INTERIM REPORT OF THE

JOINT LEGISLATIVE AUDIT AND REVIEW COMMISSION ON

EQUITY OF CURRENT PROVISIONS FOR ALLOCATING

HIGHWAY CONSTRUCTION FUNDS IN VIRGINIA

TO

THE GOVERNOR

AND

THE GENERAL ASSEMBLY OF VIRGINIA

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PREFACE

The 1982 Appropriations Act directed the Joint Legislative Audit and Review Commission to conduct a study of the reasonableness, appropriateness, and equity of the current statutory provisions for allocating highway construction funds among the various highway systems and among the various localities that share in those funds. This report represents in interim analysis dealing solely with highway construction allocations.

The system for allocating highway funds has evolved over many years. However, in 1977, the General Assembly recognized the need to simplify the process and undertook a major revision of the allocation statutes. Since 1977, rising construction costs and dwindling revenues available for construction purposes have made additional study and revision appropriate.

The recommendations contained in this report are all based on an empirical analysis of the current allocation provisions. The amounts proposed for allocation are shown in various tables throughout this report. They are based on budgetary estimates prepared by the Department of Highways and Transportation after passage of the 1982 Appropriations Act and H.B. 532, which provided new funds for highway pruposes. More recent estimates of the Highway Maintenance and Construction Fund revenues indicate that actual allocations may be lower than the amounts previously estimated. Furthermore, changes in federal motor fuel taxes will increase amounts available in certain categories. Nevertheless, the tables showing the comparison of current and proposed allocations are useful tools in evaluating the relative impact of any new distribution formula.

This interim report will be supplemented over the next six to eight months with an additional review of allocations for public transit, maintenance assistance, and ordinary maintenance. These topics have been added to the study at the request of the Commission.

On behalf of the Commission staff, I wish to acknowledge the assistance provided by employees of Roanoke County, Fairfax County, and the City of Portsmouth in hosting a series of regional workshops for this study. I also wish to acknowledge the cooperation and assistance provided by the employees of the Department of Highways and Transportation.

Ray D. Pethtel
Director

December 13, 1982

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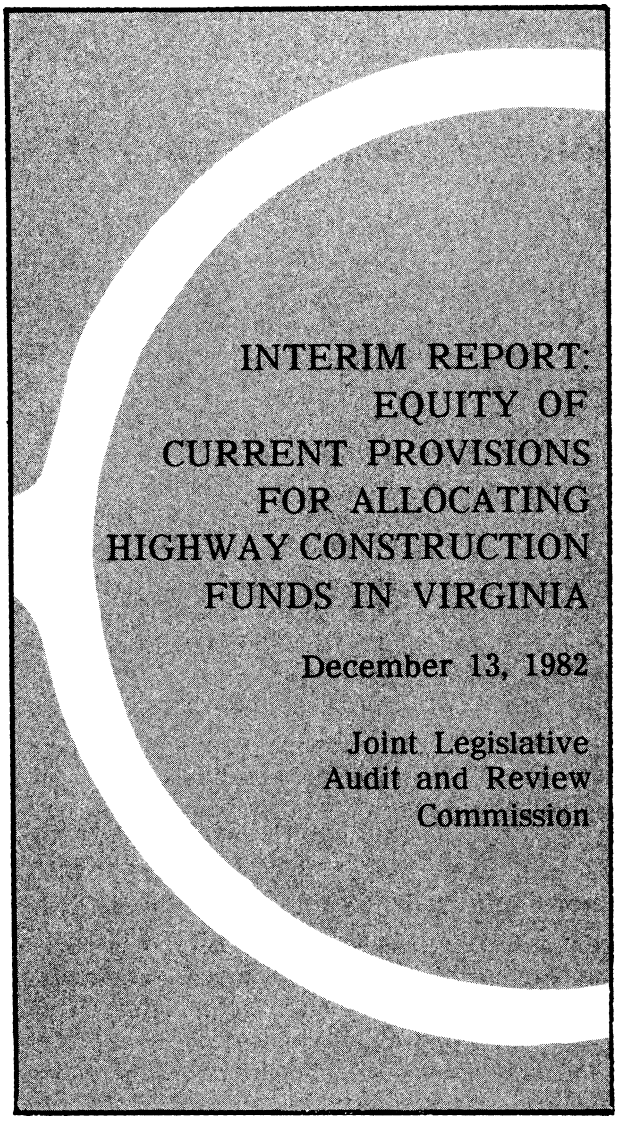


In 1977, the General Assembly undertook a major review and revision of the way in which highway construction funds were allocated in Virginia. This was the first major revision since 1962, and recognized the rapidly changing transportation environment. The outcome of the revision was a greatly simplified and more rational system for allocating highway funds. Shortly after these revisions were made, however, the highway construction environment underwent additional major changes.

With a changed funding environment and completion of major goals, a reassessment of the methods and procedures for allocating highway funds became necessary. To this end, the General Assembly requested that JLARC conduct a study of the current allocation process. In many ways, this study is a continuation of the efforts begun by the General Assembly in 1977.

Changes in the current methods for allocating funds are needed. The proportions provided to the administrative highway systems do not reflect the relative needs identified on those systems, and should be revised. Declining revenues and the requirement for secondary allocations to be based on amounts allocated in FY 1977 have resulted in inequitable allocations to the counties. This provision, which once acted as a "hold harmless" provision, now contributes to an increasingly inequitable distribution of funds. In addition, the statutory formulas for both the secondary and primary systems are technically inadequate. Revisions to the formulas will be necessary to ensure an equitable distribution of funds. The General Assembly may also wish to consider establishing, for the first time, a statutory formula for urban system allocations.

A JLARC REPORT SUMMARY

Study Approach and Process (pp. 1-8)

Equity was addressed in terms of highway construction needs. That is, JLARC postulated that an equitable distribution of construction funds occurs when the relative proportion of funds allocated to a locality is equivalent to the relative proportion of construction needs in the locality.

Because of the difficulty in measuring needs on an annual basis, however, it is necessary to use surrogates for need to calculate annual allocations. If such allocations are to be equitable, the surrogates should be the best possible estimators or predictors of need. Much of the analysis in this study is an evaluation of such surrogates for need. This evaluation involves measuring the relationships between highway construction needs and various characteristics of each locality such as population, land area, and travel.

Because highway allocations are complex and have an impact on local governments and local and regional organizations, the methodology used for the study was presented to local governments and other interested organizations at four public workshops, and through a continuing advisory network. Based on the comments at the workshops, an extensive effort was undertaken to document current and future highway needs. A wide range of data was collected on local characteristics. An automated system was designed to process the large amounts of information collected and used in the analysis. A key feature of the entire research process was the continuing involvement of local governments, planning district commissions, and many other groups.

Validation of Needs (pp. 10-12)

Because much of the analysis was based on a statistical evaluation of the relationships between needs and local factors, it was essential that accurate and meaningful data be used. A major effort was devoted to the development of data on needs, in cooperation with the Department of Highways and Transportation. Local governments were also involved in the development of the data because of the impact on them of changes in the allocations process.

For the purpose of this study, highway construction needs were identified from DHT's highway needs assessment, which was originally conducted as a part of the Statewide Transportation plan. Needs were measured as the total dollar cost of constructing various improvements in each locality. The total cost was the result of summing the individual costs of projects designed to meet specific present and future deficiencies on the State's highways through the year 2005.

Validation of the needs data was a two-step process which involved local governments and DHT. The first step was to mail the project lists to the localities across the State for their comments. In the second step DHT reviewed the comments and verified the need for technical or factual corrections.

As a result of the validation process, two separate needs lists were prepared for the analysis: the DHT list as corrected by the localities, and a list which included the DHT list plus all additional projects which the localities asked to be included.

Analysis of Factors (pp. 12-23)

The basic method for evaluating the appropriateness, reasonableness, and equity of the allocations process was an analysis of the relationships between needs and various local characteristics, such as population, area, vehicle miles of travel, and accident rates. As an outcome of the methodology chosen for the study, specific alternatives to the current process were also developed. This approach to the development of allocation formulas is based on the premise that in order to ensure that avilable funds are allocated equitably, they must be allocated on the basis of demonstrable construction needs for localities and systems.

JLARC's method had two parts. In the first part, the local characteristics, or factors, were tested to determine which were the best surrogates for need. In the second part of the analysis the factors identified in the first part were used to build models of allocation formulas.

A total of 23 factors were tested with highway needs for the primary, secondary, and urban systems. The factors that were tested are various measures of travel demand, the size of the highway network, or some special characteristic which would affect the need for highway construction. The usefulness of any given factor is dependent on how accurately it can be measured, the availability of the factor for annual allocations, and the objectivity of what is being measured.

The factors which measure the demand for travel are the most obvious characteristics which may be related to the need for highway construction. Population-based demand factors measure the need to move people from one location to another, while vehicle-based demand looks only at the number of vehicles which will use the network of highways, and the amount of travel generated by the vehicles. A second major group of factors measures the size or potential size of the highway network in each county, city, and town. Two of the factors used in the analysis are measures of

special circumstances or conditions in the localities: the accident rate on each system, and the cost per lane mile of construction. This last factor measures the differences in the cost of building roads in different parts of the State.

The relationships between highway needs and the factors were measured using correlation analysis. When the correlation analysis was applied to the relationships between needs and the 23 factors, a number of strong relationships were found. The relationships were measured with both the DHT list of needs and the local government list of needs. The same factors were found to be related to both measures of need. While the strength of the relationships varied slightly, in all cases the correlation coefficients were in the same range.

Ten of the 23 factors were applicable to an analysis with primary system needs. Of these ten factors, six were found to have a strong relationship to highway needs. These factors were: (1) population, (2) population growth, (3) employment, (4) vehicle registration, (5) population density, and (6) vehicle miles of travel.

A total of 15 factors were evaluated for relationships with secondary system needs. As with the primary system, the strongest relationships with need were found to be with the demand-based factors. These included: (1) population, (2) population growth, (3) population density, (4) employment, (5) vehicle registration, (6) vehicle miles of travel, and (7) vehicle density.

Of the nine factors tested with urban system needs, five were highly related. The relationships seen for this system were significantly different from those of the primary and secondary systems, however.

Development of Models (pp. 23-25)

Once the data on needs and the 23 factors had been collected and verified, the evaluation of the factors was conducted. The purpose of the first two parts of the analysis was to help in the selection of the factors to be used in various allocation models. Those models which were the best estimators of construction need were selected as the proposed allocations options.

Of special importance to the development of the models were the standardized regression coefficients. These statistics are produced as a part of the multiple regression. The coefficients represent the relative importance of each independent factor in estimating the needs for each locality. The weights for the factors were calculated by summing the standardized regression coefficients for the factors, and then determining what percentage each was of the total.

Systems Allocations and Special Funds (pp. 27-48)

In the past, funding for highway construction has been divided and proportions provided to the administrative highway systems and special programs. The targeting of certain portions of construction funding to the different highway systems is a useful and appropriate practice. The administrative highway systems meet different needs in the State's transportation network.

The proportions provided by law have been based in the past on specific legislative priorities and on estimates made by knowledgeable persons about the relative needs of the systems and special construction categories. The JLARC review of system allocations indicates that it would be appropriate to make an adjustment to the proportions provided to the administrative systems, if allocations are to be closely related to specifically identified construction needs.

Interstate Matching Funds. While the current process for allocating interstate federal funds to the construction districts appears appropriate, the use of primary system funds in each district to match the interstate federal aid adversely impacts several districts' primary system allocations. The General Assembly has already recognized this problem, as evidenced by its establishment of the interstate discretionary fund, which provided additional funds for primary construction in FY 1983. But this measure was only temporary. The General Assembly may wish to consider a more permanent and equitable solution for matching interstate aid in the future.

Recommendation (1). The General Assembly may wish to amend the *Code of Virginia,* requiring that funds necessary to

match federal interstate aid be set aside from the total funds available for construction activities. Funds for the match should not be deducted from a district's primary allocation.

Unpaved Roads Fund. In 1979, the General Assembly established the unpaved roads fund. This fund was intended to focus efforts on paving the 6,000 miles of dirt roads carrying 50 or more vehicles per day remaining in the Commonwealth. By providing for these funds before all other allocations are made, the General Assembly established unpaved roads as a high priority in the construction program. In order to assess the equity of the allocations made to the unpaved roads fund, a comparison of several factors and measures of need was made. This comparison indicated that some readjustment of the proportion of funds for unpaved roads may be appropriate if the allocation is to be proportionate to construction needs.

Recommendation (2). The General Assembly may wish to amend Section 33.1-23.1:1 to increase the percentage of funds for unpaved roads from 3.75 percent, not to exceed 7.6 percent. This recommendation would continue the General Assembly's earlier decision to place a priority on paving non-surface-treated secondary roads and would base the allocations on construction need.

Bridge Replacement Fund. The construction allocation process has as its major goal the equitable distribution of funds among localities. Underlying this goal is the need to fully utilize the resources available to the State. In the past, the allocation processes for the various systems have performed reasonably well in meeting this underlying goal. However, current statutory allocation processes may soon result in a loss to the State of at least $1.5 million in federal bridge funding. This will occur despite the fact that numerous bridges need replacement.

Recommendation (3). In order to ensure the use of available federal aid the General Assembly may wish to amend the *Code of Virginia* to provide for funding special bridge needs outside of the allocation process. This could be accomplished in a manner similar to the distribution of funds for interstate construction or unpaved roads. The special bridge fund should include both the available federal aid and required State match. Allocations from this fund should be made on the basis of greatest need as determined from DHT's current bridge inspection program. The funds for bridges should not be deducted from a locality's regular system allocations.

Regular System Allocations. After all of the special programs have been funded, the remaining construction funds are available for the regular allocations to the primary, secondary, and urban systems. Under the current provisions of law, the systems receive allocations in the proportions of 50 percent for primary, 25 percent for secondary, and 25 percent for urban. In order to evaluate the appropriateness of the current system percentages, a comparison of systems needs and relevant factors was made. This comparison showed that some readjustment of the current statutory proportions available for each of the systems may be appropriate. If the proportions are to be based on needs, the most reasonable distribution would be to provide one-third of the funds to each system.

Recommendation (4). The General Assembly may wish to amend Section 33.1-23.1B of the *Code of Virginia* to adjust the proportion of funds provided to each system to one-third.

Funding for Arlington and Henrico. The current procedures for allocating funds to Arlington and Henrico are confusing and complex as a result of the many pieces of legislation enacted over the last 50 years. If the General Assembly wishes to simplify the methods used to calculate the amounts or to assess equity for these two counties, further study will be required.

Secondary System Allocations (pp. 49-69)

The secondary system is the largest of the State administrative highway systems, with 67.1 percent of the total lane miles in the State. It includes all the public roads in the counties, and all public and community roads leading to and from public schools, streets, bridges, and wharves in incorporated towns with populations less than 3,500 people. Certain other roads, such as those

connecting public schools to primary or secondary highways, are also classified as secondary roads.

FY 1977 Hold-Harmless Allocations. The review of secondary allocations focused on the reasonableness, appropriateness, and equity of the current process for allocating funds to the 93 counties in the system, and alternatives for distributing secondary system funds. It is clear from the analysis that the current provisions for allocating funds are not equitable (according to construction needs), primarily as a result of the provision requiring that the allocation for each county not be less than was allocated in FY 1977. Because of the method used to allocate those funds in 1977, current allocations are the result not of statutory apportionment, but rather reflect the individual decisions of DHT's 45 resident engineers.

Recommendation (5). Because the construction allocations for FY 1977 were not set by any Statewide, consistent criteria and appear to be inequitable, the General Assembly may wish to amend Section 33.1--23.4 of the *Code of Virginia* to end the use of FY 1977 allocations as an allocation requirement.

Inadequacies of the Current Formula. The current statutory formula is composed of five factors, with each given equal weight: (1) population, (2) registered vehicles, (3) area, (4) secondary mileage, and (5) vehicle miles traveled. These five factors and their associated weights (20 percent each) form a linear function or equation. The use of a linear equation to allocate secondary funds to counties would be an improvement over the use of the FY 1977 hold- harmless provision of the current law. But the statutory formula is technically inconsistent with the weights intended to be used in the formula.

Recommendation (6). The General Assembly may wish to amend the current statutory formula to include factors which have been shown to be independent measures. The alternative formula should be based on an analysis of objective factors which meet this criterion.

Secondary System Options. Three alternative options are proposed. Each of the options includes one demand-related factor and one or two system size factors. The weights applied to the formulas were calculated as a part of the multiple regression analysis. The first option for the secondary system is based on the combination of population weighted 75 percent, area weighted 20 percent, and secondary system accident rates weighted 5 percent. This formula results in the R^2 of .90 in the regression analysis. The second option for the secondary system is a three-factor formula which is strongly demand-oriented. The factors and their associated weights are: vehicle miles of travel on the secondary system weighted 70 percent, area weighted 20 percent, and secondary system accident rates weighted 10 percent. The R^2 for this formula is .91. The third option for the secondary system is based on the combination of secondary system centerline mileage weighted 55 percent, and secondary system vehicle density weighted 45 percent. This formula results in an R^2 of .74 in the regression analysis.

Urban System Allocations (pp. 71-88)

Major highways and roads in cities and towns over 3,500 in population constitute urban highways. Under the provisions of Section 33.1-41 of the *Code of Virginia,* roads are designated as part of the urban system by the State Highway Commissioner, subject to the approval of the Highway and Transportation Commission. With 8,174 miles, the urban system is the second largest of the State systems.

Distribution of urban funds in the past has been based on the populations of the municipalities. DHT's urban division has tried to ensure that a city or town's proportion of funds eventually equals its proportion of the State's population. But equity has been measured in terms of 10-year cycles. That is, a city might have to wait 10 years for its allocations to be in line with its percentage of Statewide population. This contrasts sharply with the statutory process used for the secondary system, where equity can be judged on an annual basis.

A second problem is that the process currently in use has not been adopted by the General Assembly. In fact, there is no formal documentation of the process. The methods used to allocate such large sums of public funds should be legislatively mandated.

Recommendation (7). The General Assembly may wish to amend the *Code of Virginia* to establish a statutory formula for allocating urban system funds.

Urban System Options. Several options were developed for use as possible urban allocation formulas. Three clusters of factors —population, urban system size, and land area—were used to assemble each of the options. Elements of the various clusters were reviewed in a regression analysis with the urban system needs.

The first formula option is based on measures of area and population. The total surface area of localities in combination with population produces a regression equation that predicts urban need with a fairly high degree of accuracy, as indicated by an R^2 of .86. The individual importance of each of the two factors is 55 percent on population and 45 percent on the area of the locality.

The second formula option is also based on the use of two factors. The total surface area of the locality is again used, but this time in combination with the lane mileage of the urban system. The model is a good estimator of need, with an R^2 of .85. In this option, system mileage is weighted 60 percent, and area is weighted 40 percent.

Allocations in the third option are based on three factors: population, surface area, and urban vehicular density. This equation is fairly accurate for predicting urban need, with an R^2 of .88. The weights for this option are 45 percent for population, 40 percent for area, and 15 percent for urban vehicular density.

Primary System Allocations (pp. 89-102)

The primary system includes the arterial highways and the extensions of arterial highways within cities and towns. It is defined by Section 33.1-25 of the *Code of Virginia* as the State Highway System that supplements and complements the federal interstate system. The primary system also forms a complete network of through highways that serves both interstate and principal intrastate and regional traffic flow. Section 33.1-23.2 of the *Code of Virginia* establishes the formula for primary system allocations. In addition to requiring five factors and setting the respective weights applicable to each, it requires that allocations be made on the basis of highway construction districts. The statutory factors for allocating primary system funds include: (1) area, (2) population, (3) primary mileage, (4) vehicle registration, and (5) primary lane mile need.

An analysis of the relationships among these factors showed that they often measure the same thing and convey the same information. For example, population and vehicle registration were closely related, as were area and primary system mileage. In the case of population and lane mile need, the relationship was not quite as strong, but by including the two factors in the same formula, the information they convey would be doubly counted. Use of these highly related factors in the current formula is unnecessary. The formula can account for the information to be used in allocating funds by using fewer factors.

Recommendation (8). The General Assembly may wish to amend the *Code of Virginia* to revise the current statutory formula to include independent factors which are weighted in proportion to their relationship to construction needs.

Geographical Base. The primary system was established to link metropolitan areas and economic centers of regional importance with each other. That was the basic reason the General Assembly combined the primary and interstate systems for funding purposes and required allocations on a district basis. In analyzing the geographical base for allocating primary funds, however, it was found that the planning district commission (PDC) boundaries provided the best correlations of factors with primmary needs. This finding is not surprising, since the PDC's were established to serve regional areas in economic and transportation planning.

Recommendation (9). The General Assembly may wish to amend the *Code of Virginia* to change the geographical basis of primary allocations from DHT's eight districts to the planning district commission boudaries. These boundaries should be used only for the purpose of allocating funds. The districts should continue to administer

any projects in their areas. In order to facilitate administration of projects, the DHT district boundaries should be realigned so that they are coterminous with the boundaries of the planning districts.

Primary System Options. The primary system models were developed from factors that correlated highly with primary system needs. The analysis was conducted using the 22 planning district commissions as a base. All options are based on the PDC geographical units.

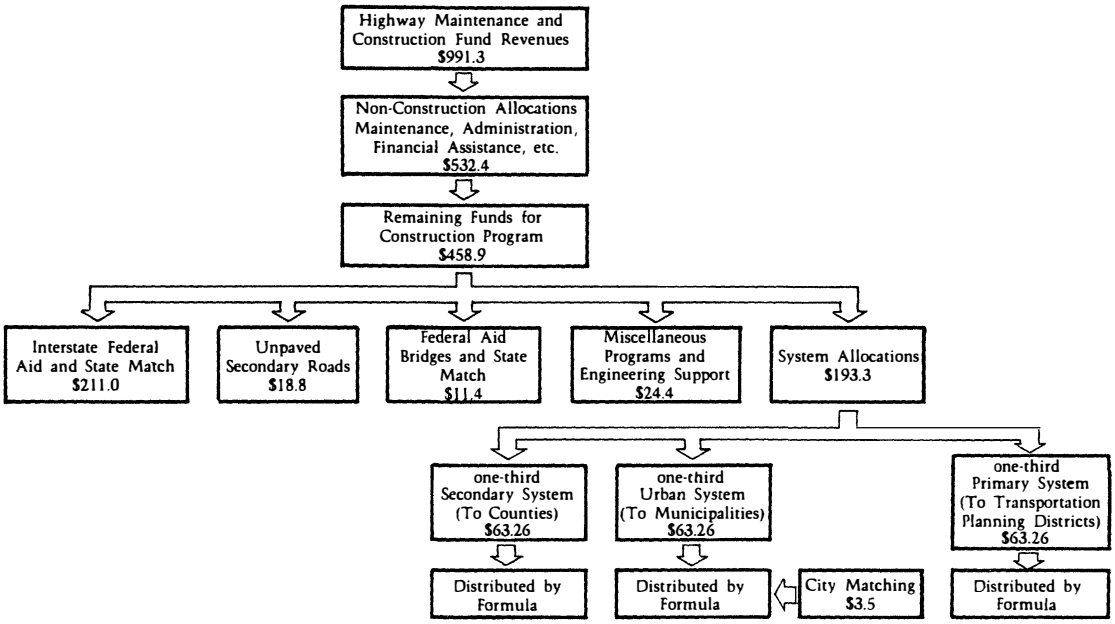
The first formula option is based on measures of centerline mileage, primary accidents, and vehicle miles of travel. The regression equation shows a moderate degree of accuracy with an R^2 of .58. The weights for the factors are 85 percent for vehicle miles of travel, 10 percent for centerline mileage, and 5 percent for primary system accidents.

