COBIT standards, specifically evaluating the appropriateness of control measures by considering identified criteria, industry standard practices, and applying auditor professional judgement. Additionally, we assessed compliance with Department policies. We substantiated the risk of not having controls in place and of controls not meeting COBIT standards by using appropriate analytical techniques. To assist the reader in understanding the COBIT standards, we have grouped findings and recommendations into five specific control objectives as follows:

- Determine whether the Department has identified, developed, communicated, and managed information technology strategies to meet its overall business objectives;
- Determine how the Department implements and modifies information technology applications;
- Determine if the required information systems services are being delivered;
- Determine if the appropriate security is in place;
- Determine if monitoring of information systems operations exists;

Additionally, we include findings and recommendations on the use of contractors and communication services. Each sub-objective contains an overall conclusion reached after performing both the COBIT and performance audit steps as described above.

INFORMATION TECHNOLOGY CONTROL ENVIRONMENT CONCLUSION:

Overall, the Department has met the business requirements for information as defined by COBIT. However, control measures have not been adequately defined, implemented, and monitored as discussed in detail in the following segments.

INFORMATION TECHNOLOGY STRATEGIES

Objective: *To determine whether the Department has identified, developed, communicated, and managed information technology strategies to meet its overall business objectives.*

Conclusion: IST, formerly MIS, has an *Information Technology Plan/Strategy*. However, this technology plan is not comprehensive and does not sufficiently support department-wide technology issues. Additionally, the Secretary of the Department had not approved the plan. Therefore, other units in the department were not aware that an information technology plan existed and do not recognize the plan as a solution to their information technology needs. Specific findings and recommendations relative to this objective follow.

MANAGEMENT HAS NOT EFFECTIVELY PLANNED THE OPERATIONS OF THE INFORMATION SYSTEMS FUNCTIONS OR ESTABLISHED PROCEDURES TO ENSURE THAT QUALITY IS MAINTAINED.

The Department of Transportation does not have an official technology plan.[4] The Information Systems Technology division (IST) had not developed written policies and procedures for all information system functions. There is neither training curriculum for IST personnel nor security awareness training for Department computer users. Also, no quality assurance function has been established.[5] Failure to perform these tasks contributes to the lack of consistency in practices among Department units, increases the risk that users are not fully trained in performing information system functions and have limited awareness of information systems security principles, and degrades the quality of the information systems function. COBIT (Control Objectives for Information Technology) standards require management to assume responsibility for formulating, developing, documenting, promulgating and controlling policies covering general aims and directives. Also, the *delivery and support domain* states that management should establish and maintain procedures for identifying and documenting the training needs of all personnel making use of information services, and that all personnel should be trained and educated in system security principles. Furthermore, the *planning and organization domain* states that management should assign the responsibility for the performance of the

[4] The May 1998 report on the Department of Transportation conducted by KPMG Peat Marwick, LLP noted the lack of technology plan as one of the problem areas for the Department.

[5] During the audit, the Department underwent a reorganization. At that time, three positions were dedicated to the quality assurance function.

quality assurance function to information services staff to ensure that information technology is meeting the needs of users.

RECOMMENDATION

The Department should immediately develop a comprehensive technology plan to effectively provide and manage information systems services. Further, the Department should develop written policies and procedures for the information systems functions and establish a training plan with adequate funding for the continuous training of Information System Technology division employees. The Department should also implement security awareness and training for users, especially for those users responsible for managing networks. Lastly, the quality assurance function should be continued for information system functions.

INFORMATION SYSTEMS FUNCTIONS ARE FRAGMENTED AND UNCOORDINATED.

The Department's information systems functions are split between Information Systems Technology (IST) and Engineering Technology Systems (ETS), with each unit reporting to different senior management. (See Exhibit 1, page 6) Because of this, duplication of effort has occurred in some of the services provided to users, such as the help desk support, user training, and network support. Users are unsure from which unit to request computer support. We found instances where users had been provided support by both units for the same request. This problem has partly been resolved by moving network support, help desk functions, and user training functions under ETS. However, we found no written policies and procedures for the division of responsibilities between the two units. We found other units performing their own information services functions, such as setting up their own networks, outside the control and oversight of either IST or ETS. Since IST and ETS do not report to the same senior management, they are inadequately positioned in the organizational structure and lack the authority to implement effective department-wide information technology infrastructure planning, policies, and procedures. COBIT standards require senior management, in placing the information services function in the overall organization structure, to ensure that this function ". . . has authority, critical mass, and independence from user departments to the degree necessary to guarantee effective information technology solutions and sufficient progress in implementing them." Also, senior management should ensure that the IST function has sufficient authority to implement department-wide policies and procedures.

RECOMMENDATION

The information systems functions should be consolidated under one unit at the division level, reporting to a deputy Secretary of the

Department of Transportation. This unit should be given the authority to implement information technology infrastructure planning and policies and procedures for the Department as a whole.

NFORMATION TECHNOLOGY APPLICATIONS

Objective: *To determine how the Department implements and modifies information technology applications.*

Conclusion: The Department is not uniform in its methods of developing, implementing, and modifying applications. Subsequently, the Department has increased the risk that crucial applications and/or changes will not be implemented as planned.

THE DEPARTMENT HAS NOT ADOPTED AND IMPLEMENTED A UNIFORM SYSTEM DEVELOPMENT LIFE CYCLE (SDLC) FOR ALL APPLICATION DEVELOPMENT TEAMS.

Each organization operating an information technology function should have a defined System Development Life Cycle (SDLC) used by all application development teams. A SDLC consists of the stages that define the system's development and maintenance activities. In conducting the audit, we noted several instances of non-compliance with COBIT standards, as listed below:

- Some development units are using a SDLC, but some units operate without a written SDLC;
- No consistency in the program change control procedures for program development teams;
- Application programmers have inappropriate access to production programs and data files;
- Controls have been established to allow only team leaders to move programs into production; however, on some teams, the Department has circumvented this control by defining most of the programmers on the team as team leaders;
- Programming contractors have the ability to update production program libraries outside the control and oversight of IST employees;
- Programmers have update access to production data files; and
- No quality assurance function to ensure compliance with the SDLC standards and to assist with moving programs from the test environment to production.

The quality of the Department's systems development efforts is seriously degraded by the absence of a common system development life cycle, absence of a quality control function for system development (see finding on page 24), and inadequate segregation of duties for moving programs from the testing environment to the production environment. COBIT

standards require the organization's senior management to define and implement information systems standards and to adopt a system development life cycle methodology governing the system development process. Also, *planning and organization control objectives* state that senior management should implement a division of roles and responsibilities which should preclude the possibility for a single individual to subvert a critical process.

RECOMMENDATION

The Department should adopt one System Development Life Cycle methodology and require all programming sections to utilize this methodology. The Department should establish a quality control function to ensure compliance with standards and to assist with moving updates from testing to production. Furthermore, the Department should adequately segregate the duties of information systems personnel to ensure that a limited group of programmers has privileges to move tests to the production environment to prevent unnecessary corruption of the Department's information system resources.

SERVICE DELIVERY

Objective: *To determine if the required information systems services are being delivered.*

The primary responsibility of the information systems units is to improve the methods used to access information. This improvement is accomplished through education of the user and the installation and repair of equipment. To assess service delivery at the administrative level, we interviewed staff and evaluated system accessibility for employees.

Conclusion: **IST is delivering required services such as help desk, network support, and access to the Department's system. However, with the Department's reorganization, the responsibilities of management within the ETS-Microcomputer Engineering Unit have become excessive. As a result, subordinates have experienced significant problems in communicating with management. This situation could impair the quality of service provided by this unit.**

SPAN OF CONTROL IS EXCESSIVE FOR THE MANAGER OF THE MICROCOMPUTER ENGINEERING UNIT.

At the time of the audit, the Information Center Manger of the newly reorganized Microcomputer Engineering unit was directly supervising 43 staff in eight different locations. Prior to the reorganization, network support services were provided by IST-Client Services and ETS–Microcomputer Technical Support units. Generally, Engineering Technology Services supported the Division of Highways and Client Services supported other divisions of the Department. However, the division of duties was unclear to Department personnel, and users often contacted the inappropriate technical support provider. To eliminate this confusion, the units were combined. The Information Center Manager became responsible for both technical support units, along with Computer Operations/Scanning, and Microcomputer Training and Support. This has increased the manager's supervisory responsibilities from nine to 43 state or contract employees at eight different locations. See Exhibit 6, page 23 for organizational chart. The manager now maintains offices at the Century Center and the Transportation Technology Center, requiring two telephone numbers and two voice mail systems.

In our opinion, this situation stretches the manager too thin and causes increased frustration for both the manger and staff. As direct supervisor, it is the manager's responsibility to observe the job performance of staff and prepare performance evaluations based in part on that observation. This function is made difficult by the fact that the staff of 43 (23 employees and 20 contractors) are located in eight different locations. The number of staff, the physical distance from staff, and the need to maintain two offices and voice mail systems impedes the manager's efficiency. The 1996 *Study of State Agency Span of Control and Organization Layers for the State of North Carolina*[6] recommends a ratio of 8 subordinates to 1 manager (8:1) as the statewide goal. The study found that the average ratio of state agencies with staff in more than one location was 8.5:1.

