CREATING AN INNOVATIVE AND PRODUCTIVE ENVIRONMENT FOR THE TWENTY—FIRST CENTURY

The Virginia Department of Transportation's Response to Senate Joint Resolution 7

February 1, 1987

REPORT OF THE VIRGINIA DEPARTMENT
OF TRANSPORTATION'S RESPONSE TO
SENATE JOINT RESOLUTION NO. 7

Creating An Innovative And Productive Environment For The 21st Century

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

Senate Document No. 18

COMMONWEALTH OF VIRGINIA
RICHMOND
1987

PREFACE

On September 26, 1986, the General Assembly passed Joint Resolution No. 7 (SJR-7) during the Special Session called to address the Commonwealth's transportation needs and funding. Part of that resolution directs the Department of Transportation (VDOT) to develop a plan for reducing expenditures for administration and maintenance by 5% as compared to FY 1987-88 appropriations and to continue these into the future. The plan is to achieve these purposes through improved efficiency and productivity in Department operations. In addition, the Department is requested to compare the costs of maintenance and other major nonconstruction activities with comparable activities of other states; examine bidding procedures, procurement policies and the process of obtaining rights-of-way; examine ways to accelerate the road building process; consider the most appropriate cost ceiling on projects to be built by state forces, and make recommendations to the 1987 regular session of the General Assembly regarding these considerations.

This report has been prepared in response to SJR-7, parallels the subject areas set forth in the Resolution, and it is viewed by the Department as an opportunity to communicate specific aspects of its commitment to a long-run, continuing focus on efficiency, as well as a means whereby to bring to the attention of the General Assembly issues which may be important to the efficient maintenance and construction of the transportation system as the Commonwealth approaches the 21st century.

This report provides a status of the current innovative environment in our agency, focuses on productivity improvement plans to cut unit costs, and describes processes and programs the Department has instituted which will foster a continuing effort of improvements in productivity over the long term.

On behalf of the Department, I wish to express our desire and intent to periodically report to the General Assembly on the status of the implementation of the plans outlined in this study.

Ray D. Pethtel
Commissioner

January 27, 1987

CREATING AN INNOVATIVE AND PRODUCTIVE ENVIRONMENT FOR THE 21ST CENTURY

(A VDOT Report Summary)

Senate Joint Resolution No. 7 (SJR-7) directs the Department to develop a plan for reducing expenditures for administration and maintenance by 5% as compared to FY 1987-88 appropriations and to continue these reductions into the future. The plan is to achieve these purposes through improved efficiency and productivity in Department operations. In addition, the Department is requested to compare the costs of maintenance and other major nonconstruction activities with comparable activities of other states; examine bidding procedures, procurement policies and the process of obtaining rights-of-way; examine ways to accelerate the road building process; consider the most appropriate cost ceiling on projects to be built by state forces, and make recommendations to the 1987 regular session of the General Assembly regarding these considerations.

This report responds to SJR-7, provides a status of the current innovative environment in the Department, focuses on productivity improvement plans to cut unit costs, and describes processes and programs the Department has instituted or intends to institute that will foster a continuing effort of improvements in productivity over the long term.

SJR-7 Interpretation and Focus (pp. 1-4)

The Department views this report as an opportunity to communicate with the General Assembly regarding specific aspects of a commitment to a long-term continuing focus on efficiency and a means of bringing to the attention of the General Assembly legislative issues that may be important to efficient construction and maintenance practices as the Commonwealth approaches the 21st century.

In November of 1986, the Department forwarded to the patrons of SJR-7 and a number of other members of the General Assembly its interpretation of the language contained in that resolution. This was an attempt to confirm that the Department's sense of direction was consistent with that of the General Assembly regarding the efforts called for.

SJR-7 has three major parts: (1) the plan for increased efficiency; (2) the information gathering and points of focus effort; and (3) the JLARC follow-up. The language referring to "5%" is interpreted to be a mandate to increase efficiency in the Administration and Maintenance programs.

"Administration of the Department" is interpreted to refer to Item 627 of the FY 1986-88 Appropriations Act with amendments at the 1987 regular session to facilitate comparison with the "5%" language, but is not construed as being a restriction on the commitment to overall

Department efficiency efforts. "Maintenance of the transportation system of the Commonwealth" is interpreted to refer to Item 631 of the FY 1986-88 Appropriations Act with amendments at the 1987 regular session which consists of the maintenance of the interstate highways, and the primary and secondary road systems.

Improvements in productivity (an increase in output for the same level of input) and economy in resource use directed toward the reduction in unit costs are the key focus of the efficiency plan. this focus is of critical importance in the context of releasing labor time (even if only a few hours each week for each employee) to aid the Department in fulfilling the demands of the expanded program.

Plans For Improving Efficiency in Administration and Maintenance (pp. 5-34)

For the purposes of this study, a distinction is drawn between near-term and long-term components of the efficiency plan. Near-term plans are plans for which the technology is available or that the Department has begun to execute or can begin to execute that will improve productivity with an attendant saving in resources beginning within the next three years. Long-term plans will result in improvements in productivity that will begin to appear beyond the next three years and will continue thereafter. Figure 1 is a visual representation of the foundation of and the relative contribution each major component makes to the Department's Productivity Improvement Plan.

An Innovative Environment

Efficient, productive, and successful companies (like 3M, General Electric, and Hewlett Packard) exhibit two essential characteristics: (1) they maintain close contact with their customers; and, (2) they maintain an environment which promotes constant innovation.

While the Department has initiated many actions to place it closer to the citizens of the Commonwealth (such as the Highway Helpline), the fostering of an innovative environment is of particular relevance to improvements in productivity over the long run. This environment encourages employee creativity and recognizes it as a major strength of the organization. Consequently, rather than have the Department's executives develop this plan for improvements in productivity, it is based on proposals from teams of people who do the work: resident engineers; district engineers; maintenance supervisors; over 100 field personnel who obtain rights-of-way; and a steering committee of 23 middle managers, research scientists, and engineers with many years of experience to give overall guidance to the effort. The charge given these teams was simple and constrained: "How can the Department work smarter?"

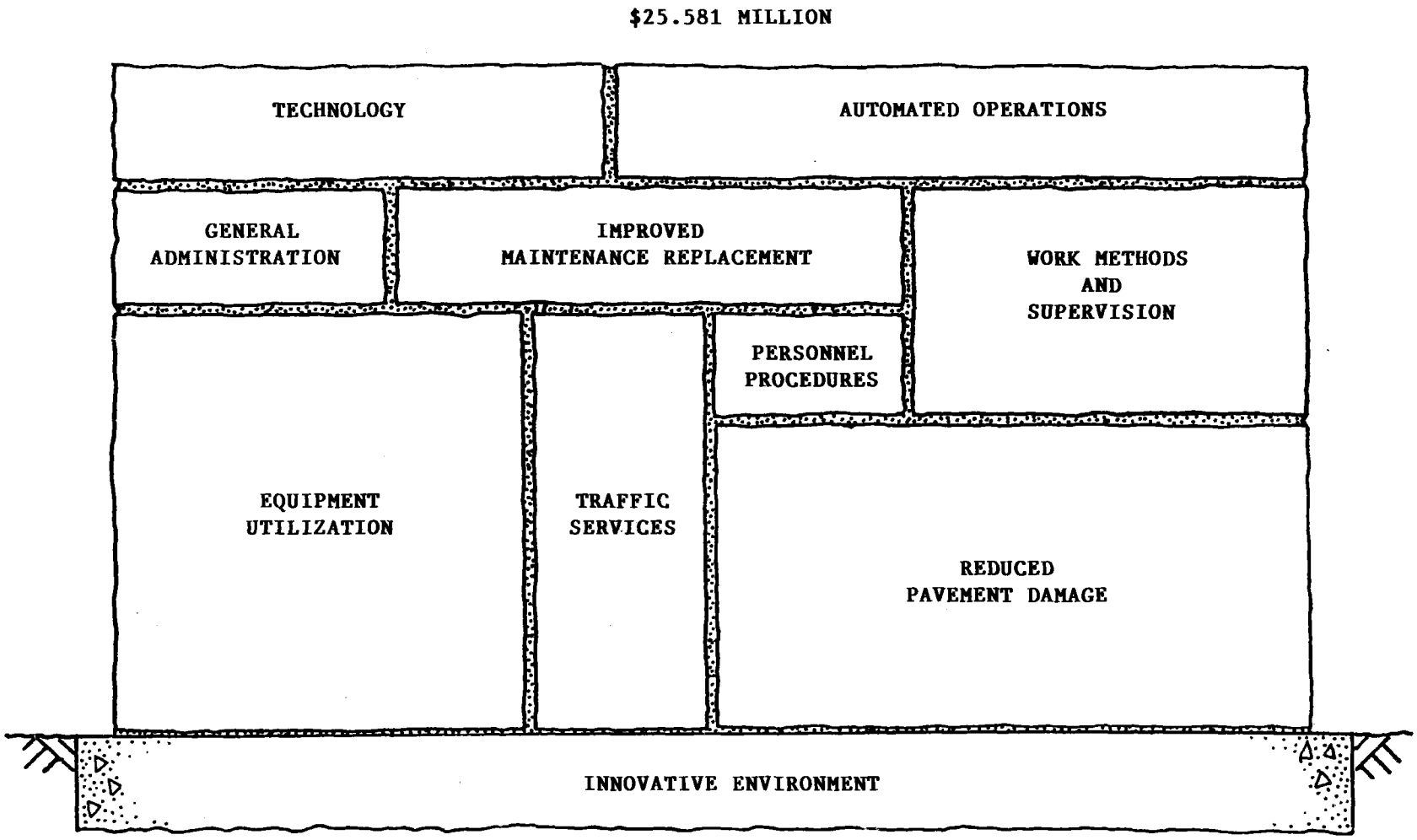

Figure 1. Building Blocks of the Productivity Improvement Plan

Among the several actions taken by management to promote innovation and improvements in productivity in the long-term is initiating a full process of decentralizing more authority and responsibility to district engineers; creating a Productivity Improvement Center to develop, train, and instruct personnel in improved procedures and quality assurance; and, establishing a Technology Transfer Center at the Department's Research Council to transfer the latest in engineering technology among field units.

Improving Productivity in Administration

The FY 1987-88 budget for administration is $45.941 million. Reducing unit costs in administration can best be achieved through efforts that reduce the number of man hours required to perform support functions. Even modest reductions in man hour requirements, when spread over employees in both the central office and the field, can help the Department fulfill the demands on the expanded program.

The Department has targeted four major administrative areas for improvements in productivity. First, the Department is initiating a paperwork reduction program that focuses on consolidating and eliminating (where possible) a number of reports and forms currently prepared and submitted by various field and central office units. More than 30 reporting requirements have been proposed for examination during 1987 and the possible combination of several cost reports hold the potential for saving up to 426 man hours annually for each of the 45 residencies. Along with eliminating the monthly waste oil report and altering the Department's letterhead, this program is estimated to conserve about $380,000 worth of resources which can be used for administering the expanded program.

Second, the Department has identified two personnel procedures (filling vacancies and training for career enrichment) that offer potential for productivity improvements in the near-term. By altering documentation procedures and consolidating interviews, the Department estimates that time of resident engineers, area supervisors, and assistant district engineers valued at approximately $827,000 can be released to apply to managing the expanded program without sacrificing the quality of recruitments or the integrity of training.

Third, general administration (utilizing of hourly and part-time personnel, alteration of the policy on collecting traffic data on secondary roads, strengthening purchasing and inventory controls in the field, and streamlining procedures related to EEO and DBE implementation) holds the potential for releasing about $970,000 worth of resources on an annual basis when fully implemented.

A fourth category, near-term technology, can be expected to release about $700,000 worth of labor time and other resources on an annualized basis when implementation is complete. Such near-term technological improvements include the enhanced use of teleconferences to avoid certain types of travel; the diffusion and more widespread use of video technology in lieu of site visits; the installation of the latest

generation of telecopiers; and, the placement of small copiers in area headquarters.

In the long-term (beyond three years) implementation of on-line data processing entry and retrieval systems will enable the Department to carry on its fiscal, accounting, budgeting, right-of-way, and inventory control functions more rapidly, with fewer errors, less duplication, and fewer hard-copy reporting requirements.

In the near-term, administration improvements in productivity represent resources worth about $2.88 million or 6.3% of the FY 1987-88 budget. For the long-term, the improvements can be expected to yield about $3.79 million worth of resources (most of which is released labor) for use by the Department to meet the demands of the expanded program (Table A).

Table A

Summary of Productivity Improvement
Plans in Administration
(Goal = $2,297,000)

Category	Value	Percent of Administration
Near-Term		
Paperwork Reduction	$ 380,000	.83%
Personnel Procedures	827,000	1.80%
General Administration	970,000	2.10%
Technology	711,000	1.55%
Subtotal	$2,888,000	6.29%
Long-Term Technology	$ 907,000	1.97%
TOTAL	$3,795,000	8.26%

Improving Productivity and Efficiency in Maintenance

The budgeted amount for maintenance for FY 1987-88 is $392.050 million. This is for ordinary maintenance (intended to maintain each roadway item as closely as possible to its original design), maintenance replacement (which is larger in scope and includes resurfacing, restoring and replacing items that have failed or exceeded their expected

life), and operations (activities directed to snow removal, tunnels, rest areas, signs, ferries, etc.)

Improving the productivity and efficiency of maintenance is set forth in three major categories. One is a set of 25 innovative cost saving plans; the second is concerned with programs and processes that are being undertaken to promote improvements in productivity over the long-term; the third concerns studies the Department will undertake to determine the feasibility of several possible ways of improving productivity.

Innovative cost saving plans. The Department has identified six major areas of maintenance activity where improvements in productivity will be undertaken that can be expected to yield resource savings in both the near-term and long-term. Among these six areas, a total of 25 innovations are planned for implementation that will result in productivity improvements estimated to be worth approximately $21.8 million (about 5.6% of the maintenance budget) on an annualized basis (Table B).

Through an aggressive planning, technology transfer, and supervision and work methods program that involves the Maintenance Division, the Research Council, and the Productivity Improvement Center, the Department will transfer improved work methods and supervision skills among the 237 area headquarters. Within the near-term this program is estimated to result in improvements in productivity valued at about $3.1 million.

Seven innovations concerned with improved utilization and management of equipment are planned for implementation. These items hold the potential for saving about $5.6 million worth of resources and manpower and include using larger capacity pavement marking machines and dump trucks, using improved ditching equipment and snowblowers, using two-way radios on a selective basis, improving replacement practices for fuel storage tanks, and using older equipment to reduce down-time for repairs.

Ten improvements are proposed in the traffic services area that hold the potential for saving approximately $2.285 million on an annual basis. Among these are: (1) improving sign fabrication; (2) reducing the size of guide signs; (3) increasing sign spacing; (4) expanding the use of durable pavement markings; (5) commencing preventive maintenance on signals and other lights; (6) altering delineation devices for work zones; (7) using more mesh maintenance signs; (8) contracting custodial services at rest areas; (9) reducing markers for certain intersections; and, (1) altering the fees for Logo signs on the interstate system.

Table B

Near-Term and Long-Term Productivity Improvement Plans in Maintenance
(Goal = $19,502,000)

Category	Value	Percent of Maintenance
Planning, Supervision, and Work Methods	$ 3,100,000	.79%
Equipment Utilization	5,642,500	1.44%
Traffic Services	2,285,000	.58%
Automating Operations	2,684,000	.68%
Improving Maintenance Replacement	2,074,500	.53%
Reducing Pavement Damage	6,000,000	1.53%
TOTAL	$21,786,000	5.56%

Plans are underway to automate three major operations of the maintenance program that now are labor intensive: (1) counting traffic on interstate and primary routes; (2) dispensing fuel at area headquarters and other locations; and, (3) recording and managing equipment utilization. When implementation is complete in 1988 and 1989 this automation is estimated to save approximately $2.7 million in resources on an annual basis.

Improving maintenance replacement techniques involve two major innovations that are estimated to save approximately $2.1 million annually when fully implemented over the next 5 years. By not requiring asphalt pavers to end daily resurfacing with lane joints coinciding, about $540,000 can be saved during a resurfacing season. Through research, the Department is examining several new surface treatment designs that are anticipated to extend the average life of treatments on secondary roads by about 3 years (from 5 years to 8 years). When the new designs are completely phased in, about $1.06 million should be saved as compared to current costs.

The cost of resurfacing and repaving interstate and primary pavements is approximately $44 million annually. Given that the duration between required resurfacings on Interstate 81 has fallen from 8 years to about 6 years during the period of time since 1981 (and could fall even more) and given that average daily axle loads have increased by 40% during the same period, the Department is undertaking an examination of ways to reduce pavement damage. Its scope will include an assessment of the enhanced use of weigh-in-motion devices and the bypassing of scales (the number of overweight violations has tripled since 1981 and the rate of violations per 1000 vehicles weighed has doubled); and a survey of efforts to reduce pavement damage in other states will be conducted.

The Department estimates that as much as 25% of pavement damage and resurfacing costs could be attributable to overloading because of the increased axle loads placed on interstate and primary pavements. Through the examinations the Department will undertake, information will be provided to outline ways to extend pavement life and reduce the growth rate of pavement resurfacing needs by up to $6.0 million annually.

Programs and Processes. A number of programs and processes are in place or will be established to improve productivity of maintenance. These include more closely examining potentials for contracting out ordinary maintenance for certain activities; instituting a maintenance quality assurance program; improving the Bridge Management System; improving the timing and targeting of pavement resurfacing through the use of the Pavement Management System; and, increasing emphasis on managing traffic movements through signal timing and other techniques.

Studies and Assessments. The Department will undertake several studies to determine the feasibility of a number of possible ways to improve productivity or reduce cost. The Department intends to use a mathematical technique (similar to one used to locate firehouses, rescue squads, and transportation terminals) to evaluate the location and coverage of area headquarters. The Department also proposes to examine alternatives that offer potential for improving the output and productivity of the current inmate labor-force arrangement (the use of minimum security trustees has proven successful in North Carolina). Finally, the Department is examining and intends to implement automatic toll collection systems as soon as possible to improve convenience for highway users and improve highway capacity.

Maintenance and Other Non-Construction Cost Comparisons With Those of Other States (pp. 35-44)

Staff from the Department visited the states of North Carolina and Maryland and collected data from Pennsylvania by way of telephone interviews. North Carolina is the only state in the nation that is truly similar to Virginia in size and responsibility for a comparable secondary road system; Maryland offers an example of states that do not have responsibility for a secondary system.

Nonconstruction Costs

The Department's major nonconstruction programs are used as a benchmark and include administration and supervision, support to other agencies, mass transit assistance, street maintenance payments to municipalities, and payments to Arlington and Henrico counties.

Costs for administration and supervision in Virginia are lower than for Maryland and North Carolina; because Pennsylvania only charges central office administration to this line item, its costs are much lower than the other states (about half).

Support to other agencies shows significant variation among the states ranging from a low of 1.56% in Maryland to a high of 13.35% in Pennsylvania for FY 1986. Virginia falls in the middle at 5.74% for the same fiscal year.

Unlike Virginia, Maryland and Pennsylvania allow payments to municipalities to be used for either maintenance or construction. North Carolina restricts the payment to maintenance use. North Carolina's funding for municipalities is about half Virginia's; it has 1.35 times the mileage of municipal streets, some of which it maintains.

Mass transit assistance shows a wide range of funding among the states. As compared to the total FY 1986 budget, figures range from .72% in North Carolina to 17.67% in Maryland. In FY 1986 transit assistance amounted to 2.79% of the budget.

Maintenance Costs

Several factors are important for assessing comparability of maintenance costs: (1) in North Carolina and Maryland many of the expenditures defined in VIrginia as maintenance replacement are defined by them as construction or not tracked in detail; (2) North Carolina uses 1148 minimum security trustees as an integral part of their labor force. This labor, used 250 days per year, is worth about $23 million but costs only $287,000; (3) Virginia funds greater traffic operations demands out of maintenance than either North Carolina or Maryland; and, (4) North Carolina has mostly a temperate climate, therefore it's snow removal costs are significantly less than either Virginia's or Maryland's.