The second option is based on three factors, which are measures of lane miles, primary system accidents, and population change. The regression equation also shows a moderate level of accuracy with an R^2 of .52. The weights for the factors are 50 percent for population change, 35 percent for lane miles, and 15 percent for primary system accidents.

The third option also includes three factors, which measure demographics, safety, and demand. The factors include lane miles, primary accidents, and vehicle registration. The model predicts the primary system needs fairly well, with an R^2 of .51. The weights for the factors are 50 percent for vehicle registration, 35 percent for lane miles, and 15 percent for primary system accidents.

The options developed and presented in this study are solutions to current imbalances among the administrative systems and among various localities in the State. The illustration below shows the system of allocations proposed by the JLARC staff.

JLARC STAFF PROPOSAL FOR ALLOCATION OF HIGHWAY CONSTRUCTION FUNDS



JLARC Staff illustration based on DHT and Appropriations data. Actual distribution of funds will depend on actual revenue for FY 1982-83.

Epilog: Allocations for the 1990's (pp. 103-104)

The options developed and presented in this study are solutions to current imbalances among the administrative systems and among various localities in the State. They should not be viewed as permanent solutions, because of the constantly changing environment of transportation needs and funding sources. Reassessments of the allocation formulas will be necessary on a periodic basis. Such an effort can be made more useful by careful preparation and planning.

Recommendation (10). The Secretary of Transportation should ensure that a reassessment of highway construction allocations is made on a periodic basis as a part of the Statewide Transportation Planning process. The analysis should be based on the prioritization of needs among the systems and localities, and transportation goals should be more clearly established for the future. An improved methodology for identifying special needs and involving local governments should be developed.

I. INTRODUCTION

In 1977, the General Assembly undertook a major review and revision of the way in which highway construction funds were allocated in Virginia. This was the first major revision since 1962, and recognized the rapidly changing transportation environment. The outcome of the revision was a greatly simplified and more rational system for allocating highway funds.

Shortly after these revisions were made, however, the highway construction environment underwent additional major changes. The interstate system was brought near completion, and more than 80 percent of the arterial network had been built. Highway revenues, which had traditionally been stable, began to decrease, leaving much of Virginia's construction program without a reliable source of funding. Even with the enactment of new highway taxes, it became clear that revenues would not grow as they had in the 1960's and early 1970's.

With completion of major goals and a changed funding environment, a reassessment of the methods and procedures for allocating highway funds became necessary. To this end, the General Assembly requested that JLARC conduct a study of the current allocation process. In many ways, this study is a continuation of the efforts begun by the General Assembly in 1977.

The mandate for this study suggested that any new system for allocating highway funds should be based in part on an empirical analysis of the construction needs in the localities, and the various characteristics of the localities that appear to generate those needs. This study is a review of the current allocation process, and is based on such an empirical analysis of needs and local characteristics.

The analysis showed that changes in the current methods for allocating funds are needed. The proportions presently provided to the administrative highway systems do not reflect the relative needs identified on those systems, and should be revised. Declining revenues and the requirement for secondary allocations to be based on the amounts allocated in FY 1977 have resulted in inequitable allocations to many counties. This requirement, which once acted as "hold harmless" provision, now contributes to an increasingly inequitable distribution of funds. In addition, the statutory formulas for both the secondary and primary systems are technically inadequate. Revisions to the formulas will be necessary to ensure an equitable distribution of funds. The General Assembly may also wish to consider establishing, for the first time, a statutory formula for urban system allocations.

The Current Allocations Process

During the 1977 session of the General Assembly, the methods and formulas for allocating highway funds to the various road systems and areas of the State were reviewed by the House Roads and Internal Navigation Committee and by the Senate Transportation Committee. The primary purpose of these reviews was to remove any inequities which might have existed under the previous requirements, and to simplify the distribution formulas. As a result of the work of the committees, H.B. 1041 was enacted. This law now prescribes the method and the formulas by which highway funds are allocated. The allocations are not financial aid to localities, but instead prescribe how and where the Department of Highways and Transportation (DHT) will expend highway funds.

The highway allocations process consists of several discrete steps (Figure 1). Before any funds are designated for construction, allocations must first be made for highway maintenance, administration of DHT, and other specified transportation activities. The remaining funds are allocated for highway construction in this manner:

First, several special categories of funds are reserved. Next, allocations are made to the administrative systems. Then, within each system, funds are distributed for expenditure on a geographic basis: by counties for the secondary system, by construction districts for the primary system, and by municipalities for the urban system. Finally, allocations are made to the individual projects.

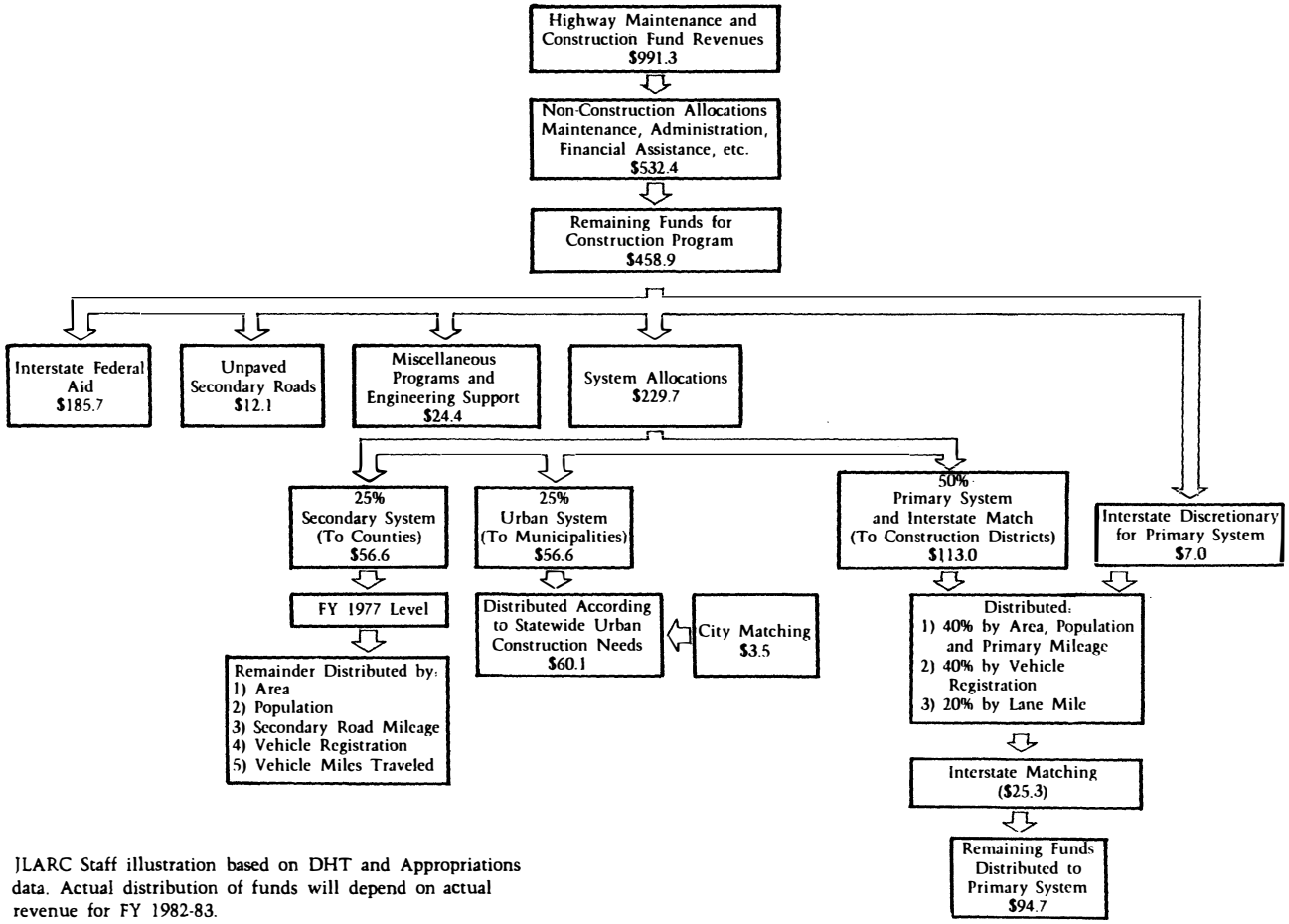
Special Category Funds. Funds for three major categories are reserved for specific purposes before any construction allocations are made. These are (1) interstate federal aid, (2) unpaved road funds, and (3) miscellaneous categories. Interstate federal aid, which amounted to $185.7 million for FY 1983, is the largest of these special funds, and is set aside for interstate projects approved by the federal government. The matching State funds for interstate aid are deducted from the primary system allocation of each affected district. Because this lowers the amount for primary system construction, the General Assembly has set up a discretionary fund. This fund provides additional primary funds for districts in which the match is a large portion of primary allocations. For FY 1983, $7.0 million was appropriated for the discretionary fund.

In 1979, a special fund was established for unpaved secondary roads. The current statute requires that 3.75 percent of available funds be set aside to pave nonsurface treated roads. For FY 1983 the General Assembly provided an additional $7.0 million, making a total of $12.1 million available for unpaved roads.

In addition, there are several categories of funds, such as coal haul roads and Appalachian roads, which are included in the construction budget but are not a part of the allocations. These funds are primarily pass-throughs for special programs. Also included in this category are funds for various access roads. For FY 1983, $4.0

Figure 1

DISTRIBUTION OF HIGHWAY MAINTENANCE AND CONSTRUCTION FUNDS (Fiscal Year 1982-83)



JLARC Staff illustration based on DHT and Appropriations data. Actual distribution of funds will depend on actual revenue for FY 1982-83.

million was reserved for industrial access, recreational access, and airport access roads. The amounts for these roads are established by statute.

System Allocations. System allocations are the distribution of the remaining construction funds to the State administrative highway systems. Section 33.1-23.1 of the *Code of Virginia* specifies this allocation of funds: 50 percent for the primary system and interstate match, 25 percent for the secondary system, and 25 percent for urban streets and highways. These proportions were established in 1977, and reflected the General Assembly's policy of placing priority on completion of the interstate and primary systems. For FY 1983, $113 million was allocated to the primary highways and interstate match, $56.6 million to the secondary system, and $56.6 million to the urban system.

Geographical Allocations. Within each system, funds are further apportioned by law to the construction districts or localities. Primary system funds are allocated to the eight DHT construction districts so that each district's share is proportionate to the relation it bears to the State as a whole in terms of area, population, and primary road mileage weighted 40 percent; vehicle registration weighted 40 percent; and lane mile need weighted 20 percent. For each district, the amount of State funds needed to match interstate federal funds is deducted from the primary system allocation. The remaining amount, plus the $7.0 million discretionary fund, is allocated to primary route improvements within the districts.

Twenty-five percent of the funds available for construction are allocated to the secondary system. The regular secondary system has an amount set aside equal to that allocated to the secondary system in FY 1977, and these funds are distributed among the 93 counties in the system in the same amounts as each county received for that fiscal year. Any remaining secondary funds are allocated among the counties in the State secondary system on the basis of area, population, secondary road mileage, vehicle registration, and vehicle miles traveled, each weighted equally.

Two counties, Henrico and Arlington, are not in the State secondary system. A small portion of the secondary system allocation is deducted for these two counties. This is Arlington and Henrico counties' share of the revenue from the Acts of 1964 and 1966. In FY 1983, Arlington and Henrico counties received a total of $664,204 from the secondary system funds.

Urban system funds are allocated among cities and towns with a population of 3,500 or more, on the basis of "statewide urban construction needs." DHT has implemented this requirement by using the population in each city and town as the basis for distribution. In contrast to the primary and secondary systems, there is currently no statutory formula for allocation of urban system funds to individual municipalities.

Project Allocations. The final step in the process is to allocate funds to individual construction projects. The process for making project allocations is different for each system. The statute requires that public hearings be held before the Highway and Transportaation Commission approves the final allocations. The boards of supervisors p'ay an important role in allocating secondary funds, and cities are also active in prioritizing projects in the urban system. The Highway and Transportation Commission is often more active in allocating funds for primary projects.

Study Approach

The mandate for this study in the 1982 Appropriations Act calls for:

> *... a study of the reasonableness, appropriateness, and equity of the current statutory provisions for allocating highway construction funds among the several highway systems and the individual cities and counties of the Commonwealth. The study shall include consideration of such factors as population, geography, vehicle registration, vehicle miles traveled, road mileage and road condition.*

Based on these requirements, the analysis of allocations included construction funding for:

- Interstate construction
- Primary construction
- Secondary construction
- Urban construction
- Access roads
- Unpaved secondary roads

State funding for public transit and maintenance of streets and highways was not included.

For the purposes of this study, equity was addressed in terms of highway construction needs. That is, JLARC postulated that an equitable distribution of construction funds occurs when the relative proportion of funds allocated to a locality is equivalent to the relative proportion of construction needs in the locality. If needs in the counties, cities, and towns could be measured on an annual basis, allocations could be made directly on the basis of those identified needs.

Because of the difficulty in measuring needs on an annual basis, however, it is necessary to use surrogates for need to calculate annual allocations. If such allocations are to be equitable, the surrogates should be the best possible estimators or predictors of need. Much of the analysis in this study is an evaluation of such surrogates for need. This evaluation involved measuring the relation-

ships between highway construction needs and various characteristics of each locality, such as population, land area, and travel. The data used in the analysis is available for inspection. Appendix A contains a description of the information on file.

The approach was in two parts. In the first step various statistical techniques were used to determine which local characteristics had the strongest relationships to highway construction needs. In the second step, those best characteristics were used to develop several models of allocation formulas. The actual allocations for each locality were then calculated to show the impact of the options.

Research Process

Because highway allocations are complex and have an impact on local governments and local and regional organizations, the methodology used for the study was presented to local governments and other interested organizations at four public workshops, and through a continuing advisory network. Based on the comments at the workshops, an extensive effort was undertaken to document current and future highway needs. A wide range of data was collected on local characteristics. An automated system was designed to process the large amounts of information collected and used in the analysis. A key feature of the entire research process was the continuing involvement of local governments, planning district commissions, and many other groups.

Allocations Workshops. Allocations workshops were held in August 1982, in Roanoke County, Fairfax County, the City of Norfolk, and the City of Richmond. JLARC staff presented its proposed methods for the study and addressed the questions and comments of the workshop participants. Representatives from many local governments participated, as did regional planning commissions and interest groups.

The purpose of the workshops was to provide for interaction between JLARC staff and the local officials. As a result of the workshops, several new factors to be used in the allocations options were identified. Also, a major revision of the construction needs data was undertaken to ensure that concerns of the workshop participants about the quality of the data were addressed. A secondary purpose of the workshops was to identify individuals interested in participating in an advisory network.

Advisory Network. The allocations advisory network was chaired by the JLARC research methodologist, and was composed of 63 members representing local governments, planning district commissions, chambers of commerce, and professional associations. The network was a formal mechanism which ensured that local concerns about the study methods and findings were communicated to the study team. The network also provided a format for obtaining comments and suggestions from individuals and organizations that had expressed an interest in the study.

Members of the advisory network were invited to each presentation of findings made to the Commission. The network was also used to solicit suggestions on other ways to measure local characteristics. Final needs data was sent out for network review and comment.

Estimation of Highway Needs. An essential part of the research was the identification of highway construction needs in each locality in the State. A reliable measure of needs was the basis for evaluating the various factors which must be used as surrogates for need in the allocations formulas. After extensive review of existing information on highway construction needs, it was determined that the only comprehensive measure available was the inventory of present and future needs developed by DHT as a part of its statewide transportation planning process.

Before it could be used, extensive validation of this data was necessary. As a first step, local governments and other interested parties were informed of JLARC staff's intent to use the statewide needs data for the analysis. The criteria used by DHT to identify needs and the inventory of needs found were available for review at the four allocations workshops. Because individual projects were not identified, however, many local officials expressed concern that the information might not be correct, and that such project listings would be necessary for localities to adequately review the needs.

Based on the concerns of local officials, JLARC requested that the DHT planning division assemble a tally of the specific projects which had been identified as needs. Within a month of the first workshop, those project lists were sent to every locality in the State. JLARC staff made a number of technical adjustments to this data. Local officials were then requested to make any necessary factual or technical corrections to the project lists, and to add a separate list of projects which they felt were needs but were not on the DHT list.

The responses of the localities were reviewed and tabulated. Two separate measures of need were developed as a result. The first was based on the original DHT project lists with those corrections made by localities and confirmed by the department. This first list of needs is consistent with the DHT highway needs assessment (Appendix B). The second listing of needs includes additional projects identified by localities (Appendix C). An analysis of need factors was made using both measures of need to determine whether using one list or the other resulted in significant differences.

Allocation Factors. The annual allocation of construction funds cannot be based directly on measures of relative need because of the high costs associated with an annual review of statewide needs. As an alternative, surrogates of need must be used in the distribution formulas. In fact, the current system of allocating funds employs such surrogates as population, vehicle miles of travel, and area.

JLARC staff collected data for and tested 23 factors. Each was thought to be some measure of a local jurisdiction's "need" for highway construction. The factors used in the analysis were collected from original data sources which included the Department of Highways and Transportation, the Division of Motor Vehicles, the Virginia Employment Commission, the Tayloe Murphy Institute, and the U. S. Census Bureau.

Evaluation of Factors and Models. Once the data on needs and the 23 factors had been collected and verified, an evaluation of the factors could be conducted. The first part of this evaluation consisted of a measurement of the statistical relationships between the needs on each highway system and the individual factors. The specific techniques and findings for this part of the analysis are reviewed in detail in Chapter II. The second part of the analysis was a measurement of the statistical relationships among the factors, and the results of this analysis are also presented in Chapter II.

These first two parts of the analysis helped determine the factors to be used in the various allocation models. The selection of factors for each model was based on two considerations: how strongly the factors were related to need, and how independent the factors were of each other. The evaluation of each model as a potential allocation formula involved measuring the strength of the statistical relationships between highway needs and the various combinations of factors which made up each model.

Those models which were the best estimators of construction need were selected as the recommended allocations options. Allocations for the localities were calculated for FY 1983 on the basis of each recommended option, and compared with current FY 1983 allocations. The comparison clearly shows the impact of each option on localities across the State. Three options have been recommended for each system: primary, secondary, and urban. Other options can be generated from the computer program developed by JLARC staff for legislative use.

Report Organization

This report is organized into seven chapters. The first chapter has been an overview of the study approach and research process. Chapter II reviews the findings of the technical evaluation of the needs and factors. How the various factors and models can be used is also examined. The third chapter focuses on the overall proportions which are allocated to the highway systems and to several special construction programs. Chapters IV, V, and VI deal with findings and options for the secondary, urban, and primary/interstate systems, respectively. These chapters review findings on a number of special issues and also include the allocations calculated for each option. Finally, Chapter VII outlines how the process and methodology used for this study can be applied to a reassessment of allocations in the 1990's.

II. ANALYSIS OF HIGHWAY CONSTRUCTION NEEDS AND LOCAL CHARACTERISTICS

The basic method for evaluating the appropriateness, reasonableness, and equity of the allocations process was an analysis of the relationships between needs and various local characteristics, such as population area, vehicle miles of travel, and accident rates. As an outcome of the methodology chosen for the study, specific alternatives to the current process were also developed. This approach to the development of allocation formulas is based on the premise that in order to ensure that available funds are allocated equitably, they must be allocated on the basis of demonstrable construction needs for localities and systems.

The problem to be solved in making such allocations is how to measure need. Clearly, a direct measure of the construction needs in each city and county on an annual basis is not feasible because of the high costs of an annual reassessment of statewide needs. The use of surrogate measures which are available annually offers an efficient and practical alternative method for solving the problem. By determining which surrogates best approximate a direct measure of needs, a formula can be constructed which will reflect the needs in each locality.

JLARC's method had two parts. In the first part, the local characteristics were tested to determine which were the best surrogates for need. "Testing" in this case meant evaluating the factors based on two criteria:

- Which factors were statistically related to needs, and how strong were the relationships?
- Which factors were statistically related to each other, and how closely were they related?

In the second part of the analysis the factors identified in the first part were used to build models of allocation formulas. The formulas which seemed to be the best estimators of need are the options presented in Chapters IV, V, and VI.

The remainder of this chapter focuses on the evaluation of the factors. The data used in the analysis is described, and the findings of the evaluation are explained. The final section outlines the development of the models.

CONSTRUCTION NEEDS AND LOCAL FACTORS

Because much of the analysis was based on a statistical evaluation of the relationships between needs and local factors, it was essential that accurate and meaningful data be used. Development of the data on needs in cooperation with the Department of Highways and Transportation was a major effort. Local governments were involved in the development of the data because of the impact on them of changes in the allocations process. Data for the 23 factors was collected from original sources, and represents a broad range of demographic information about each of the counties, cities, and towns in Virginia.

Highway Needs

For the purposes of this study, highway construction needs were identified from DHT's assessment of highway needs conducted as a part of the Statewide Transportation Plan. Needs were measured as the total dollar cost of constructing various improvements in each locality. The total cost was the result of summing the individual costs of projects designed to meet specific present and future deficiencies on the State's highways through the year 2005.

Identification of Deficiencies. Highway system deficiencies were identified by DHT in several ways. For all highways on the interstate, primary, or secondary federal aid systems in counties, a present day deficiency was considered to exist in any one of six situations:

1. the actual volume of traffic exceeded the service volume;
2. there was inadequate sight distance;
3. there was inefficient traffic flow;
4. a bridge was on the priority replacement list;
5. the number of accidents exceeded the statewide average, and there were more than five accidents; or
6. a road classified as a collector or above had a pavement width less than 16 feet.

In this analysis, the department assumed a service level of "C" except in mountainous areas or highly urbanized areas, where a level of "D" was considered the highest level by service feasible. Levels of service are estimated based on the relationship between the number of vehicles on a road and the speed at which they may safely travel. This method of calculation assumes consistent geometric design characteristics, a typical mix of vehicle classes, and a stable flow of traffic normally found in rural areas. The levels of service range from A to F, with A being the highest level of service.

Deficiencies on the non-federal aid (local) roads in the counties were based on the Secondary Roads Division's list of intolerable secondary roads. The local roads deficiencies included the cost of paving unpaved roads which carry 50 vehicles per day which were identified as a part of the total needs for each county.