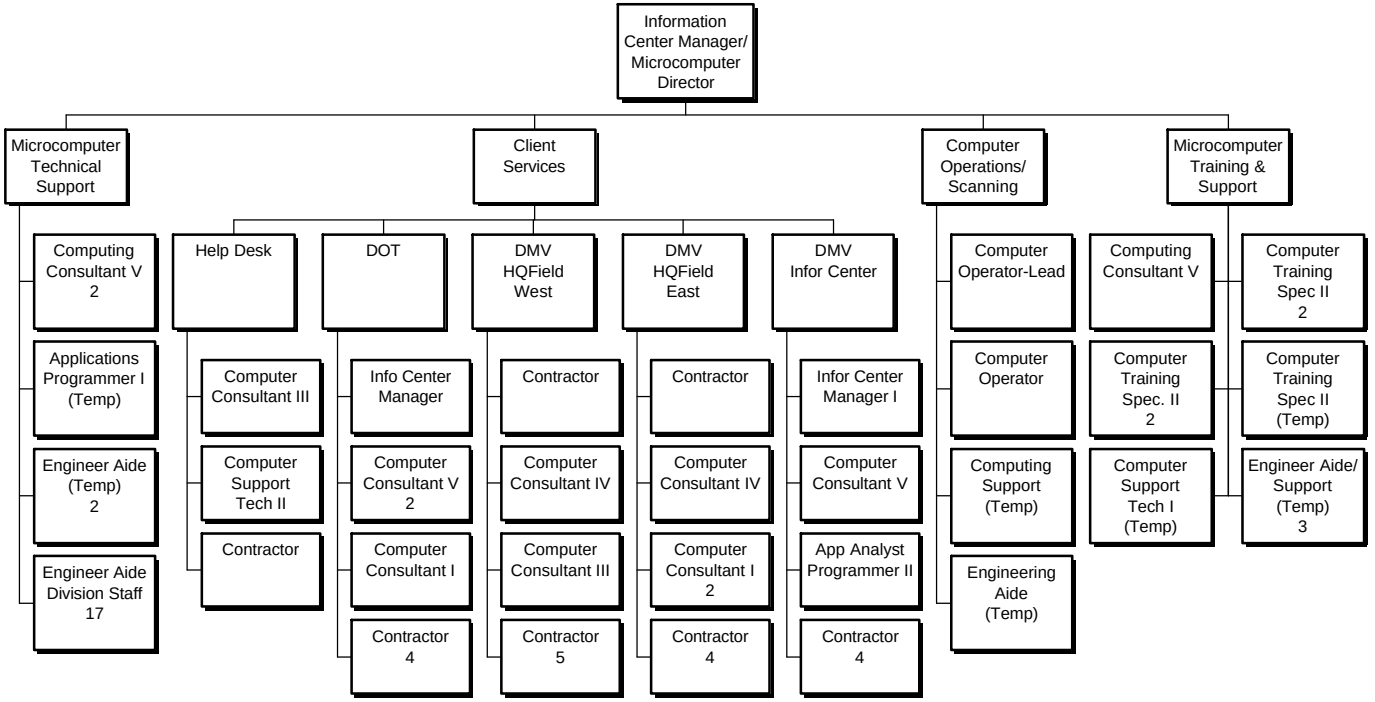
RECOMMENDATION

As part of its continuing examination of span of control, the Department should review the organizational structure of the Microcomputer Engineering unit in more detail. Consideration should be given to reassigning supervisory duties along organizational lines and physical location to reduce the excessive span of control.

Auditor's Note: The Department underwent reorganization during the audit. As part of that process, supervisory positions were identified to reduce the direct reporting responsibilities of the Information Center Manager.

[6] This study conducted by the Office of State Budget and Management found that in many government agencies the span of control is too narrow. In an effort to correct this narrow span, the study recommended an 8:1 staff to manager ratio as the statewide goal. However, the Study cautions not to increase span of control only to save funds or improve numbers.

EXHIBIT 6
NCDOT MICROCOMPTUER ENGINEERING UNIT
ORGANIZATIONAL CHART
PERSONNEL SUPERVISED BY INFORMATION CENTER MANAGER
JULY 1998



Location	Full-time/ Contractors	Temporary
	11	
Transportation Technology Center		0
DMV	12	0
Gateway	1	0
	4	
Total		10

Source: ETS Management

SECURITY

Objective: *To determine if appropriate security is in place.*

Conclusion: The security over the system is not appropriate to protect the Department's sensitive resources from access or modification by unauthorized users.

THE SECURITY ADMINISTRATION FUNCTIONS ARE FRAGMENTED AND UNCOORDINATED.

Currently, the Security Administration functions for the Department are split among IST-Database Administration unit, EST Network unit, and the Management Assessment unit (MAU). In many instances, the division of responsibilities is not clearly defined. During the audit, we learned that the Database Administration unit and MAU do not always coordinate security, sometimes overriding controls established by the other unit. Neither unit has authority to implement or enforce departmental policies and procedures for security. The current structure for the security administration function has not allowed for effective implementation of security for the various computer systems in the Department. Specific problems noted include:

- No documentation for access levels granted to users;
- Inappropriate level of access granted to users;
- Inadequate controls over the mainframe data and programs;
- An inappropriate RACF group in the access list for program libraries;
- No monitoring of security violation reports;
- No policies and procedures to define minimal security for networks and personal computers;
- No controls over users attaching modems to their personal computers (presents an increased security risk to Department networks if the personal computer is linked to the network); and
- No procedures to ensure that transferred or terminated employees have their access revoked on all computer systems.

When the Security Administrator separated from employment in May of 1998, IST management assigned the security administrator's tasks to other individuals in the Database Administration unit rather than hiring someone to fill the vacant position. This act lessens the segregation of duties and degrades the effectiveness of the security administration function. Further, in our opinion, this unit's reporting relationship within the organizational structure impedes its ability to implement and enforce security policies.

According to the Control Objectives for Information Technology standards, management should formally assign the responsibility for assuring both the logical and physical security

of the organization's information assets to an information security manager, reporting to the organization's senior management. At a minimum, security management responsibility should be established at the organization-wide level to deal with overall security issues in an organization. If needed, additional security management responsibilities should be assigned at a system-specific level to cope with related security issues.

RECOMMENDATION

The security administration functions should be moved under a separate unit reporting directly to a deputy Secretary of the Department. This unit should develop department-wide security policies and procedures for all information systems functions and be given sufficient authority to enforce the controls set forth within. This unit should be sufficiently staffed to perform the security administration functions for all computer systems in the Department.

THE DEPARTMENT HAS NOT ENSURED THAT ALL ACCESS POINTS ARE SECURED FROM MODIFICATION BY UNAUTHORIZED USERS.

During the audit, we found no controls in place to protect information systems data and resources. Specifically, we found no data classification scheme and no defined security levels to limit access to data files to authorized users only. Additionally, we found noncompliance with the Department's security policy in that employees and contracted programmers did not sign "Statements of Understanding" regarding use of computers and information system resources. We also found confidential data on servers unsecured from access by internal and external users and Web servers unsecured from modification by unauthorized users. In an online information technology environment, COBIT standards require that management implement procedures ". . .in line with the security policy that provide access security control based on the individual's demonstrated need to view, add, change, or delete data." The Department could suffer embarrassment and potential monetary damages if preventable penetrations into the system lead to unwanted images or text posted on Web servers, loss of confidential information, or exposure of sensitive data.

RECOMMENDATION

The Department should ensure that all access points are secured from modification from unauthorized users. The Department should implement methods to adequately safeguard information system resources.

MONITORING OF OPERATIONS

Objective: *To determine if monitoring of information systems operations exists.*

Conclusion: Currently, the Department does not adequately monitor the information systems operations.

THE DEPARTMENT HAS NOT PROPERLY ESTABLISHED OVERSIGHT FOR INFORMATION SYSTEMS FUNCTIONS AND RESOURCES.

Exhibit 7 lists the standards or control objectives for effective management of information technology. Our examination of the Department's Information Systems Technology division showed deficiencies in the following areas:

- Documentation could not be provided on the existence of a technology steering committee;
- No internal audit had been performed on operational, general, or application system controls of the information systems function;
- Several levels of staff, including contractors, are allowed to approve purchases of hardware and software;
- The Department does not maintain a listing of all licensed software on user's computers;
- The Department does not maintain a configuration inventory;
- The Department has not performed audits for unlicensed software within a four year period; and
- The Department has not performed systems analysis and capacity planning for potential system failures and irregularities.

EXHIBIT 7
Control Objectives for
Information Technology Management

• The organization's senior management should appoint a planning or steering committee to oversee the information services function and its activities.
• Performance indicators for information services should be established and compared with target levels.
• Management of the information services function should ensure that hardware and software acquisition plans are established and reflect the needs identified in the technological infrastructure plan.
• Software control and distribution should be integrated with a comprehensive configuration management system.
• Procedures that ensure only authorized and identifiable configuration items should be recorded in inventory upon acquisition.
• A structured review should be periodically performed on the organization's personal computers for unauthorized software.

Source: COBIT

The potential for operating errors is increased due to the lack of standards. Specifically,

- The lack of a technology steering committee to oversee the information services activities may cause inefficient planning;
- Several approval authorities for acquisitions increase the probability of purchases not conforming with the Department's technology plan;
- Audits of software are not as effective if an inventory is not maintained;
- The Department's ability to track configuration changes, unlicensed software, or exchange of equipment, such as microchips, is hampered without a configuration inventory; and
- Not performing audits for unlicensed software could potentially expose the Department to potential fines for unlicensed software infringement.

RECOMMENDATION

The Department should immediately establish the needed level of monitoring for information systems functions. First the Department should schedule the initial information committee meeting to discuss its role, responsibilities, and regular meeting schedule. Audits should be performed on unlicensed software and the Department's information technology operations. The PC software policy should be modified to include the maintenance of software inventory listings and establish a centralized library of software licenses and ownership records. A configuration inventory should be established on all hardware and software acquisitions and procedures should be developed to track all changes to the configuration. The Department should modify the approval process for hardware and software purchases to require the approval of the IST Director. Finally, the Department should become more proactive in planning to foresee and correct potential system failures and irregularities.