Virginia's ordinary maintenance costs per lane mile compare very favorably with the other states. The Commonweatlh spends $2067 per lane mile on the interstate and primary; North Carolina spends $2073 per lane mile; and Maryland spends $6647 per lane mile. Each Virginia maintenance worker takes care of 23.12 lane miles or roadway; each in North Carolina cares for 22.97 lane miles; and each worker in Maryland cares for 14.5 lane miles.

On secondary roads Virginia ordinary maintenance costs are $964 per lane mile and in North Carolina such costs are $1004 per lane mile. Maryland has no secondary road responsibility.

An Examination of the Process of Obtaining Rights-of-Way (pp. 45-56)

The principal objective of the Department's right-of-way division is to acquire rights-of-way in fee simple or easement for the implementation of the construction program. This is governed by the Uniform Relocation Assistance and Real Property Acquisitions Policy Act of 1972,

which requires that property be appraised and that a fair and just compensation based on market value be ascertained. A negotiator then examines all aspects of the appraisal and owner entitlements and makes a monetary offer. The Department assists in the relocation of all occupants and computes all payments necessary to enable them to relocate into a facility equal to or better than the one occupied prior to relocation. If the property owner does not accept the offer, the Department may exercise its right to condemn the property thus engaging the courts to settle the dispute.

Recent Improvements

During the last 18 months a number of actions have been taken that have reduced paperwork, saved man hours and enhanced public image. For example, a standardized appraisal form is now in use; approval of appraisal reviews has been given to the districts, and a single individual is used to appraise and negotiate parcels valued at $2,500 or less. Several improvements have also been undertaken to reduce the time normally taken to negotiate. Finally, a master agreement has been executed with utility companies to speed relocations of these properties.

Immediate Implementation

The Department will take several actions in the very near future to improve the right-of-way process. In order to reduce plan alteration and duplication of effort, a plan coordination meeting will be held between the right-of-way division, location and design division and utilities section prior to plans being sent to right-of-way for action. To accelerate the appraisal, relocation, and negotiation process, action will be taken to join the multiple listing services throughout the state.

Improvements Requiring Some Review

Several proposals for potential improvements require some alteration in current policy. These proposals will be examined during 1987 and appropriate action taken. Among these are the following: (1) authority for review, approval, and preparation of utility relocations on urban projects can likely be given to the districts; (2) the use of a maximum of two agents (one to appraise and one to negotiate and settle) can most likely serve as a way to reduce landowner confusion and strengthen the acquisition process; (3) the Department's relationship with the public can be strengthened through overhauling and enhancing the printed matter and visual aids used to explain the right-of-way process at public hearings; and, (4) title searches and closings generated by the new program can possibly be handled through judicious use of paralegal firms.

Issues Requiring Study

Several issues require in-depth analysis and study to develop appropriate recommendations over the next 2 years. These include: (1) assessing the current procedure for selecting condemnation commissioners and proposing alternatives which may ensure the objectivity of the panel; (2) examining the policies and procedures, and the posture of the boards of supervisors concerning donations of rights-of-way to determine their consistency with a fiscally responsible right-of-way process; (3) studying opportunities which may exist for the advanced acquisition of rights-of-way and the feasibility of using private real estate firms to dispose of certain surplus residue parcels; and, (4) evaluating alternatives to escalate the relocation of utilities.

State Force Construction
(pp. 57-58)

In considering the appropriateness of a cost ceiling, it is important to determine the role state-force construction should play both today and in the near-term in the road construction program. Influences on this determination are the availability and willingness of the industry to perform work and the cost effectiveness of state forces (versus the private sector) in performing the work.

The Department's assessment of contractor availability and willingness to bid suggests that the incidence of bid rejection has tended to be concentrated in those advertisements of less than $300,000; however, the expansion of the program and the uncertainties associated with differences in markets from region to region suggest flexibility in the use of state force construction may become more critical in the future and should be an integral part of policy development.

Consequently, three recommendations are made: (1) the continuation of the current cost ceiling per project for the near-term; (2) the dedication of 225 personnel statewide (allocated on the basis of need) for state force construction; and, (3) the initiation of an in-depth analysis of the role of state-forces in the construction of roads (including establishment of a clear and consistent understanding of state-force construction by all appropriate Department personnel and the establishment of a state-force construction data base to aid in its effective management).

Improving and Accelerating Construction
(pp. 59-64)

Actions Underway

Among those initiatives already under way to accelerate the road building process are the following: (1) compressing preliminary engineering and preconstruction to achieve a 20% increase in the number of projects designed each year; (2) increasing the use of computer aided drafting and design to reduce the time required to draft plans; (3) reinstating prequalification for all contractors; (4) evaluation of revisions to the phase inspection program; and (5) enhancements to the inspection-in-depth and quality assurance programs.

Near-Term Assessments

The Department will make assessments of several improvement potentials in 1987. Among these are: (1) aggressively considering more widespread use of standardized bridge designs where appropriate; (2) examining ways to expedite environmental permit approvals and modifications; (3) examining the propriety of allowing Department officials to award and reject bids as they are received rather than the Transportation Board doing so monthly; and, (4) examining ways to accelerate payments to contractors.

Long-Term Assessments

Twelve areas have been identified that the Department believes will offer opportunities to accelerate road building. Among these are: (1) testing alternative incentive clauses and contract arrangements to speed construction; (2) developing a data base to keep track of local ordinances that need to be taken into account in the construction process (such as nighttime work limitations); (3) evaluating and implementing state-of-the-art estimation techniques that can be used to assess the reasonableness of bids; (4) automating contract document preparation; (5) developing strategies to increase industry willingness to bid by evaluating the potential for dividing larger projects into smaller parts and grouping small projects with large ones; and, (6) enhancing the process of monitoring and managing claims.

VIRGINIA DEPARTMENT OF TRANSPORTATION STAFF WITH
PRIMARY RESPONSIBILITY FOR THIS STUDY

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Mr. James Atwell, Director of Finance
Mr. Paul Cecchini, District Engineer (Staunton)
Mr. Claude Garver, Construction Engineer*
Mr. David Gehr, Director of Operations
Mr. Peter Kolakowski, Budget Director
Mr. Jack Leigh, Maintenance Engineer*
Mr. David Mahone, Senior Scientist*
Mr. Michael Perfater, Research Scientist*
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Mr. Stuart Waymack, Assistant Right-of-Way Engineer*
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PART I

PURPOSE AND SCOPE

On September 26, 1986, the General Assembly passed Joint Resolution No. 7 (SJR-7) during the Special Session of the General Assembly called to address the Commonwealth's transportation needs and funding. Part of that resolution requests the Department of Transportation (VDOT) to develop a plan for reducing expenditures for administration and maintenance by 5% as compared to 1987-88 appropriations and to continue these reductions in the future. The plan is to achieve these purposes through improved efficiency in Department operations. In addition, the Department is requested to compare the costs of maintenance and other major nonconstruction activities with the corresponding costs in other states; to examine bidding procedures, procurement policies and the process of obtaining rights-of-way; to examine ways to accelerate the road building process; to consider the most appropriate cost ceiling on projects to be built and maintained by state forces; and to make recommendations to the 1987 regular session of the General Assembly regarding considerations.

This report has been prepared in response to SJR-7; it is divided into five major sections which parallel the subject areas delineated in SJR-7. The first section describes the Department's creation of an innovative environment for improving efficiency in administration and maintenance through increased productivity in the short term and in the long term. The second section compares maintenance and nonconstruction costs incurred by the Department with comparable costs incurred by other state departments of transportation. This section of the report is particularly useful in providing a perspective on the Department's current cost performance. The last three sections of the report are comprised of three focus areas with special relevance to the Department's carrying out a significantly larger construction program. The first is an examination of the current process for obtaining rights-of-way and how it might be improved; the second centers on the role construction by state forces plays in an integrated contract administration strategy; and the third addresses bidding, procurement, and the acceleration of road building.

The Department views this report as an opportunity to communicate with the General Assembly regarding specific aspects of a commitment to a long-term, continuing focus on efficiency, and as a means of bringing to the attention the General Assembly legislative issues that may be important to the efficient maintenance and construction of the transportation system as the Commonwealth approaches the 21st century.

PART II

INTERPRETATION OF SJR-7

Language

In November of 1986, the Department forwarded to the patrons of SJR-7 and other members of the General Assembly its interpretation of the language contained in that resolution. This was an attempt to confirm that the Department's sense of direction was consistent with that of the General Assembly regarding the efforts called for.

Appendix A consists of a copy of that document, which was mailed to the patrons for review and comment, as well as a copy of the study plan. It is appropriate to include a summary of that interpretation here, particularly the portion pertaining to the efficiency plan.

SJR-7 has three major parts: (1) the plan for increased efficiency; (2) the information gathering and points of focus effort; and (3) the JLARC follow-up. The language referring to "5%" is interpreted to be a mandate to increase efficiency in the Administration and Maintenance programs. Service levels are not to be reduced to achieve the 5% savings; however, long-term review or alteration of standards should not be ruled out in the event there is strong justification for doing so.

"Administration of the Department" is interpreted to refer to Item 627 of the 86-88 Appropriations Act with amendments at the 1987 regular session to facilitate comparison with the "5%" language; but is not construed as being a restriction on the commitment to overall Department efficiency efforts. "Maintenance of the transportation system of the Commonwealth" is interpreted to refer to Item 631 of the 86-88 Appropriations Act with amendments at the 1987 regular session which is concerned with the maintenance of the interstate highways, and the primary and secondary road systems.

The plan, which relies on existing knowledge, ideas, and refinements of previous studies and ideas, outlines what the Department intends to do and how the Department intends to do it. It offers a reasonable time table and an estimate of the range of unit cost savings (or savings in time where appropriate).

Also, the plan looks toward instituting processes that commit the Department to a continuing effort to improve the efficiency of its operations. Many initiatives are already under way, such as the compression of preconstruction activities and the establishment of the Productivity Improvement Center.

Focus

Improvement in productivity and economy in the use of resources are the key focus of the plan. An improvement in productivity is, of course, an increase in output for the same level of input.

For the Department, this focus is of undeniable importance in the labor context, for only through the aid of improvements in productivity can the Department hope to fulfill the demands of the expanded program. This is made clear by the projection (shown in Table 1) of the Department's staffing trends as compared to program size.

Table 1

Total and Construction
Employees Per Project and
Per Million Dollars of Construction Balances
(1985-1988)

Year	Employees per Project		Employees per $ Million		Number Projects	Balances (Millions)
	Total	Const.	Total	Const.		
1985	25.8	4.9	24.0	4.6	398	$428
1987	20.2	4.6	16.1	3.7	538	$677
1988	14.8	3.6	11.8	2.9	767	$961

The table clearly reveals the necessity for a focus on improvement in productivity as a means to release man-hours to ensure that quality and service are preserved as the program grows. The same is true of maintenance responsibilities, which are expected to increase by about 400 lane miles annually in the years to come.

In summary, in the efficiency plan, the Department is focusing on improvement in productivity and economy in the use of resources as a way fulfilling these increasing demands.

PART III

A PLAN FOR IMPROVING EFFICIENCY IN ADMINISTRATION AND MAINTENANCE

For the purposes of this report, a distinction will be drawn between near-term and long-term plans. Near-term plans are plans for which the technology is available or that the Department has begun to execute or can begin to execute that will improve productivity with the attendant savings in resources beginning within the next three years. Long-term plans will result in improvements in productivity that will begin to appear beyond the next three years and will continue thereafter. Because improvements will begin to take effect over time, it is the intent and the desire of the Department to report periodically to the General Assembly on the results of these plans.

This section addresses four areas: (1) Creating an innovative environment; (2) Management initiatives to foster innovation and productivity; (3) The administration efficiency plan; and (4) The maintenance efficiency plan.

The Essential Long-Run Element--An Innovative, Productive Environment

In 1985 Tom Peters and Nancy Austin published A Passion For Excellence. This best-seller examines the critical aspects of what makes an organization successful and efficient and has done much to restructure the thinking of America's business leaders. In many respects, it shakes the very foundation of many principles previously taught in leading graduate business programs.

In contrast to those who have focused on rules and managerialism as the elements of success, Peters and Austin conclude that there are only two ways to create and sustain superior performance in an organization over the long run: The first is to take exceptional care of your customers through superior service and superior quality, and the second is constantly to innovate.

A number of initiatives have been undertaken to put the Department closer to its customers. These include instituting the Highway Help-line, a statewide toll-free phone service through which citizens may report road problems and obtain information; increasing visits by the Commissioner and his staff with local governing officials; placing new emphasis on clarity in written communications by having a public information specialist critique agency publications, organize workshops on communications, and assist with correspondence; conducting a traffic reporters conference; and holding a number of open forums with the private sector. Nevertheless, it is Peters' and Austin's second theme, that constant innovation is essential in making an organization efficient and successful, that is of particular relevance to the Department's

long-term plan for improving efficiency in administration and maintenance.

Even though we outline and describe a number of productivity improvements below, it is the creation of an innovation-oriented environment that will ensure that improvements in productivity of the sort exhibited in this report become the way the Department does business in the years to come.

The method by which the Department has developed the specific productivity improvement actions and plans described here is a good example of such an innovative environment. Building upon the notion used by successful corporations (like 3M, General Electric, and Hewlett Packard) that the creative potential of each person in an organization is its major strength, the Department set out to tap and encourage such creativity in addressing SJR-7. Consequently, rather than have the Department's executives develop this plan for improvements in productivity, it is based on proposals from teams of people who do the work.

Through this team approach, ideas for improving productivity were gathered from each of the 45 resident engineers; many of the maintenance supervisors; the nine district engineers and their assistants; over 100 field personnel involved in the right-of-way process including negotiators, appraisers, and relocation agents; and a team of 23 middle managers and Department research scientists and engineers with many years of experience in the transportation and engineering professions. This latter team had responsibility for determining the areas of focus and for providing overall guidance for the study. The charge given these teams was simple and unconstrained: How can the Department work "smarter"?

- Where can the Department free man-hours that may then be used to help pick up part of the construction workload the expanded construction program will generate and part of the maintenance workload an aging system will generate?

- What is the Department in the habit of doing that is unnecessary?

- In what ways can equipment be better utilized; how can work planning and accountability be improved; and what technology is available which will enable the Department to cut the unit cost of providing a smoothly administered, well constructed, well maintained transportation system?

In short, the charge was, and remains, to ask "Why--why do we do what we do, and isn't there a better way?"

Management Initiatives to Promote An Innovative, Productive Environment

The Department has instituted a number of processes that are important for creating and fostering an innovative, productive environment. These are listed below; they are largely self-explanatory and hold great potential for tapping employee creativity and improving productivity over the years to come.

1. The Department has begun a conscious and full process of decentralization: the central office establishes policy and the field offices have taken on significant additional decision-making authority and responsibility. A decentralized organization is critical for productivity and innovation, because centralized decision making may frequently thwart the creativity fostered by many minds working on the same problem.

2. A small group has been created to perform policy analysis and to coordinate relations with federal transportation agencies. This will focus and concentrate in one unit what has been scattered throughout many divisions of the Department.

3. A Productivity Improvement Center has been created within the Management Services Division. The staff will utilize industrial engineering and related evaluative skills to conduct analysis of productivity, to examine improvements in productivity in the private sector, to develop training, and to instruct personnel in improved procedures and quality-assurance techniques. The center will maintain a library and be responsible for disseminating materials related to productivity to agency managers. A key element of the center will be a Productivity Investment Bank; it will fund proposals presented by managers for innovations, new technology, or processes for which "start up" funding is required. The Division will evaluate these initiatives for improving productivity and share the results of these evaluations with other work units that could benefit from similar initiatives.

4. Department managers, district engineers, and resident engineers have been encouraged to solicit help, advice, and technology transfer assistance from the Department's Research Council staff. The Department has also established Technology Transfer Center at the Research Council for the purpose of training Department personnel in the latest engineering technology and transferring effective techniques for planning and production to field units through short courses and monthly newsletters.

5. The Department has initiated a management development program to build skills for supervisors and managers in grades eight and above. This program is intended to help managers understand their role in training the people in their work unit to be more productive.

6. In the fall of 1986, the Department reinstated the cooperative education program with state-supported engineering colleges and

universities and initiated an internship program with institutions of higher learning in non-engineering fields related to the Department's operations.

7. The Department's leadership forum, consisting of senior management, all division administrators, and all district engineers was organized. This group meets approximately six times each year to ensure and encourage the opportunity for discussion, debate, and the exchange of views on issues important to the Department.

8. The Spring Engineer's Conference, which traditionally dealt largely with technical issues, was converted to a Spring Management Conference for 200 agency managers. This serves to encourage better communication and to foster the transfer of innovative ideas.

9. As part of the process of decentralization, the Department is encouraging independent meetings of district engineers, resident engineers, and division administrators to share ideas and to create new solutions to common problems.

10. A comprehensive agency-wide process was initiated to develop clearly expressed goals to provide direction for the Department overall and for each division and each district. This will provide benchmarks by which performance can be better measured.

11. The Department initiated an examination of employee recognition activities with the aim of expanding and strengthening these efforts.

12. A task force of employees was established to evaluate and recommend improvements in procedures and practices related to internal communications and employee relations.

To reemphasize, the Department is committed to efficiency and improved productivity in all operations. The Department has initiated a number of long lasting processes to encourage and foster an innovative, experimental, questioning organizational environment that takes advantage of the creative talents of employees and that serves as the key to improved productivity in the long run. For evidence that this approach will prove successful and foster long run efficiency gains, let us turn to the proposals for improving productivity and efficiency generated by this innovative environment.

Improving Efficiency In Administration

Scope

The plan has two major aspects: (1) Near term and long-term savings of resources to which a monetary estimate can be attached; and (2) areas that require study.

The administration of the Department is comprised of those activities which make up Item 627 of the Appropriations Act. Generally, this includes the operating budgets for VDOT support services such as budgeting, personnel, accounting, internal audit, purchasing, public affairs, management services, policy analysis, fiscal, education and training, computer services, physical plant, safety and accident prevention, equal employment opportunity, data collection, and general administration and supervision. In the field, support services account for approximately 60% of the district offices' and 50% of the residency offices' staff's efforts. This represents those costs not attributable directly to construction projects or maintenance activities. Most central office division costs, with the exception of those in preconstruction, are administrative.

To summarize: for the purposes of targeting improvements in productivity, administrative expenditures include those incurred to provide general management, direction, and support services to the Department's 9 districts, 45 residencies, and 25 divisions. For FY 87-88, the proposed amount for these activities is $45.941 million and represents 2.78% of the Department's total budget for ground transportation, exclusive of funds for air, ports, and support at other agencies. The goal for improved productivity is therefore 5% of this amount, or $2,297,000.

As is evident from the components of the plan, the thrust is improvement in productivity and economy in the use of resources. Many proposals in the administrative plan are aimed at reducing unit costs and freeing manpower currently engaged in completing required administrative activities. Man-hours freed by such improvements may then be used to pick up some of the increase in workload that can be expected from the new program.

Paperwork Reduction Program

Consolidation or Elimination of Forms. Forms and reports generated at different points in time, by different administrative units, for different purposes contain much of the same information and utilize much of the same data base when completed by the 45 residencies and 237 area headquarters statewide. While the Department is in the process of implementing a sophisticated, on-line, automated information system there remains a great potential for a reduction in paperwork, apart from that that will naturally stem from an on-line entry and inquiry system. The Resident Engineer Teams have identified a number of reports and forms which hold potential for elimination or consolidation; these are

listed in Appendix B. An in-depth review is to be undertaken by the Divisions before August 1, 1987, with the goal of reducing paperwork as much as possible. The review will be led by the Management Services Division and will achieve two purposes: (1) it will reduce the current amount of paperwork required of the residencies; and (2) it will heighten awareness (throughout the Department) of the cost of the creation of reporting requirements that may not match those required by policy and procedure.