Future deficiencies in the counties were ascertained by first projecting traffic levels for a 25-year period, and then identifying inadequate volume-to-service-volume ratios. All present needs were assumed to have been met before the analysis of future deficiencies was made. All the cost data was in 1981 dollars.

The needs in cities and towns with a population greater than 3,500 were based on the costs of constructing the projects as estimated in the urban thoroughfare plans. Because the plans and project estimates were developed in different years, all cost data was updated to 1981 dollars. The DHT construction cost index was used to make these adjustments. The projects from the thoroughfare plans were supplemented with bridges listed as deficient or obsolete by DHT's Bridge Division.

For both the county and city lists, projects which were under contract for construction were deleted. These projects were not included as needs because allocations for these projects had already been made, and contracts let for work to begin. Also excluded were local city streets not on the thoroughfare plans. These roads were not included because they are not eligible for State construction funds.

Collection and Validation. DHT provided project lists from its highway needs assessment, thoroughfare plans, and the bridge deficiency report. Traffic system management (TSM) projects were listed for each county. To prepare a cost for each county, projects from the highway needs assessment, bridge report, and TSM lists were summed. Separate costs were calculated for interstate, primary, secondary, and unpaved roads. For each city, the total cost from the thoroughfare plans was updated to 1981 dollars by multiplying it by an inflation factor, using the year the plan was prepared as the base. The cost of urban bridges was added to the revised thoroughfare plan cost estimate. Separate costs for interstate, primary, and urban system highways was prepared for each city and town.

Validation of the needs data was a two-step process which involved local governments and DHT. The first step was to mail the project lists to the localities across the State. Each local government was asked to make any technical or factual corrections it felt necessary. In addition, projects which had been identified by the locality, but were not on the lists, were to be identified separately. Responses to the requests were made by 68 localities.

In the second step of the validation process, DHT's Transportation Planning Division reviewed the comments of the localities, and verified the need for technical or factual corrections to the lists. DHT also provided the cost for any new projects added by the

localities. Based on the revisions suggested by localities, JLARC updated the DHT needs data.

As a result of the validation process, two separate needs lists were prepared for the analysis. The first was the list prepared by the department, as corrected by the localities. This listing of needs was consistent with DHT's current Statewide Transportation Plan. It included only those corrections which DHT could verify as necessary and appropriate. The second list of needs included the DHT list and all additional projects which the localities asked to be included. Many of these additional projects were not on the Statewide Plan because they did not meet the criteria established by DHT. However, they did represent those needs considered important by local officials. Table 1 compares the needs, expressed as construction costs, identified by DHT and the localities.

Table 1

HIGHWAY CONSTRUCTION NEEDS

System	DHT List of Present and Future Needs	Locality List of Present and Future Needs
Interstate	$ 1,651,771,484	$ 1,778,743,484
Primary	4,333,136,172	4,783,396,722
Secondary	5,776,102,000	5,871,485,520
Urban	4,539,397,333	4,796,503,033
Total	$ 16,300,406,989	$ 17,230,128,759

Source: DHT needs list and local governments.

The two lists are not significantly different. A statistical analysis verified that they were highly intercorrelated. In addition, in the analysis of factors, both lists were highly related to many of the local characteristics which might be expected to generate the need for highway construction. This high correlation between the factors and needs was a strong indicator that the needs lists were valid estimates of the needed improvements in the highway network. Since using either list yielded similar results, the DHT list was used for purposes of this study.

Local Factors

A total of 23 factors were tested as indicators of highway needs for the primary, secondary, and urban systems (Table 2). The analysis of factors was not performed for the interstate system because a formula would not be appropriate. Funds for the interstate are provided for projects approved by the federal government.

Table 2

LOCAL CHARACTERISTICS USED IN THE ANALYSIS OF NEED

Demand Factors

Population	Registered Vehicles
Population density	Primary vehicle miles traveled
Population growth	Secondary vehicle miles traveled
Employment	Unpaved road vehicle miles traveled
	Vehicles per primary lane mile
	Vehicles per secondary lane mile
	Vehicles per urban lane mile

System Size Factors

Primary centerline mileage	Primary lane mileage
Secondary centerline mileage	Secondary lane mileage
Urban centerline mileage	Urban lane mileage
Unpaved road centerline mileage	Area
Unpaved centerline mileage on roads with 50 vehicles per day	

Special Factors

Primary accident rates	Lane mile construction cost
Secondary accident rates	

Source: JLARC analysis of factors.

The factors that were tested are various measures of travel demand, the size of the highway network, or some special characteristic which would affect the need for highway construction. Many of the measures are similar in what they measure, though there are often differences which may be significant. The usefulness of any given factor is dependent on how accurately it can be measured, the availability of the factor for annual allocations, and the objectivity of what is being measured. All of the factors used in this analysis were objective measures -- they were not dependent on the judgement of the individual collecting the data. The 23 factors are available on an annual basis.

Measures of Travel Demand. The factors which measure the demand for travel are the most obvious characteristics which may be related to the need for highway construction. Demand-related factors can be "population based" or "vehicle based." Population-based demand

factors measure the need to move people from one location to another, while vehicle-based demand looks only at the number of vehicles which will use the network of highways, and the amount of travel generated by the vehicles.

Four of the factors tested in this analysis were population-based demand factors: (1) population, (2) population density, (3) population growth, and (4) employment. These four factors are different measures of the number of people which might generate demand for travel on the State's highways.

- Population was measured as the total number of residents in each county, city and town. The 1980 census counts were used in this analysis because they were the most accurate source of data. However, for annual population data, the only practical source was the yearly estimate prepared by the Tayloe Murphy Institute (TMI). Population is currently used to allocate primary and secondary funds, and the TMI estimates are used by DHT for that purpose.

- Population density was measured as the number of residents per square mile of area in each county, city, and town. This measure was also available from the 1980 census, but could be prepared from the TMI population estimates each year. The density factor used in this analysis was calculated using the usable land area in each locality. Rivers, lakes and other inland waterways were not included. This provided a much more realistic measure of the dispersion of residents in a locality. This factor is primarily a measure of the likely congestion on the highway network as the result of densely populated urban areas.

- Population growth was measured as the increase (or decrease) in the resident population between the 1970 and 1980 censuses. While this factor would be readily available for such ten-year spans, its use and measurement on an annual basis are questionable. However, if properly calculated, the use of annual population statistics in an allocation formula would make the formula sensitive to growth.

- Employment is the measure of the total number of people on the payrolls of employers in each county and city. It does not include self-employed persons, and does not distinguish between employees who are residents of the locality and those who are not. This data is prepared quarterly by the Virginia Employment Commission and would be available for use in allocations formulas.

While each of these factors is a measure of people, there are some obvious differences. The most important difference is between employment and the other three factors. Population, density, and growth all deal with resident populations. Employment, on the other

hand, includes both resident and non-resident employees. The types of travel demand measured are also different. Population, density, and growth measure the general level of local travel, while employment could be a measure of commuter travel, which might generate peak load demand.

Three of the factors were vehicle-based demand measures: (1) registered vehicles, (2) vehicle density, and (3) vehicle miles of travel. All of these factors measure the demand generated by the movement of vehicles on the highways.

- The vehicle registration factor is a measure of the number of motor vehicles registered in each city and county. Several types of vehicles are not included -- repossessions, mobile homes, and federal, State and municipal vehicles. The Department of Motor Vehicles is the only source of data on vehicle registrations. This factor would be readily available for use in allocation formulas.

- Vehicle density is the measure of the number of vehicles registered per lane mile of highway in each locality. Three separate density factors can be used -- one for primary highways, one for secondary, and one for urban roads. By relating vehicle registrations to the size of the highway system, these factors should be fair representations of local traffic congestion. These factors could be easily prepared on an annual basis from DMV and DHT data.

- Vehicle miles of travel (VMT) is a measure of the total number of miles traveled by vehicles in a county. The measure is calculated by DHT based on its traffic counts. Two factors are currently available: primary system VMT and secondary system VMT. Because traffic counts are not made in all cities and towns, VMT is not currently available for the urban system of roads. However, use of urban system VMT would be possible if the traffic counting program were expanded to include cities and towns.

Of these three travel-demand factors, vehicle miles of travel is the most direct measure of demand. It is also likely to be a more accurate reflection of real demand, since it includes both resident and non-resident vehicles. The registration and density factors measure only resident vehicles, and thus may greatly understate the demand for highways. Vehicle registrations could be especially misleading in localities which have large military populations, because these people may register their vehicles in their home states. The exclusion of government vehicles also tends to understate demand measured by registration.

Measures of System Size. A second major group of factors measures the size or potential size of the highway network in each county, city, and town. Three general factors are included in this group: (1) area, (2) centerline mileage, and (3) lane mileage. Both

centerline and lane mileage are available for all three highway systems and for unpaved roads.

- Area is a measure of the total surface land in each jurisdiction in square miles. The area of inland waterways has been excluded. All federally-owned land in Virginia is included. Several sources of data for area are available, including the U.S. Census and the Tayloe Murphy Institute. For annual allocations, the TMI data would be preferable, since it is updated yearly to account for annexations and mergers. Area is currently used for primary and secondary allocations.

- The centerline mileage factor is the length of the highway system in a locality. Mileage for the administrative systems is measured separately, resulting in three factors: primary mileage, secondary mileage, and urban mileage. Centerline mileage was also available for unpaved roads. Data for these factors is available from DHT, which continuously updates the measures as new mileage is added to the system.

- Lane mileage is also a measure of the length of the highway system, but each lane is counted as a mile. Thus, one centerline line mile on a two lane road is two lane miles. This measure is also available for the three systems, and is available for use in allocations formulas.

Centerline and lane mileage factors are obviously measuring very similar information. They do have slightly different meanings, however. The centerline factors measure only the distance from one point to another. Lane mileage factors, on the other hand, measure system capacity by accounting for the differences between a mile of two lane road and a mile of six lane road. Both may be related to highway construction needs in that they may be indicators of the need for improvements and reconstruction of the existing system of roads. This is an important relationship because an increasing proportion of construction activity will involve reconstruction and improvements as the highway networks reach their design life.

Area is different from the other measures because it is a more likely indicator of the need for new construction. Larger counties will require larger highway networks to connect various population and economic centers. Thus, as a county's basic road network is completed, area would become less useful. So it may be useful only to measure the need for new construction in large, fairly rural counties, and in large, rapidly developing cities. The mileage factor should be applicable over a wider range of situations.

Measures of Special Characteristics. Two of the factors used in the analysis are measures of special circumstances or conditions in the localities. These are the accident rates in each locality and the cost per lane mile of constructing highways.

- The accident rate on each system in a county measures special construction needs to improve design or deterioration on existing highways which may have contributed to automobile accidents. It is measured as the number of accidents per million miles of travel. A separate measure is available for the primary and secondary systems. Accident data is not currently available for cities. The data for primary and secondary accidents is available on an annual basis. The Virginia State Police provide the necessary data to DHT.

- Cost per lane mile of construction measures the differences in the cost of building roads in different parts of the State. The factor is based on the average of two year's construction in each locality. The differences in the type of road constructed is also controlled for. This factor may help to explain the differences in needs by accounting for the higher cost to build roads in some regions. If used in an allocation formula, it would be designed to provide additional funds to higher cost areas. This would provide the same level of construction to all areas of the State. For example, lower cost and higher cost areas would each be able to build one mile of highway, although the higher cost area would receive a larger allocation. This factor could be prepared by DHT on an annual basis.

Other Factors. In addition to these factors, many others were suggested. Many could not be used because no accurate measures of the factors were currently available. Among these were the local effort to meet highway needs, the economic development potential of an area, and the condition of the roads in a locality. While some measure of these factors may be developed in the future, data sufficient for analysis simply does not currently exist.

ANALYSIS OF STATISTICAL RELATIONSHIPS

The selection of factors to be used in the allocation formulas involved "testing" each of the factors for its relationship to highway needs. A second step was to measure the relationships between the factors. Both steps used correlation analysis. The purpose of the analysis was to identify which factors were most closely related to highway needs, and which factors were independent measures. The factors which were related to need and independent of each other could then be used to develop allocation models.

Correlation Analysis

The relationships between highway needs and the factors were measured using correlation analysis. Correlation is a standard statistical technique which measures the relationship between two variables or characteristics. The technique calculates a statistic called the

correlation coefficient, generally designated with the letter "r." The correlation coefficient can range from 0 to +1.0 for a positive relationship, and from 0 to -1.0 for a negative relationship. When r is near 0 there is no relationship between the two sets of data. A high correlation -- that is, when r is near +1.0 or -1.0 -- means that as the values of one set of data change, the values of the other set change in a mathematically consistent way. These relationships are illustrated in Figure 2.

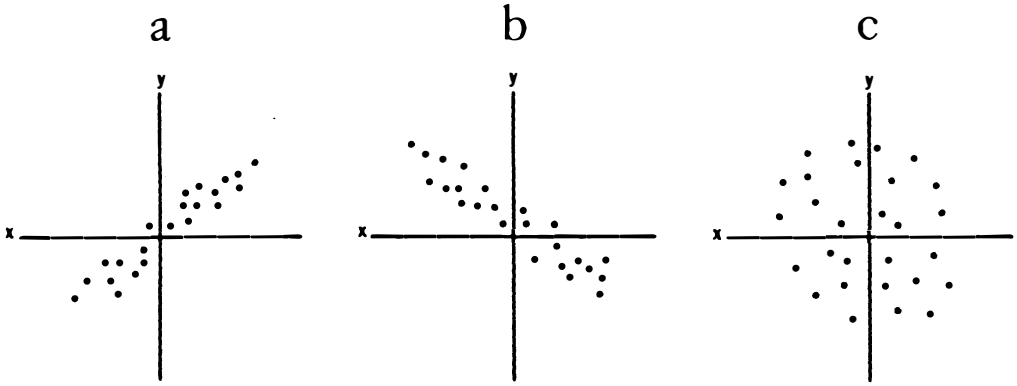
Positive Relationships. Graph (a) in Figure 2 shows a strong positive relationship. The r for the relationship of the data plotted would be close to +1.0. What the graph shows is that as the values plotted on the x axis increase, the values plotted on the y axis also increase.

Negative Relationships. A strong negative relationship is shown in graph (b) of Figure 2. In this relationship, the values plotted on the y axis decrease as the values plotted on the x axis increase. This strong inverse relationship would result in an r which was close to -1.0.

No Relationship. Graph (c) in Figure 2 shows that there is no relationship between the values plotted on the x and y axes. The

Figure 2

STATISTICAL RELATIONSHIPS



r APPROACHES +1.0

Relationship: Information plotted on Y increases as information plotted on X increases

r APPROACHES -1.0

Relationship: Information plotted on Y decreases as information plotted on X increases

r APROACHES 0

Relationship: No apparent relationship between the information plotted on X and Y

Source: Staff Illustration.

correlation coefficient for this relationship would be close to 0. This means that the two variables which have been plotted are independent of each other.

Use of Correlation Analysis in This Study. Two of the relationships shown in Figure 2 are specifically important for this study. In the analysis of the relationships between highway needs and the 23 factors, a strong positive relationship was desirable. The development of the recommended models was based first on the use of factors which had strong relationships with needs. When reviewing the interrelationships among the 23 factors, the lack of a relationship, as shown in part "C" of Figure 2, was desirable. The factors used in the formulas had to be independent measures.

Relationships with Need

When the correlation analysis was applied to the relationships between needs and each of the 23 factors, a number of strong relationships were found (Table 3). The relationships were measured both for the needs identified in the DHT Statewide Transportation Plan and for the local government list of needs. The same factors were found to be related to both measures of need. While the strength of the relationships varied slightly, in all cases the correlation coefficients were in the same range. Table 3 is a summary of the statistical relationships of the factors with needs for the secondary, urban, and primary systems.

Primary System Relationships. Ten of the 23 factors were applicable to an analysis with primary system needs. Of the ten factors, six were found to have strong relationships to highway needs. These factors were: (1) population, (2) population growth, (3) employment, (4) vehicle registration, (5) population density, and (6) vehicle miles of travel. The strongest relationship was that between needs and vehicle miles of travel. Clearly, this analysis points strongly to the use of demand-related factors for the primary formula.

None of the system size or special factors were strongly related to primary system needs. The weakest relationship was with the area factor. But the system size and special factors such as accident rates were used in the development of models to the extent that they improved the predictive ability of a model.

Secondary System Relationships. A total of 15 factors were evaluated for relationships with secondary system needs. As with the primary system, the strongest relationships found were those between needs and the demand-based factors. These included: (1) population, (2) population growth, (3) population density, (4) employment, (5) vehicle registration, (6) vehicle miles of travel, and (7) vehicle density. The single strongest relationship was between needs and population.

Table 3

RELATIONSHIPS OF NEEDS TO FACTORS

In order to determine what factors were appropriate for use in allocations formulas, each of the factors listed below was evaluated for its relationship to needs. This relationship is expressed as a correlation coefficient (r), which is shown for each of the state's highway systems. Where r approaches ±1, the relationship is strong.

Factor	Primary Needs	Secondary Needs	Urban Needs
Population Change	.671	.887	.476
Population Density	.445	.859	.101
Population	.628	.929	.858
Employment	.687	.919	.566
Vehicle Registration	.656	.929	.880
Area	.315	.310	.829
Centerline Mileage	.399	.756	.905
Lane Mileage	.543	.769	.904
Vehicles/Lane Mile	.044	.658	.157
Cost/Lane Mile	.371	.247	-.365
Vehicle Miles of Travel	.794	.925	--
Accident Rates	.287	.353	--
Total Unpaved Mileage	--	.195	--
Unpaved Mileage 50 v.p.d.	--	.257	--
Travel on Unpaved Roads	--	.497	--

Source: JLARC analysis of factors.

In contrast to the primary system, however, two of the system size factors--centerline mileage and lane mileage--did show strong relationships with need. This difference is most likely due to the differences in the sizes of the two systems. With more than 43,000 miles on the secondary system, the need for improvements and reconstruction becomes a more critical need. The area factor still did not show a strong relationship to need. The relationship between needs and unpaved road mileage was also very weak.

The models developed for the secondary system focused on the need-based factors, with the others used only to the extent that they improved the predictive ability of the formulas. Because the mileage factors were fairly strong, these were also used.

Urban System Relationships. Of the nine factors tested with urban system needs, five were highly related. The relationships found for this system were significantly different from those found for the

primary and secondary systems, however. For the urban system, three of the strongest factors were system size factors: (1) centerline mileage, (2) lane mileage, and (3) area. Only two of the demand factors were strongly related to need: (1) population and (2) vehicle registration. Employment and population growth were moderately related to needs, but not as strongly as for the other two systems.

Centerline mileage was the strongest factor, with lane mileage a very close second. These two factors seem to indicate that a large portion of the needs in urban areas is for improvements to and reconstruction of the existing urban highway system. The models for the urban allocation were developed with the focus on these two factors. Several demand factors were also used, however, when appropriate.

Intercorrelation of Factors

One of the important assumptions with regard to the use of linear equations is that the factors in the formula are independent of each other. That is, the factors should not be related to one another, or should not be measures of the same phenomenon. Multicollinearity is the term applied to the situation in which two or more of the factors in a linear formula are related to each other. This means that the factors convey essentially the same information.

Because such intercorrelated factors are measuring the same thing and conveying essentially the same information, their use in the same formula is unnecessary and in most cases unacceptable. The use of intercorrelated factors in models results in biased and inaccurate weights for the factors. This occurs because it is impossible to measure the independent influence of the factors on the dependent variable, which in this study is the construction needs. Because of the problems associated with using related factors in the same formula, an analysis of intercorrelations was conducted using the multicollinearity diagnostic available in the Statistical Analysis System (SAS) computer package. Factors found to be related to each other were not used in the same models.

Relationships of Demand Factors. In almost all cases, the demand factors, both population-based and vehicle-based, were found to be very highly intercorrelated. The relationships among these variables were not surprising or unexpected. The fact that they all measured demand was itself an indication that they must somehow be related.

An example of three factors illustrates the point. Population, employment, and registered vehicles were found to be highly intercorrelated. All that this means is that counties and cities with larger populations also have a greater number of people employed and a larger number of registered vehicles. In many ways, when one of these three factors is measured, the other two are also indirectly measured. This relationship is clearly shown in Table 4, where the counties are ranked on the basis of the three factors, and the top ten listed.

Table 4

TOP TEN COUNTIES FOR THREE
HIGHLY CORRELATED FACTORS
(In descending order)

Rank	Population	Registered Vehicles	Employment
1	Fairfax	Fairfax	Fairfax
2	Henrico	Henrico	Arlington
3	Arlington	Chesterfield	Henrico
4	Prince William	Prince William	Chesterfield
5	Chesterfield	Arlington	Henry
6	Pittsylvania	Roanoke	Prince William
7	Roanoke	Pittsylvania	Roanoke
8	Henry	Augusta	Montgomery
9	Albemarle	Henry	Campbell
10	Augusta	Rockingham	Hanover

Source: JLARC Analysis of Factors.

For each factor, the same counties generally show up in the top ten. Because the relationship is not perfect, the order of the counties is slightly different. But the important point is that the counties are generally in the same relative position on the lists.

Because the demand factors were related to each other, they were not used together in the formulas. They were substituted for each other, however, so that a different model could be developed for each factor. This was an important step, because the factors are slightly different in what they measure. As can be seen in the lists in Table 4, the use of different factors in a distribution formula will result in slightly different allocations to the localities. For this reason, many different formulas were prepared and tested. The results of these analyses are available from JLARC on request.

Relationships of System Size Factors. As was the case with the demand factors, the measures of system size were highly intercorrelated. In a few cases, these factors were also found to be related to some of the demand factors. Primary system lane mileage was related to population change and employment. All of the demand factors were found to be intercorrelated with secondary centerline and lane mileage.

Relationships of Special Factors. The special factors tended to be measures of very different things. As a result, they were not highly intercorrelated. The accident factor was also independent of both the demand and system size factors.

Effects of the Intercorrelations. Because the factors which are intercorrelated cannot be used in the same formulas, the first effect of the intercorrelations is to reduce the possible combinations

which can be used. For the most part, an attempt was made to develop the models by using one factor from each of the three major groups. In some cases, even this was not possible. The models which have been tested have, in most cases, three or fewer factors. This is somewhat of a change from the current primary and secondary allocations formulas, each of which has five factors. As the analysis has shown, however, some of the factors in the current formulas appear to be intercorrelated.

ANALYSIS OF ALLOCATIONS MODELS

Once the individual factors had been evaluated, the combination of factors to be used as models were developed and tested. This was the second step in the development of new allocation formulas. The method used to "test" the models was multiple regression. The purpose of the analysis was to (1) determine which models best estimated construction needs, and (2) calculate the weight that should be given each factor in the formulas.

Regression Analysis

Multiple regression is a statistical technique which can be used to analyze the relationship between a dependent variable and one or more independent, or predictive, variables. The general form of multiple regression is:

$Y = A + B_1 X_1 + B_2 X_2 + ... + B_k X_k$, where:

Y represents the dependent variable (needs),

A is the equation constant or Y intercept (not applicable for this analysis),

B_1 through B_k are the regression coefficients (weights), and

X_1 through X_k are the observed values of the independent variables (factors, such as population, registered vehicles).