USE OF CONTRACTORS

Objective: *To review the Department's use of information system contractors.*

The Information Systems Technology Section is responsible for the majority of the information systems' contractor personnel. These contractors supplement the State employees and are used to avoid hiring permanent employees for short-term projects or to obtain needed expertise. Contractors are hired through the ITS "convenience contract" process whereby ITS has agreements with several vendors to perform technological services for state agencies at a specific price. Agencies with technology needs contact these vendors, obtain resumes of personnel employed by the vendor, and select the contractor from available personnel. The agency remits the hourly rate stated in the convenience contract to the vendor for the services performed. To review the Department's use of information system's contractors, we reviewed Department and IST policies and procedures; conducted staff interviews; and reviewed a judgmentally-selected sample of contractor files.

Conclusion: **The Department does not have sufficient policies, procedures, and controls in place to properly monitor the activities of information system contractors in a consistent and efficient manner.**

THE DEPARTMENT IS NOT COMPLYING WITH NORTH CAROLINA GENERAL STATUTES, ADMINISTRATIVE CODE, OR POLICIES FOR CONTRACT APPROVAL.

There are a number of State laws, regulations, and policies with which a state agency must comply prior to contracting for consultant services. These include:

- *North Carolina GS §143-64.20 (b):* No state agency shall contract to obtain services of a consultant or advisory nature unless the proposed contract has been justified to and approved in writing by the Governor of North Carolina. All written approvals shall be maintained on file as part of the agency's records for not less than five years.
- *North Carolina Administrative Code Chapter T01: 05D Section .0207*: Any modification to an approved contract(s) shall be subject to the same approval requirements as the original contract(s).
- ITS convenience contracts require the Department to submit a support request to ITS for approval prior to hiring or extending the length of time for a contractor's services.
- IST procedures require the IST Contract Coordinator to submit the above request and obtain ITS approval prior to the selection and hiring of a contractor.

We reviewed 52 contracts and/or ITS support requests related to 111 contractors for the period July, 1994 to June, 1998. Of these, 21 (40%) did not have proper or timely approval, evidencing noncompliance with either the General Statutes, Administrative Code, ITS policies, or IST procedures. Overall, there were 7 contracts totaling approximately $5.6 million that did not comply with General Statutes or Administrative Code (see Table 7). The statutes and code require approval, in writing, prior to execution of a contract or modification to a contract. In addition, there are 14 convenience contracts that did not comply with ITS policy and IST procedures requiring ITS approval prior to hiring a contractor (see Table 8).

TABLE 7
Department of Transportation
IST Noncompliance With Regulations

Violation	Vendor Name	Type of Contract*	Amount	Contract Date	Explanation of Non-Compliance**
General Statute	Computer Consultant	Sole Source	$80,260	02/01/98	Approval denied. The request was made after execution of contract.
Adm. Code	CACI Modification #2	Sole Source	$54,533	08/03/94	Lack of documentation for approval
Adm. Code	CACI Modification #3	Sole Source	$776,409	01/01/96	Approval denied. The request was made after execution of contract.
Adm. Code	CACI Modification #4	Sole Source	$366,000	03/19/96	Approval denied. The request was made after execution of contract.
Adm. Code	CACI Modification #5	Sole Source	$971,913	07/01/96	Lack of documentation of approval
General Statute	CACI New Contract	Sole Source	$877,818	12/01/96	Lack of documentation of approval
General Statute	CACI New Contract	Sole Source	$2,471,504	07/01/97	Lack of documentation of approval
	Total		**$5,598,438**		

*Sole-source contracts require justification as to why no other vendor can provide the same quality of service. Justification for all these contracts was based on prior experience of the consultant or vendor.
**Agency determining approval is Department of Administration's Purchase and Contract Division

Source: Department of Transportation contractor files and Department of Administration's Purchase & Contract Division

TABLE 8
Department of Transportation
IST Noncompliance with ITS Convenience Contract Policy & IST Procedures

Vendor Name	Amount	Start/ Extension Date	Approval Date	Explanation of Non-Compliance
Comsys	$44.02/hr	07/14/97	07/23/97	Approval after start date
Comsys	$48.00/hr	04/02/97	06/09/97	Approval after start date
Metro	$50.35/hr	09/01/96	09/20/96	Approval after extension start date
Comsys	$39.00/hr	02/07/95	02/13/95	Approval after start date
Global	$66.30/hr	02/02/98	08/24/98	Approval after extension start date
Modis	$59.00/hr	02/02/98	08/24/98	Approval after extension start date
Modis	$67.00/hr	02/02/98	08/24/98	Approval after extension start date
Modis	$76.00/hr	02/02/98	08/24/98	Approval after extension start date
Keane	$85.00/hr	02/02/98	08/24/98	Approval after extension start date
Keane	$65.00/hr	02/02/98	08/24/98	Approval after extension start date
Keane	$50.00/hr	02/02/98	08/24/98	Approval after extension start date
Keane	$85.00/hr	02/02/98	08/24/98	Approval after extension start date
Modis	$76.00/hr			Lack of Documentation
OAO	$84.00/hr			Lack of Documentation

Note: The Department obtained ITS approval after the audit results were provided.

Source: Department of Transportation contractor files

RECOMMENDATION

The IST section Director should ensure all unit managers are knowledgeable of North Carolina General Statutes, North Carolina Administrative Code, ITS policies, and IST procedures related to contracting for consultant services. Controls should be established to ensure enforcement of statutory and regulatory requirements and compliance with existing policies.

INAPPROPRIATE PURCHASING AUTHORITY PROVIDED CONTRACTORS HAS RESULTED IN INCREASED COSTS TO THE DEPARTMENT.

Contractors are hired by IST to perform a specific technology task. During the audit, we learned that management has authorized contractors to lease telephone systems, operational facilities, and approve purchases of computer hardware. When questioned, management stated that it was more expedient for the contractor to obtain services directly than it was for the Department to go through State agencies. The following examples illustrate the effect of allowing contractors this level of authority.

- The Department authorized a contractor to lease a telephone system for the facility in which it operated. The lease agreement was for 24 months at $554.74 per month, paid to the lessor by the contractor, with the contractor being reimbursed by the Department. Under the terms of this lease, the telephone system will cost a total of $13,313 for the period November, 1997 to

November, 1999. We contacted ITS, the agency legislatively authorized to provide communication services for State agencies, to obtain an estimate of the purchase cost of the telephone equipment using ITS' services. This estimate, which included purchase, installation, and administrative costs, was $8,877. We then compared ITS' estimate to the total lease amount. The lease amount was $4,436 or 33% higher than the estimate provided by ITS. ITS personnel also stated that equipment purchased through ITS could be easily transferred to another facility when the project terminated.

- The Department is paying for clerical support hired directly by contractors at the rates of $25 and $28 per hour. We contacted three employment agencies to determine the average cost for clerical support staff. We learned that $15.31 per hour is the average cost. The Department paid $41,820 for 16 months of clerical services at the higher rates. If an employment agency had been used charging the average cost of $15.31 per hour, savings of $16,398 could have been realized.

RECOMMENDATION

Department management should closely examine the impact of the purchasing authority level extended to contractors to ensure that the State's resources are used in the most efficient manner. Department management should use State agencies to provide telecommunications and other services or document that the designated State agency is unable to provide them.

THE DEPARTMENT HAS PAID EDUCATION EXPENSES FOR CONTRACTOR PERSONNEL.

During interviews, IST state employees noted that there were limited educational opportunities provided to them. Contractor survey comments also stated that state personnel lacked expertise and training in new technologies. (See Appendix A, page 41 for survey results.) Contractor personnel are hired and are paid high hourly rates in part to bridge this gap and to supplement the complement of state employees. That is, to supply the expertise not possessed by the state employees. To determine whether state employees were receiving job related continuing education, we reviewed 300 technology education expenditures from January, 1997 to July, 1998. We found that state employees had received some job related training. However, during the review we noted that $17,888 had been used to provide education for **contracted personnel** (see Table 9, page 32). Expenditures consisted of class expenses, regular hourly wages ranging from $98.38 to $35.00 per hour, lodging, and subsistence. The ITS convenience contract, the contract the Department is operating under for the majority of its contractors, does not address educational expenses for contractors.

Additionally, during our review of contractor files we noted a significant discrepancy between one contractor's qualifications and those required for the position. The purpose of the convenience contracting process is to assure state agencies that they can obtain needed expertise at reasonable rates.

RECOMMENDATION

Management should insure contracted personnel meet the established minimum qualifications for the position before approving their employment. The Department should also notify ITS of contract vendors that refer unqualified individuals for interviews. Additionally, in planning for technological operations, management should incorporate promotion of the career growth of its state employees through additional training and experience opportunities as a way to reduce the number of contractors.

RECORDKEEPING FOR CONTRACTOR SERVICES AND PAYMENT APPROVAL IS INCONSISTENT.

The Department has not established formal policies or procedures that specifically address: (1) oversight responsibility of contractor personnel; (2) review and approval of documentation provided to the contract coordinator for vendor payments; or (3) allowable reimbursements for contractor expenses and the steps to follow for expenses not addressed. Due to the lack of formal policies and procedures for monitoring contractors, each division with project oversight responsibilities has developed its own. A review of contractor files revealed inconsistent procedures in recordkeeping among IST, DOH, and Fiscal as explained below.