The great potential of this program is revealed by the savings of 320 to 426 man-hours annually for each of the residences statewide from the possible consolidation of several cost reports, the A-19, A-7, ED-10, ED2C, and PA-36. In terms of resource value, this reduction in man hours is estimated to be worth between $216,000 and $287,550. Elimination of the monthly waste oil report would save 1056 filings and or about $16,000 in labor time. Automating the M-9C report could save about $73,000.

Alteration of Stationery Letterhead. Along with preparing new stationery for the Department's name change, the Department has altered the letterhead to avoid the necessity of reprinting large quantities each time an officer or division administrator or Board member changes. This will save at least 50% (about $3,000) each year on printing costs.

Streamlining Procedures for Matters Related to Personnel

Within the time available to respond to SJR-7, sufficient information was gathered by study teams to direct their attention toward streamlining the procedures for filling entry level positions in the field and for carrying out the career enrichment training program. The Department's plan is to examine aggressively and intensively these procedures and report documentation practices, and by December 31, 1987, to develop substitute procedures which can begin to significantly reduce the man hours currently devoted to them without sacrificing their integrity. While the Department currently has a consultant under contract examining the personnel organization (its report will be available in April 1987) the plan just described is not likely to be inconsistent with the consultant's recommendations. Furthermore, the potential gains from successful streamlining of this sort are so significant that they warrant an aggressive approach.

Career Enrichment Training. In 1983 the Department instituted a formal training program for field maintenance personnel entitled "The Career Enrichment Program." This program was developed as part of a consent decree agreed to by the Department in lieu of entering into litigation in a suit charging the Department with failure to provide all employees opportunities to develop skills which might help them compete equally for promotions.

Athough the thrust of the program is quite beneficial in terms of building a better work-force, the procedures which have evolved to document the Department's implementation of the program appear quite

cumbersome and excessive. (For example, the file maintained for someone who enters the program as an Operator A is 28 pages in length.)

By mid 1988, the Department will examine the documentation procedures of this program and, with the advice of the Attorney General's office, design new procedures that will be significantly less cumbersome, but which maintain the integrity of the documentation requirement. Discussions with resident engineers and training officers indicate that as much as 8 to 10 man-hours per month are spent in each area headquarters documenting this program. Potential savings per enrollee range from 50% to 80% over the current procedure or $241,740 to $386,784 worth of labor on an annualized basis.

Filling Vacancies. For 1985, the latest year of complete data, 1,446 positions were filled in the field. There were 19,829 applicants or an average of almost 14 applicants for each opening. In Bristol and Salem, there were an average of 25 applicants for each job filled. The Commonwealth Department of Personnel and Training requires extensive, labor intensive documentation of all applicants rejected. In addition, the Department has typically used two, and many times three, individuals to interview applicants for maintenance positions at the area headquarters level. These same individuals typically screen the applicants to select the interview pool.

After the applicant is interviewed, a recommendation is made to the District Personnel Manager, and after a review of the file, the Personnel Review Committee meets at the District Office to give final approval. This typically involves a meeting of the Resident Engineer, the Assistant District Engineer, the EEO coordinator, and the Personnel Manager.

Many private-sector firms use a process which is much less cumbersome, particularly for entry level positions (such as truck drivers, operator A's, operator B's, clerks, etc.). their personnel office screens and interviews the applicants, and then sends two of them to the immediate supervisor for a final interview. Alternatively, many firms utilize the services of the Virginia Employment Commission as a screening and interviewing service. To improve efficiency, the Department will develop and put in place in the near future procedures that are consistent with the policies set forth by the Commonwealth Department of Personnel and Training, but which significantly reduce the manhours of effort devoted to replacements and hiring. Reducing the time per advertisement by 10 man hours may not be unreasonable given the numerous steps in the current process. (If, for example, only five people are interviewed by a residency committee of three people, this can consume 15 man-hours. Simply cutting the interview committee by one individual can save five man-hours for this step alone.) During 1987 and 1988, the volume of field advertisements may be expected to be as high as 2200 for grades nine and below. With this volume of advertisements, a reduction of 10 man-hours per advertisement will yield a reduction of $440,000 worth of effort to fill the positions. This is particularly valuable in releasing the time of resident engineers, maintenance supervisors, and others who play significant roles in the construction program.

General Administration

Strategy for Utilization of Hourly and Part-time Employees. Selective use of job-sharing techniques and part-time hourly personnel may be part of an effective technique for managing employee turnover over the long-term, particularly in localities where certain positions tend to be subject to highly competitive pressures. During 1987 the Department's Office of Personnel will begin to develop a comprehensive strategy for the use of shared positions and hourly personnel as part of a strategy regarding employee turnover. The potential savings from this development are significant and stem from two sources: 1) eliminating the cost of repeatedly filling positions that exhibit high turnover, and 2) avoiding the cost of fringe benefits. In the case of clerical positions, for example, if the Department were to use 32 half-time shared positions in place of 16 full-time positions, the savings would be $9,632 per FTE or about $155,000 in salary expense. This 41% savings does not include the savings from avoiding repeatedly advertising certain high-turnover positions.

Disadvantaged Business Enterprise, Women's Business Enterprise, and EEO Implementation. The Resident Engineer teams suggest that, conservatively, 30-35% of the paperwork generated on construction projects is the result of EEO, WBE, and DBE documentation for contractors. The probability of streamlining the documentation process is high, if structured properly, because much of the current process appears to be the result of an overreaction on the part of the Department when it initiated the programs. Conservatively, it is expected that this streamlining could reduce the documentation process by 10 man-hours per week for each residency statewide. For a grade eight technician, the cost avoidance for completing the same level of work is $396,360 on an annualized basis. A reduction of 15 man-hours per week may be an achievable goal, with an associated resource value of $594,540.

Alteration in Policy Regarding Traffic Data Collection on the Secondary System. Through the end of 1986 the Department has maintained an extensive traffic-data collection effort on secondary roads. Estimated 1986 cost is approximately $405,000. The Secondary Roads Division in concert with the Planning Division and the Department's Research Council has developed a new biennial and rural quadrennial program that greatly reduces the number and frequency of counts without jeopardizing their function. This program will save at least $200,000 (and possibly $300,000) for the annual data collection effort on the secondary system.

Strengthening the Procurement Function in the Districts. As one of a number of recommendations made regarding the decentralization of authority to the districts, during 1987 the district procurement function will be strengthened through training in order to oversee all purchases and inventory control in the field. This will ensure more control of purchasing, speed the procurement process, allow more frequent use of local parts and suppliers when cost differences warrant this, and aid in the control of expendable hand tools. Such improved

controls are expected to save up to $20,000 annually on the replacement of hand tools alone.

Improvements in Productivity Through Technology in the Near Term

Organizational improvements of a technological nature can be expected to yield significant improvements in productivity over and above start-up costs from 1987 to 1992 and beyond. During this period of time the size of the construction program the Department handles will approximately double. Thus, improvements in productivity (that is, reducing the per-unit cost of administrative and support services) are particularly valuable as a means of minimizing the impact on the administrative budget of supporting this enlarged construction program.

First, let us deal with immediate and near term technological improvements and then turn to the longer term, more comprehensive information systems the Department is in the process of implementing.

Placing Small Copiers in Area Headquarters. This is an alternative to travelling to Residencies each week to perform copying. Given current copying requirements for many area headquarters, capital cost can be recouped in the first twelve to eighteen months, after which the net saving in avoided travel time and vehicle cost is estimated at $181,000.

Utilization of An Improved Automated Personal Computer Program. Software developed in the Department's Research Council will reduce the per-unit cost of performing transit evaluations by 50%. The software costs will be recovered after two years; thereafter, the net value of the reduced per-unit cost is expected to be about $11,000 annually. This will reduce the need for purchase of professional support services to supplement Department staff until updating, expansion, or improvements are undertaken.

Enhanced Use of Teleconferences. This technology offers an alternative to face-to-face meetings. For certain types of exchanges of technical information teleconferences offer opportunities for savings to the Department. Where they are appropriate, teleconferences are only one-eighth the cost of meetings involving travel. Departmental usage of teleconferences has doubled over the past two years and annual savings could conservatively be estimated to be $40,000 in 1988.

Diffusion of Video Technology. The Department is actively engaged in the assessment of a program geared to the diffusion of this technology throughout its field operations. The use of video technology in lieu of travel for on-site review and in lieu of travel to a centralized location for certain types of training offers great savings potential over the long run. The Department has a task group in charge of studying the feasibility of implementing video technology. The group has estimated that start-up costs for a viable program can be paid for in the travel savings from one year; thereafter, resources worth between $236,000 and $479,000 can be realized through less travel.

The Latest Technology in Telecopiers. All district offices, residency offices, the Research Council, toll facilities, critical inspection locations, and several Central Office Divisions will soon be receiving telecopiers. Although no cost avoidance estimates are offered here, the savings in time for questions regarding policy and emergencies, and the quick turnaround on review of shop drawings, questions regarding permits, and questions regarding plan sheets is expected to more than pay for the initial investment in a relatively short period of time. For example, correspondence and review material can be transmitted from the Bristol District to the Commissioner's desk in 15 seconds with this technology.

Computer-Aided Design and Drafting (CADD)--Applications Other than Design. On December 10, 1986, demonstrations of non-design applications of CADD were provided to approximately 80 representatives from the District offices and Central Office to acquaint them with the potential uses of CADD in their operations, particularly where repetitive drawings or forms must be developed. The utilization of CADD to prepare contract proposals for the Construction Division is expected to be among the earliest and most significant applications of the system outside the design area. Time savings in this area, based upon results in the design area, can be on the order of 2 to 1.

Improvements in Productivity Through Technology in the Long Term

The Department is now well into the implementation of recommendations outlined in the 1983 Management Information Systems Plan. This plan identifies and recommends priorities for major management information systems development.

An integral part of the strategy to improve management information systems is the use of state-of-the-art information-processing techniques. From the current batch system, the Department is moving to on-line information processing. Gains in technology have made the hardware and software available for the Department to implement an on-line telecommunications network. Most work is performed in the field, therefore, processing capabilities are being focused in that direction. This on-line telecommunications network should be operational by late 1987 or early 1988 and be available as a means of beginning to significantly reduce paperwork and information processing resource use as the Department's program grows over the long run. Systems such as those noted in Table 2 will improve the speed with which the expanded program can be handled, result in better planning, improve budgeting and cash management, and reduce errors and duplication in data processing. While the greatest gains in efficiency will stem from field personnel becoming familiar with the capabilities of the systems over the long run, estimates made by the 1983 Consultant Report (as documentation for the proposal submitted to the Department of Information Technology) provide an indication of the opportunities for the improvements in productivity these systems offer.

If, for example, only 50% of the savings estimated by the consultant are realized, the systems noted in Table 2 can be expected,

when fully operational, to release about 52,000 man-hours department wide, which can aid in offsetting the demands of a larger construction program. If a very conservative estimate of only 30% of the consultant savings are realized, 31,300 man-hours would be available for the expanded construction program effort in the long run. At grade eight technician's pay, these reduced man-hours translate to improvements in productivity worth between $546,000 and $907,000, once all systems are in place. It is not unreasonable to expect that each system can pay for itself four to five years after start-up.

Table 2

Status of Management Information Systems

System	Status
Program/Project Management System (P/PMS)	Implement. 1987
Right-of-Way Management System (RWMS)	Implement. 1987
*Financial Management System (FMS) Data Entry/Inquiry (Phase I)	Operation. 87-88
*Purchasing/Inventory Management System (PIMS) (Phase I)	Operation. 88-89
Highway & Traffic Records Information System (HTRIS)	Operation. 88-90
Construction Manpower Management System (CMMS)	Operation. 88-89

*Both the FMS and PIMS systems have two phases. Phase II, which includes a fully integrated accounting system, is not expected to be operational before 1992-93.

Areas Which Hold Potential for Gains in Productivity, But Which Require Study in the Near Term

In keeping with the theme of fostering an innovative and productive environment, there are several areas that the Department intends to evaluate because of the potential they hold for improving the organization and its productivity over the long run. These are listed below.

1. Evaluate the function and structure of the residency in light of the anticipated environment of the late 1980's and early 1990's.

2. Examine ways of managing the use of sick leave more effectively in order to improve the productivity of maintenance field forces.

3. Investigate the advantages and disadvantages of alternatives to the current procedures used to make payments to contractors and vendors.

4. Evaluate and make recommendations regarding an aggressive posture on promoting professionalism within the Department. Becoming a registered professional engineer, a member of the Institute of Transportation Engineers, a member of the American Right of Way Association, etc. can serve to improve overall productivity and innovation.

5. Examine the possibility of coordinating and consolidating a number of data-collection efforts currently carried out by Department. Improvements in productivity are most likely to be the result of the economies resulting from large-scale efforts and the elimination of duplication.

The Department intends to undertake these evaluations over the next biennium and report as appropriate to the General Assembly.

A Summary of the Administration Efficiency Plan

Based on the proposals for the improvement in efficiency and productivity outlined above, the Department estimates that resources valued at $2,888,000 can be freed in the near term for use in dealing with the expanded program (Table 3). In the long term, additional resources can be freed by implementation of the management information systems, which when fully in place could free resources valued at $907,000 annually.

These near-term improvements in productivity represent approximately 6.3% of the FY 1987-88 proposal for the administrative budget. The long-term improvements can be expected to save resources valued at approximately 8.3% ($3,795,000) of that budget.

Table 3

Summary of Productivity Improvements
in Administration
(Target $2,297,000)

Category	Value ($)	Percent of Administration
Near Term		
Paperwork Reduction	$ 380,000	.83%
Personnel Procedures	827,000	1.80%
General Administration	970,000	2.10%
Technology	711,000	1.55%
Subtotal	$2,888,000	6.29%
Long Term	$ 907,000	1.97%
Total	$3,795,000	8.26%

Improving Efficiency in Maintenance

The budgeted amount for maintenance for FY 1987-88 (Item 631 of the Appropriations Act) is $392.050 million; this represents approximately 23% of the total budget for ground transportation. Generally, this can be separated into ordinary maintenance, maintenance replacement, and traffic services and operations. Ordinary maintenance is intended to ensure that each roadway item is maintained as closely as possible to its original design specifications. Maintenance replacement is larger in scope and includes resurfacing, restoring, and reconstructing roadway and bridge components that have failed or exceeded their expected life. Operations consists of activities directed to snow removal, tunnels, rest areas, signs, ferries, fog systems, and the traffic management system on I-66. Ordinary maintenance comprises about 43% of the maintenance budget; Operations is about 12%; and maintenance replacement is about 45%.

For purposes of the report, improving the efficiency of maintenance operations will be discussed in three sections: The first consists of a set of 25 innovative cost-saving plans. The second is concerned with programs and institutional processes that are being undertaken to promote improvements in productivity and savings in the long run. The third section describes studies the Department will undertake in the near term to determine the feasibility of several possible ways of improving productivity.

The programs, processes, and studies will be considered first before turning to those specific innovations for which cost estimates have been prepared.

Near Term Programs and Processes for Improving Efficiency in Maintenance

A number of programs and processes offer great potential for ensuring gains in efficiency in the long run over and above the cost-saving innovations described in the next section of the report. Some are already in place or will be in place in the near future.

Improving Planning, Scheduling, Supervision and Work Methods. A number of programs have been put in place that promote productivity and full utilization of the maintenance workforce through improved planning, scheduling, supervision and work methods. Among these are the Department's Productivity Improvement Center, and Management Development Program, and the Technology Transfer Center at the Department's Research Council. All of these initiatives were described earlier in the section of the report on promoting an innovative, productive environment but clearly have applicability to maintenance.

Contract Maintenance. The Department has contracted out maintenance replacement for many years, but ordinary maintenance by contract has been less widespread. Through a short course prepared by the Department's Research Council, all resident engineers and maintenance supervisors have been trained how to determine when to use contract labor for maintenance. Indications are that contracting certain types of operations such as mowing holds great potential for long-run savings.

Quality Assurance Program. During 1987 the Department will institute a maintenance quality-assurance program similar to the construction inspection-in-depth program. The intent of the program is to monitor the overall quality of maintenance, point out areas of inconsistent performance, and provide a more formal process for assuring that consistent service levels are provided statewide.

Improvements in Budgeting and Forecasting. The Department is continually making improvements in the maintenance budgeting process. Three steps in this process are of particular relevance to developing improved estimates of maintenance requirements. First, unit costs for pavement-related maintenance are being developed for each county, rather than by district. This reflects the uniqueness of individual counties and provides more accurate county budgets. Second, standards for performance in maintenance are being reviewed by a consultant and the Department. Refinement of these standards will promote more accurate estimates of the resources required to achieve the desired level of service. Third, a more accurate maintenance cost index is being used, this will enable forecasts of budget needs to be based upon the latest available cost information. In addition to developing unit costs for pavement-related maintenance items, other unit costs will be developed from the most recent cost information available rather than on information from the last fiscal year.

Improvements in the Bridge Management System. The Department conducts an extensive inspection program to monitor the condition of bridges. While the bridge rating system is used to aid the Bridge Division in setting priorities for replacement, the system is not well suited to forecasting which bridges are likely to deteriorate most rapidly and how fast the deterioration might occur owing to an increase in traffic volume or changes in environmental conditions. Consequently, the Research Council, in concert with the Bridge Division is developing a mathematical technique, based upon a sample of nearly 1000 of Virginia's bridges, for forecasting the deterioration rates of various bridge components. As part of a research effort sponsored by the Federal Highway Administration, the consistency of the inspection program is being assessed. These efforts will lead to a more effectively directed bridge maintenance program and aid in the appropriate timing of maintenance for critical bridge components. This assessment is scheduled for completion in the spring of 1988.

Pavement Management. For several years, the Department has been developing a data base and forecasting technique to help in effectively maintaining its pavements. This system is currently being used to estimate and direct funds for maintenance replacement on the interstate and primary systems. It will soon be available for use on the secondary highway system as well; it will enable the Department to more accurately forecast which pavements are likely to be in greatest need of repair. Over the long run, appropriately targeted and timed maintenance replacement can be expected to aid in avoiding certain ordinary maintenance expenditures.

Highway User Savings Emphasis. The Department plans to increase the emphasis on its Transportation Systems Management Program (TSM). TSM is a program of short-range, low-cost capital improvement strategies that will greatly improve the performance of the transportation system. Typical TSM strategies range from traffic operations improvements and parking management to preferential treatment for high occupancy vehicles and ride-sharing activities. Even though minimal investments are required in the implementation of TMS, the user savings (fuel, time, vehicle wear, etc.) of such a program allows the Department to defer, and in some cases avoid, construction expenditures while improving service level.

Nationwide experience in small, medium and large communities reveals that such traffic engineering improvements result in an increase in the traffic capacity (by as much as 15%) and a decrease in accidents. Typically traffic signal systems have led to at least a 10% decrease in travel time and vehicle delay and benefit-to-cost ratios as high as 60:1.

Near Term Assessments and Studies

Location and Coverage of Area Headquarters . The Department's Research Council has developed a mathematical technique, based on a framework used by the private sector to locate warehouses and distribution terminals, that the Department intends to use in a continuing

program of evaluating the location and coverage of area headquarters. The technique uses a number of parameters critical to the location and coverage of area headquarters, including response time, climate, topography, and congestion. Preliminary results of applying the technique suggest there may be justification in consolidating a number of area headquarters. In addition, this analytical technique can prove particularly useful in adjusting the locations of headquarters near rapidly growing urban areas.

Inmate Labor Program Assessment. Based on interviews and discussions with maintenance managers in North Carolina, the Department proposes to examine alternatives that offer great potential for improving the output and productivity of the current inmate labor-force arrangement. In North Carolina, 1148 minimum security trustees are used as an integral part of the maintenance operation, rather than being used in separate groups under guard as they are in Virginia. Although they are restricted to using certain types of equipment, some of them perform skilled labor. In addition, the trustees are paid $1.00 per day and are transported by the Corrections Department. Each trustee works 250 days per year. The Department will report its findings regarding the cost and feasibility of instituting such a program at the 1988 session of the General Assembly.