In this study, construction needs are the dependent variable (Y), the objective factors are the independent variables (X), and the weights to be given each factor are the regression coefficients (B).

Measuring the Strength of the Model. A number of statistics are generated as a part of the multiple regression analysis. One of the most important is the coefficient of multiple determination, designated as R^2. This statistic is very similar to the correlation coefficients discussed earlier in that it measures the strength of the relationship between needs and the combination of factors. R^2 can range from 0 to 1. The statistic is essentially the percentage of the

variance in the dependent variable which is explained by the independent variables. So, if a model has an R^2 of .92, then it means that the combination of factors has accounted for 92 percent of the difference in highway needs from one locality to the next. The purpose of this analysis was to find the combination of factors which will result in the highest R^2.

Measuring the Accuracy of the Model. The standard error of the estimate was used to measure the dispersion, or scatter, of the actual needs in each locality with the predicted needs which resulted from the model. The number which was calculated is not a proportion, but an absolute value measured in the same units as the needs. Thus, the standard error indicates how far off an average estimate of needs would be from the actual amount of needs identified.

Calculation of Factor Weights. Of special importance to the development of the models were the standardized regression coefficients. These statistics are produced as a part of the multiple regression. The coefficients represent the relative importance of each independent factor in estimating the needs for each locality. Therefore, they were used as the weights to be applied in the formula.

The weights for the factors were calculated by summing the standardized regression coefficients for the factors, and then determining what percentage each was of the total. For example, in one primary formula, the combination of registered vehicles, primary centerline mileage, and primary system accident rates was found to be a good estimator of needs. To translate the model into an allocation formula, the regression coefficients for the three factors were converted to percentages, and then rounded. Table 5 shows the calculations of the weights and the resulting formula weights for a primary model. The formula which results from this analysis would allocate funds on the basis of 50 percent for registered vehicles, 35 percent for lane mileage, and 15 percent for accident rates. The same process was used for each of the proposed formulas in Chapters IV, V, and VI.

Table 5

CALCULATION OF WEIGHTS FOR A PRIMARY MODEL

Factor	Regression Coefficient	Percentage	Rounded Percentage (Weight) for Formula
Registered Vehicles	0.60513	51.4%	50%
Primary Lane Mileage	0.41966	35.7	35
Primary System Accidents	0.15158	12.9	15
Total	1.17637	100.0%	100%

Source: Multiple regression analysis.

CONCLUSION

The allocations formulas proposed in this study are based on highway construction need. The factors used in these formulas are the best surrogates for need which are currently available on an annual basis. The models constructed are the most accurate in estimating need.

Before an analysis can be made of the formulas and related allocations provisions within each highway system, the process for determining the funds available for each system must be examined. Chapter III focuses on the findings of a JLARC analysis of system allocations, and on several special funding categories.

III. SYSTEMS ALLOCATIONS AND SPECIAL FUNDS

The General Assembly has historically divided and set aside funds for many types of government programs to meet specific purposes it has identified. Similarly, funding for highway construction in the past has been divided and proportions provided to the administrative highway systems and special programs. This distribution of funds to various programs occurs before the statutory formulas are used to allocate funds within each system.

This chapter is organized according to the way system allocations are made. First, the equity of the special funding categories is discussed. Then the equity of the proportions provided to the primary, secondary, and urban systems is examined. Finally, the State aid provided to the two counties not in the secondary system of roads is reviewed.

The targeting of certain portions of construction funding to the different highway systems is a useful and appropriate practice. The administrative highway systems meet different needs in the State's transportation network. The interstate system serves as the major carrier of statewide and interstate traffic. The primary system of highways functions as a regional network serving centers of population and economic activity. As a result, the factors which are conceptually most appropriate for the primary system are those which are measures of regional highway needs. When measured in the regional areas around the state, population, centerline mileage, and vehicle miles of traffic were found to be good measures of those regional needs.

The secondary system, on the other hand, is a local network and serves mostly local needs. The urban system serves primarily as a local network, but also includes important regional linkages in the primary system of highways. Local measures of population, registered vehicles, and area proved most useful for these local systems.

By separating the funds for the different highway systems, the General Assembly has ensured that different types of needs have been funded simultaneously, and that the attempt to meet the needs on one system has not interfered with meeting the needs on the others. The proportions provided by law have been based in the past on specific legislative priorities and on estimates made by knowledgeable persons about the relative needs of the systems and special construction categories. But an empirical analysis has not been used to quantify the actual needs in each of the funding categories. The JLARC review of system allocations indicates that it would be appropriate to adjust the proportions provided to the administrative systems if allocations are to be closely related to specifically identified construction needs.

Some of the special funding categories, such as interstate highways and unpaved roads, also could be restructured. The review found no cause to discontinue the long-established policy of the General Assembly to designate certain types of needs as priorities. But the General Assembly may wish to reexamine those priorities. Interstate construction and paving of non-surface treated roads could continue to be funded from special amounts set aside for those purposes. In addition, the General Assembly may wish to establish a special bridge fund to ensure that Virginia does not lose available federal funds for bridge replacement and rehabilitation.

SPECIAL FUNDING CATEGORIES

Two major categories of funds are currently set aside for special purposes: (1) interstate federal aid, and (2) unpaved road funds. In both cases the special funds are the result of decisions by the General Assembly to place priority on certain needs. These funds are distinguished from the regular allocations in that they are taken "off the top," or set aside before any other funds are distributed. In this sense, the General Assembly has indicated that these two categories are not solely based on need. A special fund may also be appropriate for at least one other special need. Bridge replacement aid cannot currently be expended as a result of the allocations statutes. Establishing a special fund might help to program and expend these funds.

Interstate System Funding

The interstate highway system was created by the Federal Aid Highway Act of 1956 and is authorized in Section 33.1-48 of the *Code of Virginia*. By December 1981, Virginia had constructed 994 miles of interstate highways, or more than 90 percent of its 1,069 miles of authorized interstate. While the current process for allocating funds to the construction districts appears appropriate, the use of primary system funds in each district to match the interstate federal aid adversely affects several districts' primary system allocations. The General Assembly may wish to provide for interstate match as a special funding category to reduce the impact of interstate funding on the primary system construction programs in those districts.

The Current Allocation Process. The Highway and Transportation Commission has established the policy allocating interstate funds to the eight DHT construction districts. That policy states that:

> *Federal Funds for the Interstate System shall be allocated to highway districts in the ratio that the estimated cost of completing the system in each district bears to the cost of completing the Interstate System in the entire State. State money*

required to match Federal Interstate funds shall be taken from the amount apportioned to the districts for Primary System Construction.

The *Code of Virginia* authorizes DHT to match federal funds for the interstate system from district primary allocations to the maximum extent it deems appropriate. The State must provide ten percent of the funding for interstate construction.

In practice, interstate funds have been allocated to each district based on the relation between the estimated cost of completing the interstate system in a district and the cost of completing the State system as a whole. Safety projects approved by the Federal Highway Administration (FHWA) and financing of work under way are also factored into each district's allocation. The required match of federal funds is allocated as part of the district's primary system allocation and is then taken from the district in the amount necessary to match federal interstate aid. In the 1982 General Assembly, an additional $7 million was appropriated as an "interstate discretionary fund" to be used for primary construction in some districts due to the reductions caused by matching federal interstate aid.

The estimated cost of completing the interstate system in a district is based on estimates approved by the FHWA. Only projects approved by FHWA are included in DHT's calculation of percentages. Once the FHWA approves the estimates, DHT calculates 90 percent of the estimate to determine the total federal aid available to a district. The total funds allocated to each district since the beginning of the interstate highway program are then deducted from the 90 percent estimate, which leaves a balance for apportionment purposes. Each district's apportionment in relation to the total apportionment is calculated by DHT. This apportionment percentage is then used to calculate the annual amount of federal aid each district is entitled to receive.

Based on the federal aid provided to each district, DHT determines the amount needed for the required State match. This amount is then deducted from the district's primary system allocation. This process reduces the funding available for the primary system construction program in the affected districts.

Equity of Existing Allocation Process. The calculation of the district interstate apportionment by DHT appears to be a reasonable and equitable method for distributing these federal funds. DHT does not make a determination of need for any district or locality. The Congress and FHWA have already established the amount of interstate to be constructed in each state.

Analysis of prior years' allocations and apportionment percentages indicated that DHT has consistently used the method prescribed by policy and statute. While the current method of allocating federal funds to the districts appears reasonable and appropriate, the use of primary funds to match interstate aid has severely impacted several district primary systems.

Impact of Interstate Match on Primary Allocations. In the past, the impact of interstate match on the primary system was not great because of consistently high revenues for the construction program. In recent years, however, the Department of Highways and Transportation has experienced declining revenues, increased expenditures for support and operations, and higher than usual inflation for construction activities. As a result, each of the State highway systems has experienced a decline in funds, with one exception. Interstate federal aid has remained fairly constant over this period, as has the required State match. As a result, the State match for interstate aid in recent years has been a larger portion of primary allocations. Because highway revenues are expected to continue to decline while interstate matching funds remain constant, the proportion of the primary allocations which will remain for the primary program will also decline over the next six years.

For FY 1983, the General Assembly appropriated an additional $7 million to the primary system from the revenues of H.B. 532 to offset these declining funds. This special aid was distributed to districts experiencing unusually large decreases in primary road funding due to the interstate match. As a result of the increase in revenues from H.B. 532 and the special $7 million appropriation, the impact of the match on primary allocations was greatly reduced for FY 1983.

But the effects of H.B. 532 on the construction program are only temporary. Total funds available for construction will continue to decline through FY 1988 as the proportion of funds devoted to maintenance increases. Figure 3 shows, for fiscal years 1983-88, the amount of primary allocations which will remain after projected interstate aid is matched. Interstate federal aid is expected to remain constant for the period, requiring a fairly constant State match. But the total funds available for the primary system and interstate match are expected to decline over the same period. The result will be a progressively smaller proportion of funds available each year for the primary system construction program.

Three districts will experience especially severe impacts on primary system funds. As shown in Table 6, the Richmond, Suffolk, and Fredericksburg districts will have significantly reduced funds available for primary construction by FY 1988. If the trend continues, the Suffolk district will have to use 81.9 percent of its primary system allocation for interstate match. The Richmond district will lose 56 percent of its primary allocations to interstate match by FY 1988.

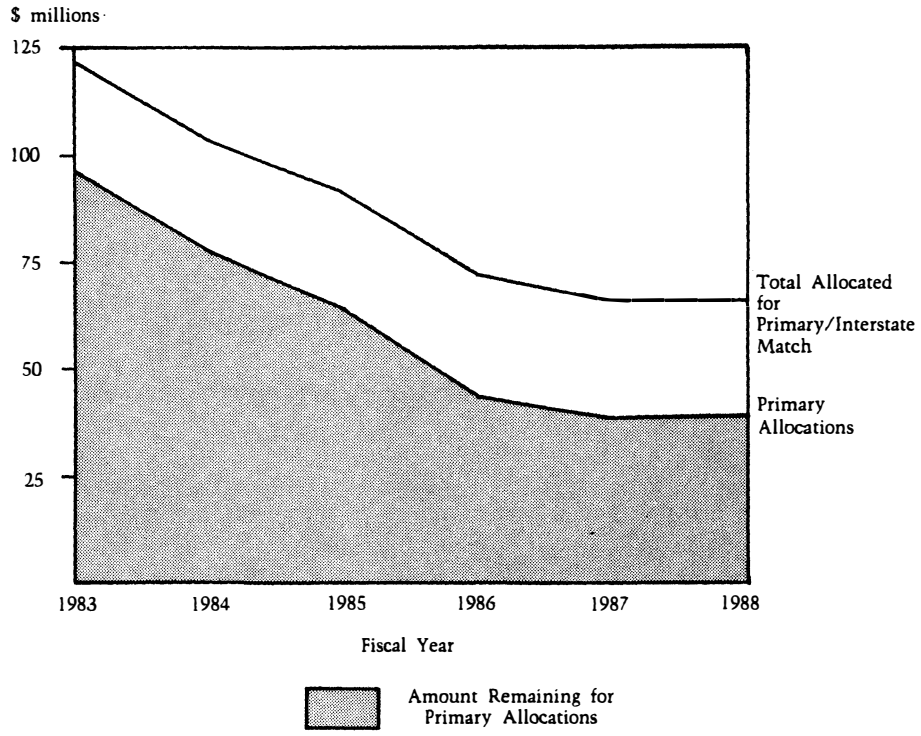
The General Assembly has already recognized this problem, as evidenced by its establishment of the interstate discretionary fund which provided additional funds for primary construction in FY 1983. But this measure was only temporary. The General Assembly may wish to consider a more permanent and equitable solution for matching interstate aid in the future.

Recommendation (1). The General Assembly may wish to amend the *Code of Virginia* to require that funds necessary to match federal

Figure 3

STATEWIDE IMPACT OF INTERSTATE MATCH ON PRIMARY ALLOCATIONS

Total allocations for the primary system are projected to decrease over the next six fiscal years. During that time, however, federal interstate allocations and the required State match should remain constant. The graph demonstrates the resulting reduction in available funds for primary construction.



Source: DHT Six-Year Improvement Program

interstate aid be set aside from the total funds available for construction activities. Funds for the match should not be deducted from a district's primary allocation. The advantage of this change is that the necessary match would be met by spreading the burden over all construction funds, reducing the severe impact on a few areas.

Table 6

IMPACT OF MATCHING FUNDS ON DISTRICT ALLOCATIONS

	Interstate Match As A Percentage of Primary Construction Allocations					
District	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Bristol	9.8%	12.6%	13.3%	7.7%	2.4%	1.9%
Salem	4.5	5.3	5.2	7.1	8.1	7.3
Lynchburg	0	0	0	0	0	0
Richmond	25.0	31.8	29.5	36.6	35.5	56.0
Suffolk	40.6	50.8	63.0	78.1	81.9	81.9
Fredericksburg	24.7	31.5	36.5	48.7	48.5	48.5
Culpeper	29.5	37.7	40.6	60.8	51.8	36.8
Staunton	2.8	2.7	2.7	.5	.6	.6
State Average	21%	27%	31%	40%	39%	39%

Source: DHT Six Year Improvement Program

Funding For Unpaved Roads

In 1979, the General Assembly established the unpaved roads fund. This fund was intended to focus efforts on paving the 6,000 miles of dirt roads carrying 50 or more vehicles per day remaining in the Commonwealth. By providing for these funds before all other allocations are made, the General Assembly established unpaved roads as a high priority in the construction program.

Current Funding Provisions. Unpaved roads which carry 50 or more vehicles per day are eligible for funding from the unpaved roads fund. The fund is to be used exclusively for paving non-surface treated secondary roads.

By statute, 3.75 percent of all construction funds available, excluding interstate federal aid, is set aside for the fund. Allocations to the counties in the secondary system are based on the ratio of unpaved mileage in each county carrying 50 or more vehicles per day to the State total of such unpaved mileage. For FY 1983, the 3.75 percent amounts to $5,145,300. In addition, the 1982 General Assembly appropriated funds from HB. 532 for unpaved roads, bringing the total for FY 1983 to $12.1 million.

Equity of the Funding. In order to assess the equity of the allocations made to the unpaved roads fund, a comparison on several factors and measures of need was made. The comparison shows that some readjustment of the proportion of funds provided for unpaved roads may be appropriate if the allocation is to be proportionate to construction needs. Although the current statutory percentage for unpaved roads is

3.75, the additional $7.0 million appropriated in FY 1983 has resulted in an effective proportion for unpaved roads of 4.9 percent.

In both the DHT statewide highway assessment needs list and the locality based needs list, unpaved road construction needs could be separately identified. These needs totaled $1.23 billion. This is approximately 7.6 percent of the total needs identified (Table 7). The unpaved roads with 50 vehicles per day make up 9.1 percent of the total mileage in the State highway system. However, it is also a fact that travel on these roads is less than one percent of the total annual travel.

Table 7

COMPARISON OF NEEDS AND FACTORS
FOR UNPAVED ROADS
(FY 1983)

	Percentages
Statutory Proportion of Allocations	3.75%
Effective Proportion of 1983 Allocations	4.9
Proportion of Construction Need	7.6
Proportion of Mileage	9.1
Proportion of Travel	0.6

Source: JLARC analysis of DHT statistics.

This comparison indicates that a larger portion of highway funds might be allocated to the unpaved roads fund if allocations are to be made on the basis of construction need. If 1983 allocations had been based on the proportion of construction needs for unpaved roads, the fund would have received $18.8 million, or $6.7 million more than was actually allocated. However, the General Assembly may wish to set the proportion based on policy judgements.

Recommendation (2). The General Assembly may wish to amend Section 33.1-23.1:1 to increase the percentage of funds for unpaved roads from 3.75 percent, not to exceed 7.6 percent. This recommendation would continue the General Assembly's earlier decision to place a priority on paving nonsurface treated secondary roads and would base the allocation on construction need. The allocations available for each county under this proposal are shown in Table 8.

Alternatives to Special Funding. An alternative method of providing additional priority on unpaved roads would be to include the unpaved roads in regular secondary funds, and to allocate those funds partially on some measure of unpaved road need. Under this option, no separate unpaved roads fund would be established. Instead, unpaved and

Table 8

UNPAVED ROAD ALLOCATIONS FOR FY 1983 BASED ON JLARC STAFF PROPOSAL

County	Current FY 1983 Allocation	FY 1983 Allocation JLARC Staff Proposal
ACCOMACK	$ 9,117	$ 14,162
ALBEMARLE	345,349	536,575
ALLEGHANY	18,513	28,765
AMELIA	84,807	131,767
AMHERST	128,719	199,993
APPOMATTOX	87,977	136,691
AUGUSTA	398,047	618,454
BATH	14,120	21,938
BEDFORD	353,240	548,835
BLAND	96,435	149,834
BOTETOURT	209,002	324,730
BRUNSWICK	96,042	149,222
BUCHANAN	421,894	655,505
BUCKINGHAM	257,547	400,156
CAMPBELL	47,977	74,543
CAROLINE	25,857	40,175
CARROLL	328,890	511,003
CHARLES CITY	9,748	15,146
CHARLOTTE	124,326	193,167
CHESTERFIELD	17,705	27,508
CLARKE	49,245	76,513
CRAIG	15,628	24,282
CULPEPER	242,881	377,369
CUMBERLAND	156,500	243,157
DICKENSON	239,384	371,935
DINWIDDIE	64,392	100,048
ESSEX	19,759	30,700
FAIRFAX	36,939	57,393
FAUQUIER	274,006	425,728
FLOYD	187,734	291,686
FLUVANNA	51,649	80,249

Table 8

UNPAVED ROAD ALLOCATIONS (Continued)

County	Current FY 1983 Allocation	FY 1983 Allocation JLARC Staff Proposal
FRANKLIN	171,866	267,031
FREDERICK	200,018	310,772
GILES	123,495	191,877
GLOUCESTER	49,573	77,022
GOOCHLAND	64,458	100,149
GRAYSON	353,852	549,786
GREENE	49,376	76,717
GREENSVILLE	14,601	22,686
HALIFAX	194,532	302,248
HANOVER	108,195	168,104
HENRY	37,027	57,529
HIGHLAND	45,573	70,808
ISLE OF WIGHT	47,540	73,864
JAMES CITY	2,514	3,905
KING & QUEEN	60,305	93,697
KING GEORGE	34,710	53,929
KING WILLIAM	34,294	53,284
LANCASTER	10,513	16,335
LEE	164,281	255,247
LOUDOUN	483,576	751,341
LOUISA	184,346	286,423
LUNENBURG	126,205	196,088
MADISON	120,479	187,190
MATHEWS	14,295	22,210
MECKLENBURG	211,384	328,432
MIDDLESEX	31,103	48,326
MONTGOMERY	266,400	413,910
NELSON	91,758	142,566
NEW KENT	36,196	56,239
NORTHAMPTON	109	170
NORTHUMBERLAND	6,251	9,713

Table 8

UNPAVED ROAD ALLOCATIONS (Continued)

County	Current FY 1983 Allocation	FY 1983 Allocation JLARC Staff Proposal
NOTTOWAY	17,814	27,678
ORANGE	161,899	251,545
PAGE	149,833	232,799
PATRICK	273,263	424,574
PITTSYLVANIA	305,940	475,345
POWHATAN	61,529	95,599
PRINCE EDWARD	82,840	128,710
PRINCE GEORGE	11,475	17,827
PRINCE WILLIAM	158,861	246,825
PULASKI	176,849	274,774
RAPPAHANNOCK	110,774	172,112
RICHMOND	7,738	12,022
ROANOKE	15,278	23,738
ROCKBRIDGE	187,865	291,890
ROCKINGHAM	285,481	443,558
RUSSELL	297,262	461,862
SCOTT	194,007	301,433
SHENANDOAH	318,311	494,566
SMYTH	122,490	190,314
SOUTHAMPTON	94,993	147,592
SPOTSYLVANIA	102,883	159,852
STAFFORD	38,753	60,212
SUFFOLK	31,081	48,292
SURRY	17,748	27,576
SUSSEX	38,054	59,125
TAZEWELL	225,657	350,608
WARREN	114,118	177,308
WASHINGTON	224,892	349,419
WESTMORELAND	48,283	75,019

Table 8

UNPAVED ROAD ALLOCATIONS (Continued)

County	Current FY 1983 Allocation	FY 1983 Allocation JLARC Staff Proposal
WISE	130,271	202,404
WYTHE	340,147	528,493
YORK	1,355	2,106
TOTALS	$12,100,000	$18,800,000

regular secondary roads would receive allocations from a single formula. One factor in the formula would account for unpaved roads--by mileage or by travel.

When unpaved road needs are included with regular secondary needs, the portion of needs for the whole secondary system is 39.6 percent. In FY 1983, this would be approximately $82.6 million of funds available for construction under JLARC staff proposals. On the basis of this amount, JLARC staff prepared a formula which used population weighted 75 percent, umpaved road mileage with 50 vehicles per day weighted 20 percent, and secondary system accident rates weighted five percent. The formula was used to calculate secondary allocations for each county for FY 1983. Table 9 shows these allocations as compared to current allocations for regular secondary and unpaved roads. If the General Assembly wishes to end the use of a special fund for unpaved roads, such a formula is an equitable alternative.

Bridge Replacement Funds

The construction allocation process has as its major goal the equitable distribution of funds among localities. Underlying this goal is the need to fully utilize the resources available to the State. In the past, the allocation processes for the various systems have performed reasonably well in meeting this underlying goal. However, current statutory allocation processes may soon result in a loss to the State of at least $1.5 million in federal bridge funding. This will occur despite the fact that numerous bridges are in need of replacement.

Nature of the Problem. There are two basic causes for this situation. The first is the high cost of bridge work generally, and the lack of public interest in that type of expenditure. The second is the configuration of the federal bridge program in relation to the State's allocation system.