- IST's informal policy requires contract personnel to be supervised by a state employee. This is a control for ensuring contractual services are actually performed and monitored. IST is responsible for overseeing the Department's Year 2000 (Y2K) conversion project. Two contractors have been assigned as project managers, a task that the Department's procedures say should be performed by a state employee. These project managers are responsible for monitoring the daily work of the 54 contractors in this section. Monitoring includes review and approval of time sheets. The project managers report directly to the IST Director.
- For most projects, IST has a contract coordinator responsible for maintaining files with all pertinent documents (written approval, letter of agreement, purchase orders, time sheets, etc.) related to a contractor or project and reviewing vendor invoices for payment. For HiCAMS and SPECS (joint IST and DOH projects), no one individual is responsible for recordkeeping. This lack of coordination has led to the establishment of several files for one contractor, incomplete files, and confusion among staff as to who is responsible for maintaining certain documents. A

TABLE 9
Department of Transportation
Information Systems
Contractor Education Expenses

Contractor	Individual	Section	Date(s) of Education	Course or Conference	Course Cost	Billed Educ. Hrs	Hrly Wage	Wages Paid	Lodging Subsistance Travel	Total Educ	Educ. Vendor
CACI	1	STARS	9/15/97 - 9/16/97	Project Workbench PMW Training Course	453.75	8	73.00	584.00		1,037.75	ABT Corporation
CACI	2	LITES	9/15/97 - 9/16/97	Project Workbench PMW Training Course	453.75	8	98.38	787.04		1,240.79	ABT Corporation
Subtotal					907.50			1,371.04		2,278.54	
COMSYS	3	Client Services	4/20/98 - 4/24/98	IntranetWare 4.11 Admin. V 1.03 (NOV520)	995.00	0	53.85	0.00		995.00	Cedalion Education,Inc
COMSYS	3	Client Services	5/26/98 - 5/28/98	IntranetWare 4.11 Adv. Admin.V 1.03 (NOV525)	495.00	0	53.85	0.00		495.00	Cedalion Education,Inc
COMSYS	4	Client Services	3/12/98 - 3/13/98	Netware 4.11 Installation	397.50	0	44.02	0.00		397.50	AlphaNumeric Systems,Inc
COMSYS	4	Client Services	2/2/98 - 2/6/98	Novell 520: InternetWare 4.11 Admin	997.50	40	44.02	1,760.80		2,758.30	AlphaNumeric Systems,Inc
COMSYS	4	Client Services	3/9/98 -3/11/98	Novell 520: InternetWare 4.11 Adv. Admin	497.50	0	44.02	0.00		497.50	AlphaNumeric Systems,Inc
COMSYS	5	Client Services	9/11/97	Upgrading to Office 97	100.00	8	44.52	356.16		456.16	Productivity Point International
COMSYS	6	Fuel Tax	10/23/97	Southeast Mainstreaming Conference	0.00	8	45.00	360.00	143.00	503.00	Vir Dept of Trans.
COMSYS	7	Fuel Tax	10/23/97	Southeast Mainstreaming Conference	0.00	8	55.00	440.00	143.00	583.00	Vir Dept of Trans.
COMSYS	8	Fuel Tax	10/23/97	Southeast Mainstreaming Conference	0.00	8	55.00	440.00	143.00	583.00	Vir Dept of Trans.
COMSYS	9	Fuel Tax	10/23/97	Southeast Mainstreaming Conference	0.00	8	35.00	280.00	143.00	423.00	Vir Dept of Trans.
COMSYS	10	Fuel Tax	10/23/97	Southeast Mainstreaming Conference	0.00	8	45.00	360.00	143.00	503.00	Vir Dept of Trans.
Subtotal					3,482.50			3,996.96	715.00	8,194.46	
CRA	11	Client Serv.DMV	5/29/97-5/30/97	LanDesk Management	595.00	0	44.52	0.00		595.00	DCG
CRA	11	Client Services	9/11/97	Upgrading to Office 97	100.00	8	45.86	366.88		466.88	Productivity Point International
CRA	12	Client Services	9/11/97	Upgrading to Office 97	100.00	8	45.86	366.88		466.88	Productivity Point International
Subtotal					795.00			733.76		1,528.76	
METRO	13	Client Services	1/22/98 - 1/23/98	4.11 Install & Config v1.03	395.00	0	51.86	0.00		395.00	Cedalion Education,Inc.
METRO	13	Client Services	3/16/98 - 3/18/98	IntranetWare 4.11 Design & Implementation	595.00	0	51.86	0.00		595.00	Cedalion Education,Inc.
METRO	13	Client Services	1/5/98 - 1/9/98	5.20 IntranetWare 4.11 Admin v 1.03 (NOV 520)	997.50	0	51.86	0.00		997.50	Cedalion Education,Inc.
METRO	13	Client Services	3/19/98 - 3/30/98	Building Intranets with IntranetWare	355.00	0	51.86	0.00		355.00	Cedalion Education,Inc.
METRO	13	Client Services	1/19/98 - 1/21/98	525:IntranetWare 4.11 Adv. Admin. V 1.03(NOV525)	497.50	0	51.86	0.00		497.50	Cedalion Education,Inc.
METRO	14	Client Serv-DMV	2/27/97	Using Microsoft Office	69.00	0	50.35	0.00		69.00	Skill Path Seminars
METRO	14	Client Serv-DMV	1/31/97	Microsoft Office	79.00	0	50.35	0.00		79.00	Fred Pryor Seminars
METRO	14	Client Serv-DMV	5/5/97 - 5/6/97	PC Troubleshooting	370.00	8	50.35	402.80		772.80	Skill Path Seminars
METRO	15	Client Services	2/17/97 -2/18/97	Groupwise 4.1 ASYNC Gateways	357.00	16	58.83	941.28		1,298.28	Alphanumeric Systems
METRO	15	Client Services	2/20/97	Groupwise 4.1 Advanced Admin.	357.00	8	58.83	470.64		827.64	Alphanumeric Systems
Subtotal					4,072.00			1,814.72		5,886.72	
Total					**9,257.00**			**7,916.48**	**715.00**	**17,888.48**	

Source: Compiled by OSA from IST Contract Files

DOH employee is responsible for approving vendor invoices for payment but does not receive time sheets for verification of billable hours. DOH has also allowed a contractor, who was a previous state employee, to continue in her previous state role as monitor for contractors.

- The BSIP (Fiscal's responsibility) contract requires the vendor to monitor its contractors' performance. Personnel in the Fiscal section review and approve the vendor invoices, but time sheets are not received for verification of billable hours. However, on a monthly basis, the Department compares budgeted requirements and task requirements to expenditures and project progress. Management has elected to pay vendor invoices, based on this monthly comparison, without further review. Although the Department does monitor the project's status, the Department is billed hourly for contractors' work and not by task. Complete monitoring procedures should include a state employee reviewing time sheets and comparing this information to the invoices prior to payment.

The lack of formal policies and procedures and/or enforcement of existing procedures has led to questioned payments to vendors. A review of 111 contractors for labor charges and 123 contractors for travel charges revealed 619 instances of inadequately documented or inappropriate vendor payments that total $4,507,460 and $26,251, respectively, as shown in Table 10..

Table 10
Department of Transportation
Questioned Vendor Payments

Inadequately Documented Vendor Payments	**Amount**
Labor: time sheets: • Not included with invoices for verification of billable hours (260) [see Auditor's Note below] • No supervisor's signature (73)	$3,804,676
Facility: payments for utilities, supplies, office rent, and furniture payments. Supporting documentation was not available from 1/94 to 12/97. (24)	413,748
Travel: • Not supported by travel vouchers (6) • Voucher not approved in writing prior to reimbursement--***Department Policy Violation*** (4) • Contractor reimbursed travel expense from home to duty station and travel within 35 miles of duty station.--***Department policy violation*** (13)	285,441
Lodging: • Receipts not present.--***IST policy violation*** (23) • Lack of proper approval (over state rates)--***IST policy violation*** (160)	3,022
Parking: • Receipts not present, cost greater than $4--***Department policy violation*** (10)	573
Total Unsupported Payments	**$4,507,460**
Inappropriate Payments	
Lodging: Billing errors (2)	201
Hours Billed For Benefits: Sick, Vacation, or Compensatory time paid (4)	2,073
Over Billed Work Hours : mathematical errors and hours billed but not worked (3)	21,241
Late Fee :fee passed on to the Department for vendor error (1)	112
Meals over allowable rate--*IST policy violation* (9)	162
Alcohol expense--*OSBM policy violation* (3)	13
Lunch Meetings--*OSBM policy violation* (16)	2,338
Refreshments (less than 20 in attendance)--*OSBM policy violation* (8)	111
Total Inappropriate Payments	**$26,251**
TOTAL UNSUPPORTED AND INAPPROPRIATE PAYMENTS (619)	**$4,533,711**
Source: Department contractor files	

Auditor's Note: Since the completion of the fieldwork, we learned that timesheets for the BSIP project are kept at the project worksite. However, they were not included with invoices for verification.

RECOMMENDATION

After a detailed review of supporting documentation, the Department should immediately request a refund for questioned reimbursements shown in Table 10 for which inadequate documentation can be supplied. To better safeguard State funds, the Department should centralize the oversight function for all information systems development projects under the IST section to enhance accountability and consistent oversight. However, it is extremely important that the primary user of the system have significant input into the project's design, development, and implementation. The Department should also establish formal policies and procedures further defining contractor activity to include:

- **Supervisory oversight of contract personnel;**
- **Responsibilities of the contract personnel supervisor;**
- **Contractor invoice payments;**
- **Reimbursable contractor expenditures;**
- **Documentation required for reimbursement; and**
- **Controls to ensure compliance.**

The formal policies and procedures should be provided to all vendors, contract personnel, and Department staff.

THE DEPARTMENT HAS RENEGOTIATED HOURLY RATES ON CONVENIENCE CONTRACTS FOR TWO CONTRACTOR AGENCIES.

State Information Processing Services' (ITS) mission is to provide competitive, state-of-the-art information management services for all State agencies. Through the sharing of resources, ITS aims to reduce unit cost of telecommunication services. However, ITS does not have the resources in-house to assist all agencies with their requests for services in a timely manner. Therefore, ITS has established convenience contracts with several vendors for information technology consulting services. The purpose of the convenience contract is to assist agencies with their information technology needs by accelerating the contracting process and reducing the overall cost to the State for these services. An agency is allowed to contract for services with any vendor on the convenience contract list at the stated rates once ITS approval is received.