Maintenance Personnel Turnover Strategy. In certain geographic areas of the state, and for certain maintenance job classifications the Department has in recent years experienced high turnover rates. Turnover is particularly costly in two ways: (1) it renders maintaining an effective, well-trained labor force very difficult; and (2) filling positions is very costly and, by the best estimate available at the present time, $800 to $1,000 per employee is lost. Over the course of the next two years, the Personnel Division of the Department intends to identify any geographic areas where or job classifications in which there is high turnover, assess the causes, and propose strategies to effectively mitigate the turnover within a reasonable period.

Automatic Toll Collection System. The Department is examining and intends to introduce automatic toll collection systems (ATCS) as soon as possible and will report on the status of the effort at the 1988 Regular Session of the General Assembly. Such systems will enable tolls to be collected from vehicles without drivers having to stop to handle cash, tickets, or other immediate forms of payment. The ATCS will use the advanced technology of automatic vehicle identification (AVI) to debit prepayment accounts directly as vehicles pass toll plazas.

ATCS will reduce delays at toll facilities, will free up staff from the monotonous and hazardous task of collecting tolls, and will increase highway capacities during peak periods. It will also simplify accounting for commercial and business traffic and be more convenient for the great majority of highway users.

Cost Saving Innovations

This section outlines a set of innovations which will result in near-term and long-term savings of resources valued at approximately $22 million on an annualized basis. These savings in labor, equipment use, and materials, stem from improvements in six major areas: (1) planning, technology transfer, and improved work methods ($3,100,00); (2) equipment utilization and management ($5,642,000); (3) operations and traffic services ($2,285,000); (4) automated operations ($2,684,000); (5) maintenance replacement techniques ($2,074,500); and (6) reducing pavement damage ($6,000,000).

Planning, Technology Transfer, and Improved Supervision and Work Methods. The Joint Legislative Audit and Review Commission reported that when examining six maintenance activities they found wide variations in productivity rates among the residencies. Consequently, they suggested that the Department further identify variations in productivity and their causes and develop a program for transferring proven technology, work methods, and planning techniques.

In response to JLARC, the Research Council has analyzed the productivity rates of those twelve activities which account for about ninety percent of state force maintenance expenditures. This analysis was conducted at the area headquarters level rather than at the residency level and it was found that, indeed, some area headquarters have a much higher productivity rate for specific activities than do others. Some of this higher productivity is a result of differences in terrain and climate; but a portion can be attributed only to superior work methods and the use of advanced technology. The Maintenance and Equipment Divisions and the Research Council are undertaking a joint venture which will identify the use of superior work methods and supervision, advanced technologies, and improved planning techniques at area headquarters and will aggressively begin to transfer these methods and technologies to all areas during 1987.

Preliminary results from Research Council work indicates productivity variations that are not inconsistent with earlier JLARC results.

Based upon the preliminary evidence, the Council estimates that an improvement in productivity of 5%-6% is not unreasonable in the long run. A conservative estimate for the near term is about 2% of maintenance salaries or $3.1 million. Within three years, the program should be more mature and result in both a reduction in variations in productivity, and an increase in the average level of productivity.

Equipment Utilization and Management. In this section, seven items concerned with improved utilization and management of equipment are discussed. (1) tandem axle pavement marking machines, (2) equipment replacement, (3) ditching equipment, (4) snowblowers, (5) tandem axle dump trucks, (6) kerosene tank replacements and, (7) two-way radios. Improved use and/or mangement of these seven items could save $5,642,500 worth of resources and manpower.

1. Tandem Pavement Marking Machines

A single-rear-axle truck can carry 400 gallons of paint; a tandem-rear-axle unit can carry 800 gallons. This increased capacity alone should reduce by one hour the time taken to reload a unit. Since the tandem units cannot be effectively used on narrow roads with poor alignment, only 10 of the 23 existing units could be replaced with this equipment.

Pavement-marking units work approximately 143 days per year. One hour per day is saved by the tandem unit and the estimated resource loss for downtime to reload is $60 per hour; therefore, each unit replaced yields an annual gain in productivity of $8,580. This has to be reduced by $1,030 because of the additional depreciation cost incurred by the more expensive tandem units. This leaves $7,550 per truck for a total annualized gain of $75,500 when the 10 units are placed in service. This is anticipated during 1988-89.

2. Equipment Replacement

The Department's equipment replacement procedures require the exchange of the old unit when the new unit is placed in service. The replaced unit is processed for disposal at auction. Equipment downtime could be reduced during peak work cycles by retaining a number of the old units through this key period before disposal. This strategy has been used for several years with front-end loaders during the winter and pickups during the summer. The Department intends to expand this strategy to other classes of equipment to meet short-term requirements for service during extended repair situations and to aid in expediting work during both normal work cycles and emergencies.

The statewide operating statement for FY 1985-86 indicated operating hours of 9,074,494 operating costs of $40,525,781, and 825,000 hours of downtime. By using the new replacement procedures, equipment utilization can be increased by 25% of the downtime hours, or 206,250 hours. The equipment portion of maintenance activity averages 20%-25% of the total cost. This implies that utilization of one unit of equipment can be combined with available labor to generate about four units of maintenance output. Thus, the availability of 206,250 more equipment hours can increase maintenance output by about $3.68 million.

3. Ditching equipment

A comparison was made of the estimated costs of ditching operations that use self-loading trucks, pull-type ditchers, tractor-mounted ditchers, and the standard

technique that uses motor graders, belt loaders, dump trucks, and sweepers. Each technique has unique operational characteristics that limit its use or make it especially useful in specific applications.

The Department's analysis shows that it is possible to utilize the more efficient, self-loading truck on about 1,500 miles of secondary roads with an attendent 40% reduction in costs. Full implementation will yield $186,000 in savings annually after paying for the equipment.

4. Snowblowers

The Department has recently purchased three Unimog Special Purpose Tractors for snow removal where fixed plows would not be adequate. These units use a ribbon cutter and blow the snow out of the road. Depending on the condition of the snow, the Unimog ribbon cutter will remove up to 15 tons of snow per hour. In addition, it can be equipped with mowing, sweeping, loading, and back-hoe attachments and accessories that give it all-season capabilities.

The Department's present snowblowers have no capability other than snow removal, and are being replaced with Unimog tractors equipped with a snowblower, backhoe, and loader bucket. These units can replace 21 backhoe loaders priced at $41,000 each and serve other purposes, at an estimated one-time savings of $861,000. Replacing three units the first year would provide a savings of $123,000, and replacing two units each year thereafter would give an annual savings of $82,000 through 1996.

5. Tandem Dump Trucks

The tandem dump truck will carry 2.06 times the payload of a single-axle truck with an increase in cost of only 82%. The tandem truck with one operator will haul more material than two single-axle trucks with two operators thus saving $7.80 per hour.

However, the tandem truck is suitable as a replacement for a standard dump truck only for long hauls, in ditching and grading, and in spreading chemicals.

The assignment of two tandem trucks to each residency appears to be appropriate for these purposes and will create a savings of $1,094,000 annually after capital costs are annualized through the rental rates (90 TRUCKS x 1,559 HR. UTILIZATION x $7.80/HR. SAVINGS = $1,094,000).

6. Kerosene Tanks

The Department has 301 fuel service stations with 211 underground metal kerosene tanks; 128 of them are at least 15 years old and in need of replacing. Most of these locations have low volume use; therefore, the Department intends to replace the metal underground tanks with 550 gallon fiberglass aboveground tanks that can be operated more economically with less potential for environmental hazard.

The cost of installing each tank is approximately $500, and the cost for removing the underground tank and restoring the area is estimated at $2,000. Total one time savings on replacement is $1,472,000 for 128 tanks. Annualized over 15 years, this amounts to approximately $98,000 in savings per year.

Removal of underground tanks will also eliminate the need for pump dispensers which are estimated to cost $2,575 to purchase and $150 annually to maintain over their 15 year life. Therefore, future cost avoidance would be $617,000, as shown below.

128 x $2,575	=	$329,600
128 x $150 x 15	=	$288,000
TOTAL		$617,600

Average Annual Cost Avoidance = $617,600/15 = $41,173.

In summary, the annualized cost avoidance from this program totals $139,000.

7. Two-Way Radios

The Department has radio base stations at the Central Office, each district headquarters residency office, and 88 of the 237 area headquarters. There are 1,160 mobile units presently in service.

Managers have indicated there are many occasions when two-way communications would eliminate a return to headquarters or the turnaround time to perform some emergency service. Therefore, it is proposed that 460 additional mobile units be installed, and that base stations be installed at the remaining area headquarters over the next five years. A minimum of $25 will be saved for each trip eliminated. It is estimated that each radio (which rents for $30 per month) would save one trip per week, so that the addition of 460 units will release

$386,000 worth of lost travel time annually when implemented.

Operation and Traffic Services. Within this area, ten improvements can be made: (1) improving sign fabrication, (2) reducing the size of guide signs, (3) increasing sign spacing, (4) increasing the annual charge for logos's, (5) reducing route markers for intersections, (6) expanding the use of durable pavement markings, (7) commencing preventive maintenance on signals and other lights, (8) altering work zone delinations, (9) using mesh maintenance signs, and (10) contracting custodial service at rest areas. The total value of these 10 improvement plans is $2,285,000 annually.

1. Sign Fabrication

A change to the use of pressure applied sign copy in place of demountable copy on large guide signs would reduce the cost of signs by approximately 40¢ per sq. ft. For the estimated 33,750 sq. ft. of signs contracted in an average year, the savings would be approximately $13,500. For sign overlays done by state forces, one hour per sign (or about 2000 man-hours worth $20,000) would be saved. The total annual savings for contract and state force work would be $33,500.

2. Reducing Guide Sign Size

It is proposed to reduce the size of guide signs from the present 10 ft. 6 in. by 3 ft. 6 in. to 8 ft. 6 in by 3 ft. 6 in., where there would be no conflict with minimum post spacing requirements. This would reduce the size of the average sign by approximately seven sq. ft. At an estimated fabrication cost of $10 per sq. ft., with approximately 400 new and replacement signs being fabricated annually by the district sign shops, the savings would be approximately $28,000 per year. The reduction on contract plans, where there are generally four signs at interchanges and major intersections, would reduce the cost per location by $280.

3. Increasing Sign Spacing

Erecting mileage distance signs along rural primary routes at ten-mile intervals rather than five-mile intervals would reduce the number of signs that must be maintained in service from approximately 3,200 to approximately 1,600. Ten percent (160) of these signs are replaced each year. At an average fabrication cost of approximately $350 per sign ($10 per sq. ft.), the annual savings in replacement costs would be approximately $56,000.

4. Changing Fees For Private Sector Logos

Currently, the Department is not recovering the cost of maintaining signs for businesses participating in the Travel Services Sign Program. Charging an annual maintenance fee per direction and per route, as is now done in 23 states, could garner annual revenue of $624,000. This money could be used to fund the sign program on a break-even basis. During 1987 the Department intends to examine the current policy regarding the Travel Services Sign Program and establish a fee for service structure which is equitable and fiscally responsible.

5. Reducing Route Markers

Savings could be achieved by modifying the directional signs at major intersections by (1) eliminating the advance and intersection shield assemblies used to inform the driver that the route he is traveling continues straight ahead, (2) reducing the number of route markers displayed and the number of posts used for such signs with the use of a single route shield employed with two directional arrows and separate cardinal direction panels where applicable, and (3) eliminating from minor (local) secondary routes the markers designating primary routes. With regard to item (3), removal of the 26,600 shield assemblies, which would each cost $35 to replace under the present system, would yield a savings of $93,000 per year. Although these actions would save money in the long term, they would not alter service level.

6. Expanding the use of Durable Pavement Markers

Thermoplastic markings have an expected service life of at least three years as compared to one year for the alkyd paint currently widely used. It is estimated that the Department's current use of thermoplastic pavement marking is yielding a savings of approximately $140,000 a year. A second thermoplastic pavement marking truck was put into service in 1986 and similar savings will continue in 1987 and beyond.

7. Commencing Preventive Maintenance on Signals and Other Lights

The implementation of an experimental preventive maintenance program for traffic signals in the Culpeper District resulted in a 25% reduction in total annual maintenance costs (from $224,290 during FY 1982-83 when this program was just beginning, to $169,230 during FY 1983-84, when the program was fully implemented) even though the number of signals increased from 110 to 125.

The unit cost reduction per signal was therefore 33% in this district alone.

Implementing a preventative maintenance program like the one outlined in this pilot program will save approximately $364,000 annually statewide. It should take two to three years to realize the full benefits of this program. As new signals are added, the savings will increase.

8. Altering Work Zone Delineations

The cost of using reflectorized panels to delineate concrete barriers used for traffic control in work zones is from 5% to 10% of the cost of using steady-burn lights; however, the legibility and effectiveness of delineation of the panels need to be evaluated before they are widely used. Plastic barrels could be used in some cases rather than concrete barricades if they met safety requirements. The Research Council has undertaken an evaluation of reflectorized panels. It is estimated that the use of reflectorized panels could yield a savings of $638,000 to $782,000 on lighting alone. The savings resulting from the use of plastic barrels could be much higher.

9. Using Flexible Mesh Signs

Over the past three years the Department has been phasing in the use of flexible signs when the existing aluminum signs are no longer functional. The purchase of flexible signs increased approximately 400% in FY 1985-86 over FY 1984-85.

Since the cost of a mesh sign is approximately one-third that of a comparable aluminum sign, it is estimated that the Department will realize annual savings of approximately $82,500 when this type of sign material is substituted for aluminum for certain work-area signs. Such savings should be expected in late 1987 and throughout 1988.

10. Contracting Custodial Service at Rest Areas

Of the 40 rest areas in Virginia, 12 are served by public sewer and water. Contract custodial service is both feasible and economical at these sites since a certified treatment plant operator is not required. The custodial service at four of these areas has been contracted at a savings of approximatly 10%. The current cost for service for the eight rest areas staffed by state personnel is approximately $817,000. Contracting at a 10% savings would yield savings of approximately $82,000 annually (beginning in 1988).

Automating Operations. Plans are underway to automate the three following operations of the maintenance program: (1) counting traffic, (2) managing equipment, and (3) dispensing fuel. This automation is expected to save approximately $2,684,000 in resources annually when fully implemented in 1988 and 1989.

1. Counting traffic

The initial cost of the automatic traffic count system will be approximately $1,300,000. The annual operating cost will be approximately $523,000. The current manual system costs approximately $814,000 a year to operate. The payback period is estimated to be three years (using a 7% interest rate). Afterwards, the annual savings will be approximately $290,000. The Department is taking steps to implement an automated system in 1987 and will make a progress report at the 1988 Regular Session.

2. Managing equipment

Under a steering committee, work is proceeding on the design and implementation of an automated equipment management system to upgrade and enhance the Department's equipment and fleet management procedures. The system will include rental and nonrental equipment as well as pool cars. It will aid in the development of the equipment replacement program by evaluating the replacement criteria and ensuring the minimization of life cycle costs.

Operating costs for the equipment complement for FY 1985-86 were approximately $40,500,000. The system will provide data to increase efficiency and equipment utilization and reduce operating costs. This system with its current data, control functions, and scheduling programs should provide a savings in excess of 5%. A savings of 4% annually would provide a savings in operations cost of $1,620,000 in 1989 after paying for start up costs.

3. Dispensing Fuel

The Department handles approximately 16,000,000 gallons of gasoline, diesel fuel, kerosene, oils, greases, and other products annually from 301 pump locations to service approximately 21,000 vehicles and pieces of equipment. These activities require approximately 1,000,000 transactions annually.

The Department has investigated an automated fuel dispensing system and it is estimated that this system will provide an annual savings of 96,000 man-hours in recording and processing fuel records. At $6.25 per hour

plus the fringe benefit additive rate, there would be an estimated annual labor savings of more than $924,000. The Department is moving ahead to place this system in operation by the spring of 1988. It should pay for itself in four years and result in net annual savings of $774,000 thereafter.

Improving Maintenance Replacement Techniques. In this section the following are discussed: (1) squaring up bituminous paving each day, and (2) surface treatments on secondary roads. Improving these techniques will save approximately $2,074,500 annually when fully implemented.

1. Squaring up Paving

Presently, asphalt paving contractors are required to end daily pavement resurfacing with lane joints coinciding thus making one transverse joint across the entire pavement. It is estimated that elimination of this requirement would provide for a savings of 50¢ per ton of bituminous concrete for an estimated average annual savings of $540,000 (1,079,226 tons at 50¢ per ton). This change is being included in the specifications for contracts beginning in the spring of 1987.

2. Longer Lasting Surface Treatments

The Department has been looking for improved technology that will provide higher quality, longer lasting surface treatments. During 1986 the Research Council and the Maintenance Division examined ways that North Carolina reduced problems with secondary surface treatments through the use of multicourse treatments. The Department currently resurface treats on a five-year cycle which results in an annual cost of about $17,000,000. However, with the North Carolina type of treatment it is believed that the life cycle of surface treatments can be extended to at least eight years.

It is estimated that it will cost 50% more per mile to resurface with split-seal surface treatments but because the average resurfacing cycles can be extended by three years, the annual cost can be reduced to $15,937,500 rather than $17,000,000. This is a yearly savings of $1,062,500. However, it should be noted that the new surface treatment program will require a phase-in period, and it will be five to six years before the yearly savings begin to be realized.

A second surface treatment improvement is being undertaken. Since the Department has adopted a design procedure which prescribes the required quantities of asphalt and stone rather precisely, three districts have experimented with paying for cover aggregate by a

prescribed number of pounds per square yard (rather than accept the judgments of contractors and inspectors). This procedure has resulted in a 4.2% savings in these three districts. Since these two districts represent about 30% of the state surface treatment mileage, there is a potential for the cost of treating the remaining 70% of the mileage to be reduced by $469,000 savings per year beginning in late 1987 (.7 x $15,937,500 x 4.2%).

These savings from these two improved techniques total to $1,534,500 annually.

Reducing Pavement Damage. Part of the Department's responsibility in the maintenance area includes efforts to manage pavements, reduce pavement damage, and conduct an effective truck weighing program. These responsibilities take on particular importance in light of evidence from the pavement management system which indicates that since 1981 the average life expectancy of pavements on Interstate 81 has fallen from 8 years to only six years. During the same period, average daily axle loadings have increased approximately forty percent. Further evidence from the Pavement Mangement System suggests that as much as 25% of axle loads may be generated by overweight vehicles and that such violations account for about 25% of pavement resurfacing needs (approximately $12 million). In fact, the number of weight violations per 1000 vehicles weighed is higher than it has been since the current liquidated damage schedules were established in 1956. The rate has doubled from 3.2 violations in 1981 to 6.7 per 1000 vehicles weighed in 1985. Given that 2.5 million more vehicles were weighed in 1985 than in 1981 the number of violations nearly triples to 62,301 during the four year period.

To continue the efforts in managing pavements, the Department will undertake a study with a focus on exploring ways to reduce pavement damage. The scope of the study will include an examination of the enhanced use of weigh-in-motion devices, the extent of by-passing of scales, efforts to reduce pavement damage in other states, and their liquidated damage schedules as compared to Virginia's.

Based on these examinations, the Department believes it will be in the position to outline ways, for consideration by the General Assembly, to reduce pavement damage, extend the life of pavement and reduce growth in pavement resurfacing needs on the interstate and primary systems by up to $6,000,000 annually.

The Department will undertake such an assessment during 1987-88 and report to the General Assembly when it is completed.

Potential for Additional Savings. In addition to the above six areas, four additional items will provide savings of uncertain magnitude. They are concerned with (1) secondary route marking policy, (2) steel sign posts, (3) bridge inspection equipment, and (4) shoulders.