Table 9

SECONDARY ALLOCATIONS WITH UNPAVED ROADS INCLUDED

County	Current Combined Unpaved And Construction Allocation	FY 1983 Allocation With This Option
ACCOMACK	$ 776,101	$ 726,347
ALBEMARLE	1,332,100	1,745,907
ALLEGHANY	268,170	384,206
AMELIA	453,438	335,417
AMHERST	612,062	883,494
APPOMATTOX	410,823	416,332
AUGUSTA	1,814,002	1,766,253
BATH	355,467	181,735
BEDFORD	1,100,813	1,296,064
BLAND	334,823	312,158
BOTETOURT	818,310	856,102
BRUNSWICK	705,308	510,923
BUCHANAN	1,039,209	1,469,524
BUCKINGHAM	770,573	650,306
CAMPBELL	885,937	1,027,493
CAROLINE	360,440	467,032
CARROLL	1,122,631	1,099,745
CHARLES CITY	175,478	198,448
CHARLOTTE	525,135	467,283
CHESTERFIELD	1,690,207	3,174,018
CLARKE	259,225	337,364
CRAIG	201,996	148,200
CULPEPER	730,966	731,916
CUMBERLAND	445,387	423,071
DICKENSON	614,893	822,230
DINWIDDIE	687,280	620,976
ESSEX	237,771	267,383
FAIRFAX	4,221,265	12,610,197
FAUQUIER	1,032,801	1,117,774

Table 9

SECONDARY ALLOCATIONS WITH UNPAVED ROADS (Continued)

County	Current Combined Unpaved And Construction Allocation	FY 1983 Allocation With This Option
FLOYD	702,959	549,729
FLUVANNA	348,044	341,494
FRANKLIN	1,011,165	972,807
FREDERICK	838,917	1,065,776
GILES	467,110	508,311
GLOUCESTER	378,709	548,189
GOOCHLAND	350,882	379,356
GRAYSON	709,846	892,267
GREENE	230,461	295,564
GREENSVILLE	252,974	294,826
HALIFAX	1,148,797	979,057
HANOVER	921,641	1,195,198
HENRY	1,170,287	1,360,154
HIGHLAND	290,154	151,778
ISLE OF WIGHT	605,880	505,657
JAMES CITY	283,919	543,804
KING AND QUEEN	258,397	246,912
KING GEORGE	248,959	313,490
KING WILLIAM	218,225	281,805
LANCASTER	191,070	261,675
LEE	655,146	854,060
LOUDOUN	1,850,586	1,791,575
LOUISA	791,743	682,559
LUNENBERG	645,185	481,571
MADISON	507,047	442,748
MATHEWS	144,751	206,494
MECKLENBURG	975,132	827,527
MIDDLESEX	153,324	245,137
MONTGOMERY	767,128	914,185

Table 9

SECONDARY ALLOCATIONS WITH UNPAVED ROADS (Continued)

County	Current Combined Unpaved And Construction Allocation	FY 1983 Allocation With This Option
NELSON	489,970	446,108
NEW KENT	203,096	277,687
NORTHAMPTON	359,398	346,377
NORTHUMBERLAND	238,465	245,092
NOTTOWAY	336,850	304,027
ORANGE	591,301	650,447
PAGE	454,285	601,509
PATRICK	857,360	807,739
PITTSYLVANIA	1,942,107	1,921,066
POWHATAN	350,867	414,884
PRINCE EDWARD	545,493	393,650
PRINCE GEORGE	431,833	613,243
PRINCE WILLIAM	2,203,232	3,444,073
PULASKI	699,704	836,064
RAPPAHANNOCK	340,979	336,297
RICHMOND	180,974	187,454
ROANOKE	731,743	1,514,835
ROCKBRIDGE	750,468	702,208
ROCKINGHAM	1,630,203	1,579,671
RUSSELL	742,392	1,178,252
SCOTT	879,088	868,091
SHENANDOAH	963,709	1,019,721
SMYTH	547,627	753,665
SOUTHAMPTON	670,666	571,542
SPOTSYLVANIA	642,543	941,056
STAFFORD	580,776	988,736
SUFFOLK	818,832	943,775
SURRY	221,193	200,963
SUSSEX	450,083	321,807
TAZEWELL	786,097	1,121,455

Table 9

SECONDARY ALLOCATIONS WITH UNPAVED ROADS (Continued)

County	Current Combined Unpaved And Construction Allocation	FY 1983 Allocation With This Option
WARREN	378,889	451,597
WASHINGTON	961,924	1,281,841
WESTMORELAND	379,162	405,229
WISE	633,029	1,000,496
WYTHE	732,130	920,574
YORK	410,286	827,165
TOTALS	$65,237,803	$82,600,000

Bridge projects are costly in terms of both engineering and construction. There are additional costs associated with meeting various environmental standards for design and construction. An average two-lane bridge on a secondary system road, for example, costs $250,000.

Under current allocation requirements, funds for bridges are included in the regular allocations. Thus, funds used for bridges must be taken from the allocation which would be available for other construction. Bridge costs have hampered the development of needed bridge projects because these high cost projects can severely reduce the allocation which remains. Local officials are reluctant to commit to bridge projects for this reason. In addition, public interest in bridge work is relatively low. As a result, few are programmed. This is especially true in the secondary system because of the relatively small amounts available to individual counties.

The second reason for the inability to program needed bridge projects is the lack of congruence between the federal bridge program and Virginia's administrative systems for highways. The federal programs direct funds toward the bridges that are in most need of repair or replacement. Bridges are replaced or repaired by the State on the basis of a 20 percent match.

> *Currently, $3.1 million in federal dollars is tentatively scheduled for construction of bridges on the secondary system between now and September 30, 1983. Over the past several years, $4.6 million has built up for Virginia in this federal program. Because of the problem with allocating enough funds at the local level, it appears likely*

that at least $1.5 million will revert to the federal government for distribution to other states in 1984. With average bridge costs of $250,000 ($200,000 federal, $50,000 State), this means that at least seven bridges in need of replacement or rehabilitation will not have the work done.

The impact of this circumstance is the unnecessary erosion of State resources for highway construction. In this period of declining revenues, it is especially important for the Commonwealth to fully utilize all available resources.

Recommendation (3). In order to ensure the use of available federal aid, the General Assembly may wish to amend the *Code of Virginia* to provide for funding special bridge needs outside of the allocation process. This could be accomplished in a manner similar to the distribution of funds for interstate construction or unpaved roads. The special bridge fund should include both the available federal aid and required State match. In FY 1983, such a fund would have amounted to $11.4 million. Allocations from this fund should be made on the basis of greatest need as determined from DHT's current bridge inspection program. The funds for bridges should not be deducted from a locality's regular system allocations.

Conclusion

The impact of the three recommendations to set aside interstate, unpaved, and bridge funds can be seen in a comparison with the current distribution of funds (Table 10). Requiring that the State match for interstate federal aid be set aside off the top of construction funds would not increase the amount allocated for interstate construction. The increase in the unpaved roads percentage would increase these funds to be more in line with needs. Establishing a special bridge fund would not increase bridge allocations, since they are already available from the federal government, but would ensure that these funds are expended on necessary projects in a more timely fashion.

The final impact is that the total remaining funds available for regular allocations would be slightly reduced. In most cases, however, the reduction would be the result of moving specifically targeted federal funds out of the regular allocations. The interstate match and bridge replacement funds, for example, could not really be allocated to other systems, although they are included in the current total available for the regular allocations. These funds must to be used on bridge and interstate projects approved by the federal government.

Table 10

COMPARISON OF SPECIAL CATEGORY FUNDING FOR FY 1983
(In Millions)

	Current FY 1983 Amounts	Amounts for FY 1983 Based on JLARC Staff Proposals
Total Construction Funds	$458.9	$458.9
Less:		
Interstate Federal Aid	185.7	185.7
Interstate Match	--	25.3
Unpaved Roads Fund	12.1	18.8
Bridge Replacement	--	11.4
Other Miscellaneous	24.4	24.4
City Match	3.5	3.5
Funds Available for Allocations	$233.2*	$189.8

*Interstate match and bridge funds included in this total are dedicated and are not actually available for system road construction.

Source: JLARC analysis and FY 1983 appropriations.

REGULAR SYSTEM ALLOCATIONS

After all of the special programs have been funded, the remaining construction funds are available for the regular allocations to the primary, secondary, and urban systems. Under the current provisions of law, the systems are to receive allocations in the proportions of 50 percent for primary, 25 percent for secondary, and 25 percent for urban. These proportions were assumed to have represented relative needs on the various systems.

Comparison of Needs and Factors

In order to evaluate the appropriateness of the current system percentages, a comparison of system needs and relevant factors was made. In the computation of needs, only those needs which would be met from regular system allocations were included. Unpaved road and interstate needs were excluded. For the computation of system mileage and vehicle miles of travel, unpaved roads and interstates were again excluded. Table 11 provides a comparison of the factors examined. Current allocations are shown for the purpose of comparison.

The comparison shows that approximately two-thirds of the mileage on the highway network is in the secondary system. But in the

Table 11

COMPARISON OF SELECTED FACTORS FOR THE STATE HIGHWAY SYSTEMS

System	Current Statutory Percentage	Current Effective Percentage	Percentage of Need	Percentage of Lane Miles	Percentage of Vehicle Miles of Travel
Primary	50	44.8	32.7	17.2	47.4
Secondary	25	26.8	33.8	67.1	20.7
Urban	25	28.4	33.5	15.7	31.9
TOTAL	100	100.0	100.0	100.0	100.00

Source: DHT.

comparison of travel, nearly half is on the primary system, almost 32 percent is on the urban system, and only 21 percent is on the secondary system.

The variation between these two important measures for the highway systems points to the usefulness of the needs data used in this study. Because needs were measured as the expected dollar cost of correcting highway deficiencies, the data is a direct measure of what the allocations are intended for -- construction of highways. Neither system mileage nor travel account for the differences in cost in meeting the demands for highway construction. So, while they both may be very good measures of the demand, the needs data is a better indicator of how money should be distributed to meet that demand.

Readjustment of Proportions

Based on the comparison of current proportions and the proportions of need, current statutory percentages for each of the systems may be inappropriate. If the proportions were to be based on needs, the most reasonable distribution would be to provide one third of the funds to each system.

This distribution would be applied to the total construction funds available after special program set-asides had been made. The impact of these proportions is shown in Table 12. The table shows the funds allocated for FY 1983 and the amounts which would have been allocated under this proposal. It should be noted that the total amount available for allocation was adjusted to account for the recommendations on special funding categories.

Based on the JLARC staff proposal, each of the three systems would be allocated $63.26 million in FY 1983. For the primary system, this is a reduction of $31.44 million from the amount actually

Table 12

PROPOSED READJUSTMENT OF SYSTEM ALLOCATIONS
(In Millions)

	Current FY 1983 Amounts	Amounts for FY 1983 Based on JLARC Staff Proposal
Funding Available for Allocations	$204.4	$189.8
Primary Allocation	94.7	63.26
Secondary Allocation	53.1	63.26
Urban Allocation	56.6	63.26

Source: Analysis of systems needs.

allocated for FY 1983. But for the secondary and urban systems the JLARC staff proposal results in increases of $10.16 million and $6.66 million, respectively.

Recommendation (4). The General Assembly may wish to amend Section 33.1-23.1B of the *Code of Virginia* to adjust the proportion of funds provided to each system to one-third.

ARLINGTON AND HENRICO SECONDARY SYSTEM ALLOCATIONS

Arlington and Henrico counties are not included in the secondary system allocation process. They chose in 1932, when the secondary system was established, to remain independent. The two counties receive payments directly from the Department of Highways and Transportation and have complete responsibility for constructing and maintaining their secondary roads. The two counties combined will receive $13.6 million in FY 1983.

The current procedures for allocating funds to Arlington and Henrico are confusing and complex as a result of the many pieces of legislation enacted over the last 50 years. The current percentages were based on factors which had little relationship to current transportation needs. An analysis of equity conducted by JLARC staff was inconclusive, so further review of the appropriateness of the current process may be warranted.

Current Allocation Process

By statute, Arlington and Henrico receive jointly 3.106 percent of the net gas tax receipts. They also receive 3.106 percent of the revenues attributable to the Acts of 1964 and 1966. And as a result of the 1982 Appropriation Act, they receive 3.042 percent of the total revenues derived from H.B. 532.

Basis of Current Percentage. The percentage of highway funds currently distributed to Arlington and Henrico is based on a formula that was established in 1932. This formula was based on the distribution of funds in 1930, which allotted 30 percent of gas tax receipts to the counties for maintenance and construction of local roads.

In 1932, when the State secondary system was created, the counties of Arlington and Henrico chose to remain independent. As a result, those counties received a share of gas tax receipts that were applicable to the State secondary system on the basis of the folllwing factors:

(1) State taxes collected by the County Treasurer as provided for by the Acts of 1918, weighted one third.

(2) area, population, and taxes collected by the County Treasurer on State and local levies in the next preceding fiscal year, each counted equally and the resulting factor weighted two thirds.

Under the provisions of the first part above, the percentages for the counties would remain static in future years. Under the second part, the factors for area and population changed every ten years, according to the latest U.S. Census, while the factor for taxes collected changed each year.

A new percentage was calculated annually for each of the two counties by the State Comptroller. While it may have made sense in 1932 to distribute funds on the basis of the above factors, conditions in the counties, transportation policies, funding mechanisms, and needs changed considerably over time. Funding road maintenance and construction on the basis of the above formula is contrary to current transportation funding policies and bears little relationship to transportation needs within the counties and in relation to other counties.

Acts of 1964 and 1966. The Acts of 1964 established and increased several fees for service and user charges. As a result, additional revenue was generated for highway maintenance and construction activity. Section 33-49 of the *Code of Virginia* was amended so that counties not part of the State secondary system would receive a portion of new revenues. Arlington and Henrico, under this act, would receive a portion of new revenue equal to the percentage they received of the gas tax from that portion of increased secondary funds. The gas tax percentages were, therefore, applied to only the increased amount of secondary funds.

The Acts of 1966 established the Sales and Use Tax on the sale of motor vehicles at a rate of two percent of the sales price. The funds derived from this tax were to be for highway maintenance and construction activity. DHT calculated that the increase in secondary funds was 18 percent. Arlington and Henrico therefore received their calculated percent of the 18 percent increase.

Acts of 1977. In 1977, the General Assembly enacted Section 33.1-23.5 of the *Code of Virginia*, which required that Arlington and Henrico counties receive:

(1) 3.106 percent of the net revenues available for highway purposes. Arlington would receive 1.281 percent and Henrico 1.825 percent (motor fuel tax revenues); and

(2) 3.106 percent of the secondary fund increases resulting from the Acts of 1964 and 1966. Arlington would receive 1.281 percent and Henrico 1.825 percent.

In addition to fixing the percentages calculated for fiscal year 1976, the General Assembly legitimized the method of calculation.

Acts of 1982. The 1982 session of the General Assembly enacted legislation which greatly increased the Highway Department's revenues, primarily through user charges. DMV fees-for-service were increased in order to make the service programs self-supporting.

Arlington and Henrico were allocated a share of these funds for FY 1983. Based on the amount appropriated to each county by the Appropriations Act, the counties will receive 3.042 percent of the entire revenue generated from H.B. 532.

Equity of Current Allocation Process

The distribution of funds to Arlington and Henrico has been based on a complex system of formulas and procedures. While a direct analysis of equity by JLARC was inconclusive as a result of inadequate data, some revision of the methods for allocating these funds might be appropriate after additional study.

JLARC staff compared FY 1983 funding for Arlington and Henrico to the funding for other counties with similar populations and travel to determine if any inequities result from the complex procedures now in use. The comparison included the maintenance budgets for the counties and their secondary construction allocations to ensure that the budget data were comparable. Two factors which measure demand for highways were used for the analysis -- population and vehicle miles of travel. A correlation analysis showed that the two factors were in fact closely related to the total secondary budgets for the counties.

But the use of the factors to predict the budgets for Arlington and Henrico produced conflicting results. When the budgets were estimated using vehicle miles of travel, both counties were estimated to be receiving less than their equitable share. When population was used, both were estimated to currently be receiving more than their fair share.

Because the results of this analysis were inconclusive, it is not possible to determine the equity of funds for the two counties. If the General Assembly wishes to simplify the methods used to calculate the amounts or to assess equity for these two counties, further study will be required.

IV. SECONDARY SYSTEM ALLOCATIONS

The secondary system is the largest of the State administrative highway systems, with 67.1 percent of the total lane miles. It includes all the public roads in the counties, and all public and community roads leading to and from public schools, streets, bridges, and wharves in incorporated towns with populations less than 3,500 people. Certain other roads, such as those connecting public schools to primary or secondary highways, are also classified as secondary roads as provided by Sections 33.1-67 and 33.1-68, *Code of Virginia*. All counties except Arlington and Henrico are included in the secondary system.

JLARC's review of secondary allocations focused on the reasonableness, appropriateness, and equity of the current process for allocating funds to the 93 counties in the system, and alternatives for distributing secondary system funds. It is clear from the analysis that the current provisions for allocating funds are not equitable (according to construction needs), primarily as a result of the provision requiring that the allocation for each county not be less than the allocation for FY 1977.

The alternative secondary allocation formulas presented at the end of this chapter are intended to meet three basic criteria. The recommended alternatives must be: (1) based on sound theory as to the relationship between highway demand and the characteristics of the locality, (2) technically correct, and (3) highly accurate estimators of identifiable highway needs.

EQUITY OF CURRENT SECONDARY ALLOCATIONS

The current process for allocating secondary system funds was the result of legislation passed by the 1977 General Assembly. The methods and the formulas for allocating highway funds to the various road systems and areas of the State were reviewed by the House Roads and Internal Navigation Committee and the Senate Transportation Committee. The primary purpose of this review was to remove any inequities which might have existed under the previous requirements, and to simplify the distribution formulas. As a result of the work of the committees, H.B. 1041 was enacted. This law now prescribes the methods and formulas by which the highway funds are allocated.

H.B. 1041 greatly improved the process used to allocate secondary funds. The use of several different formulas to allocate funds from different highway revenue acts was eliminated. The confusing process was simplified and, in general, was made much easier to

administer. The new law required that 25 percent of construction funds be allocated to the secondary system, because it was estimated this amount was approximate to system need.

The Current Allocations Process

The methods and formulas for allocating regular secondary funds are set out in Section 33.1-23.4 of the *Code of Virginia*. The process has three basic parts: (1) deduction of special category funds, (2) allocation of amounts equal to FY 1977 amounts, and (3) allocation of remaining funds by a five-factor formula.

Special Secondary Funds. Before allocations are made to the counties, several special categories are funded as required by law. A sum not to exceed $2.5 million is set aside for the special road and bridge fund. The Highway and Transportation Commission may allocate these funds to counties based on its determination of need. The funds are to be used for secondary road or bridge construction or replacement.

A second special provision of the law requires that a portion of the highway revenues attributable to the 1964 and 1966 Acts of the General Assembly be provided to Arlington and Henrico counties. In FY 1983, Arlington received 1.281 percent of the $21.4 million attributable to 1964 and 1966 revenues, or $273,936. Henrico County received 1.825 percent of the revenues, or $390,268. These amounts are deducted from the total secondary funds available for allocation.

Henrico County's share of federal aid secondary funds is also calculated and deducted from the total available for allocation. Arlington participates in the federal aid urban system, so no federal secondary funds are allocated to the county.

FY 1977 Allocations. Section 33.1-23.4B requires that:

> ... an amount equal to that allocated to the secondary system for construction in fiscal year 1976-77 shall be set aside and distributed among the counties in the system in the same amounts as each county received for that fiscal year....

In the event that the funds available are less than the amount allocated in FY 1977, each county's allocation is reduced in proportion to the shortfall. The total amount allocated under this provision is $51,357,885 or about 91 percent of the regular secondary funds available for FY 1983.

Secondary Formula Allocations. The funds remaining after special categories and the FY 1977 allocations have been funded are allocated on the basis of a five-factor formula. Each county receives a share equal to its proportion of the statewide total of population,

area, registered vehicles, secondary road mileage, and vehicle miles traveled on the secondary system. Each of these factors is weighted equally.

Unpaved road mileage is given extra weight. Each mile of unpaved road which carries between 50 and 99 vehicles per day is counted as two miles of secondary road. If an unpaved road carries 100 or more vehicles per day, it is counted as three miles.

In FY 1983, only $1,779,918 was allocated to the 93 counties in the system on the basis of the five-factor formula.

Use and Effect of FY 1977 Allocations

When the 1977 General Assembly revised the laws which allocate highway funds, it enacted the provision which requires that no county receive less than it received in FY 1977. The purpose of this provision was to ensure that the major changes made in the law would not drastically reduce the funds available to some counties. It was assumed that the portion of funds allocated on the basis of the five-factor formula would continue to increase each year. This would have provided growing counties increased funding to meet growing demands on the secondary system.

Highway revenues have declined in recent years, however, and the portion of funds allocated by the formula has decreased. Between FY 1978 and FY 1982 the funds allocated by the formula decreased from $21.1 million to $0 (Table 13). For FY 1983, only $1.8 million was allocated, and this amount was available only as a result of the additional revenues generated by H.B. 532.

The effect of the provision, though entirely unintended, has been to allocate funds only on the basis of the allocation for con-

Table 13

FUNDS ALLOCATED BY FIVE-FACTOR FORMULA
(In Millions)

Fiscal Year	Total Secondary Funds Allocated	Funds Allocated by Formula
1978	$72.5	$21.1
1979	67.5	16.2
1980	64.9	4.2
1981	63.9	3.3
1982	38.2	0
1983	53.1	1.8

Source: DHT.

struction in FY 1977. Because of the method used to allocate those funds in 1977, the current allocations are inequitable. In fact, because they are linked to FY 1977 allocations, the current allocations do not reflect statutory apportionment, but rather reflect the individual decisions of DHT's 45 resident engineers.

Prior to the 1977 revision of the *Code*, statutory allocations to the counties included funds for both construction and maintenance. The resident engineer was responsible for determining how much of the total budget was to be used for construction, and how much for maintenance. In practice, the proportions often fluctuated widely, with construction taking priority for one or more years, and then maintenance being more heavily funded.

When the General Assembly adopted the 1977 allocations for construction as a part of the new statutes, it froze into law amounts which were often very much lower than in previous years. If a resident engineer decided to place his priority on maintenance in FY 1977, then that county may have received less than its equitable share of construction funds ever since. On the other hand, if the engineer budgeted an unusually large construction program for FY 1977, then the county may have received more than its equitable share in the years that followed. Two case examples illustrate this problem:

The secondary construction budgets for Fairfax County for the period from 1973 to 1977 were:

Fiscal Year	*Construction Budget*
1973	*$5,119,482*
1974	*5,997,000*
1975	*6,466,850*
1976	*3,323,123*
1977	*3,933,410*

In 1976 and 1977 the construction budgets were only one third of the county's secondary allocation. In previous years they had been as much as 61 percent of the total allocation. For FY 1983, Fairfax has been allocated $4,184,360 for construction. Had the allocation been made on the basis of the five-factor formula only, the county's allocation could have been $7,491,898, or 79 percent more than was actually allocated. Had the allocation been based on a more typical construction budget, Fairfax would have received substantially more.