During the review of contractor files, we noted two instances where the Department independently negotiated with vendors to have the ITS convenience contract rate reduced.

- Vendor OAO Corporation agreed to change a position title from "premium programmer" at the convenience contract rate of $97.50 per hour to a "system analyst" at a rate of $84 per hour. This change was made for four contractors hired by the Department to work on the

Year 2000 conversion project. Contractor titles must reflect the actual duties assigned to contract personnel. According to file documentation and project management, the contract personnel are conducting premium programmer work and not system analyst work.

- The Department hired an "application programmer specialist" from Computer Professionals, Inc. at a rate of $51.50 per hour through the ITS convenience contract. In February, 1998 a 32% rate increase to $68.00 per hour, negotiated between ITS and the vendor, became effective for this position. The Department came to an independent agreement with the vendor to pay only $58.00 per hour for the services of the application programmer specialist.

While the changed rates were beneficial to the Department, these instances are in noncompliance with ITS convenience contract policies that govern this type contract.

RECOMMENDATION

The Department should comply with all policies for ITS convenience contracts. The practice of negotiating with vendors to change the hourly rate as established on ITS convenience contracts should be stopped immediately. If rates need to be adjusted, the Department should contact ITS for assistance.

COMMUNICATION SERVICES

Objective: *To review the Department's use of communication services.*

The Department of Transportation has 13,137 employees located in 2,866 facilities throughout the State. In order to effectively coordinate the various functions and duties of such a dispersed staff, it is imperative that the Department provide effective communication services in the most cost effective manner. As part of the audit, we conducted a limited review of telephone systems, cellular telephones, and pagers. Specifically, we interviewed Department and ITS staff and reviewed records for telephone and pager services. Additionally, we examined expenditures for these services to assess the Department's use of communication services.

Conclusion: Decentralized communication efforts have caused inconsistent and inefficient operations. This decentralization has resulted in payments being made for telephone lines not in use.

THE DEPARTMENT IS NOT IN COMPLIANCE WITH STATE REGULATIONS REGARDING COORDINATION OF COMMUNICATION SERVICES.

ITS is statutorily charged with coordinating all telecommunication services for State agencies. Therefore, to examine the Department's use of communication services, we

contacted various personnel within the Department and ITS to obtain reports regarding use of telephones and pagers. We learned that no one person or section within the Department has responsibility for the coordination of all Department telecommunication services. One person is assigned responsibility for coordinating the installation of telephone systems for all new construction, relocations, and replacement of existing systems; however, some divisions contact ITS directly to coordinate these services. Additionally, once the system is installed, each unit is individually responsible for contacting ITS to obtain service for maintenance or upgrades required for its system. The Department does not have step by step policies and procedures for obtaining and maintaining communication services.

We also noted inconsistency in the acquisition of cellular telephone service. At the time of the audit, the Department had 1,037 cellular telephones in service, with 816 (78.7%) serviced through ITS and 221 (21.3%) by private firms[7]. Upon examination of records, we found that 156 of the 221 lines serviced by private firms were in counties that could have been serviced through ITS.

A proper internal control environment suggests telecommunication services should be centralized to assure adequate accountability and coordination. The current decentralized structure and lack of written policies and procedures has led to inconsistent procedures in acquiring service. This situation has also led to a violation of State policy requiring all telecommunication service to be coordinated by ITS.

RECOMMENDATION

The Department should take steps to immediately coordinate all communication services through ITS. The coordinating of all telecommunication services within the Department should be centralized. Centralization would provide accountability for all systems and equipment in use within the Department and ensure that these systems were properly authorized. Also, written policies and procedures should be adopted and communicated to all Department personnel to ensure awareness of responsibility and the need to use the coordinator's services.

[7] ITS does not service 5 counties in the State. Agencies in those counties must contract with a private firm for services.

MONTHLY FEES WERE PAID FOR TELEPHONE LINES NOT IN USE.

We reviewed telephone billings for the Department's Century Center and Highway Administration Building for the month of June, 1998. We noted 23 of 424 (5.4%) telephone numbers did not reflect any activity. As a result, we tested each of the lines in question to determine whether the lines were valid. Of the 23 telephone lines tested, we determined that 21 (91.3%) were outdated modem or telephone lines that have not been used by the agency in over a year. Agency personnel stated that these lines were no longer needed and should have been disconnected. Approximately $5,544 in savings could have been realized over the twelve-month period June 1997 to June 1998 had these lines been disconnected, as shown in Table 11.

Table 11
Department of Transportation
Telephone Line Review

Line Type	Cost Per Line (A)	No. of Lines That Should Have Been Disconnected (B)	No. of Months Reviewed (C)	Total of Potential Savings (A)x(B)x(C)
Single(dedi-cated line)	$20.50	14	12	$3,444
Key(group of numbers)	$25.00	7	12	$2,100
TOTAL		**21**		**$5,544**

Source: Department Telephone Records

We also noted that after a division vacated office space at the Century Center, its telephone lines were not disconnected for a period of five months. Management made the decision not to disconnect these lines until it was determined how many lines an incoming division would require. This decision resulted in charges for unused lines totaling $12,336. Once the new division moved in, it was determined that only 8 lines were needed. ITS personnel stated that reconnect fees are $65 for the first line and $22 for each additional line, making the reconnect fees $219. The Department could have realized a net savings of $12,117 had these lines been disconnected when the original division moved out and the actual number of lines needed by the incoming division reconnected at a later date. Table 12 details the costs that could have been avoided.

Table 12
Department of Transportation
Cost of Lines Not Disconnected

	Cost Per Service (A)	Number of Lines (B)	Monthly Service Cost (C) (a x b)	Number of Months Reviewed (D)	Savings (E) (c x d)
SERVICES					
Voice Mailbox	4.50	1	4.50	4	18.00
MemoryCall Voicemail	15.45	46	710.70	4	2,842.80
BellSouth Single Line	20.50	55	1,127.50	4	4,510.00
BellSouth Key Line	25.00	27	675.00	4	2,700.00
SUB TOTAL		129	2,517.70	4	$10,070.80
Partial Month (2517.70/30 days)x 27 days					2,265.92
TOTAL					$12,336.72
Installation Cost of 8 Lines(1x $65) + (7x$22)					(219.00)
NET					**$12,117.72**

Source: Department Telephone Records

RECOMMENDATION

The Department should review all telecommunication lines reflected on its monthly billings to determine whether they are actually needed. In addition, future space planning should be conducted in a timely manner to eliminate or minimize the cost related to any unnecessary communication lines.

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APPENDICES

APPENDICES

APPENDICES

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APPENDICES

APPENDIX A

MAILED: 160
RETURNED: 106
% RETURNED: 66.2%

OFFICE OF THE STATE AUDITOR
PERFORMANCE AUDIT
DEPARTMENT OF TRANSPORTATION MANAGEMENT INFORMATION SYSTEMS
CONTRACTOR QUESTIONNAIRE

PURPOSE: *The Office of the State Auditor is conducting a performance audit of Information Systems Technology in the Department of Transportation. As part of the audit procedures, we are gathering information to assist in the identification of the strengths and weaknesses of its operations.* ***Individual responses will remain strictly confidential.*** *Please complete and return this questionnaire in the enclosed envelope no later than* **Friday, July 3, 1998**.

CONTRACTOR FIRM NAME: _____

NUMBER AND PERCENTAGE OF RESPONSES ARE SHOWN BELOW. PERCENTAGES MAY NOT ADD BACK TO 100% BECAUSE OF ROUNDING.

1. What type(s) of service is (are) provided by your firm to the Department? **362 RESPONSES**

a. ☐ Installation of Equipment	b. ☐ Software Development	c. ☐ Data Storage/ Retrieval	d. ☐ System Maintenance	e.☐ Programming
17 4.7%	50 13.8%	13 3.6%	39 10.8%	54 14.9%

f. ☐ Mainframe Applications	g. ☐ Training	h. ☐ Problem solving/ Trouble-shooting	i. ☐ System Development	j. ☐ Other_____
45 12.4%	26 7.2%	41 11.3%	45 12.4%	32 8.9%

2. In which section(s) within the Information Systems Technology Section do you work? **137 RESPONSES**

a. ☐ DMV Systems	b. ☐ DOH Systems	c. ☐ Year 2000	d. ☐ Multimodal Systems	e. ☐ Database Systems
23 16.8%	31 22.6%	32 23.4%	5 3.7%	4 2.9%

f. ☐ New Tech Engineering	g. ☐ Networking Administration	h. ☐ Imaging Systems	i. ☐ Administration	j. ☐ Client Services
2 1.5%	6 4.4%	3 2.2%	5 3.6%	14 10.2%

k. ☐ DMV Liaison	l. ☐ Other_____
1 .7%	11 8%

RATE ALL ITEMS TO THE NEAREST WHOLE NUMBER

3. How do you rate the expertise of the IST personnel with whom you have direct contact at the Department? **98 RESPONSES**

1	2	3	4	5	6	7	8	9	10
Poor		Fair		Average		Good		Excellent	
1 1%	2 2%	5 5.1%	3 3.1%	15 15.3%	5 5.1%	17 17.4%	29 29.6%	14 14.3%	7 7.1%

4. How many employees from your firm assist the Department with its information systems? **91 RESPONSES**

a. ☐ 1	b. ☐ 2 to 4	c. ☐ 5 to 7	d. ☐ 8 or more
7 7.7%	14 15.4%	13 14.3%	57 62.6%

5. How many separate contracts does your firm have with the Department? (please list contracts) **61 RESPONSES**

a. ☐ 1	b. ☐ 2	c. ☐ 3	d. ☐ 4	e. ☐ more than 4
25 41%	4 6.6%	6 9.8%	3 4.9%	23 37.7%