1. Secondary Route Markers

The average cost for a secondary route marker (9" x

11") is $7.50 for materials only. To remove these route markers when street names have been assigned to secondary roads can result in savings in maintenance and sign cost in the long run. The secondary route number can be replaced with a metal tag similar to that used on Virginia Power poles at an approximate cost of $ .25 each. While the exact savings cannot be determined, a review of Fairfax, Chesterfield, and York counties indicates that at least $60,000 in materials alone could be saved.

2. Steel Post Standards

Current "Road and Bridge Standards" (page 1401.04) allow the contractor to substitute U-type steel posts for wood posts for signs with an area of 9 sq. ft. or less provided they meet breakaway safety requirements. While our maintenance personnel have the same option when posts are replaced, they have not been encouraged to use it. The use of this option over the next biennium will save significantly on replacement costs.

3. Bridge Inspection Equipment

Current bridge inspection equipment is inefficient for inspections on structures that exceed 28 feet in width. New equipment being used by the Department has a maximum working reach of 40 feet. The new inspection device also allows for a more complete inspection because a short boom allows for inspection of areas that were previously inaccessible (for example, into and behind the six and eight foot girders). Thus, a more proficient inspection is performed which permits detection of problems before serious deterioration occurs. While it is difficult to estimate savings, early detection of problems does often reduce the cost of repairs.

4. Shoulder Maintenance

For many years, the Department has scheduled shoulder maintenance on a routine basis in keeping with standards established by AASHTO. Throughout the coming years the Productivity Improvement Center and the Maintenance Division will examine a number of standards, including those for shoulder maintenance. It is

anticipated that in the future the field will schedule such maintenance on the basis of a survey of road conditions thereby, allowing the Department to eliminate such activities when warranted.

Summary of Maintenance Efficiency Plan

Cost saving goals are summarized in Table 4 and are presented in detail in Table 5.

The near-term and long-term improvements in productivity are valued at $21.786 million or 5.56% of the Appropriations Act maintenance figure of $392.050 million. This is $2.3 million in excess of the goal.

Table 4

Near-Term and Long-Term Cost and Resource Saving Innovations
(Goal = $19,502,000)

Category	Amount	%
Planning, Supervision and Work Methods	$ 3,100,000	.79%
Equipment Utilization and Management	5,642,500	1.44%
Operation & Traffic Service	2,285,000	.58%
Automating Operations	2,684,000	.68%
Maintenance Replacement Techniques	2,074,500	.53%
Reducing Pavement Damage	6,000,000	1.53%
Total	$21,786,000	5.56%

Table 5

Near Term and Long Term Productivity Improvements

	Planning, Technology Transfer and Improved Work Methods		$ 3,100,000
	Equipment Utilization and Management		
1.	Tandem Pavement Marking Machine	$ 75,500	
2.	Equipment Replacement	3,680,000	
3.	Ditching Equipment	186,000	
4.	Snowblowers	82,000	
5.	Tandem Dump Trucks	1,094,000	
6.	Kerosene Tanks	139,000	
7.	Two-Way Radios	386,000	
	TOTAL		$ 5,642,500
	Operation and Traffic Service		
1.	Sign Fabrication	$ 33,500	
2.	Guide Sign Size	28,000	
3.	Increased Sign Spacing	56,000	
4.	Fees for Private Sector Logos	624,000	
5.	Reduction in Route Markers	140,000	
6.	Preventive Maintenance on Signals and Other Lights	364,000	
7.	Work Zone Delineation	782,000	
8.	Flexible Mesh Signs	82,500	
9.	Contract Rest Area Service	82,000	
	TOTAL		$ 2,285,000
	Automating Operations		
1.	Traffic Counts	$ 290,000	
2.	Equipment Management	1,620,000	
3.	Fuel Dispensing	774,000	
	TOTAL		$ 2,684,000
	Improvemed Maintenance Replacement Techniques		
1.	Squaring up Paving	$ 540,000	
2.	Longer Lasting Surface Treatments	1,534,500	
	TOTAL		$ 2,074,500
	Reducing Pavement Damage		6,000,000
	TOTAL		$21,786,000

Summary, Administration and Maintenance Efficiency Plan

The goal for the plan was 5% of maintenance and administration as shown in the FY 1987 Appropriations Act. This amount is $437.991 million. The plan target was, therefore, $21.896 million. As shown in Table 6, the Department has met and exceeded this target by $3.68 million in near and long term improvements in productivity. These are valued at $25.581 million or 5.9% of the total maintenance and administration budget.

Table 6

Near Term and Long Term Maintenance and Administration Productivity Improvements (Goal = $21.896 million)

Category	Amount
Administration	$ 3.795 million
Maintenance	21.786 million
Total	$25.581 million

PART IV

MAINTENANCE AND OTHER NONCONSTRUCTION COST COMPARISONS WITH THOSE OF OTHER STATES

Introduction and Data Sources

This section of the report consists of a comparison of Virginia's maintenance and other major nonconstruction costs with those of several other states. Within the short period of time available for the data collection effort, only maintenance cost data for North Carolina and Maryland were examined. In addition to maintenance data and other information gathered through visits to these states, comparable nonconstruction cost data were also obtained for the state of Pennsylvania by phone.

These states were chosen for several reasons: (1) research experience shows that cost data published by the Federal Highway Administration lacks the comparability and detail to make meaningful comparisons and the ability to meet face-to-face with officials in those states chosen for comparison was determined as the best means of assuring comparability; (2) North Carolina is the only state in the nation which is truly comparable to Virginia in size and responsibility for the secondary system of highways; (3) Maryland is similar to Virginia topographically and climatologically but its DOT is organized in a fashion sufficiently different from Virginia to serve as a reasonable benchmark for many urbanizing states in the northeast; and (4) Pennsylvania has a state system slightly smaller than Virginia, is geographically similar to Virginia, has responsibility for some local roads, and is recognized by many in the transportation community as being highly aggressive regarding administrative improvements in recent years. Because Pennsylvania has traditionally had responsibility for urban transit, it is particularly interesting from the standpoint of nonconstruction expenditures. It should be noted that transit is partially financed by a lottery.

Data were collected for the last three fiscal years: FY 1984, FY 1985, and FY 1986 and included financial statements and annual reports, as well as explanatory information collected through interviews. Because the data showed consistent patterns for each of the years, only the data for 1986 are presented in the report.

In the case of Maryland, the appropriated amount for each program was used as the data base for 1986 because the financial statements had not been audited at the time the data was collected.

Table 7 presents pertinent general information on population, area, centerline miles operated and maintained by the department of transportation, and local system miles for each state.

Table 7

Demographic and Highway Characteristics of
Virginia and Other States

State	Population	Area In Square Miles	State System Centerline Miles	Local System Centerline Miles	Percent of System Under State Control
Maryland	4,392,000	9,837	5,319	21,720	21%
Pennsylvania	11,853,000	44,888	43,333	66,668	39%
Virginia	5,346,000	40,815	53,767	9,888	84%
North Carolina	6,255,000	48,843	76,459	13,424	83%

Cost Categories Included for Comparison Purposes

For the purposes of this section of the report, the Department's major nonconstruction and maintenance programs are utilized as the benchmark. This provide comparable data on costs with the other states, particularly with respect to maintenance. In addition to maintenance, five major nonconstruction programs are used as a basis for cost comparisons. These five items include administration and supervision, support payments to other agencies, mass transit assistance, street maintenance payments to municipalities, and maintenance payments to Arlington and Henrico Counties. Maintenance cost comparisons are presented for the interstate, primary, and secondary systems and are subdivided into ordinary maintenance, traffic operations, and maintenance replacement.

Nonconstruction Cost Comparisons

As noted above, data for the last three fiscal years exhibited very consistent patterns. Therefore, only data for 1986 is presented. Table 8 contains this data and serves as the basis for the comparison of nonconstruction costs that follows.

Administration and Supervision

This item includes the costs for personal and nonpersonal services for general administration for each of the departments of transportation. The principle of charging projects for the maximum costs for administration is practiced in all the states. The state of Pennsylvania, for example, charges only the costs of their central office to administration and supervision. Virginia, as well as the other states, includes the administrative costs not attributable to construction and maintenance in the administration and supervision portion of the budget. Virginia is comparable to the other states in

Table 8

State Comparisons of Major Nonconstruction Costs
(FY 1986 - In Thousands)

	Virginia	North Carolina	Maryland[a]	Pennsylvania
Total Budget	$1,260,609	$1,002,607	$1,479,087	$1,365,048
Administration and Supervision	47,350	42,046	65,019	20,760[b]
% of Total Budget	3.76%	4.19%	4.40%	1.52%
Support to Other State Agencies	72,372	88,296	23,096	182,263
% of Total Budget	5.74%	8.81%	1.56%	13.35%
Mass Transit Assistance	35,225	7,247[c]	261,286	174,500[d]
% of Total Budget	2.79%	0.72%	17.67%	12.78%
Maintenance Payments to Municipalities	95,293	47,157	338,605	213,800
% of Total Budget	7.56%	4.70%	22.89%	15.66%
Maintenance Payments to Arlington & Henrico Counties	15,195	--	--	--
% of Total Budget	1.21%			
Other Major Nonconstruction Costs:				
Debt Service[e]	--	38,446	69,739	166,334
% of Total Budget		3.83%	4.72%	12.19%
Department of Motor Vehicles[f]	64,683	52,121	49,392	48,184
% of Total Budget	5.13%	5.20%	3.34%	3.53%
Major Agency Supported:				
Department of Motor Vehicles	64,683	--	--	--
State Police	--	60,548	6,683	148,112
Chesapeake Bay Initiatives	--	--	6,309	--

(a) FY 1986 figures are not audited; these figures are based on Appropriation Act figures.

(b) This figure is for the personal and nonpersonal costs of the central office. The other offices and costs are included in the construction and maintenance portions of the Budget.

(c) The General Fund provides revenue for this assistance, except in FY 1986, $500,000 is provided from highway user fees.

(d) Mass transit revenue is from the General Fund and the state lottery.

(e) This is General obligation debt service.

(f) This is included for Virginia for comparison purposes only. It is contained in the figure in the "Support to Other Agencies" line.

administrative costs when viewed as a percent of the total amount of the budget and in view of the fact that Pennsylvania charges only a small part of administrative cost to this line item. As a percent of the total budget, Virginia's administrative costs are lower than those of either North Carolina or Maryland.

Support to Other Agencies

This item shows significant variation among the states. The percentage of total budget for support of other agencies ranges from a low of 1.56% for Maryland to a high of 13.35% for Pennsylvania for FY 86. Virginia falls in the middle with 5.74% for the same fiscal year. This variation can be attributed to differences in the states' legislative intent with respect to funding other agencies.

The major other agency funded in Virginia is the Department of Motor Vehicles. In the other states, the DMV operations are part of or a division of the department of transportation. Virginia DMV operations as a percent of the budget are comparable to North Carolina's yet significantly higher than Maryland's or Pennsylvania's. The state police is the major other agency funded in North Carolina and Pennsylvania. Maryland is an exception to this, with the state police operations of weigh station enforcement, and partial funding of the Chesapeake Bay initiatives as the major other agencies receiving payments. Virginia's support to other agencies also funds these same activities, but these payments are not major budget items.

Mass Transit Assistance

This item shows a wide range of funding among the states. Funding in comparison to the total budget for FY 86 ranges from 0.72% in North Carolina to 17.67% in Maryland. Major reasons for the variation are the states' legislative intent to support mass transit, the difference in urbanization among the states and local decisions on service level.

In addition to differences in funding levels, the funding source is quite different among the states. North Carolina and Pennsylvania receive their funding from the respective states' General Fund. Pennsylvania also supplements transit aid with proceeds from their lottery fund.

Maintenance Payments to Municipalities

North Carolina is the only state comparable to Virginia in terms of the broad jurisdiction over local road maintenance and construction. On the other hand, the large percentages of aid to municipalities in Maryland and Pennsylvania reflect the size of the local systems and the local maintenance and construction responsibility for roads. The other states' formulas for distribution are based upon amount of revenue, population percentages, vehicles registered in the jurisdictions, and system mileage. Virginia, however, is the only state that distributes funds to municipalities and to counties on the basis of a rate per lane mile (Arlington and Henrico).

Unlike Virginia, Maryland and Pennsylvania allow the payments to be used for either construction or maintenance expenditures on local road systems. North Carolina restricts the use to maintenance.

Other Major Nonconstruction Costs

The other states have other major expenditures for nonconstruction in addition to those discussed above. One other major expenditure is for debt service of general obligation highway bonds. Virginia does not have general obligation highway bonds.

The second major nonconstruction cost that other states identify separately is the cost of the motor vehicle registration and services division or department of motor vehicles (DMV). In the other states' organizational structure, the DMV is a division of the department of transportation. In Virginia, the DMV is a separate agency funded through payments in support of other agencies. As noted above, these costs are almost identical as a percent of the budget for North Carolina and Virginia. Virginia's costs are significantly above Maryland's and Pennsylvania's.

Conclusions

Two major conclusions may be drawn from a comparison of Virginia's major nonconstruction costs with those of other states:

1. Legislative policy and intent frequently are the determining factors in the differences of major nonconstruction costs. This is particularly true for support to other agencies, aid to mass transit, and maintenance payments to municipalities.

2. Regarding administration and supervision, a nonconstruction cost over which the Department has significant control, Virginia's expenditure level is lower than either North Carolina or Maryland as a percent of the total budget.

Maintenance Cost Comparisons

The data and information that serve as the basis for comparing the cost of maintenance in Virginia with that of other states was gathered through visits and interviews with maintenance managers in the departments of transportation in North Carolina and Maryland.

While North Carolina is probably the state most comparable to Virginia in terms of organizational arrangement and maintenance responsibility, several aspects of the North Carolina maintenance program are sufficiently different to warrant mention, for they influence the manner in which the cost data must be presented and interpreted. Maryland offers a good benchmark for costs for states that are somewhat different from Virginia, especially from the standpoint of not having responsibility for a secondary system of roads. Table 9 provides pertinent background data for maintenance cost comparisons.

Factors Which Influence Comparability

At least six major institutional and cost accounting differences must be taken into consideration in the cost comparisons:

1. Maintenance replacement is defined very differently in the three states. In North Carolina and Maryland, what Virginia funds as maintenance replacement is considered in many cases as construction and is funded accordingly. In addition, North Carolina frequently has special initiatives such as the current $100 million appropriated for resurfacing, which might fit into the category called maintenance replacement. North Carolina and Maryland do not consistently track these expenditures; therefore maintenance replacement is not included as part of the per mile maintenance cost comparison table.

2. North Carolina uses inmate labor in a fashion significantly different from Virginia. They have a very aggressive inmate labor program whereby 1,148 minimum security inmates are interspersed as trustees with state maintenance crews, are unguarded, and are included as part of the labor force for planning and operational purposes. These trustees are delivered and picked up by the penal institutions, work 250 days per year, and each is paid $1.00 per day. Effectively, this increases the North Carolina maintenance force to 7,008 as compared to its stated payroll of 5,860. In the judgement of officials in the North Carolina DOT, the program is quite productive. In addition, 852 medium security inmates perform menial hand tasks as requested by the resident engineers. However, they are transported and supervised entirely by the Corrections Department. The cost of the 852 inmates is a flat fee, but it is not charged to maintenance. At a comparable basic pay grade for Operator A maintenance employees, the work of the 1,148 minimum security trustee inmates is worth $22.96 million in labor effort to North Carolina. Yet, the impact on

Table 9

Background Data Pertinent to Maintenance Cost Comparisons
FY 1986

	Virginia	North Carolina	Maryland
Cost of Ordinary Maintenance and Operations	$178,818,424	$218,052,594	$109,666,673
Cost of Maintenance Replacement	$152,523,000	Unavailable[a]	Unavailable[a]
Total Lane Mile Inventory	114,191	160,854	14,552
Total Number Bridges	12,254	17,382	4,966
Total Number of Paid Maintenance Employees	4,938	5,860	1,700
Total Number of "Free," Interspersed Inmate Trustee Laborers	0	1,148	Unavailable
Total Number Guarded Inmate Laborers	1,000	852	Unavailable
Total Effective Maintenance Force Under DOT Control	4,938[b]	7,008	1,700
Number Lane Miles Maintained Per Maintenance Worker	23.12	22.95	8.56

[a] Maintenance replacement in many instances is more nearly defined as construction for accounting purposes in these states.

[b] Includes traffic and environmental personnel for comparability.

the North Carolina maintenance budget is only $287,000 per year. This means that North Carolina is getting $142.00 worth of maintenance work per lane mile for only $1.78 per lane mile of budgetary cost impact.

3. Virginia funds significantly more traffic operations requirements out of the maintenance budget than does either North Carolina or Maryland. Whereas Virginia funds operations for the traffic management system in Northern Virginia $760,000; several tunnels ($3.5 million); a fog light system ($177,000) and a safety service patrol, North Carolina and Maryland have no such demands on their maintenance budget.

4. Interstate and primary system expenditure accounts are consolidated in Maryland and, to some degree in North Carolina; therefore, in the cost tables which follow, Virginia's lane mile costs for the interstate and primary highway systems are combined.

5. The overhead rate for labor in Maryland is significantly higher than in either Virginia or North Carolina. The rate in Maryland is 142%; in North Carolina the rate is 46% and in Virginia the rate is approximately 55%.

6. While snowfall is roughly comparable for Virginia and Maryland, the relative absence of snow due to North Carolina's temperate climate results in their costs on interstate and primary routes being about $700 per lane mile less than costs in Virginia and Maryland. North Carolina costs are about $100 per lane mile; Virginia costs are about $800 per lane mile. On the secondary system, Virginia expends about $100 per lane mile to clear snow; the relative absence of snow in North Carolina allows them to clear snow on the secondary system at a cost of about $10 per lane mile. Neither North Carolina nor Maryland pursue a bare pavement policy to the same extent as Virginia.

Lane Mile Cost

Because of the institutional and cost accounting differences noted in the previous section, maintenance costs per lane mile are presented in major categories to preserve comparability. More specifically, ordinary maintenance costs are presented in Table 10 and represent expenditures which are repetitive in nature and frequently are considered as preventive. Table 11 sets forth the operations cost for such items as rest areas tunnels, and snow removal. Maintenance replacement costs are not available for North Carolina or Maryland. These costs support activities to restore and replace pavements and bridge components that have failed or exceeded their original design life. Although Virginia maintenance replacement costs average about $3,600 per lane mile on the interstates, about $3,000 on the primary system and about $854 on the secondary system of roads no comparison is offered for the other states because they treat a large portion of such expenditures as construction.

Table 10

FY 1986 Ordinary Maintenance Cost In Dollars Per Lane Mile

State	System	
	Interstate and Primary	Secondary
Virginia	$2,067	$ 964
North Carolina[a]	2,073	1,004
Maryland	6,647	NA[b]

[a] Note that this cost figure should be interpreted in light of the labor obtained through interspersing non-guarded trustee minimum security inmates as an addition to the labor force. This additional labor costs $1.78 per lane mile and is worth $148.00 per lane mile. This labor is worth approximately $22 million annually but costs only $287,000.

[b] Maryland has no secondary system.

Table 11

FY 1986 Operations Costs In Dollars Per Lane Mile on Interstate and Primary Routes[a]

Category	Virginia	North Carolina	Maryland
Drawbridges & Rest Areas	$215	$180	Unavailable
Snow Control	785	106[b]	$726
Tunnels, Fog, Safety Patrol, TMS[c]	204	No Facilities	163[d]

[a] The only major operation on the secondary system for North Carolina and Virginia is for snow removal. The cost is $105 per lane mile in Virginia and $11 per lane mile in North Carolina.

[b] Climatological differences account for this low figure as compared to Maryland and Virginia.

[c] North Carolina and Maryland have no comparable facilities demanding operational expenditures from the maintenance budget.

[d] These are largely special operations not comparable to any performed in Virginia or North Carolina.

Conclusions

A comparison of per mile maintenance costs suggests the following conclusions:

1. Institutional and cost accounting differences are significant among Virginia, North Carolina, and Maryland and must be considered when interpreting maintenance costs.