* * *

Roanoke County's secondary construction budget for the period from 1973 to 1977 also showed major fluctuations:

Fiscal Year	*Construction Budget*
1973	*$ 963,625*
1974	*1,184,288*
1975	*1,066,016*
1976	*886,554*
1977	*688,571*

The amount budgeted for construction in 1977 was only 58 percent of the amount budgeted in 1974. For FY 1983, Roanoke County has been budgeted $716,497 for construction. Had the allocation been made on the basis of the five-factor formula only, the county's allocation could have been $833,732, or 16.4 percent more than was actually allocated. In this case, the county's construction budget was based on a fiscal year with the lowest construction allocation in five years.

The examples from Fairfax and Roanoke are not isolated cases. Statewide, 35 of the 93 counties in the secondary system received lower allocations for FY 1983 than they would have if funds were distributed by the formula.

Recommendation (5). Because the construction allocations for FY 1977 were not based on any statewide, consistent criteria and appear to be inequitable, the General Assembly may wish to amend Section 33.1-23.4 of the *Code of Virginia* to end the use of FY 1977 allocations as an allocation requirement.

Inadequacies of the Current Formula

The current statutory formula is composed of five factors, with each given equal weight: (1) population, (2) registered vehicles, (3) area, (4) secondary mileage, and (5) vehicle miles traveled. These five factors and their associated weights (20 percent each) form a linear function or equation. The sole use of a linear equation to allocate secondary funds to counties would be an improvement over the current combined use of this formula and the FY 1977 allocation provision. But the current statutory formula is not adequate for this purpose because the factors are not independent measures.

As shown in Chapter II, one of the important assumptions with regard to the use of linear equations is that the factors in the formula are independent of each other. However, an analysis of the five factors in the current statutory formula indicated that there are two groups of highly related factors. This means that the factors convey the same information.

A correlation analysis of the factors indicated that population, registered vehicles, vehicle miles traveled, and secondary

mileage are all highly interrelated. Secondary mileage and area were also found to be highly interrelated. Because of the strong relationships between the factors, their use in the current statutory formula is technically inconsistent with the weights intended to be used in the formula. While it is not possible to show that the current formula would necessarily produce inequitable allocations, the analysis indicates that the formula could be greatly simplified and properly weighted.

Recommendation (6). The General Assembly may wish to amend the current statutory formula to include factors which have been shown to be independent measures. The alternative formulas presented in the next section include only the objective factors which meet this criterion.

SECONDARY SYSTEM OPTIONS

Because the current statutory allocations are inequitable, many alternative formulas were tested. Three options are presented here as proposed replacements. Each of the options includes one demand-related factor and one or two system size factors. Demand factors such as population and vehicle miles of travel are very good indicators of local traffic. Because the secondary system is a local network, these measures were found to be most heavily weighted.

The weights applied to the formulas were calculated as a part of the multiple regression analysis. Following the explanation of each option is a table showing the current FY 1983 allocations and the allocations which would have been made if the option had been applied. The allocations for the option are based on a total secondary system allocation of $63.26 million, as proposed in Chapter III. Under that proposal, the secondary system allocation would be increased from one-quarter to one-third of available construction funds.

Option S-1 allocates funds on the basis of population, area, and accident rates in each locality. Option S-2 substitutes vehicle miles of travel for population, and revises the weights for area and accident rates. Option S-3 is an entirely different approach, making allocations on the basis of centerline mileage and vehicle density.

Option S-1 (Population--75%, Area--20%, Accidents--5%)

The first option for the secondary system is based on the combination of population weighted 75 percent, area weighted 20 percent, and secondary system accident rates weighted 5 percent. This formula results in an R^2 of .90 in the regression analysis. The weights used in each formula were rounded to make the calculations simpler.

Because population is weighted 75 percent, the formula is demand oriented. This is consistent with the nature of the needs on the secondary system, which are related mostly to local travel. The population factor is one of the strongest measures of local demand.

A lesser importance is given to the area factor. This factor is related to the need to construct the basic system network, and will result in increased allocations for those counties with the largest systems.

Though it is not heavily weighted, the accident factor is an important one. It may help in directing funds to counties with critical needs on narrow, dangerous secondary roads.

The allocations for this option are calculated as illustrated below for Alleghany County (Figure 4). Table 14 shows the allocations for each county in the secondary system based on this option. Current FY 1983 allocations are shown for comparison.

Figure 4

CALCULATION OF ALLOCATION FOR OPTION S-1
(Example: Alleghany County)

$$\text{Secondary Allocation} = \text{Secondary Budget} \times \left(\left(\text{Proportion of Population} \times \text{Weight}\right) + \left(\text{Proportion of Area} \times \text{Weight}\right) + \left(\text{Proportion of Accidents} \times \text{Weight}\right)\right)$$

$$\text{Secondary Allocation} = \$63{,}260{,}000 \times \left((.00508 \times .75) + (.01164 \times .20) + (.01065 \times .05)\right)$$

$$\text{Secondary Allocation} = \$63{,}260{,}000 \times (.0066705)$$

$$\text{Secondary Allocation} = \$421{,}975$$

Table 14

OPTION S-1

HIGHWAY ALLOCATION OPTIONS SUMMARY
SECONDARY SYSTEM FY 1983

Name	Current Allocation	Allocation for FY 1983 With This Option
ACCOMACK	$ 767,026	$ 703,878
ALBEMARLE	986,766	1,221,176
ALLEGHANY	249,657	421,975
AMELIA	368,617	289,136
AMHERST	483,318	697,761
APPOMATTOX	322,856	341,188
AUGUSTA	1,416,033	1,263,203
BATH	331,310	303,400
BEDFORD	747,614	869,055
BLAND	238,386	260,556
BOTETOURT	609,343	618,711
BRUNSWICK	609,234	480,772
BUCHANAN	617,282	852,707
BUCKINGHAM	513,085	421,597
CAMPBELL	837,900	904,337
CAROLINE	334,546	511,255
CARROLL	794,753	662,062
CHARLES CITY	165,798	201,824
CHARLOTTE	400,868	383,646
CHESTERFIELD	1,672,541	2,558,864
CLARKE	209,978	264,562
CRAIG	186,387	208,541
CULPEPER	488,119	433,132
CUMBERLAND	288,934	256,633
DICKENSON	375,555	489,431
DINWIDDIE	622,908	574,289
ESSEX	218,048	266,968
FAIRFAX	4,184,360	9,748,060

Table 14

OPTION S-1 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
SECONDARY SYSTEM FY 1983

Name	Current Allocation	Allocation for FY 1983 With This Option
FAUQUIER	$ 758,736	$ 787,238
FLOYD	515,167	351,679
FLUVANNA	296,377	303,001
FRANKLIN	839,345	793,462
FREDERICK	638,904	748,362
GILES	343,569	380,465
GLOUCESTER	329,099	443,616
GOOCHLAND	286,389	318,908
GRAYSON	355,921	462,974
GREENE	181,093	225,420
GREENSVILLE	238,333	309,516
HALIFAX	954,229	809,956
HANOVER	813,467	955,002
HENRY	1,133,261	1,129,632
HIGHLAND	244,537	206,490
ISLE OF WIGHT	558,327	440,618
JAMES CITY	281,378	463,852
KING & QUEEN	198,139	231,492
KING GEORGE	214,232	262,106
KING WILLIAM	183,982	272,153
LANCASTER	180,543	234,795
LEE	490,828	627,509
LOUDOUN	1,367,070	1,036,366
LOUISA	607,339	496,674
LUNENBURG	518,982	383,705
MADISON	386,531	321,484
MATHEWS	130,473	172,602
MECKLENBURG	763,745	613,906

Table 14

OPTION S-1 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
SECONDARY SYSTEM FY 1983

Name	Current Allocation	Allocation for FY 1983 With This Option
MIDDLESEX	$ 122,227	$ 198,279
MONTGOMERY	500,686	542,086
NELSON	398,252	401,847
NEW KENT	166,917	244,436
NORTHAMPTON	359,276	340,677
NORTHUMBERLAND	232,173	244,101
NOTTOWAY	319,063	315,570
ORANGE	429,403	445,572
PAGE	304,487	407,837
PATRICK	584,142	486,600
PITTSYLVANIA	1,636,219	1,483,492
POWHATAN	289,278	342,513
PRINCE EDWARD	462,608	331,873
PRINCE GEORGE	420,338	545,615
PRINCE WILLIAM	2,044,359	2,582,934
PULASKI	522,802	562,665
RAPPAHANNOCK	230,264	230,238
RICHMOND	173,230	198,447
ROANOKE	716,497	1,224,759
ROCKBRIDGE	562,555	540,595
ROCKINGHAM	1,344,764	1,198,011
RUSSELL	445,095	751,462
SCOTT	685,125	640,624
SHENANDOAH	645,358	616,175
SMYTH	425,175	592,028
SOUTHAMPTON	575,681	537,049
SPOTSYLVANIA	539,693	745,380
STAFFORD	542,056	806,119

Table 14

OPTION S-1 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
SECONDARY SYSTEM FY 1983

Name	Current Allocation	Allocation for FY 1983 With This Option
SUFFOLK	$ 787,735	$ 826,047
SURRY	203,406	227,242
SUSSEX	412,089	370,527
TAZEWELL	560,432	792,220
WARREN	264,786	295,961
WASHINGTON	736,985	931,278
WESTMORELAND	330,883	335,752
WISE	502,712	762,451
WYTHE	391,878	499,070
YORK	408,955	670,515
TOTALS	$53,128,802	$63,259,748

Option S-2 (VMT--70%, Area--20%, Accidents--10%)

The second option for the secondary system is a three factor formula which is strongly demand oriented. The factors and their associated weights are: vehicle miles of travel on the secondary system weighted 70 percent, area weighted 20 percent, and secondary system accident rates weighted 10 percent. The R^2 for this formula is .91.

Vehicle miles of travel is the most direct measure of demand. Its use in this formula is consistent with the concept that needs are generated as a result of travel. Unlike the other demand factors, vehicle miles of travel measures the demand generated by non-residents of the county as well as by residents.

The area factor reflects the need for construction of the road network necessary for county-wide travel. Its use ensures that larger, rural counties receive an appropriate share of secondary funds.

Secondary accident rates indicate the need for improvements to the existing system of highways. While it has been given the lowest weight, it is still a very important factor because it may help in directing funds to counties with critical needs on narrow, dangerous secondary roads.

The following table (Table 15) shows the allocations for each county in the secondary system based on this option. Current FY 1983 allocations are shown for comparison.

Table 15

OPTION S-2

HIGHWAY ALLOCATION OPTIONS SUMMARY
SECONDARY SYSTEM FY 1983

Name	Current Allocation	Allocation for FY 1983 With This Option
ACCOMACK	$ 767,026	$ 655,177
ALBEMARLE	986,766	1,225,456
ALLEGHANY	249,657	411,629
AMELIA	368,617	364,602
AMHERST	483,318	531,699
APPOMATTOX	322,856	377,784
AUGUSTA	1,416,033	1,207,708
BATH	331,310	365,613
BEDFORD	747,614	837,649
BLAND	238,386	252,858
BOTETOURT	609,343	525,684
BRUNSWICK	609,234	548,586
BUCHANAN	617,282	920,653
BUCKINGHAM	513,085	437,537
CAMPBELL	837,900	850,510
CAROLINE	334,546	522,262
CARROLL	794,753	586,545
CHARLES CITY	165,798	241,143
CHARLOTTE	400,868	396,549
CHESTERFIELD	1,672,541	2,807,389
CLARKE	209,978	280,925
CRAIG	186,387	227,423
CULPEPER	488,119	426,660
CUMBERLAND	288,934	267,988
DICKENSON	375,555	436,470
DINWIDDIE	622,908	581,807
ESSEX	218,048	313,434
FAIRFAX	4,184,360	11,180,270

Table 15

OPTION S-2 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
SECONDARY SYSTEM FY 1983

Name	Current Allocation	Allocation for FY 1983 With This Option
FAUQUIER	$ 758,736	$ 874,315
FLOYD	515,167	359,921
FLUVANNA	296,377	314,999
FRANKLIN	839,345	908,544
FREDERICK	638,904	680,462
GILES	343,569	342,387
GLOUCESTER	329,099	412,496
GOOCHLAND	286,389	386,517
GRAYSON	355,921	417,383
GREENE	181,093	232,202
GREENSVILLE	238,333	366,082
HALIFAX	954,229	846,497
HANOVER	813,467	1,080,861
HENRY	1,133,261	1,050,194
HIGHLAND	244,537	219,957
ISLE OF WIGHT	558,327	452,287
JAMES CITY	281,378	345,260
KING AND QUEEN	198,139	274,922
KING GEORGE	214,232	196,505
KING WILLIAM	183,982	263,619
LANCASTER	180,543	233,403
LEE	490,828	435,491
LOUDOUN	1,367,070	1,017,115
LOUISA	607,339	500,174
LUNENBURG	518,982	402,572
MADISON	386,531	312,879
MATHEWS	130,473	143,082
MECKLENBURG	763,745	603,929

Table 15

OPTION S-2 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
SECONDARY SYSTEM FY 1983

Name	Current Allocation	Allocation for FY 1983 With This Option
MIDDLESEX	$ 122,227	$ 203,770
MONTGOMERY	500,686	600,529
NELSON	398,252	364,793
NEW KENT	166,917	218,160
NORTHAMPTON	359,276	296,682
NORTHUMBERLAND	232,173	282,336
NOTTOWAY	319,063	302,532
ORANGE	429,403	386,226
PAGE	304,487	394,339
PATRICK	584,142	479,420
PITTSYLVANIA	1,636,219	1,371,677
POWHATAN	289,278	366,352
PRINCE EDWARD	462,608	324,289
PRINCE GEORGE	420,338	432,730
PRINCE WILLIAM	2,044,359	2,625,844
PULASKI	522,802	588,346
RAPPAHANNOCK	230,264	237,361
RICHMOND	173,230	211,443
ROANOKE	716,497	753,108
ROCKBRIDGE	562,555	551,773
ROCKINGHAM	1,344,764	1,244,117
RUSSELL	445,095	542,847
SCOTT	685,125	538,022
SHENANDOAH	645,358	619,973
SMYTH	425,175	516,394
SOUTHAMPTON	575,681	723,593
SPOTSYLVANIA	539,693	773,354
STAFFORD	542,056	796,831

Table 15

OPTION S-2 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
SECONDARY SYSTEM FY 1983

Name	Current Allocation	Allocation for FY 1983 With This Option
SUFFOLK	$ 787,735	$ 682,934
SURRY	203,406	295,222
SUSSEX	412,089	370,208
TAZEWELL	560,432	648,598
WARREN	264,786	321,848
WASHINGTON	736,985	767,462
WESTMORELAND	330,883	341,923
WISE	502,712	739,489
WYTHE	391,878	427,848
YORK	408,955	461,720
TOTALS	$53,128,802	$63,260,159

Option S-3 (Centerlane Mileage--55%, Vehicle Density--45%)

The third option for the secondary system is based on the combination of secondary system centerline mileage weighted 55 percent, and secondary system vehicle density weighted 45 percent. This formula results in an R^2 of .74 in the regression analysis.

This option includes a system size measure as the major factor. As a result, it is related to the need for improvements and reconstruction on the current system of roads. The secondary mileage in each county would be the more important factor in this formula.

The vehicle density factor accounts for the congestion of traffic on the secondary system. It is a good balance to the mileage factor--which favors larger counties--because congestion will be a problem in the urban counties.

The following table (Table 16) shows the allocations for each county in the secondary system based on this option. Current FY 1983 allocations are shown for comparison:

Table 16

OPTION S-3

HIGHWAY ALLOCATION OPTIONS SUMMARY
SECONDARY SYSTEM FY 1983

Name	Current Allocation	Allocation for FY 1983 With This Option
ACCOMACK	$ 767,026	$ 761,212
ALBEMARLE	986,766	980,774
ALLEGHANY	249,657	497,620
AMELIA	368,617	413,974
AMHERST	483,318	689,439
APPOMATTOX	322,856	499,517
AUGUSTA	1,416,033	1,118,662
BATH	331,310	322,148
BEDFORD	747,614	954,361
BLAND	238,386	313,140
BOTETOURT	609,343	667,334
BRUSNWICK	609,234	592,762
BUCHANAN	617,282	781,201
BUCKINGHAM	513,085	546,969
CAMPBELL	837,900	878,868
CAROLINE	334,546	566,122
CARROLL	794,753	814,024
CHARLES CITY	165,798	378,817
CHARLOTTE	400,868	508,513
CHESTERFIELD	1,672,541	1,608,420
CLARKE	209,978	439,167
CRAIG	186,387	274,184
CULPEPER	488,119	547,511
CUMBERLAND	288,934	357,027
DICKENSON	375,555	557,317
DINWIDDIE	622,908	613,928
ESSEX	218,048	396,353
FAIRFAX	4,184,360	3,125,769

Table 16

OPTION S-3 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
SECONDARY SYSTEM FY 1983

Name	Current Allocation	Allocation for FY 1983 With This Option
FAUQUIER	$ 758,736	$ 839,473
FLOYD	515,167	598,771
FLUVANNA	296,377	420,452
FRANKLIN	839,345	956,974
FREDERICK	638,904	821,328
GILES	343,569	468,285
GLOUCESTER	329,099	657,950
GOOCHLAND	286,389	471,464
GRAYSON	355,921	641,853
GREENE	181,093	393,774
GREENSVILLE	238,333	401,943
HALIFAX	954,229	855,538
HANOVER	813,467	974,990
HENRY	1,133,261	1,022,906
HIGHLAND	244,537	250,591
ISLE OF WIGHT	558,327	562,491
JAMES CITY	281,378	823,063
KING AND QUEEN	198,139	352,688
KING GEORGE	214,232	516,869
KING WILLIAM	183,982	419,859
LANCASTER	180,543	467,848
LEE	490,828	624,288
LOUDOUN	1,367,070	970,128
LOUISA	607,339	588,508
LUNENBURG	518,982	518,290
MADISON	386,531	423,072
MATHEWS	130,473	473,084
MECKLINBURG	763,745	726,067

Table 16

OPTION S-3 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
SECONDARY SYSTEM FY 1983

Name	Current Allocation	Allocation for FY 1983 With This Option
MIDDLESEX	$ 122,227	$ 458,953
MONTGOMERY	500,686	556,050
NELSON	398,252	512,021
NEW KENT	166,917	420,114
NORTHAMPTON	359,276	488,398
NORTHUMBERLAND	232,173	452,186
NOTTOWAY	319,063	434,318
ORANGE	429,403	579,796
PAGE	304,487	533,928
PATRICK	584,142	649,090
PITTSYLVANIA	1,636,219	1,400,824
POWHATAN	289,278	477,162
PRINCE EDWARD	462,608	433,092
PRINCE GEORGE	420,338	565,503
PRINCE WILLIAM	2,044,359	1,763,920
PULASKI	522,802	637,985
RAPPAHANNOCK	230,264	339,832
RICHMOND	173,230	359,079
ROANOKE	716,497	1,241,490
ROCKBRIDGE	562,555	650,148
ROCKINGHAM	1,344,764	1,066,775
RUSSELL	445,095	723,926
SCOTT	685,125	708,373
SHENANDOAH	645,358	753,981
SMYTH	425,175	630,589
SOUTHAMPTON	575,681	670,624
SPOTSYLVANIA	539,693	790,156
STAFFORD	542,056	928,073

Table 16

OPTION S-3 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
SECONDARY SYSTEM FY 1983

Name	Current Allocation	Allocation for FY 1983 With This Option
SUFFOLK	$ 787,735	$ 853,213
SURRY	203,406	331,206
SUSSEX	412,089	483,677
TAZEWELL	560,432	751,914
WARREN	264,786	453,204
WASHINGTON	736,985	852,115
WESTMORELAND	330,883	507,719
WISE	502,712	784,156
WYTHE	391,878	567,434
YORK	408,955	1,007,508
TOTALS	$53,128,802	$63,266,212

V. URBAN SYSTEM ALLOCATIONS

Major highways and roads in cities and towns over 3,500 in population constitute the urban highway system. Under the provisions of Section 33.1-41 of the *Code of Virginia*, roads are designated as part of the urban system by the State Highway Commissioner, subject to the approval of the Highway and Transportation Commission. With 8,174 miles, the urban system is the second largest of the State systems.

The JLARC review of urban allocations focused on the equity of the administrative procedures developed by DHT to allocate urban funds, and on several alternatives for distribution of the urban funds. It is clear that some adjustment to the current process would improve equity by ensuring that allocations are legislatively mandated, and that this mandate is consistently applied from year to year.

The alternative urban allocations formulas presented in this chapter are intended to meet three basic criteria. The proposed alternatives must be: (1) based on sound theory as to the relationship between highway demand and the characteristics of the locality, (2) technically correct, and (3) highly accurate estimators of identifiable urban highway needs.

EQUITY OF CURRENT URBAN ALLOCATION PROCESS

Allocation of funds to the urban system has largely been conducted through administrative processes developed and managed by DHT. Legislative involvement in this area has usually been limited to provision of total urban system funds and the stipulation that urban localities provide a five percent match of State funds. The balance of the process has been administratively determined.

Assessment of current processes for allocating urban construction begins with an examination of the basic steps in the allocation process. Included in this section is discussion of the relationship between allocations and prioritization of individual construction projects. The second major topic is the question of urban need factors. Consideration must be given to the availability of various factors for urban allocations and technical analysis of these factors.

Current Allocation Process

Urban construction allocations are presently made without explicit statutory guidelines or formulas. The *Code of Virginia* does specify that urban construction allocations be made based on statewide need for urban system improvements in cities and towns with populations

greater than 3,500. In practice, this allocation process has resulted in funding for localities with larger and more extensive urban construction projects. Smaller construction needs generally are identified and addressed independently by cities and towns in the State.

The urban allocation and construction process is characteristically project oriented. It is a cooperative effort by DHT and the municipalities, and is based on shifting the emphasis on actual construction from urban area to urban area. The process is often lengthy and involved.

The need for transportation improvements in cities and towns are identified either through the thoroughfare planning process or independently by each locality. A locality then requests that DHT explore the feasibility of a construction project to meet the identified transportation need. After local staff and DHT cooperatively examine the need, DHT provides the local governing body with preliminary plans for construction or with alternatives to construction that respond to the need. The locality, through its governing body, must then endorse or reject these recommendations. If endorsed, further development on the improvement is undertaken and the locality agrees to provide five percent of the total cost of the work.

DHT and the locality proceed cooperatively to develop plans and designs for the road project. After preparation of more detailed plans, the project moves to public review through appropriate hearings at the local level. The content of these hearings depends on characteristics of the project, such as environmental impacts on other land uses.