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6. Does your firm use subcontractors in assisting the Department with its technology needs? **74 RESPONSES**

a. ☐ yes	b. ☐ no
30 40.5%	44 59.5%

7. Do **you individually** work on more than one the Department contract? If yes, please list contracts. **101 RESPONSES**

a. ☐ yes	b. ☐ no
8 7.9%	93 92.1%

8. What is the term(s) of **your** current contract(s) with the Department? **80 RESPONSES**

a. ☐ less than 1yr	b. ☐ 1 yr	c. ☐ 2 to 3 yrs	d. ☐ 4 yrs	e. ☐ more than 4 yrs
32 40%	33 41.2%	13 16.3%	0 0.0%	2 2.5%

9. For how many years have **you** had a contractual relationship with the Department? **100 RESPONSES**

a. ☐ less than 1yr	b. ☐ 1 yr	c. ☐ 2 to 5 yrs	d. ☐ 6 to 10 yrs	e. ☐ more than 10 yrs
50 50%	36 36%	14 14%	0 0.0%	0 0.0%

10. Who provides **you** with daily assignments? **115 RESPONSES**

a. ☐ the Department State Employees	b.☐ Other Contractors	c. ☐ Employees of your firm	d. ☐ Other _____
44…..38.3%	37 32.2%	28 24.3%	6 5.2%

11. Who supervises **you** while performing duties for the Department? **123 RESPONSES**

a. ☐ the Department State Employees	b.☐ Other Contractors	c. ☐ Employees of your firm	d. ☐ Other _____
51 41.5%	36 29.3%	34 27.6%	2 1.6%

12. How frequently do **you** submit progress reports to the Department personnel? **103 RESPONSES**

a. ☐ None	a. ☐ Weekly	a. ☐ Every Two Weeks
14 13.6%	72 69.9%	4 3 .9%
a. ☐ Monthly	a. ☐ Quarterly	a. ☐ Other_____
5 4.8%	0 0.0%	8 7.8%

13. Please discuss any concerns you have about the Department's Information Systems Technology Section.

- Serious shortage of staff with in-depth knowledge of the systems used.
- Lack of expertise and training in new technologies. New projects require heavy use of contract personnel. Support becomes an issue when contractors leave.
- No formal methodologies in place throughout the entire organization making it impossible to repeat a process.
- There are weaknesses in management levels of the organization --- also affects overall morale.
- The Department-IST management team does not have an understanding of what the staff is doing.
- Lots of turnover among contractors, has led to tension in the work environment as to who is next.

ONLY if you would like to speak with the auditors about any issue, please provide your name, telephone number where you would like us to contact you, and the best time to reach you. This questionnaire and any other communications we have with you will be kept STRICTLY CONFIDENTIAL.

Name:_____ **Telephone #**_____ **Best Time to Call:**_____
(Please Print)

APPENDIX B

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 20, 1999

Mr. Ralph Campbell, Jr.
State Auditor
300 North Salisbury St.
Raleigh, NC 27603-5903

Dear Mr. Campbell:

Enclosed is the Department of Transportation's response to the draft of the combined performance and information audit entitled *Department of Transportation, Technology Systems.* We will be available to discuss any of the points raised in the draft and to provide any of the documentation to which we refer in our response.

We appreciate the cooperation your staff has exhibited and the time extension we were granted for this response.

Should you have any questions about this response, please call me.

Sincerely,

E. Norris Tolson

ENT/jma

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APPENDIX B

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The response from the Department of Transportation has been reformatted to conform with the style and format of the rest of the audit report. However, no data has been changed.

APPENDIX B

Department of Transportation
Information Systems Technology

Response to the Combined Performance And Information Systems Audit

June 3, 1999

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APPENDIX B

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APPENDIX B

Overview

In assessing this audit report, our responses are delineated into three segments. We have identified deficiencies where we can take short-term actions to immediately correct an identified problem. Where we have been positioned to immediately correct the deficiency, the corrective action is noted. Second, we address deficiencies where the corrective action will require a plan whose time is longer than our required response date back to the Office of the Auditor. In these instances, we have identified what our planned action is to be. Third, we address deficiencies identified that require enterprise-wide strategic decisions. Each response within the body of the report identifies either corrective action completed, planned or requiring strategic decision making.

Information Technology Control Environment

CONCLUSION:

Overall, the Department has met the business requirements for information as defined by COBIT. However, control measures have not been adequately defined, implemented, and monitored as discussed in detail in the following segments.

We acknowledge that the Department has met the overall business requirements for information as identified by COBIT.

Information Technology Strategies

STATE AUDITOR RECOMMENDATION

The Department should immediately develop a comprehensive technology plan to effectively provide and manage information system services. Further, the Department should develop written policies and procedures for the information systems functions and establish a training plan with adequate funding for the continuous training of Information Systems Technology division employees. The Department should also implement security awareness and training for users, especially for those users responsible for managing networks. Lastly, the quality assurance function should be continued for information systems functions.

Information Technology Plan/Strategy:

A comprehensive Information Technology Plan was developed for Information Systems in August of 1997. This Technology Plan was coordinated with the Secretary of Transportation and submitted to the Information Resource Management Commission (IRMC) and staff in August of 1997 as required by IRMC procedure. Feedback from the IRM staff indicated that the plan was not only acceptable but also one of the most comprehensive plans submitted by state agencies.

To ensure full communication of the plan both inside and outside the Department, it was posted to our website in August of 1997 and is a frequently referenced document on our ongoing planning strategy. It is key communications tool we use with vendors and other states to share our enterprise structure as well as our forward vision. At the time the plan was developed, there was no Technology Steering Committee and responsibility for plan development was delegated to the Technology Director. Therefore, a Technology Plan has been in existence since August of 1997 meeting the needs of the Department, external contacts and the IRMC.

Given that the plan was written for a biennium cycle, we will be issuing a revised plan in August of 1999. Since the original inception of the plan, we have been actively involved in our Year 2000 remediation and testing efforts. As a result of remediation, replacement and/or retirement of systems within the Department portfolio, the plan requires an update to accurately reflect our systems complement as well as our strategic technology vision for the next business cycle. We have purposely postponed any updates until the required August timeframe. With our upcoming release, we will be positioned to accurately reflect the enterprise with all Year 2000 changes.

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Since the original development of this document, the Department has matured in our processes and does now have standing Technology Steering Committee. Therefore, the next iteration of the Department Technology Plan will be prepared through the Technology Steering Committee Structure. The plan will include other technology applications outside of the Systems Development arena such as Engineering Technology Systems projects and plans. The cumulative product of this committee will be presented to and approved by the Secretary.

> ***Auditor's Note:*** *The Technology Plan referred to by the Department is a plan for the IS section only. As reported in the 1998 KPMG Peat Marwick report and updated in this report, it is not a comprehensive, Department wide plan with specific policies and procedures for the Department, as recommended by OSA.*

Policy and Procedure Development

Our strategy for the development of written policies and procedures has been to develop and document procedure as situations have arisen identifying the need for such policy/procedure. Since 1997, the following procedures have been developed and posted to our website as the need has been identified:

- Cabling Requests
- Circuit Requests
- Convenience Contracts
- Equipment Purchases
- Ordering Hubs and Switches
- RACF-ID's
- Router Requests
- Software Use
- Sysgen Requests

For general policies and procedures relating to technology and technology management, the Department utilizes those policies and procedures developed by the IRM staff. We do not duplicate policy. IRMC policies, procedures and standards used by the Department include:

- Project Certification
- Estimating Project Costs and Delivery Dates
- Project Reporting
- Guiding Principles
- The Statewide Technical Architecture
- Network Protocol Standards
- Use of the Internet
- Use of the North Carolina Integrated Information Network (NCIIN)
- Wiring Standards
- Intelligent Hub Contract
- LAN Standards
- Voice Processing Standards
- North Carolina Information Highway
- NCIIN Network Perimeter Security
- Information Asset Protection
- Electronic Mail
- Electronic Document Management

It is our practice to develop policy and procedure when the need for such policy and procedure is identified. Using the structure of the IRMC policies and procedures, augmented by specific Department procedures that have been developed, we believe we are taking the appropriate approach in enterprise management.

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Training Plan for IST Personnel

As employees of the Department, IST employees are subject to and attend all training requirements targeted for the Department employee population. Some of the training is mandatory (e.g., Safety Training, ADA/Bloodborne Pathogens) while other training is optional (e.g., Time Management, Concepts of Leadership). In addition, specialized training is provided for technology issues and new applications available on the market. Typically, this training is provided by sending employees off-site for system specific training. In addition, training opportunities are offered by Information Technology Systems (formerly SIPS) and the IRM staff on a regular basis. This past year, we even negotiated a block-training contract with a 3rd party vendor to provide large-scale training to our staff. This past fiscal year, we have spent $185,300.00 on training for our employees.

While it is true that there is no specific individual by individual training plan, that is partially true because of the dynamics and ever changing nature of the technology applications arena. What was appropriate for training last year may no longer apply this year. That is why we must take a more proactive approach than a set pre-constructed plan to meet the needs of the Department with Just in Time training for use when it is needed. This is a common approach used by the technology industry today.

As noted in the audit report, the SQA function was established on June 15, 1998 during the organizational restructure. Three senior employees were assigned to this function and have actively been pursuing SQA goals and providing SQA and tools training to employees since that time. This effort will continue and expand to assure highest quality/lowest cost implementation of systems development.

In regards to security awareness training, the Technology Steering Committee is currently assessing this deficiency and will determine an appropriate security structure to ensure this type of training is provided through our Information Security Unit.

STATE AUDITOR RECOMMENDATION

The information systems functions should be consolidated under one unit at the division level, reporting to a deputy Secretary of the Department of Transportation. This unit should be given the authority to implement information technology infrastructure planning and policies and procedures for the Department as a whole.