2. Virginia's ordinary maintenance costs per lane mile compare very favorably with the other states. Virginia's interstate and primary cost is $6.00 per lane mile less than North Carolina's and almost $4,600 per lane mile less than Maryland's. On the secondary system, Virginia performs maintenance at a cost which is $40 per lane mile less than North Carolina. In addition, Virginia maintains slightly more lane miles per maintenance worker than does North Carolina (23.12 vs. 22.95), and 14.5 lane miles more per employee than Maryland.

3. What Virginia funds as maintenance replacement is frequently considered as construction in North Carolina and Maryland.

4. Although the cost of traffic operations is significantly different among the states, these differences are reconcilable in view of the demands of Virginia's tunnels, ferries, safety patrols, the transportation management system in Northern Virginia, the fog light system and the historical pattern of relatively heavy snowfalls. The magnitude of such demands is much less in North Carolina and Maryland, thus Virginia's higher cost in the operations category is not surprising.

PART V

AN EXAMINATION OF THE PROCESS OF OBTAINING RIGHTS-OF-WAY

Purpose, Scope and Methodology

The Department's Right-of-Way Focus Team began its examination of the right-of-way process with three goals in mind: (1) to further accelerate the process; (2) to reduce costs through increased efficiencies beyond those associated strictly with program acceleration; and, (3) to inform the Department and the General Assembly of right-of-way policies and procedures. Improvements or efficiencies which might improve the right-of-way process were addressed from the following standpoints: (1) initiatives already instituted which address efficiency; (2) additional improvements which can be made immediately or with minimal Departmental policy change; and, (3) modifications or changes in existing state and federal statutes which will result in improvements to the right-of-way process.

First, an overview is presented of the procedure used by the Department's Right-of-Way focus team to gather information. Second, an overview is presented of the right-of-way process dictated by the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1972 (Title 25, Chapter 6, Article 1 of the Code of Virginia). Third, a discussion is presented of those initiatives which the Department has recently implemented to streamline the right-of-way process. Fourth, several items are presented for improving the right-of-way process in the future.

All recommendations regarding right-of-way which were received from the 9 Resident Engineer Teams were evaluated. Also, two open forums were conducted which were attended by approximately 100 district staff appraisers, negotiators, relocation and property management personnel. Each participant was briefed in advance regarding the purpose of the forums and was asked to be candid and creative in their responses to SJR-7. Finally, the right-of-way organizations in Maryland, Pennsylvania, Texas, and West Virginia were queried regarding condemnation procedures and whether they had conducted any studies similar in focus to SJR-7.

The feasibility of most recommendations were evaluated using several guiding principles: (1) the repetitiveness of certain recommendations pointed to common items in need of immediate attention; (2) all recommendations were considered in light of the consistency with state and federal statutes which govern the right-of-way process. (3) the right-of-way and legal expertise and experience of the members of the focus team were relied upon in considering the information brought before it; and (4) the administrative and organizational structure of the Department and the conditions under which it operates had to be considered regarding information received from right-of-way organizations in other states.

The Right-of-Way Process

Objective and Organizational Structure

The principle objective of the Right-of-Way Division is to acquire rights-of-way in fee simple or easements for the construction, maintenance and operation of the interstate, arterial, primary, urban, and secondary highway systems. Embodied in this objective is the accomplishment of related activities, including the relocation of people and businesses, the disposition of buildings and other improvements, and the adjustment of utilities. All activities are governed, for the most part, by the previously mentioned state and federal statutes. The Department's intent is to afford each displacee the opportunity for input into the process and to receive adequate compensation with as little inconvenience as possible.

The right-of-way engineer is directly responsible for establishing policies and procedures for every phase of the right-of-way work, overseeing the work of 3 assistants and providing technical supervision for district right-of-way personnel. The district engineers provide administrative supervision for right-of-way operations in the field. Each district right-of-way office is headed by a right-of-way manager, who is in charge of all field activities. In addition, the Attorney General of the Commonwealth of Virginia has assigned a Deputy and Assistants to assist in legal matters and an Assistant Attorney General in four district offices examines titles and closings.

Staffing

A staff of 286 performs the right-of-way function with consultant assistance as needed. A central office staff of 54 individuals develops policy and procedures and monitors those procedures to ensure quality control. Certain functions, such as the processing of condemnation certificates and consultant utility contracts, are conducted in the central office due to the degree of expertise required and the need for uniformity. However, the district right-of-way offices are responsible for the appraisal of property, negotiations, relocations, and utility adjustments.

Appraisal

Section 25-248 of the 1950 Code of Virginia as amended requires property to be appraised before the initiation of negotiations and an opportunity be given to the owner to accompany the appraiser during his inspection of the property. The appraisal process, as exercised by the Department, is further controlled by Federal rules and regulations which dictate minimum requirements to determine fair market value.

The appraisal may include selective research of appropriate market areas, the cost to reconstruct the facility less depreciation, or an income approach, which identifies the value of a proposed acquisition based upon its potential for income. Any reduction in value to a

remaining property associated with the acquisition and proposed use is identified as damages, which must be considered in the appraisal. Any increase in value is declared an enhancement, which may be used to offset damages but cannot be used as compensation for the acquisition of real property.

In summary, an appraisal is a formal, written document prepared by a qualified individual for the purpose of determining a fair and just compensation for real property acquired. Prior to its use in negotiations or eminent domain proceedings, the appraisal must be approved by a qualified reviewer. To ensure that the appraisal process maintains a high degree of quality and equity both for the property owner and the taxpayers of the Commonwealth, central office staff periodically conduct statewide audits of appraisals and appraisal reviews.

Negotiation

Section 25-248 of the 1950 Code of Virginia as amended requires that the state negotiator will carefully examine the plans, title report, appraisal, relocation assistance information, replacement housing report and building retention value report as he prepares the offer to a landowner. In negotiating with the owner, he is to carefully examine the property, improvements, and means of access on the ground and explain the plans and the effect of construction on the property. Furthermore, he must furnish plan sheet(s) showing the taking from the owner's land. He then makes an offer of the market value based on the approved appraisal and advises the owner of the replacement housing allowance (if applicable).

Relocation

Section 25-248 and 249 of the Code of Virginia, as amended, establishes the relocation policies and procedures of the Department. The Uniform Relocation Assistance Act of 1972 which is embodied in the Code provides that if the value of an improvement taken is insufficient to purchase an available comparable replacement, the additional amount necessary to enable the displacee to do so has to be determined. Once the eligibility of the displacee for certain benefits is established, specific needs are ascertained and the real estate market is searched for comparable properties. A replacement housing payment is then computed based on the difference between the acquisition price and the value of a comparable property. The displacee receives the fair market value of the property plus the replacement housing payment necessary to purchase a comparable replacement. Though procedures and benefits vary for tenant occupants, it is the intent of the statutes to enable the displacee to relocate into an equal or better facility than the one occupied prior to relocation.

Condemnation

In all instances the Department's negotiators are urged to reach agreement and settlement with the property owner. If, however, during the course of negotiations the property owner does not accept the Department's offer, Title 33, Chapter 1, Article 7 of the 1950 Code of Virginia, as amended, entitles the Department to condemn the property for purchase. This procedure allows for the determination of the monetary compensation due the property owner to be decided by the courts.

Recent Initiatives to Accelerate The Right-of-Way Process

During the last 18 months the Department has implemented a number of initiatives in the interest of compressing the preconstruction process and accelerating the construction program.

Appraisals

Several procedures have been implemented that have accelerated the appraisal process and have resulted in reduced paperwork, an enhanced public image:

1. A standard appraisal form has been developed that accommodates 70% of all appraisals;

2. District offices have been authorized to approve prenegotiation appraisals;

3. District offices have been authorized to approve consultant fee appraisal contracts up to $10,000 and residue parcel appraisals up to $50,000; and,

4. The same individual has been utilized to appraise and negotiate the acquisition of properties valued at less than $2,500.

Negotiations

Items implemented to date include --

1. District offices have been authorized to issue voluntary conveyances;

2. The two contact concept has been introduced to reduce negotiation time; and,

3. District offices have been authorized to approve administrative settlements up to $10,000.

Relocation

The entire relocation process has, for the most part, been decentralized to the districts. This strategy has resulted in projects being cleared more rapidly because it eliminates central office approvals and allows for quicker payments to owners.

Utilities

The clearing of utilities from the Department's rights-of-way has often been an agonizing process and frequent cause of project delay. Several actions have been introduced to help alleviate this situation. These actions include --

1. the development of a master agreement which, with the exception of the urban system, permits the districts to deal with utilities at the local level and to execute agreements in order to relocate utilities necessary for project development;

2. the procurement of consultants to locate underground utilities in connection with plan development;

3. the acquisition of utility easements by Department staff to affect the early relocation of utilities; and,

4. additional, continued contact between the Department and utility administrative personnel to improve communication and solve problems quicker.

Management System

The Right-of-Way Division remains in a dynamic mode in an effort to streamline policies, procedures, and activities in order to increase the efficiency of its operations. Foremost in this endeavor is the full implementation of the Right-of-Way Management System, which includes the electronic transmission of information on a statewide basis and project status monitoring that is parcel specific.

Decentralization

The decentralization effort will continue. The ultimate goal will be to perform all operational activities in the districts. Specifically, master agreements for utility companies will be expanded to the urban system, consultant contract review and approval will be delegated to the Richmond, Suffolk, and Culpeper districts, and an investigation of the decentralization of the eminent domain process will be undertaken.

Discussion of Potential Areas of Improvement

A number of items have been identified that, if implemented, could result in improvements in the process of obtaining rights-of-way. These are grouped under three major headings as follows: (1) items that can be implemented immediately; (2) items that can be implemented with administrative policy change; and, (3) items that may be implemented pending further examination.

Items That Can Be Implemented Immediately

During 1987, a number of actions will be taken to affect an immediate improvement in the right-of-way process.

Improved Coordination. Earlier collaboration between the district location and design and right-of-way units is necessary. Frequently, projects are surveyed, plans are drawn, and the project is shelved for lack of funds or changes in priority. When these projects are reactivated, the plans are out of date; yet, these are the plans that the right-of-way staff must work with. This, coupled with the fact that survey parties have undergone cuts in staffing levels and have not been made fully aware of the necessity for certain details on the plan sheets, has resulted in many items being overlooked and left for right-of-way personnel to resolve. Thus, right-of-way staff often use lead time correcting plans. To alleviate this occurrence, a plan meeting will be instituted between the right-of-way, location and design, and utilities sections before plans are submitted to the right-of-way unit to determine whether a new survey needs to be conducted. In addition, the designer and a member of the right-of-way staff will routinely visit projects before plans are submitted to the right-of-way unit. As an adjunct to these actions, the Department will consider whether it is prudent to provide additional training for survey party personnel in right-of-way requirements.

Improved Communication. Communication between the Central Office and District right-of-way units and within the district right-of-way units themselves appears in need of improvement. Many policies already prescribed by the central office have not been implemented in the districts. To help improve communications, we will institute a series of open forums involving central office and district right-of-way staff and managers. These forums should be used to discuss and clarify policies, establish uniformity, and share ideas. When prudent to do so, location and design staff will be included in these discussions.

Court House Searches. Professional appraisers and negotiators on the staff currently spend an inordinate amount of time on paperwork and other incidental activities which could be executed by technical or clerical personnel. Much of the work performed in courthouses (as well as other paperwork), could be performed by technicians and clerical staff. In keeping with the administrative efficiency plan, the feasibility of utilizing technical, clerical, or hourly staff for performing these duties will be explored. This would greatly accelerate appraisals and negotiations.

Multiple Listing Service. Each district will explore subscribing to this service for their respective localities. This will aid the staff in the computation of comparable housing for use in appraisals and relocations.

Items That Can Be Implemented With Administrative Policy Change

Several proposals for improving the right-of-way process will require changes in current Departmental policies. These policies will be reviewed during 1987 and appropriate action taken.

Utility Approvals. Presently all utility work is approved at the district level by the district utility coordinator, but on some small projects it is more efficient to allow this approval to be made by the resident engineer. During 1987 the Department will consider authorizing resident engineers to approve utility estimates and authorize adjustments on all "no-plan" projects in the secondary system. The implementation of this recommendation will save an unnecessary step in the development of secondary projects.

Utility Agreements. The review, approval and preparation of formal utility agreements for work performed by utility companies on urban projects can be decentralized, provided that adequate staffing is available in the districts and that the district engineers are given the authority to execute utility agreements. In 1987 the Department's policy requiring the chief engineer to execute these agreements will be reviewed with the idea that authority be given to the district engineer.

Consolidation of Functions. Currently the Department often assigns three employees to acquire a parcel: one to appraise, one to negotiate, and one to make the settlement. Also there are often instances where agent assignments change, forcing landowners to deal with more than one appraiser or more than one negotiator. During 1987 it is the Department's intent to require in all districts that a maximum of two agents -- one to appraise and one to negotiate and settle (as dictated by federal statutes) -- be utilized on the acquisition of right-of-way parcels. Furthermore, every effort will be made to continue the assignment of these two agents through the completion of the acquisition. In cases in which a parcel valued at $2,500 or less is involved, every effort will be made to have one individual conduct the entire acquisition. A commitment on the part of the Department to cross train the right-of-way staff is crucial to the implementation of this recommendation and it should proceed during 1987.

Title Searches and Closings. Due to the number of title requests and closings, the four Assistant Attorneys General assigned to district offices are unable to keep up with the workload. To alleviate this situation, the Department will pursue avenues whereby additional paralegals may be used in each district to perform title examinations. This should enable the Assistants to concentrate on closings, for which an attorney is required. Depending on the number of outstanding requests, an alternative is to engage independent firms to assist in the title work or perform closings.

Dissemination of Information. An intense effort is necessary to inform the public as to the specifics of the right-of-way program and to create an atmosphere which mirrors the spirit and intent embodied in the Federal mandates pertaining to right-of-way. A broad based campaign informing the potentially affected citizenry of the ramifications of the expanded highway program needs to be undertaken from the standpoint of Right-of-Way. In short, the Right-of-Way Division needs to get closer to its customers. To help accomplish this will require that (1) the current right-of-way pamphlet used at public hearings be rewritten; (2) the right-of-way Division expand and enhance its portion of the public hearing program; (3) a videotape be produced which explains all aspects of the right-of-way process to property owners and tenants; (4) the Right-of-Way Division reemphasize to all individuals in the Department who are involved in the procurement of rights-of-way that settlement with the property owner is the primary goal; and, (5) as much effort as is prudently possible be made to ensure that staff appraisals are comparable to those made by contract appraisers to avoid any implication that staff appraisals are conservative as compared to fee appraisals.

These efforts will enhance the image and credibility of the right-of-way agent, reduce much of the controversy associated with acquisition, and thus lessen the time required to procure property.

Payment of Incidentals. Current policy allows for the payment of up to $1,500 for incidental items to landowners who donate right-of-way. These payments are currently being construed by resident engineers as damages, which they are not. During 1987, the terminology regarding these payments as incidental items will be clarified to the Resident Engineers, and consideration will be given to raising the limit for the taking of incidental items on donated right-of-way to $2,500. This will allow the resident engineer much more latitude in obtaining donated right-of-way and will also result in quicker development of secondary projects.

Installation of Fencing. Given the fact that state forces are often not available to erect fencing concurrently with donation agreements on secondary projects, the Department will review a recommendation that a county-wide item number in the secondary budget be provided to allow residencies to pay for the installation of fencing ahead of actual construction. This action will assist the resident engineer in obtaining advanced donated rights-of-way.

Video Technology. Right-of-way staff spend a great deal of time visiting project sites. While information gathering is necessary, some visits could be eliminated if videotapes of certain projects were available at the district and central offices. These videotapes might also prove useful in contractor disputes and court deliberations.

Items That Can/May Be Implemented Pending Further Examination

Several issues will require lengthier investigation than was achievable within the time frame available. These, the Department believes, offer opportunities for significant improvements.

Condemnation Procedures. The present system of condemnation commissioners being selected by the parties to the condemnation needs to be fully assessed for two reasons. First, the size of condemnation awards generally bears little relationship to appraised value. During the period from January 1, 1985 to June 30, 1986 for example, of the 111 condemnation cases tried, the award was on average, double the appraisal value. Even more telling is the fact that a sample of 45 court cases tracked from beginning to end over the last 5 years reveals that awards average 2.3 times the certificate filed. Secondly, the personal and business relationships of commissioners with the landowner, the landowner's witnesses, and the landowner's counsel consistently lean such cases heavily in the landowner's favor. All components of Virginia's condemnation procedures have been compared with those used in Maryland, West Virginia, Pennsylvania, Delaware, North Carolina, and Texas. With the exception of the process used to select commissioners, the Commonwealth's procedures appear consistent with an equitable and fiscally responsible right-of-way process. While information received from other states revealed a number of alternatives to the Commonwealth's selection process, in the time available for the response to SJR-7 the Department was unable to ascertain a preferable alternative. Consequently, a study of the alternatives to this procedure will be initiated during 1987. It is felt that other authorized condemnors in the Commonwealth should be included in the study and that further examination of procedures used in other states be made. This study will also identify avenues for reducing the continuance of cases due to the failure of summoned commissioners to appear, and propose alternatives which ensure objectivity on the part of the commission. The Department intends to complete the study by the fall of 1987.

Donation of Rights-of-Way. The policy of obtaining rights-of-way on non-paved secondary roads by donation is a procedure administered by resident engineers. There exists a wide variety of methods for obtaining and postures of the boards of supervisors regarding donated rights-of-way. However, the resident engineer teams and others indicate that the policy may be one which is in need of review because, in some geographic areas it may be costing more to secure rights-of-way by donation than by purchase. The Department will, therefore, undertake an examination of the policy on obtaining donated rights-of-way. The study will include an investigation of how the policy is being administered in each residency and district, the posture of the various boards of supervisors and the cost of donated rights-of-way when all factors are considered. Finally, it will address the impact the donation policy is having on meeting local transportation needs -- i.e., Is the availability of donated rights-of-way adversely impacting secondary construction? This study should not limit itself to an ultimate recommendation regarding either the retention or abolition of the donation policy. Rather, it will seek to establish warrants for the employment of donations.

Utility Relocations. The construction of highway improvement projects necessitates that utility and communications companies relocate

their facilities outside of the construction limits. Historically, the Department has been faced with claims from contractors for construction delays because of the incomplete removal of these facilities and since 1985 has received 33 such claims. Currently, the Department does not have the ability to provide strong incentives to the utility companies to relocate their lines and other facilities expeditiously. An evaluation will be made of the alternatives which are available to provide such incentives.

Protective Buying/Advanced of Acquisition/Dedicated R/W. An investigation will be made of the opportunities for and restrictions on the advanced purchase of right-of-way where widenings are planned. In many instances developers and commercial establishments are allowed to build adjacent to highways that are destined to be widened. Once these corridors are developed, the right-of-way costs are many times what they would have been if the Department had purchased the right-of-way earlier. The federal position on this issue will also be included in this study since there is a possibility that certain advanced purchasing may imply establishment of highway corridors without due process. Nevertheless, if it is feasible to establish procedures whereby properties can be acquired when they are available for public sale substantial savings in right-of-way costs may result. (The legal opinion on this issue is that the Commonwealth Board could establish an advanced right-of-way acquisition fund for all systems. Statutory authority to do this presently exists; all that is needed is the adoption of a policy for expenditure, but care would have to be taken where federal funds are to be involved.)

Residue Parcels. A previous JLARC study recommended that the Right-of-Way Division complete its residue parcel listing and place a higher priority on disposing of large or valuable parcels. It was also recommended that random inspection of residue parcels be conducted by district right-of-way staff to guard against improper use and that state agencies located near these parcels be provided an opportunity to acquire them. The Right-of-Way Division has made progress in addressing these recommendations, and, during the last three years, has conveyed 2,320 acres valued at $8.5 million to the private sector. However, the Department may be able to more effectively dispose of parcels, if in certain districts, real estate brokers were allowed to handle some parcels for conveyance on an experimental basis. During 1987, an assessment will be undertaken to determine the feasibility and benefit such a policy might have if implemented.