After DHT review of public comment or other suggested modifications in the plans, an estimate of the project's cost is prepared, and designs are again presented to the local governing body for their final endorsement before proceeding to construction. The Highway Commission then begins the process of allocating the bulk of construction funds to urban projects in the State. This process is oriented toward shifting the emphasis from one urban project to another to allow for timing of actual construction.

Equity of the Current Process

Distribution of urban funds in the past has been based on the population in the municipalities. DHT's urban division has tried to ensure that a city or town's proportion of funds eventually equals its proportion of the State's population. But equity has been measured in terms of 10-year cycles. That is, a city might have to wait 10 years for its allocations to be in line with its percentage of Statewide population. This contrasts sharply with the statutory process used for the secondary system, where equity can be judged on an annual basis.

Because of the rapidly changing funding environment, it is important that urban allocations also be equitable from year to year. If this is not done, those municipalities which receive allocations

when revenues are low, as in recent years, will receive less than their fair share when compared to localities that received allocations when revenues were high. Each city may have allocations in proportion to its share of population, but a city allocated funds in a year when revenues are low will receive less funding.

A second problem is that the process currently in use has not been adopted by the General Assembly. In fact, there is no formal documentation of the process. The methods used to allocate such large sums of public funds should be legislatively mandated if they are to be consistent with other allocation procedures.

Prioritization of Projects. The current process for prioritizing individual urban construction projects is multi-faceted. The construction allocation is only one of a number of factors which determine when a project is scheduled and brought to construction. Other important factors are the availability of federal or other special funding for the particular project, progress in completion of plans, right-of-way acquisition, and appropriate environmental clearances for construction.

The emphasis that DHT places on a project is an overall factor affecting the course of a project's development and the speed that it moves to construction. In the past, the department's emphasis has been focused on the interstate and primary systems, which limited activity on urban projects. Earlier JLARC reports identified a $208 million difference in urban allocations and expenditures. Individual urban projects, even with large construction allocations, were left in a state of limbo. Given the increasing emphasis on the relationship of expenditures and allocations required by H.B. 565, the need for a system of project prioritization becomes very important.

The process that is now used for making allocations to projects is inadequate for prioritizing construction projects. Evidence of this fact are the numerous urban system projects that are fully funded in terms of construction allocations but which have not proceeded to construction.

Allocations and Expenditures. The JLARC interim report Organization and Administration of DHT noted the lack of a desirable relationship between allocations and expenditures. This problem was especially serious for the urban system. Between 1967 and 1981, urban allocations exceeded expenditures by $206 million. Primary system allocations exceeded expenditures by $59 million, and secondary allocations exceeded expenditures by $39 million.

These large allocations balances resulted from the lack of a clear statutory relationship between allocations and expenditures. In response to this problem, the 1982 General Assembly passed two pieces of legislation. H.B. 565 defines allocations as a commitment to expend funds available in each fiscal year. It also requires DHT to report when expenditures are not in line with allocations. The 1982 Appropriations Act requires the department to develop a plan for addressing the imbalances in expenditures and allocations identified by JLARC.

DHT's plan for complying with this legislation has three parts. First, the six-year improvement program will bring the excessive urban allocations balance in line with those of the other systems by bringing to construction many of the urban projects which have accumulated large balances. Second, the six-year plan will be used to establish appropriate on-going balances for all systems by ensuring that funds are obligated. Finally, several new reporting mechanisms have been established. The six-year plan provides an expected schedule for construction to begin on each project. Also, a quarterly report will be made to the Secretary of Transportation on why previously programmed funds were not obligated as planned.

Improving Equity for Urban Allocations

The legislative mandate to examine the reasonableness, appropriateness, and equity of providing for urban need requires two efforts. The first is to evaluate the factors which can be used as surrogates for need. The second is the overall question of whether the establishment of a statutory allocation formula for distributing urban system construction funds is a feasible and practical solution to the current inadequacies in the urban allocations. Related to this point is the timing of allocations and urban project development and construction. This analysis seems to indicate that a formula can provide an equitable distribution of urban funds. Based on the analysis of factors, three statutory allocation options have been developed, and are presented at the end of this section.

Use of Urban Allocation Formula. The absence of statutory direction for distributing urban allocations has encouraged the development of a loose system for distributing allocations based on population. Combined with the lack of strong ties between urban allocations and expenditures, this system has in the past hampered public understanding of project development and prioritization. Increased legislative emphasis on the relationship between allocations and expenditures, as evidenced by H.B. 565, increases the need for a rational, systematic, and publicly understood process for allocating urban system construction funds.

An assessment of true need across the State has not been the basis for urban allocations in the past. Now that DHT has developed a measure of urban highway construction need, the process for urban allocations should be re-examined. It is now possible, for example, to establish a statutory allocation system which distributes urban funds in a equitable and reasonable way, based directly on an empirical analysis of need and the factors which generate that need.

Establishment of a statutory allocation system is also related to the timing of allocations and prioritization of individual construction projects. The current urban allocation process is characteristically project oriented. Allocations are made to projects rather than localities. If the General Assembly decides to statutorily allocate urban construction funds to localities, the department must then develop a system for making known its prioritization of projects.

Urban areas must also be afforded the opportunity to reserve some of their allocations for future or more extensive urban construction projects. Allocations to projects must become a meaningful and useful part of an entire system of project development and prioritization.

Urban Need Factors. According to DHT, urban needs total $4.5 billion. For FY 1983, urban system construction funds amount to only $56.6 million for road improvements in cities and towns. Current annual allocations are therefore available to address only about one percent of the identified need at current construction costs.

Examination of how to meet large urban needs with limited resources must begin with consideration of reasonable and equitable distribution factors. The factors which have been developed for this analysis must first be reviewed in terms of their availability for urban areas.

Unlike the primary and secondary systems, the urban system is largely configured, constructed, and maintained by local urban governments. The resulting problem for this analysis is the lack of comparable urban system information. Measures of road system utilization, such as average daily traffic counts, are not available for cities and towns. Urban system accident counts are also currently unavailable.

In comparison with secondary system needs and the various measures which were available for that analysis, urban needs are much more difficult to analyze. Few comparable types of information are gathered or maintained for the urban areas of the State. Therefore, a number of potentially important factors are lacking for the urban needs analysis. The options presented in this analysis should therefore be considered as the best that can be produced, given the limited information available for the urban factors. The General Assembly may wish to require that additional data, such as vehicle miles of travel, be made available for the urban system in the future.

Need Factors. Analysis of the relationships between the various factors and urban system needs identified three clusters of relevant factors:

- population characteristics
- road system size
- area of the municipality

Each of the three groups is composed of similar measures. For example, resident population may be measured directly by census counts, or by a relative measure, registered vehicles. The choice among similar factors within a group for use in a statutory allocation formula may then be made on the basis of ease of collection or the perceived accuracy of the measure.

The first cluster is composed of population characteristics. Urban construction need is concentrated in cities and towns with larger numbers of people, but not necessarily in those communities with higher

population densities. Using the resident population or registered vehicles factors in localities, the analysis showed a correlation of .84 with urban construction need. Measures of population density did not, however, relate to urban road needs. The possible underlying relationship is that larger numbers of people create a need for new roads only to some point, after which new roads begin to compete with other land uses.

The second important group of factors is the overall size of each urban area's road system. The analysis showed a correlation of .90 between construction needs and the mileage of the road system. This was true whether mileage was measured as centerline miles or lane miles. The likely explanation for this result is that the larger the road network the more need for new alignments, connections, and other fine-tuning of the road system.

Construction needs in urban areas were also found to relate to the overall area of the municipality. The total surface area of cities and towns would seem to affect the need for new construction by increasing the demand for linking distant communities within a city or town. Another relationship between area and construction need is that cities with greater land areas have more room for development and correspondingly more need for roads.

Recommendation (7). The General Assembly may wish to amend the *Code of Virginia* to establish a statutory formula for allocating urban system funds.

URBAN SYSTEM OPTIONS

Three allocation formulas are presented as possible alternatives to the current process for urban allocations. The three groups of factors identified in the previous section were used to produce the formulas. The weights applied to the formula were calculated as a part of the multiple regression analysis, and have been rounded to simplify the calculations. Following the explanation of each option is a table showing the allocations that would be made for the option. These allocations are based on urban system funds of $63.26 million as proposed in Chapter III.

Option U-1 includes the factors of population and area. Option U-2 substitutes lane mileage for population. Option U-3 is based on three factors: population, area, and vehicle density.

Option U-1 (Population--55%, Area--45%)

The first formula option is based on measures of area and population. The total surface area of a locality in combination with either vehicle registration or census counts produces a regression equation that predicts urban need with a fairly high degree of accuracy, as indicated by an R^2 of .86. The individual importance (weight) of each of the two factors is 55 percent on population and 45 percent on the area of the locality.

If this option were translated into an allocation formula, it would be sensitive both to the needs of large numbers of people and to the communities' land areas. The option thus reflects a major emphasis on population as a need-generating force, and a secondary emphasis on available development area in cities and towns.

The following example shows how allocations were calculated for the City of Fredericksburg (Figure 5). Table 17 shows the allocations which would be provided by this option for all cities and towns.

Figure 5

CALCULATION OF ALLOCATION FOR OPTION U-1
(Example: City of Fredericksburg)

$$\text{Urban Allocation} = \text{Urban Budget} \times \left(\left(\text{Proportion of Population} \times \text{Weight} \right) + \left(\text{Proportion of Area} \times \text{Weight} \right) \right)$$

$$\text{Urban Allocation} = \$63{,}260{,}000 \times \left((.007057 \times .55) + (.00453 \times .45) \right)$$

$$\text{Urban Allocation} = \$63{,}260{,}000 \times (.005919)$$

$$\text{Urban Allocation} = \$374{,}436$$

Table 17

OPTION U-1

HIGHWAY ALLOCATION OPTIONS SUMMARY
URBAN SYSTEM FY 1983

Name	Allocation for FY 1983 With This Option
ABINGDON	$ 123,561
ALEXANDRIA	1,978,254
ASHLAND	160,733
BEDFORD	241,469
BIG STONE GAP	186,527
BLACKSBURG	893,658
BLACKSTONE	104,274
BLUEFIELD	199,927
BRISTOL	552,689
BUENA VISTA	169,959
CHARLOTTESVILLE	864,035
CHESAPEAKE	8,984,283
CHRISTIANSBURG	336,817
CLIFTON FORGE	148,979
COLONIAL HEIGHTS	434,749
COVINGTON	239,571
CULPEPER	250,921
DANVILLE	1,077,624
EMPORIA	128,919
FAIRFAX	445,043
FALLS CHURCH	195,467
FARMVILLE	194,561
FRANKLIN	198,982
FREDERICKSBURG	374,436
FRONT ROYAL	383,924
GALAX	272,570
HAMPTON	3,175,416
HARRISONBURG	442,887
HERNDON	269,432

Table 17

OPTION U-1 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
URBAN SYSTEM FY 1983

Name	Allocation for FY 1983 With This Option
HOPEWELL	$ 606,589
LEESBURG	214,569
LEXINGTON	170,151
LURAY	116,953
LYNCHBURG	2,143,707
MANASSAS	420,591
MANASSAS PARK	140,225
MARION	193,006
MARTINSVILLE	512,381
NEWPORT NEWS	3,692,870
NORFOLK	5,460,973
NORTON	228,136
PETERSBURG	1,154,070
POQUOSON	370,596
PORTSMOUTH	2,309,643
PULASKI	256,287
RADFORD	383,620
RICHLANDS	148,753
RICHMOND	4,805,225
ROANOKE	2,520,831
ROCKY MOUNT	163,962
SALEM	687,768
SMITHFIELD	195,769
SOUTH BOSTON	223,036
SOUTH HILL	176,233
STAUNTON	541,087
SUFFOLK	191,382
TAZEWELL	153,895

Table 17

OPTION U-1 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
URBAN SYSTEM FY 1983

Name	Allocation for FY 1983 With This Option
VIENNA	$ 340,092
VINTON	197,400
VIRGINIA BEACH	9,760,332
WARRENTON	133,946
WAYNESBORO	406,169
WILLIAMSBURG	269,262
WINCHESTER	523,826
WISE	125,144
WYTHEVILLE	291,815
TOTAL	$63,259,962

Option U-2 (Lane Mileage--60%, Area--40%)

The second formula option is also based on the use of two factors. The total surface areas of the localities are again used, but this time in combination with the lane mileage of the urban systems. The model is a good estimator of need, with an R^2 of .89. In this option, system mileage is weighted 60 percent, and area is weighted 40 percent.

The use of this formula for distribution of urban construction funds would address the needs of cities and towns on the basis of the size of their road systems and their overall areas. Following the rationale presented earlier, the size of the local road systems is related to the need for improved capacities and the reconstruction of urban streets and highways. The following table (Table 18) shows the allocations which would be provided by this option for cities and towns.

Table 18

OPTION U-2

HIGHWAY ALLOCATION OPTIONS SUMMARY
URBAN SYSTEM FY 1983

Name	Allocation for FY 1983 With This Option
ABINGDON	$ 160,395
ALEXANDRIA	1,279,700
ASHLAND	210,950
BEDFORD	299,510
BIG STONE GAP	208,766
BLACKSBURG	754,697
BLACKSTONE	162,085
BLUEFIELD	182,556
BRISTOL	705,875
BUENA VISTA	215,781
CHARLOTTESVILLE	780,482
CHESAPEAKE	9,267,472
CHRISTIANSBURG	421,461
CLIFTON FORGE	147,656
COLONIAL HEIGHTS	462,270
COVINGTON	247,738
CULPEPER	300,240
DANVILLE	1,230,594
EMPORIA	158,640
FAIRFAX	446,989
FALLS CHURCH	191,633
FARMVILLE	250,924
FRANKLIN	231,516
FREDERICKSBURG	391,674
FRONT ROYAL	426,542
GALAX	403,648
HAMPTON	2,916,757
HARRISONBURG	416,343
HERNDON	230,810

Table 18

OPTION U-2 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
URBAN SYSTEM FY 1983

Name	Allocation for FY 1983 With This Option
HOPEWELL	669,537
LEESBURG	170,946
LEXINGTON	148,935
LURAY	168,929
LYNCHBURG	2,353,429
MANASSAS	429,200
MANASSAS PARK	88,243
MARION	213,439
MARTINSVILLE	640,041
NEWPORT NEWS	3,198,740
NORFOLK	4,527,716
NORTON	236,314
PETERSBURG	1,229,929
POQUOSON	389,334
PORTSMOUTH	2,368,440
PULASKI	335,860
RADFORD	448,831
RICHLANDS	133,461
RICHMOND	4,727,283
ROANOKE	2,819,778
ROCKY MOUNT	199,170
SALEM	837,519
SMITHFIELD	206,161
SOUTH BOSTON	282,117
SOUTH HILL	245,898
STAUNTON	605,323
SUFFOLK	194,907
TAZEWELL	155,221

Table 18

OPTION U-2 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
URBAN SYSTEM FY 1983

Name	Allocation for FY 1983 With This Option
VIENNA	$ 343,793
VINTON	226,806
VIRGINIA BEACH	9,549,271
WARRENTON	182,827
WAYNESBORO	474,537
WILLIAMSBURG	273,524
WINCHESTER	509,592
WISE	113,971
WYTHEVILLE	456,784
TOTAL	$63,259,509

Option U-3 (Population-45%, Area--40%, Vehicle Density--15%)

The third formula option is based on three factors: population, surface area, and urban vehicular density. This equation is fairly accurate for predicting urban need, with an R^2 of .88. The weights for this option are 45 percent for population, 40 percent for area, and 15 percent for urban vehicular density.

The theoretical basis for this option is that the greatest pressures for urban construction are found in the larger and more heavily populated cities and towns. The effect of large populations is enhanced by the urban system vehicle density of the community. The relationship expressed in this allocation option is sensitive to the needs of people for roads, the needs of urban areas for development, and the needs generated by urban vehicular densities.

The following table (Table 19) shows the allocations which would be provided by this option for cities and towns.

Table 19

OPTION U-3

HIGHWAY ALLOCATION OPTIONS SUMMARY
URBAN SYSTEM FY 1983

Name	Allocation for FY 1983 With This Option
ABINGDON	$ 205,326
ALEXANDRIA	1,969,223
ASHLAND	263,191
BEDFORD	299,328
BIG STONE GAP	284,144
BLACKSBURG	940,922
BLACKSTONE	176,688
BLUEFIELD	361,868
BRISTOL	579,850
BUENA VISTA	238,564
CHARLOTTESVILLE	876,601
CHESAPEAKE	7,964,801
CHRISTIANSBURG	378,125
CLIFTON FORGE	266,106
COLONIAL HEIGHTS	542,069
COVINGTON	351,954
CULPEPER	334,198
DANVILLE	1,042,359
EMPORIA	219,504
FAIRFAX	472,538
FALLS CHURCH	425,556
FARMVILLE	254,627
FRANKLIN	303,379
FREDERICKSBURG	461,813
FRONT ROYAL	474,703
GALAX	317,653
HAMPTON	2,856,136
HARRISONBURG	514,977
HERNDON	455,080

Table 19

OPTION U-3 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
URBAN SYSTEM FY 1983

Name	Allocation for FY 1983 With This Option
HOPEWELL	$ 652,942
LEESBURG	458,913
LEXINGTON	273,373
LURAY	195,955
LYNCHBURG	1,957,386
MANASSAS	521,962
MANASSAS PARK	393,851
MARION	304,112
MARTINSVILLE	547,126
NEWPORT NEWS	3,296,890
NORFOLK	4,716,394
NORTON	279,773
PETERSBURG	1,109,544
POQUOSON	464,506
PORTSMOUTH	2,067,836
PULASKI	328,027
RADFORD	431,292
RICHLANDS	324,432
RICHMOND	4,177,689
ROANOKE	2,268,267
ROCKY MOUNT	254,515
SALEM	718,445
SMITHFIELD	300,151
SOUTH BOSTON	283,260
SOUTH HILL	236,228
STAUNTON	602,200
SUFFOLK	314,193
TAZEWELL	287,062

Table 19

OPTION U-3 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
URBAN SYSTEM FY 1983

Name	Allocation for FY 1983 With This Option
VIENNA	$ 469,193
VINTON	336,730
VIRGINIA BEACH	8,534,099
WARRENTON	221,038
WAYNESBORO	482,436
WILLIAMSBURG	375,298
WINCHESTER	623,574
WISE	300,562
WYTHEVILLE	319,452
TOTAL	$63,259,990

VI. PRIMARY SYSTEM ALLOCATIONS

The JLARC review of primary system allocations focused on (1) the reasonableness, appropriateness, and equity of the current process for allocating funds to the eight construction districts, and (2) alternatives for distributing the funds. It was clear from the analysis that the current provisions for allocating funds are not equitable. The statutory factors are highly intercorrelated, and the districts are not the best geographical units in which to allocate primary funds.

The alternatives to the current primary system allocation formula are presented at the end of this chapter and are intended to meet three basic criteria. The alternatives must be: (1) based on sound theory as to the relationship between highway demand and the characteristics of a geographical unit, (2) technically correct, and (3) highly accurate estimations of identifiable highway needs.

EQUITY OF CURRENT PRIMARY ALLOCATIONS

The primary system includes the arterial highways and the extensions of arterial highways within cities and towns. The primary system is defined by Section 33.1-25 of the *Code of Virginia* as the State Highway System that supplements and complements the federal interstate system. The primary system also forms a complete network of through highways that serves both interstate and principal intrastate and regional traffic flow. As of December 1981, 7,901 miles of primary roads were open to traffic.

Construction allocations are made to the highway districts based on a formula set out in Section 33.1-23.2 of the *Code of Virginia*. The distribution factors used in the current statutory requirements for allocating primary funds are highly intercorrelated and are not the best predictors of primary needs. In addition, the planning district commission boundaries were found to be a preferred geographical basis on which to distribute the primary system funds.

Current Allocation Process

Section 33.1-23.2 of the *Code of Virginia* establishes the formula for primary system allocations. In addition to requiring five factors and setting the respective weights applicable to each, it requires that allocations be made on the basis of highway construction districts.

The Department of Highways and Transportation prioritizes projects on the basis of local input at pre-allocation and allocation

hearings held in each district. Projects are then programmed based on the prioritization.

Statutory Requirements. A construction district's allocation for primary roads is equal to the proportion the construction district bears to the State as a whole in terms of:

(a) Area, population and primary road mileage each treated equally and weighted 40 percent;

(b) Vehicle registration weighted 40 percent; and

(c) Primary lane mile need weighted 20 percent.

The amount of State funds needed to match federal interstate aid in each district are deducted from each district's primary system allocations. The remaining funds are then allocated to primary route improvements and new construction within the districts.

Five factors are required by law for allocating primary funds. The area factor as used by DHT measures the total surface area within the political boundaries of a jurisdiction. The population factor is a measure of the total residents of the district. Population estimates generated by the Tayloe Murphy Institute are used by DHT in calculating percentages. Primary mileage includes all centerline miles approved by the Highway Commission in each district. Vehicle registration data is provided by the Division of Motor Vehicles and measures the total number of vehicles registered in the locality in a year. The lane mile need factor is based on the Critical Improvement Program established by DHT. It measures the miles of projects programmed and approved within a district.

Data for cities, counties, and towns are included in each of the statutory factors and are summed to the district level by DHT. Since the data for cities and towns is included, larger predominantly urbanized districts receive larger portions of primary funds. Table 20 shows the allocations to the districts for FY 1983. Once each district receives the primary allocations, specific projects that have been previously programmed are allocated funds.

Project Prioritization. Programming projects is a process of translating legislative policies and long-range plans into work programs which link funds with specific projects.

The first step in programming projects is the development of DHT staff recommendations for tentative allocations. The DHT staff work with Highway Commission members in each district to make allocations for projects. Priority is given to projects under way. Second priority is given to projects which extend or complement work already completed. Finally, allocations are made to new projects if funds are available. Generally, few new projects are added each year because most available funds are needed to continue active projects.

Table 20

PRIMARY ALLOCATIONS TO THE DISTRICTS
FOR FY 1983

District	Primary District Allocations	Allocations Less Interstate Match Plus Discretionary
Bristol	$ 11,470,000	$10,341,000
Salem	12,881,000	12,298,000
Lynchburg	10,829,000	10,829,000
Richmond	17,838,000	13,760,000
Suffolk	18,684,000	14,057,000
Fredericksburg	7,320,000	5,515,000
Culpeper	23,279,000	17,477,000
Staunton	10,729,000	10,433,000
Total	$113,030,000	$94,710,000

Source: DHT

The JLARC interim report Organization and Administration of the Department of Highways and Transportation found that the programming decisions and priority setting did not correspond to the allocations for projects. Expenditures for the primary system fell short of allocations by $40 million as of June 30, 1980.

Equity of the Current Allocation Formula

The JLARC evaluation of the current statutory provisions for allocating primary funds was based on an analysis of the factors currently used. The analysis revealed that several problems may exist in using the factors as provided for by law.