Prior to June 15, 1998, there were many areas in DOT Technology Services that were duplicated between Information Systems Technology and Engineering Systems Technology. One of the primary reasons for the June reorganization was to specifically address these duplicative activities and realign the organizations along functional boundaries.

As a result, IST focuses primarily on the delivery and support of software applications development and maintenance while ETS focuses on hardware acquisition and maintenance as well as the development and support of the network infrastructure. Due to projects in work at the time, there still remain some small levels of duplication, however, these will phase out as projects complete. Although the two technology support areas report to different senior managers, there is constant communication and coordination between the two units. As part of our continuing review of the overall business structure, the Department has discussed this concern at the Technology Steering Committee and is in the process of determining the best support structure for all Technology Services in DOT to support the mission of the Department.

Information Technology Applications

STATE AUDITOR RECOMMENDATION

The Department should adopt one System Development Life Cycle methodology and require all programming sections to utilize this methodology. The Department should establish a quality control function to ensure compliance with standards and to assist with moving updates from testing to production. Furthermore, the Department should adequately segregate the duties of information systems personnel to ensure that a limited group

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of programmers has privileges to move tests to the production environment to prevent unnecessary corruption of the Department's information system resources.

Uniform System Development Life Cycle

Our enterprise portfolio consists of approximately 130 systems of differing platforms and business functions that have been developed independently over the last 35 years. Some were developed in house, some were developed by contract, and some were developed by other states and adopted by DOT. In such a scenario, the result is basically a smorgasbord of complex independent systems with no centralized SDLC. It is noted that this is not an anomaly but rather the similar experience as that seen in the private sector and other government entities. Over the past three to five years, there has been a push in the technology arena to move to standardized SDLCs across a business's enterprise portfolio. The most prominent evidence of this in North Carolina State Government is the creation of the IRMC for standards selection and the establishment of State Enterprise standards.

While contractors have not usually been given authority to move programs into production, the operating environment of the Department (as well as other agencies in the State) has changed so that this is a delegated contract function. Contractors are no longer utilized only for new systems application development but are part of our base systems support resource staff. Therefore, many tasks previously reserved for employees have been delegated to contract labor. In a pure COBIT model, a different production file access scheme would be the best. However, in the current state of business affairs where the realities of budget constraints and resource limitations modify the business approach, we utilize the best, most efficient method to meet the business needs of the Department. Therefore, we will continue to apply best practices and manage our resources within our operational constraints. When we take into account our historical data, our current methodology and our contractual guarantees, we do not consider there to be a significant risk to the Department in this area.

Within the structure of the IRMC, we are coordinating each and every new system development activity with the IRM Chief Technology Officer as well as coordinating our methodology with the IRM Quality Assurance Staff. It must be noted that this evolution to a standardized methodology and SDLC will not happen overnight but is an iterative process. We will continue to work directly with the IRM staff in our movement toward a single SDLC.

Service Delivery

STATE AUDITOR RECOMMENDATION

As part of its continuing examination of span of control, the Department should review the organizational structure of the Microcomputer Engineering unit in more detail. Consideration should be given to reassigning supervisory duties along organizational lines and physical location to reduce the excessive span of control.

As noted in the audit report, the reorganization in June of 1998 and supervisory restructuring resulted in a ratio of eight subordinates to one manager (8 to 1) which complies with the recommendations of the audit and of the 1996 Study of State Agency Span of Control and Organizational Layers for the State of North Carolina.

Security

STATE AUDITOR RECOMMENDATION

The security administration functions should be moved under a separate unit reporting directly to a deputy Secretary of the Department. This unit should develop department-wide security policies and procedures for all information systems functions and be given sufficient authority to enforce the controls set forth within. This unit should be sufficiently staffed to perform the security administration functions for all computer systems in the Department. The Department should ensure that all access points are secured from modification from unauthorized users. The Department should implement methods to adequately safeguard information system resources.

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Implementation of these recommendations requires significant strategic changes in the way the Department currently is organized and staffed to provide the optimum level of security control. The recommendations have been presented to the Technology Steering Committee and are currently under study for a best solution.

Monitoring of Operations

STATE AUDITOR RECOMMENDATION

The Department should immediately establish the needed level of monitoring for information systems functions. First, the Department should schedule the initial information committee meeting to discuss its role, responsibilities and regular meeting schedule. Audits should be performed on unlicensed software and the Department's information technology operations. The PC software policy should be modified to include the maintenance of software inventory listings and establish a centralized library of software licenses and ownership records. A configuration inventory should be established on all hardware and software acquisitions and procedures should be developed to track all changes to the configuration. The Department should modify the approval process for hardware and software purchases to require the approval of the IST Director. Finally, the Department should become more proactive in planning to foresee and correct potential system failures and irregularities.

Technology Steering Committee

The Technology Steering Committee has effectively been in place since June of 1998. This committee consists of the Secretary of Transportation, Senior Management executives and the heads of both IST and ETS. Prior to the receipt of this audit, the committee had met twice in 1998. Until now, we have only convened this group when there was a strategic decision that required enterprise decision-making. Since receipt of the audit, we have met to discuss both the audit and our roles, functions and responsibilities. We are currently working on the establishment of a regular schedule for meetings as well as full documentation of our charter and activities.

Software Audits

In the past, the Department has conducted random software audits of divisions within the Department to ensure compliance. Over the last six months, we have been actively teaming with ITS to pilot a new technological answer to this problem. We are planning to implement in the near future a new technology tool that will allow us to monitor all software and configurations of PCs across the State. With this tool in place, we will have a constant, dynamic inventory of the software configuration of all systems under our control. The anticipated rollout of this new technology is August of 1999. This tool will also allow a one for one correlation with software licensing to ensure no errors in appropriate license matching. In addition, we are working with ITS on the concept of statewide licensing of software products which would essentially eliminate this concern.

Hardware and Software Acquisitions

All hardware and software for the entire Department is purchased through one individual exercising a regimented process. We disagree that it is the role of the IST Director to review and approve all hardware and software purchases for the Department. This was the method used prior to 1997 in the Department. The result was that there was no value added to the process stream AND a time delay up to 2 months was injected in the process.

Our method to ensure adequate oversight of technology purchases was to remove the IST Director's review of all paperwork, delegating both the authority and accountability to a single individual in the Department AND providing that individual with specific parameters associated with the purchase of technology. The Director of IST is provided copies of requisitions in an "information only" scenario for the specific purpose of audit.

In addition, we have established a "CORE" hardware and software inventory for the Department. With such a core systems definition, purchases are of like products across all Department units. This also reduces any potential conflicts or abhorrent purchasing problems that may arise.

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We do in fact have an inventory of all computing systems in the Department and their current status. This inventory is maintained by ETS and is used in conjunction with applications development information provided by IST to project future capacity planning requirements, anticipate system failures and assure adequate system resource reserves to meet the needs of the Department.

> ***Auditor's Note:*** *The Department began working on the inventory during the audit. At the completion of the fieldwork, this inventory had not been finalized or reviewed by OSA.*

Use of Contractors

STATE AUDITOR RECOMMENDATION

The IST section Director should ensure all unit managers are knowledgeable of North Carolina General Statutes, North Carolina Administrative Code, ITS policies, and IST procedures related to contracting for consultant services. Controls should be established to ensure enforcement of statutory and regulatory requirements and compliance with existing policies.

Copies of the noted General Statute's 143-64.20 (b) and Administrative Codes Chapter T01: 05D Section .0207 have been provided to all employees involved in contractor hiring decisions. Department policies are being reviewed and will be updated to ensure full compliance with the above referenced documents. A new draft policy has been developed and is targeted for completion by May 31, 1999.

STATE AUDITOR RECOMMENDATION

Department management should closely examine the impact of the purchasing authority level extended to contractors to ensure that the State's resources are used in the most efficient manner. Department management should use State agencies to provide telecommunications and other services or document that the designated State agency is unable to provide them.

Contractor Provided Workspace

There are two situations where the Department has allowed the contracting agency to secure facilities and facilities support. While it is anticipated that a situation could arise again in the future, there are no state-wide standards in place that address contractor provided workspace. We will be working closely with ITS to determine if such standards are necessary in addition to the contracting process or what steps should be taken. State agencies will be identified as the sole source for acquisition of telecommunication and other services.

Clerical Support

The clerical support positions identified were clerical support to the contractor provided by the contractor for a short-term engagement. The rates were processed and approved through the State convenience contract. Subsequently, these positions have been replaced by state temporary labor.

> ***Auditor's Note:*** *Review of ITS State convenience contracts show that clerical rates are not covered under this type contract.*

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STATE AUDITOR RECOMMENDATION

Management should insure contracted personnel meet the established minimum qualifications for the position before approving their employment. The Department should also notify ITS of contract vendors that refer unqualified individuals for interviews. Additionally, in planning for technological operations, management should incorporate promotion of the career growth of its state employees through additional training and experience opportunities as a way to reduce the number of contractors.

Employee and Contractor Training

ITS will be notified of any vendors who submit unqualified persons for interviews.

As previously discussed in regards to employee education, the Department fully meets its training goals each year as established by the budgeted training account. We will continue to provide career growth opportunities for employees wherever possible.

In regards to providing training for contract employees, the Department does provide training to contract employees when this training is necessary to further the business objectives of DOT. Because of our large scope of activities and relatively small number of state employee programmers, we have many contractors who support our base systems. These are contractors that are necessary to meet the basic business needs of the Department. As our systems change or new technology is available that is applicable to our systems, it is more cost effective to train both employees and contractors as members of the same team rather than go out and seek new contractors with new skills.