Regional Service Centers. In 1980, the Hansen Report recommended that the Right-of-Way Division be regionalized. A task force comprised of the director of engineering, several district engineers, and right-of-way personnel was formed to investigate the issue. The right-of-way division recommended the institution of the concept to management, however, no action was taken at that time.

In keeping with the Department's current posture on decentralization, regionalization may be a viable alternative for administering the right-of-way program. By 1988 the Department will examine the

potential a regional right-of-way organization holds, especially in light of the expanded construction program.

Drainage Easements. Currently the Department is spending a considerable amount of money purchasing drainage easements. An evaluation of the Department's policy regarding the size of these easements will be made. Significant savings could result if it is determined that some or all such easements could be smaller or eliminated.

PART VI

STATE-FORCE CONSTRUCTION

Background

This section of the report provides information regarding appropriate cost ceilings for projects to be built or maintained by state construction forces. In the past, state construction forces performed two functions: the removal of snow and the construction of roads. Today, the Department confronts a new environment that embodies a new philosophy based on effectiveness (doing the right things), efficiency (doing things right), and productivity (doing the right things right).

Current and Future Role

In considering the appropriateness of a cost ceiling, it is important to determine the role state-force construction should play both today and in the near-term in the Department's road construction program. Two dynamic and diverse influences on this determination are: (1) the availability and willingness of the roadbuilding industry to perform work; and, (2) the cost effectiveness (cost, timeliness, quality) of state forces (versus the private sector) in performing the work.

The Department can assess the availability and willingness of the roadbuilding industry to perform work by monitoring bid rejections by various criteria, such as contract size and location. For example, a review of bid rejections for 1983 through 1985 shows rejections tend to be more frequent on projects with a value less than $2.5 million than on those that exceed that amount. In fact, within the less than $2.5 million group, most rejections occur on contracts of $300,000 or less. However, this varies by geographic region. These market characteristics suggest the Department should adjust the size of contracts and maintain a state construction force to ensure an effective contract construction program. Because the environment changes rapidly and uncertainty tends to be more often the rule than the exception, flexibility rather than constraint should be the guiding principle in developing policies regarding state force construction.

Conclusions and Recommendations

Given the current and expected construction environment, it is the goal of the Department to use state forces to achieve an effective and efficient construction program while not competing with the private sector. Put simply, state force construction should be an alternative

to utilize in instances where contract cost or availability warrants. To this end, the Department proposes the following recommendations:

1. For the near term, the current cost ceiling of $300,000 per project should be continued;

2. A maximum of 225 personnel statewide should be dedicated to state-force construction and allocated based on identified need;

3. An in-depth analysis should be conducted and include

   -- an assessment of the appropriate future role of state-force construction;

   -- the establishment of a clear and consistent understanding of state-force construction by Department personnel; and

   -- the development of a data base that will aid in making decisions regarding the use of state-force construction.

PART VII

IMPROVING AND ACCELERATING CONSTRUCTION

Introduction

The construction focus team was called upon to identify issues and opportunities for improving the roadbuilding process. They focused on: (1) accelerating the roadbuilding process; (2) reducing costs to the Department; (3) improving the quality of the Department's products and services; and, (4) informing the Department and the General Assembly of construction practices and procedures. The thrust of the evaluation was two-pronged: (1) it included an examination of the Department's bidding procedures and procurement policies (applicable to construction); and, (2) it sought to identify ways to accelerate the roadbuilding process.

Discussion of Potential Areas for Improvement

Issues and opportunities which hold potential for improving the construction process were addressed from the following standpoints: (1) initiatives already under way which address efficiency; (2) items that will be assessed in the near future; and, (3) items that require long-term analysis and evaluation to establish details for appropriate action.

Initiatives Underway

The Department has several activities already underway to accelerate the roadbuilding process.

Preconstruction Compression. The Department is increasing by 20% the number of roadway projects designed per year through improvements in technology and adjustment in policies and procedures.

CADD. Computer-aided drafting and design (CADD) is being used to draft roadway and bridge structures and significantly reduce the cost. Since most plans require many of the same elements as well as constant modification, the number of projects designed per year will increase.

Reinstatement of Contractor Prequalification. As a result of instituting the Disadvantaged Business Enterprise Program in 1985, the Department's prequalification process was waived for many contractors. However, the Department does not have the resources available to assess the capability of individual road contractors for every project. To remedy this situation, efforts are under way to reinstate prequalification for all contractors performing work for the Department. This action should improve the quality of projects as well as the number completed per year.

Decentralization of Work Order Authorization. During the life of construction projects, both internal and external factors often necessitate plan changes. These could include anything from design mistakes to environmental alterations. Past Department policy has called for district engineer approval of these changes. The feasibility of changing this policy such that these approvals will be delegated to the position responsible for the particular budget item involved is being evaluated. This policy change could result in an increase in the number of projects built per year, especially on the secondary system.

Development of a Manpower Construction Planning System. Essential to a high-quality construction program are accurate estimates of construction inspection staffing needs. To enable the Department to make these estimates, the current manpower planning system for inspectors is being modified. This new system will provide an effective method for assessing and projecting the Department's construction staffing requirements and be instrumental in increasing the number of quality road projects built per year.

Evaluation of Phase Inspection. Phase inspection is an effort intended to provide for the adequate inspection of all critical stages of construction work in lieu of the total inspection of each specific activity. Since the proposed Construction Manpower Management System will be based upon phase inspection, a new set of guidelines based on quantitative rather than qualitative assessments are being developed.

Enhancement of Inspection In-Depth. The Department recognizes that a number of factors inherent in the current inspection in-depth program limits its utilization as a management tool. As a result, the current program is being evaluated with a view in mind to improve the quality and reduce the cost of construction and maintenance to the taxpayer.

Near Term Assessments

There are a number of items which the Department will examine and take action on during 1987.

Signatures on Plans. Although the current process for placing signatures on road plans has been used for some time, there is some question as to whether savings might be realized if some of the signatures customarily required could be eliminated. An evaluation of this policy will be made.

Standardized Bridge Plans. The Department does not always consider standardized bridge designs in lieu of specialized designs when opportunities are made available. In certain cases, increasing the use of standardized designs will decrease the time necessary to design and construct projects while reducing costs and the Department will move to establish an appropriate policy on the use of standardized bridge designs.

Environmental Impacts as Design Criteria. The number of projects designed and built annually can be increased provided that environmental concerns are taken into account during the design phase. This will be achievable if location and design personnel are trained regarding the mitigation of environmental concerns during project development. This training procedure will be initiated during 1987.

Expediting Environmental Permits. The Department must often secure environmental permits from federal and state agencies and at present a one-day monthly meeting is held with officials from those agencies from which permits are issued. The short duration and limited frequency of these meetings have often proven to be insufficient. Anticipating the increase in the number of projects to be built in the future, the Department will pursue avenues to increase the duration and frequency of these meetings to expedite permit modifications and acceptance.

Commonwealth Transportation Board Role in Bid Procedure. Prior to awarding jobs to contractors, the Department must secure the approval of the Commonwealth Transportation Board. The Board usually approves a monthly aggregation of awards and rejections rather than addressing the merits of each individual transaction. There is considerable evidence that if the Department were able to award bids as they are received, the time required to process projects may be reduced. Consequently, the process of awarding and rejecting bids will be evaluated focusing on the propriety of having Department officials approve and reject bids with Board approval after the fact.

Timely Contractor Payments. The Department pays contractors on a monthly basis for work performed. Many of these contractors depend on timely cash flow to perform quality work. In some instances slow payments from the Commonwealth forces contractors to borrow money, which adds to the cost of construction projects. During 1987, the Department will determine a procedure for accelerating such payments to contractors.

Use of Long-Term Service Contracts. Since 1982, the Department has found it necessary to hire increased numbers of outside consultants to perform work, but the cost effectiveness of this practice has never been evaluated. Given the projected work load the Department faces, an analysis of the cost effectiveness of the utilization of consultant versus Department staff is needed. This evaluation will also include an examination of the feasibility of hiring engineering firms according to specialty on an annual basis rather than on an individual project basis.

Long Term Assessments

A number of areas have been identified that the Department believes may offer countless opportunities to improve and accelerate the building of roads.

Test Alternative Incentive Clauses. The speeding of construction through appropriately designed incentive and penalty clauses, as well as alternative types of contracts, is an area of great potential. The Department will aggressively test various strategies regarding these incentives and, upon reviewing results, will establish appropriate policies and procedures.

Evaluate and Improve Field Inspection Process. A revision to the current field inspection process and focus will be sought including: (1) future mantainability; (2) traffic detours; (3) on-site maintenance; (4) 24-hour work days; and, (5) night work only. Included in this assessment will be a reevaluation of the current field inspection form, an attitudinal survey of district constituency regarding construction issues, and a statistical analysis of maintenance cost to identify design standards needing modification.

Develop a Computerized Local Ordinance Data Base. The Department constructs projects in all localities of the state, each of which has restrictive ordinances which could affect the construction of a project. Presently, the Department lacks a source for retrieving relevant information regarding these local ordinances. A local ordinance data base will therefore be developed which includes information on night, weekend, and seasonal work as well as other restrictions on contractor actions. The result will be an improvement in the Department's relationship with local governments and possibly a reduction in the time needed to complete projects.

Evaluate State-of-the-Art Bid Estimating Techniques. State-of-the-art estimating techniques are critical to an effective contract construction program. This is even more important as the increased size of the program puts pressure on the market. To ensure the proper expenditure of state funds, an evaluation of the Department's estimating procedure will be initiated and will include a review of procedures used in other state transportation agencies as well as successful techniques used in the private sector.

Automate Contract Document Preparation. Project-specific information is forwarded from several divisions to the construction division and is used to prepare contract documents manually. This process can be accomplished quicker as the various divisions begin working from common data bases which will be an integral part of the management information systems the Department is implementing.

Evaluate Alternatives to Advertisement Time Frames. Currently, the Department uses a standard, 60-day time frame between the advertisement of projects and the receipt of bids. The potential exists, however, for varying this time frame according to project scope and complexity and during 1987, such avenues will be pursued.

Alter EEO Affirmation Procedure. All contractors performing work for the Department are required to file appropriate data and information regarding the EEO policies and personnel on each individual project. Since many contractors perform work on various projects throughout the

state, they are faced with providing repetitive information. The Department will, therefore, assess the feasibility of allowing contractors to file EEO affirmations with prequalification submittals or renewals. The result would be a reduction in administrative costs for both the Department and the contractors.

Develop Strategies to Increase Industry Willingness to Bid. There are many contractors who have never performed work for the Department. With the work load projected over the next 10 years, it is appropriate for the Department to strive to attract new contractors and foster new growth in the industry. The Department thus proposes to assess the causes for disinterest on the part of some contractors and to develop methods to remedy these causes. This assessment will also include an evaluation of the potential for dividing large projects into smaller parts and the grouping of small projects with large ones.

Institute Mobile Offices for Inspectors. As a result of manpower adjustments, inspectors are assigned responsibility for several projects simultaneously. Beginning in 1987 the Department will investigate the feasibility of providing inspectors with a number of vans equipped as mobile offices to increase their productivity and responsiveness to inspection needs. The potential for reducing inspector clerical responsibilities will also be examined.

Establish Inspector Recruitment and Training Program. Although the Department has three levels of inspector classifications, there is concern that they are not directly connected to any measurable competency levels. Certified training for each level is needed and the Department will seek to establish a comprehensive recruiting and training program which will provide the skills and knowledge required for inspecting road and bridge construction.

Develop Process to Monitor and Manage Claims. Each year the Department processes numerous claims submitted by contractors alledging that their progress has been hindered by forces beyond their control. Although the Department's claim procedure is basically sound, it is less than adequate in monitoring the causes of claims. By monitoring claims more effectively, the Department may identify decisions or actions within its control that typically lead to claims or impediments to construction. Only by such action can claims be reduced or avoided in the long run. The Department will establish a system to begin monitoring and managing such claims by the end of 1988.

EPILOGUE

This response to SJR-7 has attempted to provide a reasonable balance between providing specific detail and focus sufficient to clearly communicate the Department's commitment to the intent of the Resolution, while not overburdening the reader.

The Department's most important message is that it is committed to an innovative, productive environment that will ensure that the performance of the organization and the quality of work is consistent with the expectations of the citizens of the Commonwealth.

It is the Department's intent and desire periodically to report to the General Assembly regarding the status of the implementation of the plans for improvement in productivity that have been outlined here.

APPENDIX A

INTERPRETATION OF SJR-7 AND VDOT STUDY PLAN

THE VDH&T's INTERPRETATION OF THE LANGUAGE CONTAINED IN SJR-7

Because the time available for the completion of the analysis and data collection called for in Senate Joint Resolution 7 (SJR-7) is short, it is very important that the efforts undertaken be well focused from the very beginning. In addition, it is critical that the focus of the Department be consistent with intent of the language of SJR-7.

Consequently, the interpretation of the language of SJR-7 which is contained herein is offered as a vehicle to confirm that the VDH&T's sense of direction is consistent with that of the General Assembly regarding the efforts called for in SJR-7. The following are offered for review and comment:

I. SJR-7 Has Three Major Parts --

A. The plan for increased efficiencies;

B. The data collecting, information gathering, cost comparison, and points-of-focus efforts;

C. The JLARC follow-up effort.

The interpretation of the items is outlined below.

II. Regarding the VDH&T Plan for Increased Efficiencies

The Department is proceeding with the following as guidelines --

A. The language referring to "5%" is interpreted to be a plan for increasing efficiency in the Administration and Maintenance programs. Service levels are not to be reduced to achieve the five per cent efficiency savings.

In this context, the Steering Committee has interpreted "administration of the Department" to mean Item 627 of the 86-88 Appropriations Act with amendments at the 1987 regular session. This interpretation is made to facilitate comparison with the "5%" language of SJR-7, but should not be construed as being a restriction on the commitment to overall Department efficiency efforts.

The Steering Committee has further interpreted "maintenance of the transportation system of the Commonwealth" to mean Item 631 of the 86-88 Appropriations Act with amendments at the 1987 regular session. More specifically, the maintenance of the Interstate, Primary, and Secondary Systems.

B. The plan should be future oriented. It should rely on existing knowledge and ideas, and refinements of previous studies and ideas. It should tell the General Assembly what the Department intends to do, how the Department will do it, offer a time table for each aspect, and offer an estimate of the range of unit cost savings or time savings where appropriate.

C. Service reductions are not the mechanism to achieve the intent of this part of SJR-7, however, long-term review or alteration of standards should not be ruled out in the event there is strong justification for doing so.

D. Productivity improvement and economy in resource use are key facets of the development of the plan. In addition, the plan should look toward institutionalizing processes which commit the Department to a continuing effort of efficiency in carrying out its mission. This obviously embraces many initiatives already under way, such as compression of preconstruction activities and the establishment of the productivity improvement center.

E. JLARC documents on the organization and administration of the Department offer target areas which may stimulate ideas regarding aspects of the plan.

F. Organization of the plan should be simple and easily understood. This could imply an organization along major lines, such as technology, facilities and equipment, and policies and procedures.

G. Where appropriate, impacts on the motoring public (in terms of savings in their user costs) can be an important aspect of the plan. This is particularly applicable in the context of traffic operations, safety, and nighttime maintenance or construction.

III. Regarding the Data and Information Gathering Effort (The Second "Resolved")

A. Item (i) on per mile maintenance cost will distinguish major cost categories of ordinary maintenance, maintenance replacement, and operations and the elements in each. Three years of data should be obtained if available.

B. Item (ii) on comparable data on maintenance in other states will focus on data from North Carolina and other states to the extent time permits. Other candidates include Pennsylvania and Maryland. The states chosen for comparison most likely will be visited.

C. Item (iii) on major non-construction costs will be defined to include support to other agencies, general VDH&T administration as defined in Item II. A, direct transit support, city street payments, and maintenance payments to counties not in the secondary system.

D. Item (iv) on bidding, procurement, and right-of-way is being dealt with in the following fashion: Right-of-way is being handled by a special focus team. Bidding and procurement are being interpreted as focusing largely on their relationship to the road building process which will be studied by another team.

However, this focus will not constrain the procurement examination from including aspects pertaining to the maintenance function or procurement in general.

E. Item (v) on acceleration of the road building process is taken to include not only the part of the process after the contract is let, but preconstruction and advertisement as well.

F. Item (vi) on state force construction should include discussion of the rationale for using state forces, historical data on state force versus contract construction levels, the extent to which it can serve as an integral part of an effective contract program, and the relative importance of dollar limits per job as compared to the level of resources committed to state force construction.

IV. Regarding the JLARC Follow-up Effort

A. During 1987, JLARC will be conducting their follow up of recommendations made in their previous studies of the Department. The Department is prepared to assist JLARC staff in this effort through supplying data, documentation of recommendation implementation, and other information as requested.

B. The Department looks forward to the JLARC follow up and the opportunity it will offer to report on its efficiency plan implementation at the 1988 Regular Session of the General Assembly.

SENATE JOINT RESOLUTION NO. 7

Requesting the Department of Transportation and the Joint Legislative Audit and Review Commission to conduct certain studies, obtain certain information, and make recommendations based thereon.

Agreed to by the Senate, September 26, 1986
Agreed to by the House of Delegates, September 25, 1986

WHEREAS, the Governor's Commission on Transportation in the Twenty-First Century has detemined that the Commonwealth has certain critical highway needs; and

WHEREAS, the Commission has predicted that, unless taxes are raised, no funds for highway construction in Virginia will be available beyond 1991; and

WHEREAS, the General Assembly and all other citizens of the Commonwealth are concerned that our taxes be used in the most efficient manner; and

WHEREAS, if the state highway program's administrative and maintenance costs were contained or reduced, more money would be available to fund highway construction projects; now, therefore, be it

RESOLVED by the Senate of Virginia, the House of Delegates concurring, That the Commonwealth Transportation Commissioner is requested to report to the members of the General Assembly, prior to February 1, 1987, a plan by which expenditures for administration of the Department of Transportation and maintenance of the transportation system of the Commonwealth, shall be reduced by at least five percent as compared to appropriations for such expenditures for fiscal year 1987-88. Such plan shall provide for the achievement of such reductions through increased efficiencies in Departmental operations. The Commissioner shall include his plan to continue these savings into the future; and, be it

RESOLVED FURTHER, That the Department of Transportation is requested: (i) to determine the per-mile cost, during recent years, of maintaining the Commonwealth's interstate, primary, secondary, and urban highways; (ii) to seek comparable data on highway maintenance costs in other states; (iii) to obtain data necessary to compare the other major nonconstruction costs of Virginia's highway program with those in other states; (iv) to examine the Commonwealth's bidding procedures, procurement policies, and the process of obtaining right-of-way; (v) to examine ways to accelerate the road building process; (vi) to consider the most appropriate cost ceiling on projects to be built or maintained by state employees; and (vii) to make recommendations to the 1987 Regular Session of the General Assembly concerning these costs; and, be it

RESOLVED FURTHER, That the Joint Legislative Audit and Review Commission shall also report to the 1988 Regular Session of the General Assembly concerning a review of the recommendations issued by them to the 1982 Regular Session, regarding the Department of Highways and Transportation. The review shall examine the recommendations made by the Joint Legislative Audit and Review Commission and how those recommendations have been implemented by the Department of Transportation.

STUDY PLAN

SENATE JOINT RESOLUTION NO. 7

October 22, 1986

PREFACE

On September 26, 1986, the Senate passed Joint Resolution Number 7 during the Special Session of the General Assembly, which was called to address the Commonwealth's transportation needs and funding. Part of that resolution requests the Department to develop a plan for reducing expenditures for administration and maintenance by 5% as compared to 1987-88 appropriations and a long-term plan for increasing efficiency in its operations and administration. In addition, the Department is requested to compare the cost of maintenance and other major nonconstruction activities with those of other states; examine bidding procedures, procurement policies and the process of obtaining rights of way; examine ways to accelerate the road building process; consider the most appropriate cost ceiling on projects to be built and maintained by state forces, and make recommendations to the 1987 regular session of the General Assembly regarding these data and information gathering efforts.