For example, let's look at a contractor that has worked for three years side by side with state employees on the operation and maintenance of the STARS system, one of our most complex systems. Due to recent changes in the Imaging Technology, (which is integral to STARS) we need the STARS operations and maintenance team trained on the new imaging technology. Under the approach used by the Department, we would train the entire STARS team consisting of both employees and contractors. If we followed the audit suggestion of not training contractors, we would either (1) terminate the existing contractor and replace him with a new contractor who has the imaging technology skills or (2) hire an additional contractor to specialize in the new imaging technology.

If you choose (1), you lose all of the experience and knowledge of the STARS system the contractor has learned over the last three years. If you choose (2) you do nothing more than add additional expense.

Therefore, logic demands that one choose the lowest cost approach that provides the greatest stability and lowest risk to the Department.

STATE AUDITOR RECOMMENDATION

After a detailed review of supporting documentation, the Department should immediately request a refund for questioned reimbursements shown in Table 10 for which inadequate documentation can be supplied. To better safeguard State funds, the Department should centralize the oversight function for all information systems development projects under the IST section to enhance accountability and consistent oversight. However, it is extremely important that the primary user of the system have significant input into the project's design, development and implementation. The Department should also establish formal policies and procedures further defining contractor activity to include:

- **Supervisory oversight of contractor personnel**
- **Responsibilities of the contract personnel supervisor**
- **Contractor invoice payments**
- **Reimbursable contractor expenditures**
- **Documentation required for reimbursement; and**
- **Controls to ensure compliance**

The response from the Department of Transportation has been reformatted to conform with the style and format of the rest of the audit report. However, no data has been changed.

APPENDIX B

In regards to vendor invoices for consultant time charged to the Business Systems Improvement Project (BSIP) being unsupported with vendor staff time sheets, the following is provided:

The BSIP was jointly staffed by an approximately equal number of contract personnel and DOT personnel (approximately 15 of each during most of the project). Every facet of the project was a joint effort and all staff was stationed at a common work site. Contractor staff members were (and are) prior approved by the DOT project manager before they join the project. Copies of all timesheets were/are maintained at the project work site. The DOT project manager reviewed each invoice to verify that the persons billed had been assigned to the project and that the hours billed on the invoice were reasonable.

Because of the close working relationship between DOT staff/management and contractor staff/management it was not considered cost effective to perform a detailed pre-audit of contractor time sheets related to every billing. Further, the contractor on-site manager did/does perform a detailed comparison of time sheets to proposed-billed amounts before the contractor ever submitted its bill. However, we will institute such a detailed review of timesheets in the future.

It is our understanding that the Office of State Auditor audit team compared a sample of the time sheets for contractor personnel to the billed amounts and found no discrepancies between time billed and time indicated on the time sheet. This fact leads us to believe that the hours billed are correct, accurate and supported.

The audit team also noted that in some cases the contractor manager had not signed the time sheet of contractor personnel. The consulting firm on the BSIP does not require its consultants to obtain supervisory signatures on their timesheets. The firm does require its project managers to perform a detailed comparison of time charges billed to clients to the employee timesheets, as mentioned above. In summary, we do not believe any over billing for contractor personnel on the BSIP has occurred and we will strengthen our controls to assure it does not occur in the future.

The Following Table identifies current actions being taken to address each identified issue in Audit Report Table 10:

Table 10 Department of Transportation Questioned Vendor Payments
Inadequately Documented Vendor Payments

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APPENDIX B

Labor: time sheets: 1. Not included with invoices for verification of billable hours 2. No supervisor's signature	1. In most cases time sheets were on file and available for viewing, even though they were not filed with the invoices. It has been our practice to maintain signed timesheets at the specific contractor supervisory level. The fact that time sheets were not stored physically with invoices does not indicate that the timesheets were not compared with the invoices. Our practice has been to have the invoices reviewed by the specific supervisor prior to payment. Physical location of timesheets is irrelevant as long as a proper reconciliation is made between the invoices and timesheets. These are not inappropriate payments as there have been no identification of under/over or mis-payment in this category but rather an administrative preference for physically locating invoices and timesheets together. 2. In some cases, signed time sheets were on file in project managers' offices while unsigned ones were on file with the invoices. In some other cases contract employees had been improperly authorized to sign the time sheets of other contract employees under their supervision. We are in the process of establishing procedures that would ensure copies of all signed time sheets are archived with the Contracts Administrator.

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Facility: payments for utilities, supplies, office rent, and furniture payments. Supporting documentation was not available from 1/94 to 12/97.	In 1997, there was an administrative change as well as a physical move in IST and EST. During that transition, older records were purged from our on-site records storage. Therefore, we do not have records dating back 5 years to 1994. We are requesting documentation from the contractor for the items not available at the time of the audit.
Travel: 1. Not supported by travel vouchers 2. Voucher not approved in writing prior to reimbursement 3. Contractor reimbursed for travel expenses from home to duty station and travel within 35 miles of duty station	1. The Department will request documentation or refunds, as appropriate, for travel for which vouchers were not present at the time of the audit. 2. Procedures were not in place to prevent this oversight at the time they occurred. New procedures will prevent this type of oversight in the future. 3. The contractor, David Bozak, was recognized as a national expert on crash reporting. As a resident of Maryland and utilized on this project on a temporary basis, it was necessary to pay his travel expenses from his home and his living expenses in Raleigh for the duration of his service in order to have the benefit of his expertise. This service was necessary to meet mission critical business objectives of the Department.
Lodging: 1. Receipts not present 2. Lack of proper approval (over state rates)	1. In some cases, receipts were not filed with the appropriate invoices; and, in other cases, receipts were not available. We are searching our records to locate errant receipts and file them with the correct invoices and will request documentation from contractors for those instances in which receipts cannot be located in our files. 2. The amount of $768.71 was cited as the amount overpaid. That amount has been refunded by the contractor.
Parking: • Receipts not present, cost greater than $4	Receipts for reimbursed parking of more that $4.00 will be requested from the contractors.
Inappropriate Payments	
Lodging: Billing errors	One of the payments cited was for $198.98 for two trips by one contract employee that appear to have occurred on the same date. We will request that the contract company either provide documentation that the trips actually occurred on separate dates or refund the cost of the trip that was improperly claimed.
Hours Billed For Benefits: Sick, Vacation, or Compensatory time paid	We are in the process of requesting refunds for these amounts improperly claimed and paid.
Over Billed Work Hours: mathematical errors and hours billed but not worked	We have requested a refund for most of the amount in question from one contractor and will request a refund for the balance from a separate contractor.
Late fee	We are working directly with the contractor to rectify this charge. ($112.00)
Meals over allowable rate	We will request a refund from the contractor for the amounts improperly claimed and paid. ($162.00)
Alcohol expenses	We will request a refund for the amount reimbursed. ($9.50)
Lunch Meetings	We are working directly with the contractor to rectify this charge.
Refreshments	We are working directly with the contractor to rectify this charge. ($111.00)

It is noted that the majority of the lack of documentation/inappropriate authorization of expenses occurred in the 1994 to 1997 time frame with a preponderance of the errors occurring in the area of Client Services. During our reorganization in June of 1998, the responsible manager for Client Services was removed from a supervisory position and has subsequently left the employment of the Department. The current manager of Service Delivery has done an outstanding job of ensuring proper policy and procedure is being followed.

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STATE AUDITOR RECOMMENDATION

The Department should comply with all policies for ITS convenience contracts. The practice of negotiating with vendors to change the hourly rate as established on ITS convenience contracts should be stopped immediately. If rates need to be adjusted, the Department should contact ITS for assistance.

This anomaly has occurred on two occasions. It is noted that in both instances, the Department took actions to save State funds. All managers have been formally briefed that any aberration to normal contract flow for labor must be coordinated with Ms. Sarah Stevens in ITS. Should adjustments be necessary to protect the interest of the state, these will be done. However, they will be fully coordinated through Ms. Stevens using the convenience contract vehicle.

Communication Services

STATE AUDITOR RECOMMENDATION

The Department should take steps to immediately coordinate all communication services through ITS. The coordinating of all telecommunications services within the Department should be centralized. Centralization would provide accountability for all systems and equipment in use within the Department and ensure that these systems were properly authorized. Also, written policies and procedures should be adopted and communicated to all Department personnel to ensure awareness of responsibility and the need to use the coordinator's services. The Department should review all telecommunication lines reflected on its monthly billings to determine whether they are actually needed. In addition, future space planning should be conducted in a timely manner to eliminate or minimize the cost related to any unnecessary communication lines.

Implementation of these recommendations requires some strategic changes in the way the Department currently is organized and staffed to provide the optimum level of telecommunications control. We acknowledge the need for centralized control of telecommunication systems coordination. The recommendations have been presented to the Technology Steering Committee and are currently under study for a best solution.

Summary

Technology in the North Carolina Department of Transportation has been an ever-evolving entity for over thirty-five years. As with most industry, infrastructure and computer solutions have grown without a clearly architected plan. The result has been many islands of computing functionality moving along without structured growth.

With the recent focus at a state-wide enterprise level on architectural and information systems standards, we are greatly improving our technology backbone day by day. We have set forth a vision to be the best in this area of business, not only compared with other state agencies, but also using private companies as benchmarks.

We recently achieved a Software Engineering Institute Capability Maturity Model Level III on our Year 2000 activities and are recognized for our organized, methodical approach to this challenge. We are now using all we have learned from this process to spread this model approach throughout all of our technology strategies.

Your audit was timely in that it provided us with a critical review, specifically identifying strategic issues we must address to ensure the future success of our business. Thank you.

This report has been prepared and respectfully submitted to the Office of State Auditor for review. We appreciate the work of the audit team and feel issues have been identified that will make the North Carolina Department of Transportation a better Department. If you would like to meet with us to discuss this response or if there are other questions or areas we might assist, please advise.

The response from the Department of Transportation has been reformatted to conform with the style and format of the rest of the audit report. However, no data has been changed.

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June 15, 1999

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