The study plan presented herein outlines the main features of the process proposed to address the requests set forth in the joint resolution. Conducting the requested studies not only affords the Department the opportunity to effectively communicate with the General Assembly regarding specific aspects of the commitment to a long-run, continuing focus on efficiency, but also presents a mechanism whereby to bring to the attention of the members of the General Assembly legislative issues which may be important to the efficient maintenance and construction of the Commonwealth's transportation system.

STUDY PLAN

SENATE JOINT RESOLUTION NO. 7

INTRODUCTION

Aside from addressing the specific study and data collection efforts set forth in Senate Joint Resolution No. 7 (SJR-7), a copy of which is included as Appendix A, this plan carries with it a two-fold perspective which is critical to performing a successful study and keeping the individual deliverables in proper focus. First, SJR-7 offers an opportunity for the Department to effectively communicate its commitment to efficiency through recently implemented initiatives and specific longer range institutionalized processes, such as the establishment of the productivity improvement center. Secondly, SJR-7 provides a mechanism by which to bring legislative issues and important information which bear on the efficiency and effectiveness of the Department's operations to the attention of the General Assembly.

The remainder of this plan description is arranged into three sections. The first section describes the team approach to be used, the work content, and the steps required to develop the final report. The second section establishes target dates and a work-time schedule. The third section lists the team members, and where appropriate, the team leaders.

STUDY METHODOLOGY

A multidisciplinary team approach will be employed to address SJR-7. The broad scope and short deadline of the study necessitates the use of many expertise areas; however, it will remain the responsibility of a steering committee to provide overall guidance to the effort and prepare the final report. A schematic of the team approach is shown in Figure 1.

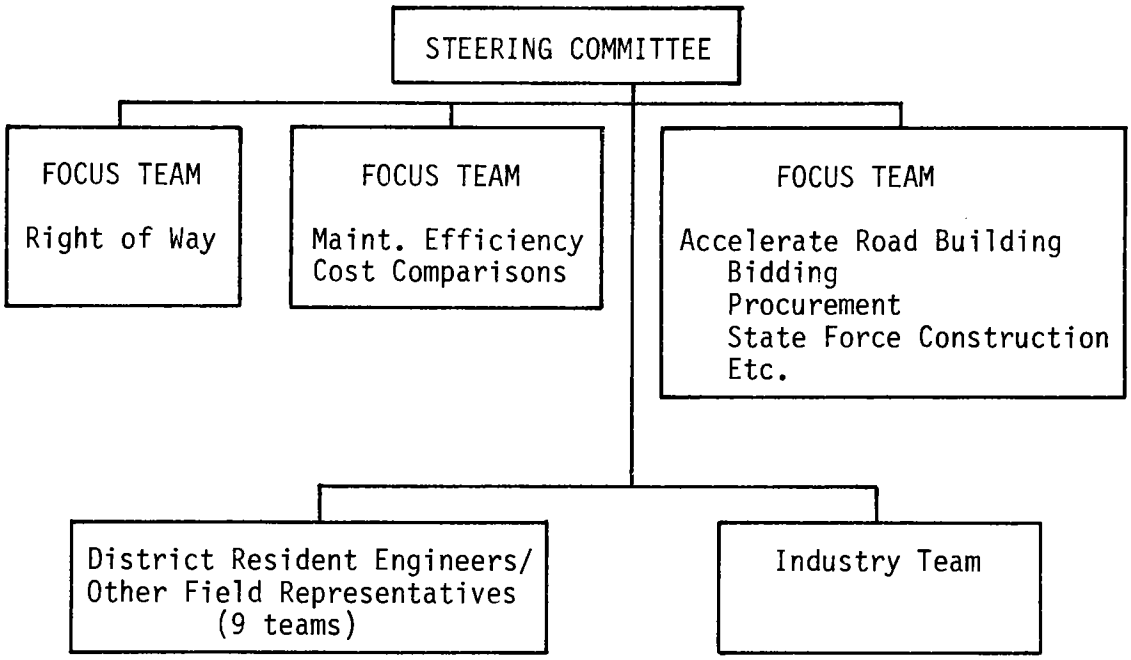

Figure 1

In addition to providing overall guidance to the effort, maintaining close contact with the Commissioner and Executive Committee, and preparing the final report, the Steering Committee will be responsible for the development of the plan for increased efficiencies as called for in SJR-7. While closely related to the focus team efforts, it is anticipated that not all elements of the plan will necessarily stem from the focus team reports. For example, some elements of the plan will consist of efforts already under way, such as an evaluation of the inspection-in-depth program, the initiation of the Productivity Improvement Center, and the development of the construction manpower management system. Other elements of the plan will, of course, result from efforts of the several teams.

FOCUS TEAMS

Three Focus Teams are proposed. While their structure in general reflects well defined areas consistent with the Department's organizational arrangement, some activity combinations (such as placing procurement under the

Focus Team on Accelerating the Building Process) are based upon what appears to be an orderly arrangement in view of the overall focus of SJR-7, but in no way should be construed as a restriction on the breadth of the examination of procurement procedures.

RIGHT OF WAY

The technical aspects of obtaining rights of way under the Uniform Relocation and Real Property Acquisitions Policy Act justifies that it be treated as a separate focus area. Among the specific aspects of the process to be examined are the following:

-- Negotiation, Appraisal, Relocation

-- Donations

-- Turnkey operations

-- Condemnation

-- Experiences elsewhere

-- Utility relocations

MAINTENANCE OPERATIONS

A second Focus Team shall concentrate on that portion of SJR-7 concerning maintenance efficiency and cost comparisons of both maintenance and nonconstruction with other states, and in particular, those administratively organized like the Department. It is important that clear distinctions be made between ordinary maintenance, maintenance replacement, and operations (such as tunnels, rest areas, and traffic services). The team should also review recommendations made in previous TRB, Research Council, JLARC, and other reports for possible application in the context of SJR-7, keeping in mind the goal of developing a continuing program of efficiency improvement.

ACCELERATING THE ROAD BUILDING PROCESS

The third team is to concentrate its efforts on the "road building process." While listed separately in SJR-7, it is reasonable to combine this topic with other items, including the state force construction cost ceiling, bidding procedures, and procurement policies because of the interrelationships of the activities. The establishment of the most appropriate cost ceiling for state force construction will likely receive significant attention, but it is clearly related to an effective contract construction program as well (particularly in the case of small contracts).

It is anticipated that the scope of the work for this team will include, but not be limited to, the following areas: bidding procedures, procurement policies, state force construction, incentive and penalty rates, mobilization, nighttime activities, alternative bidding focal points (e.g., fixed prices with bids awarded to the shortest time bid), project bundling, seasonal and geographic distribution of advertisements, and environmental clearances.

RESIDENCY TEAMS

Successfully addressing SJR-7 requires an additional perspective only the field can provide. Consequently, the study plan includes nine (9) district teams representing the field. Each team will be comprised of the resident engineers and the residency maintenance supervisors from the district in question.

The purpose of each district team is to provide field input directly to the focus teams on their respective subject areas, as well as submitting a report of their ideas to the steering committee. Obviously it is anticipated that the district teams' value lies largely in their knowledge and focus on maintenance, construction, and operations efficiency topics; however, the

district teams should feel free to provide suggestions regarding efficiencies in other areas within the purview of SJR-7 as well.

INDUSTRY IDEAS

Ideas from the construction industry should not be overlooked in addressing SJR-7. Consequently, this study plan calls for actively soliciting ideas from the construction industry through the presidents of the several trade associations and providing them with an open line of communication to the Steering Committee to provide their input. The major focus of this effort will be that of providing the Steering Committee with a view of the Department/Contractor interface from the industry perspective.

DEVELOPING THE FINAL REPORT

As noted above, the final report development will be the responsibility of the Steering Committee. While much of the committee's focus will be on the development of the efficiency plan, it will expect formal reports from each Focus Team and each Resident Engineer Team for use in the final report preparation. Because these individual reports must, to a significant degree, feed the final report, the work of the teams must be well conceived, complete, and simply presented; yet it must also be carried out within a very short period of time. It is expected that Focus Team Leaders will keep the appropriate directors informed of their progress and deliberations. In addition, the Steering Committee will brief the Executive Committee at important milestones in the study.

TARGET DATES AND WORK TIME SCHEDULE

Target dates and a work time schedule are described below.

CRITICAL TARGET DATES

November 3, 1986	-	Complete Study Planning and Team Organizational Meetings.
November 21, 1986	-	Submission of Residency Team Reports to Focus Teams and Summary to Steering Committee.
	-	Submission of Industry Ideas to Steering Committee.
December 3, 1986	-	Submission of Draft Focus Team Reports to Steering Committee.
December 9, 1986	-	Steering Committee Briefing with the Commissioner, Executive Committee, and Leadership Forum.
December 18, 1986	-	Submission of Draft Final Report and Visual Aids to Executive Committee.
December 24, 1986	-	Completion of Review and Comment by Executive Committee and Focus Teams.
January 9, 1987	-	Deadline for Completion of Printing of Final Document and Visual Aids for Presentation to General Assembly.

WORK TIME SCHEDULE

	Oct. 23	Nov. 1	Dec. 1	Jan. 1	Feb. 1
Plan & Organize	_____				
Residency Team Report Prep.		_____			
Focus Teams Report Prep.		_____			
Industry Ideas		_____			
Steering Committee Efficiency Plan Development		_____			
Steering Committee Draft Prep.			_____		
Review and Comment on Focus Team Reports			_____		

	Oct. 23	Nov. 1	Dec. 1	Jan. 1	Feb. 1
Executive Committee Comment on Draft			———		
Final Report Writing				———	
Document Printing and Final Slide Preparation					———
Executive Overview	———————————————				

Figure 2

STEERING COMMITTEE

Gary Allen
Jim Atwell*
Paul Cecchini
Claude Garver
Dave Gehr
Jack Leigh
Dave Mahone
Mike Perfater
Connie Sorrell
Bob Sumpter
Stuart Waymack

*NOTE: Jim Atwell, Director of Finance, will be frequently involved with efforts of the Steering Committee but may do so through Pete Kolakowski.

FOCUS TEAMS*

RIGHT OF WAY	MAINTENANCE/OPERATIONS EFFICIENCY & COST ANALYSIS	ACCELERATING ROAD BUILDING
**Stuart Waymack	**Dave Mahone	**Claude Garver
**Mike Perfater	**Jack Leigh	**Bob Sumpter
Grayson Alexander	Paul Cecchini	Aubrey Baird
Fred Altizer	Ron Fink	Don Keith
John Beall	Dave Gehr	Robert Mannell
Dennis Weddle	Pete Kolakowski	Ken McGhee
	John McEwen	Earl Robb
	Jim Melone	
	Neal Robertson	
	Al Thomas	
	Woody Woodward	

*Gary Allen and Connie Sorrell will act as "floaters" on all Focus Teams.

**Indicates Co-Team Leaders.

RESIDENCY TEAMS

Residency teams should jointly decide on their respective team leaders from among the resident engineers in each district and notify the Steering Committee of their choice through Gary Allen by October 27, 1986.

APPENDIX A

SENATE JOINT RESOLUTION 7

SENATE JOINT RESOLUTION NO. 7

Requesting the Department of Transportation and the Joint Legislative Audit and Review Commission to conduct certain studies, obtain certain information, and make recommendations based thereon.

Agreed to by the Senate, September 26, 1986
Agreed to by the House of Delegates, September 25, 1986

WHEREAS, the Governor's Commission on Transportation in the Twenty-First Century has detemined that the Commonwealth has certain critical highway needs; and

WHEREAS, the Commission has predicted that, unless taxes are raised, no funds for highway construction in Virginia will be available beyond 1991; and

WHEREAS, the General Assembly and all other citizens of the Commonwealth are concerned that our taxes be used in the most efficient manner; and

WHEREAS, if the state highway program's administrative and maintenance costs were contained or reduced, more money would be available to fund highway construction projects; now, therefore, be it

RESOLVED by the Senate of Virginia, the House of Delegates concurring, That the Commonwealth Transportation Commissioner is requested to report to the members of the General Assembly, prior to February 1, 1987, a plan by which expenditures for administration of the Department of Transportation and maintenance of the transportation system of the Commonwealth, shall be reduced by at least five percent as compared to appropriations for such expenditures for fiscal year 1987-88. Such plan shall provide for the achievement of such reductions through increased efficiencies in Departmental operations. The Commissioner shall include his plan to continue these savings into the future; and, be it

RESOLVED FURTHER, That the Department of Transportation is requested: (i) to determine the per-mile cost, during recent years, of maintaining the Commonwealth's interstate, primary, secondary, and urban highways; (ii) to seek comparable data on highway maintenance costs in other states; (iii) to obtain data necessary to compare the other major nonconstruction costs of Virginia's highway program with those in other states; (iv) to examine the Commonwealth's bidding procedures, procurement policies, and the process of obtaining right-of-way; (v) to examine ways to accelerate the road building process; (vi) to consider the most appropriate cost ceiling on projects to be built or maintained by state employees; and (vii) to make recommendations to the 1987 Regular Session of the General Assembly concerning these costs; and, be it

RESOLVED FURTHER, That the Joint Legislative Audit and Review Commission shall also report to the 1988 Regular Session of the General Assembly concerning a review of the recommendations issued by them to the 1982 Regular Session, regarding the Department of Highways and Transportation. The review shall examine the recommendations made by the Joint Legislative Audit and Review Commission and how those recommendations have been implemented by the Department of Transportation.

APPENDIX B

REPORTS AND FORMS WHICH ARE CANDIDATES FOR CONSOLIDATION OR ELIMINATION

PAPERWORK

-- Eliminate Form FD-55

-- Too many O.M. & M.R. reports; combine on one

-- Highway Land Use Permits - Form CE-7 consists of 4 copies of a 2-page form plus liability sheet MP-250 (sometimes a sketch and other standards attached). We also must complete a MP-240 computer sheet and exhibit (A) cover letter. The MP-240 and exhibit (A) include a lot of information, virtually all of which is duplicated on the CE-7 and both should be eliminated.

-- Eliminate M-39

-- Combine M-40, hired equipment record, hired equipment bid form into one form

-- M41, M41A, calibration chart should be eliminated.

-- Eliminate or drastically improve fiscal summary required on secondary.

-- Under the heading of paperwork, one suggestion would be to reduce the number of report forms generated by the residency to start the refund procedure for permittee funds deposted for guarantee fee. Currently, with the completion of the CE-7 Land Use Permit Form, we generate an MP-70, an AS-5, an A-53, and a F-5 in order to return an individual's money. Two of these forms have just been added within the last several months. It would appear rather than adding additional forms for additional information, we should either increase the number of copies of one form, or, perhaps, add information to that form if it is truly necessary.

-- It is recommended that Progress Schedules should be eliminated on all contracts with 90 calendar days or less time limit. This would, overall, reduce volumes of paperwork and result in savings to the Department.

-- Recommendation is made to eliminate the Plan of Operations on all No Plan and/or Minimum Plan contracts. This, again, would reduce paperwork and result in savings to the Department. (Many don't submit anyway.)

-- Form C-28 - It is recommended that contractors send this form in when the project is completed for unpaved road and coal-hauling projects. This would only require that one (1) report be submitted for each project. (EEO)

-- Forms C-63 and C-63A - Where the contract has no goals required or established for the contractor, this report would be submitted upon the completion of the project. In instances where there are goals established and the contractor has not met those goals, the project would be accepted with the contractor being put on notice in the

acceptance letter that he has not met the goals and that final payment would be held up until those requirements are satisfied. (DBE)

-- Form C-64 - It is recommended that this form be filed directly with the district EEO officer, bypassing the residency office entirely.

-- Eliminate Interim RW-24 submission to residency

-- Review all EEO & DBE forms; combine and/or eliminate as necessary.

-- Restructure forms SR-1, SR-8 into one; eliminate their use on No Plan, state force, or hired equipment.

-- Form T&S13 (Fatal Accident Report). This form is prepared at the residency level, usually by an assistant resident engineer, then submitted for traffic and safety review. After review, if a recommendation for corrective activity is made, it is referred back to the residency. Presently, a review of the accident site is also made by the Traffic and Safety Division. The primary benefit of this report is to document the files against possible future litigation. If the Highway Hazard and Information Report, which is prepared and submitted to us by the State Police, could be expanded to include all fatalities, we believe that Section II, 2.4b of our Claims Manual applies so far as file documentation. If this report could be discontinued, we find that an assistant resident engineer could spend an average of one (1) day per month on other demanding work with emphasis toward construction.

-- Forms M41 and M41A - Snow and Ice Control Reports. This report is prepared annually to document a residency plan for snow and ice removal. It is necessary to transfer labor and equipment to meet the demands of each storm. At no time ca this plan be relied on to be accurate. The area superintendents, maintenance supervisors, and office clerical personnel could be released to perform other assigned tasks if this report could be discontinued. (1 copy to district, 1 copy in residency, 1 copy area headquarters, never goes to Central Office)

-- Waste Oil Report and letter for pickup. This report is prepared monthly to indicate volume collected and on storage at each residency lot. An additional letter is prepared and submitted to the district equipment superintendent requesting shipping instructions for final storage at the district lot. It is believed this information was required initially to establish a program at the district for utilization of waste oil in boiler burning systems. Since this oil is no longer used in this program, we recommend all paper work be discontinued. As this program of collecting waste oil has an effect toward satisfying environmental requirements, we recommend the collecting and storage programs be continued. (goes to district shop superintendent)

-- Form AS-5, A-14, AS-9, DA02-041 and A-53. These reports are prepared for processing, distributing cost and payment for commodities purchased locally, services rendered, and employee expense accounts.

(Fiscal Division) We recommend that Form AS-5 be modified to include requirement of Forms AS-9, A-14, and A-53. Also, Form DA02-041 be modified to include requirement of Form A-53. This could include a reduction of four (4) forms which are a duplication of the original forms. The consolidation of these forms will offer a reduction in time involved by the clerical staff and allow them to perform more demanding functions. On Form AS-5, we could eliminate the Remittance Advice Copy since the checks now issued contain a stub which provides credit information to the vendor. We also recommend this AS-5 form be prepared using carbonized paper.

-- Daily Mileage Report for Pool Vehicles. We find this is a duplication of monthly report prepared to the Equipment Division for mileage inventory. In some instances, this report is prepared and maintained as a daily diary with benefits for usage into the end of the year tax program. We recommend this form be made optional.

-- Forms F80 and S-21 (Property Damage). These forms are prepared in duplicate to cover Property Damage and Accounts Receivable. We recommend Form S-21 be modified to include any requirement of Form F-80. Eliminate Form F-80. This would reduce clerical time involved in a duplicate report. (comes from State Police)

-- Forms A-41, A-30, PA-40 - Residency Stock Control Reports. The Form A-41 is required as a control measure to account for differences between Form A-30, Central Office Computer Control of Stock Inventory. This difference is prepared and reported monthly on Form PA-40 as Monthly Reconciliation Statement. We recommend the Residency Computer Data System be expanded to eliminate the duplication of Forms A-41, A-30, PA-40, and the present computer entry system.

-- Study computer printouts presently being distributed to Residency level to eliminate repetition of information. A review of Form A-27, A-21 0571-01, and two (2) A-17s reveals mostly duplication of information received for maintenance over a two-month period. If the information contained on Form A-21 0572-01 could be returned to the residency office at an earlier date, the other forms supplying this duplicate information could be eliminated. (Stock Reports) There are many forms in the Construction Division supplying duplicate information. If a study could be made to modify Form A-12 to include supplemental information, this reduction would provide all necessary information.

-- Form F-204 - Hiring Hourly Employees. Use this form as a turnaround form for temporary hourly employees who are rehired on an hourly status at a later date; also, at his termination if there has been no status change.