The statutory factors for allocating primary system funds include: (1) area, (2) population, (3) primary mileage, (4) vehicle registration, and (5) primary lane mile need. An analysis of the relationships among these factors showed that they often measure the same thing and convey the same information.

For example, population and vehicle registration are closely related; they measure the same phenomenon and convey essentially the same information. Area and primary system mileage are also highly interrelated. In the case of population and lane mile need, the relationship is not quite as strong, but by including the two factors in the same formula, the information they convey is doubly counted. Use of these highly related factors in the current formula is unnecessary and technically inappropriate. The formula can account for the information to be used in allocating funds by using fewer factors.

In addition, the area factor was found to be only weakly related to needs. So its equal weight in the formula with such factors as population is inappropriate.

Recommendation (8). The General Assembly may wish to amend the *Code of Virginia* to revise the current statutory formula to include independent factors which are weighted in proportion to their relationship to construction needs.

Geographical Units. The primary system was established to link metropolitan areas and economic centers of regional importance with one another. This was the basic reason the General Assembly combined the primary and interstate systems for allocations purposes and allocated funds on a district basis. An analysis of the geographical base for allocating primary funds, however, revealed that the planning district commission (PDC) boundaries provided the best correlations of factors with primary needs. This finding is not surprising, since the PDC's were established to serve regional areas in economic and transportation planning (Figure 6).

The analysis of the geographical base involved the correlation of demographic and demand factors with the primary system needs within the geographical units. Three alternatives were analyzed: (1) locality based allocations, (2) construction district based allocations, and (3) planning district boundary based allocations. It was clear from the correlation analysis that a greater number of factors correlated with need when the PDC boundaries were used. In fact, seven of the 11 factors used had the highest correlation when the PDC's were used as the base.

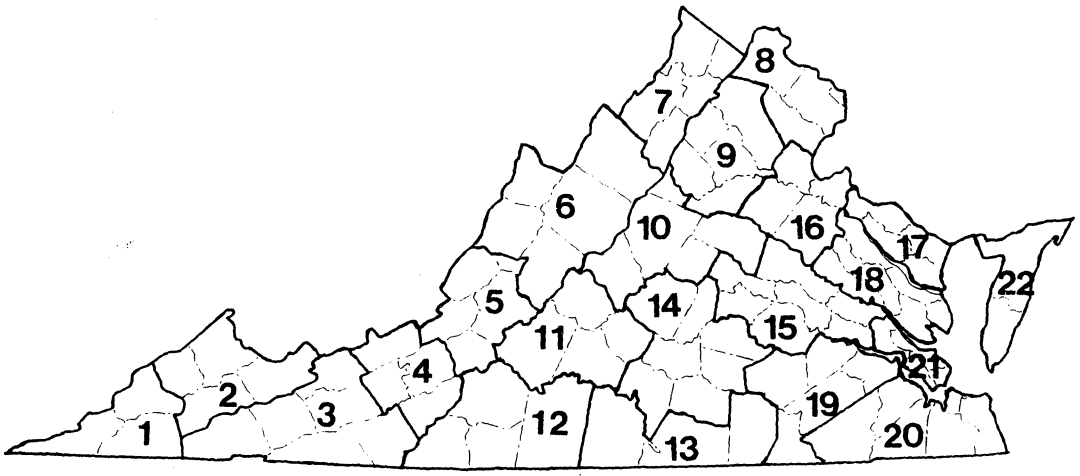
The construction district had the highest correlation on four of the factors. These were, however, demographic rather than demand factors. District boundaries have not been adjusted since they were first established in 1923. The State's population has more than doubled since that time. Transportation needs have changed, and centers of economic activity no longer serve just one region but several.

The locality based analysis did not result in factors with high correlation to primary system needs. This indicates the regional relationship of factors to primary needs.

Recommendation (9). The General Assembly may wish to amend the *Code of Virginia* to change the geographical basis of aggregating primary allocations from DHT's eight districts to the planning district commission boundaries. These boundaries should be used only for the purpose of allocating funds. The districts should continue to administer any projects in their areas. In order to facilitate administration of projects, the DHT district boundaries should be realigned so that they are coterminous with the boundaries of the planning districts.

Figure 6

PLANNING DISTRICT COMMISSIONS



PD 1 Lenowisco
PD 2 Cumberland Plateau
PD 3 Mount Rogers
PD 4 New River Valley
PD 5 Fifth
PD 6 Central Shenandoah
PD 7 Lord Fairfax
PD 8 Northern Virginia
PD 9 Rapahannock-Rapidan
PD 10 Thomas Jefferson
PD 11 Central Virginia
PD 12 West Piedmont
PD 13 Southside
PD 14 Piedmont
PD 15 Richmond Regional
PD 16 Radco
PD 17 Northern Neck
PD 18 Middle Peninsula
PD 19 Crater
PD 20 Southeastern Virginia
PD 21 Peninsula
PD 22 Accomack- Northampton

JLARC staff illustration.

PRIMARY SYSTEM OPTIONS

The primary system models were developed from factors that correlated highly with primary system needs. The models were developed using the 22 planning district commissions as a base. All options are based on the PDC geographical unit.

Three different options are presented in the following section. Each option includes a description of the model, the conceptual framework for the factors included, and a table showing the allocations for each PDC. The allocations are based on total primary funds of $63.26 million, as proposed in Chapter III. This is one third of the available funding for construction.

Option P-1 includes measures of centerline mileage, accident rates, and vehicle miles of travel. Option P-2 also includes accident rates as a factor, but replaces centerline mileage with lane mileage, and also includes population growth. Option P-3 is composed of lane mileage, accidents, and vehicle registration.

Option P-1 (Vehicle Miles of Travel--85%, Centerline Mileage--10%, Accident Rates--5%)

In the first formula option, allocations are based on measures of centerline mileage, primary accidents, and vehicle miles of travel.

The first factor, vehicle miles of travel, is the most direct measure of demand on a transportation system. It is also likely to be a more accurate reflection of real demand, since it includes both resident and non-resident vehicular travel.

The second factor, centerline mileage, measures the length of the primary system within the PDC. The size of the network of primary roads affects the need for new roads by increasing the demand for connectors. When demand increases, volume also increases, which leads to the need for greater capacity.

The third factor used in this option is primary system accidents. Accident rates, when high, point to special construction needs that are necessary to improve the existing roadway. DHT currently uses this data in prioritizing safety projects, but it is not used as a basis for allocating funds.

The regression equation resulted in a moderate degree of accuracy with an R^2 of .58. The weights for the factors are 85 percent for vehicle miles of travel, 10 percent for centerline mileage, and 5 percent for primary system accidents.

The allocations to the PDC's under this option are listed in Table 21, with a comparison to district allocations as a point of reference only. Figure 7 shows how the allocations for PDC 22 were calculated.

Figure 7

CALCULATION OF ALLOCATIONS FOR OPTION P-1
(Example: Accomack - Northampton PDC)

$$\text{Primary Allocation} = \text{Primary Budget} \times \left(\left(\text{Proportion of Vehicle Miles} \times \text{Weight}\right) + \left(\text{Proportion of Mileage} \times \text{Weight}\right) + \left(\text{Proportion of Accidents} \times \text{Weight}\right)\right)$$

$$\text{Primary Allocation} = \$63{,}260{,}000 \times \left((.02235 \times .85) + (.01946 \times .10) + (.01122 \times .05)\right)$$

$$\text{Primary Allocation} = \$63{,}260{,}000 \times (.0215045)$$

$$\text{Primary Allocation} = \$1{,}360{,}374$$

Table 21

OPTION P-1
HIGHWAY ALLOCATION OPTIONS SUMMARY
PRIMARY SYSTEM FY 1983
(BY PLANNING DISTRICTS)

Planning District Commission	Allocation for FY 1983 With This Option
LENOWISCO	$2,077,551
CUMBERLAND PLATEAU	3,206,109
MOUNT ROGERS	2,585,964
NEW RIVER VALLEY	1,979,011
FIFTH	2,248,354
CENTRAL SHENANDOAH	3,142,317
LORD FAIRFAX	2,391,302
NORTHERN VIRGINIA	8,562,351
RAPPAHANNOCK-RAPIDAN	2,925,035
THOMAS JEFFERSON	2,708,113
CENTRAL VIRGINIA	3,368,741
WEST PIEDMONT	3,561,064
SOUTHSIDE	2,106,781
PIEDMONT	2,508,489
RICHMOND REGIONAL	6,388,214
RADCO	2,493,122
NORTHERN NECK	1,182,543
MIDDLE PENINSULA	2,036,763
CRATER	2,039,964
SOUTHEASTERN VIRGINIA	2,855,941
PENINSULA	1,449,898
ACCOMACK NORTHAMPTON	1,360,374
TOTAL	$63,178,001

Table 21

OPTION P-1 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
PRIMARY SYSTEM FY 1983
(BY CONSTRUCTION DISTRICTS)

Construction District	Current Allocation	Allocation for FY 1983 With This Option
BRISTOL	$10,341,000	$ 7,447,708
SALEM	12,298,000	7,760,281
LYNCHBURG	10,829,000	6,660,152
RICHMOND	13,760,000	9,474,166
SUFFOLK	14,057,000	6,702,936
FREDERICKSBURG	5,515,000	5,712,427
CULPEPER	17,477,000	13,707,301
STAUNTON	10,433,000	5,795,028
TOTALS	$94,710,000	$63,260,000

Option P-2 (Population Change--50%, Lane Mileage--35%, Accident Rates--15%)

This option is based on three factors, which are measures of lane miles, primary system accidents, and population change.

The first factor, lane miles, measures both the length and capacity of the primary system network. As indicated earlier, the size and capacity of roads affect the need for new roads by increasing the demand for connectors and greater capacity.

The second factor is population change, which measures the increase or decrease in the resident population between decennial censuses. The underlying assumption for this factor is that as the population in a PDC increases, so does the need for transportation, both in terms of new roads and in additional capacity of existing roads. Expanding the capacity of a road is considered and funded as construction.

The third factor, primary system accidents, measures the relative safety of the network of roads. When many accidents occur over the same portion of a roadway, it points to a possible design flaw which requires construction activity, or to serious deterioration of the roadway.

The regression equation had a moderate level of accuracy with an R^2 of .52. The weights for the factors are 50 percent for population change, 35 percent for lane miles, and 15 percent for primary system accidents.

The allocations to the PDC's are listed in Table 22, with a comparison to district allocations as a point of reference only.

Table 22

OPTION P-2
HIGHWAY ALLOCATION OPTIONS SUMMARY
PRIMARY SYSTEM FY 1983
(BY PLANNING DISTRICTS)

Planning District Commission	Allocation for FY 1983 With This Option
LENOWISCO	$ 1,696,861
CUMBERLAND PLATEAU	2,808,809
MOUNT ROGERS	3,227,620
NEW RIVER VALLEY	2,504,349
FIFTH	2,190,069
CENTRAL SHENANDOAH	2,869,066
LORD FAIRFAX	2,775,551
NORTHERN VIRGINIA	9,296,357
RAPPAHANNOCK RAPIDAN	2,603,834
THOMAS JEFFERSON	2,830,107
CENTRAL VIRGINIA	2,778,768
WEST PIEDMONT	2,609,622
SOUTHSIDE	1,599,932
PIEDMONT	2,110,290
RICHMOND REGIONAL	5,998,445
RADCO	3,037,347
NORTHERN NECK	879,587
MIDDLE PENINSULA	1,743,308
CRATER	1,067,063
SOUTHEASTERN VIRGINIA	6,391,095
PENINSULA	1,597,048
ACCOMACK NORTHAMPTON	727,422
TOTAL	$63,342,549

Table 22

OPTION P-2 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
PRIMARY SYSTEM FY 1983
(BY CONSTRUCTION DISTRICTS)

Construction District	Current Allocation	Allocation for FY 1983 With This Option
BRISTOL	$10,341,000	$ 7,193,441
SALEM	12,298,000	7,573,697
LYNCHBURG	10,829,000	5,312,065
RICHMOND	13,760,000	8,414,562
SUFFOLK	14,057,000	8,810,408
FREDERICKSBURG	5,515,000	5,660,242
CULPEPER	17,477,000	14,357,294
STAUNTON	10,433,000	5,937,964
TOTALS	$94,710,000	$63,259,672

Option P-3 (Vehicle Registration--50%, Lane Mileage--35%, Accident Rates--15%)

The third option also includes three factors which measure demographics, safety, and demand. The factors include lane miles, primary accidents, and vehicle registration.

The first factor, lane miles, is a measure of the length and capacity of the network of primary roads. The second factor, primary accidents, is a measure of the need to improve dangerous or deteriorated highways. The third factor is vehicle registration, which measures the demand on a system by local residents. While use of vehicle registration as a factor may slightly underestimate the demand on the highway system, it is a good substitute for population.

The model predicted the primary system needs fairly well with an R^2 of .51. The weights for the factors are 50 percent for vehicle registration; 35 percent for lane miles; and 15 percent for primary system accidents.

The allocations to PDC's under this option are listed in Table 23, with a comparison to district allocations as a point of reference only.

Table 23

OPTION P-3
HIGHWAY ALLOCATION OPTIONS SUMMARY
PRIMARY SYSTEM FY 1983
(BY PLANNING DISTRICTS)

Planning District Commission	Allocation for FY 1983 With This Option
LENOWISCO	$ 1,559,713
CUMBERLAND PLATEAU	2,378,316
MOUNT ROGERS	3,280,057
NEW RIVER VALLEY	2,043,186
FIFTH	2,839,211
CENTRAL SHENANDOAH	3,183,819
LORD FAIRFAX	2,481,166
NORTHERN VIRGINIA	8,977,040
RAPPAHANNOCK RAPIDAN	2,166,365
THOMAS JEFFERSON	2,379,606
CENTRAL VIRGINIA	2,687,681
WEST PIEDMONT	3,099,518
SOUTHSIDE	2,059,004
PIEDMONT	2,297,806
RICHMOND REGIONAL	6,088,387
RADCO	1,921,304
NORTHERN NECK	985,775
MIDDLE PENINSULA	1,599,974
CRATER	1,900,607
SOUTHEASTERN VIRGINIA	5,841,157
PENINSULA	2,672,287
ACCOMACK NORTHAMPTON	900,570
TOTAL	$63,342,549

Table 23

OPTION P-3 (Continued)

HIGHWAY ALLOCATION OPTIONS SUMMARY
PRIMARY SYSTEM FY 1983
(BY CONSTRUCTION DISTRICTS)

Construction District	Current Allocation	Allocation for FY 1983 With This Option
BRISTOL	$10,341,000	$ 6,709,612
SALEM	12,298,000	7,720,154
LYNCHBURG	10,829,000	5,963,942
RICHMOND	13,760,000	9,613,085
SUFFOLK	14,057,000	9,714,495
FREDERICKSBURG	5,515,000	4,528,042
CULPEPER	17,477,000	13,133,774
STAUNTON	10,433,000	6,128,531
TOTALS	$94,710,000	$63,511,636

VII. EPILOG: ALLOCATIONS FOR THE 1990's

JLARC's review of highway construction allocations was based on an empirical analysis of factors that can serve as surrogates for highway construction needs. By identifying the factors which most nearly approximate need, allocation formulas can be developed to distribute funds on the basis of need.

This approach has a strong theoretical base for determining highway allocation formulas. The options developed and presented in this study are solutions to current imbalances among the administrative systems and among various localities in the State. Figure 8 shows the system of allocations proposed by JLARC staff. This system should not be viewed as a permanent solution, because of the constantly changing environment of transportation needs and funding sources. It was just such a change in the environment that led the General Assembly to request this study. Reassessment of the allocations formulas will be necessary on a periodic basis. Such an effort can be made more useful and less difficult through careful preparation and planning.

Measures of Need. Highway construction needs are controversial and difficult to identify. Any inventory that is developed might exclude perceived needs in the localities, or include needs with which the localities are not in agreement. The Department of Highways and Transportation, under the direction of the Secretary of Transportation, must therefore begin now to develop inventories of need for the 1990's. Those inventories should be a continuing part of the Statewide Transportation Planning process, and should be based on a comprehensive and consistent methodology. Transportation goals should be established, and projects should be prioritized as to their relative importance. Local government involvement throughout the process would improve the inventory of needs.

Data on Local Characteristics. Data currently available on local characteristics should be improved. New sources could be added, and additional measures of demand for transportation services developed. During the course of the JLARC allocation study, inadequacies were found to exist in many data sources and measures. Vehicle travel data was not available for the urban system in cities and towns. Information on accidents in cities was also lacking.

Several other factors, such as business intensity and industrial intensity, should be tested to determine their relationship to transportation need. Those sources were not available during the course of the JLARC review.

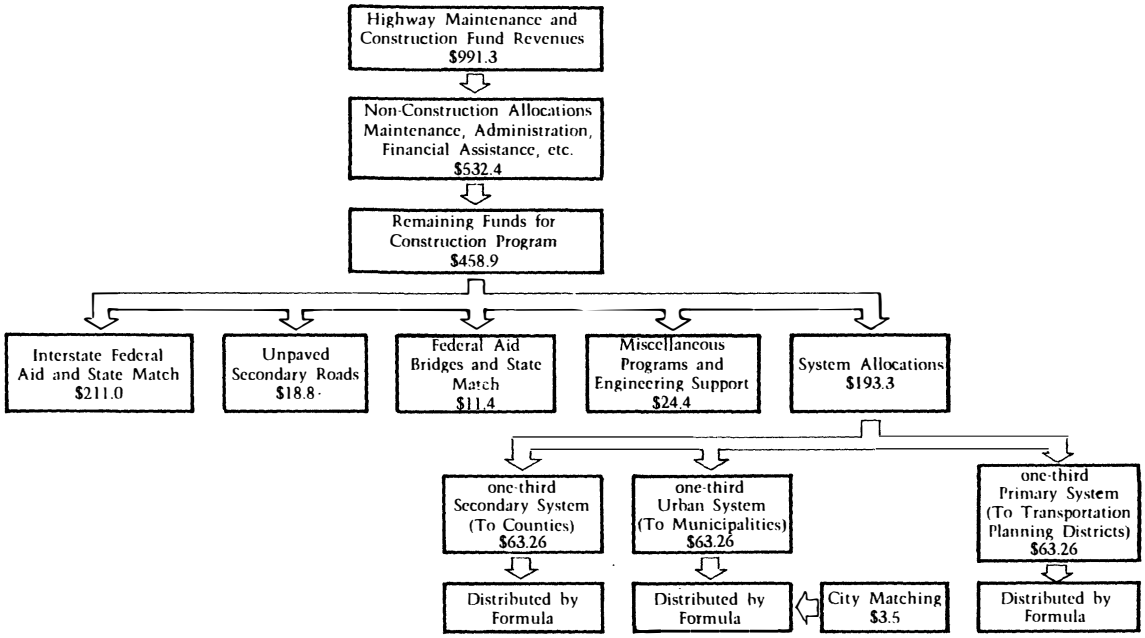
The reassessment of transportation needs should include the factors identified by JLARC during its review and should include ad-

ditional factors that are evident based on the transportation environment at that time.

Recommendation (10). The Secretary of Transportation should ensure that a reassessment of highway construction allocations is made on a periodic basis as a part of the Statewide Transportation Planning process. The analysis should be based on the prioritization of needs among systems and localities, and transportation goals should be more clearly established for the future. An improved methodology for identifying special needs and involving local governments should be developed.

Figure 8

JLARC STAFF PROPOSAL FOR ALLOCATION OF HIGHWAY CONSTRUCTION FUNDS



JLARC Staff illustration based on DHT and Appropriations data. Actual distribution of funds will depend on actual revenue for FY 1982-83.

APPENDIXES

APPENDIX A

TECHNICAL APPENDIX SUMMARY

JLARC policy and sound research practice require a technical explanation of research methodology. The analytic methods used to prepare this report are described in detail in Chapter II. This summary describes additional information used by JLARC staff but which was not included in the report. This information is available for inspection on request.

1. Highway Construction Needs Data. The highway construction needs for each locality are listed in Appendixes B and C of this report. This information was prepared from individual project needs identified by DHT and local governments. The lists of the projects are contained in seven looseleaf volumes and include highway construction projects, traffic system management projects, and bridge replacement and rehabilitation projects. Project cost estimates prepared for JLARC by DHT are also included.

2. Local Characteristics Data. The 23 local characteristics tested in this study are shown in Table 2, Chapter II. The raw data for these factors has been listed for each locality.

3. Allocation Models. In addition to the options presented in this report, JLARC staff developed and tested many other models for each of the three administrative highway systems. The statistics used to evaluate each model have been retained in three printout binders. The information includes correlation matrices, descriptive statistics, coefficients of multiple determination, significance tests, standard errors, and collinearity diagnostics.

APPENDIX B

HIGHWAY CONSTRUCTION NEEDS
(DHT ASSESSMENT)
FY 1982-2005

LOCALITY=CITY

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
ALEXANDRIA	$0	$0	$0	$92,556,366	$92,556,366
BEDFORD	$0	$0	$0	$48,926,866	$48,926,866
BRISTOL	$0	$0	$0	$41,139,052	$41,139,052
BUENA-VISTA	$0	$0	$0	$12,486,838	$12,486,838
CHARLOTTESVILLE	$0	$0	$0	$31,130,431	$31,130,431
CHESAPEAKE	$35,652,760	$985,000	$0	$512,318,192	$548,955,952
CLIFTON-FORGE	$0	$0	$0	$21,739,303	$21,739,303
COLONIAL-HEIGHTS	$0	$0	$0	$39,614,785	$39,614,785
COVINGTON	$0	$0	$0	$35,586,483	$35,586,483
DANVILLE	$0	$0	$0	$32,271,000	$32,271,000
EMPORIA	$0	$0	$0	$1,407,112	$1,407,112
FAIRFAX	$0	$0	$0	$8,679,100	$8,679,100
FALLS-CHURCH	$0	$0	$0	$6,392,436	$6,392,436
FRANKLIN	$0	$0	$0	$6,227,530	$6,227,530
FREDERICKSBURG	$0	$0	$0	$8,656,000	$8,656,000
GALAX	$0	$0	$0	$36,501,071	$36,501,071
HAMPTON	$28,193,756	$0	$0	$197,054,544	$225,248,300
HARRISONBURG	$0	$0	$0	$12,658,709	$12,658,709
HOPEWELL	$28,000,000	$0	$0	$29,198,770	$57,198,770
LEXINGTON	$0	$0	$0	$10,308,322	$10,308,322
LYNCHBURG	$0	$9,104,000	$0	$146,304,000	$155,408,000
MANASSAS	$0	$0	$0	$19,169,252	$19,169,252
MANASSAS-PARK	$0	$0	$0	$571,976	$571,976

HIGHWAY CONSTRUCTION NEEDS
(DHT ASSESSMENT)
FY 1982-2005

LOCALITY=CITY

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
MARTINSVILLE	$0	$0	$0	$21,793,500	$21,793,500
NEWPORT-NEWS	$355,980,000	$0	$0	$218,891,768	$574,871,768
NORFOLK	$315,260,000	$0	$0	$511,393,502	$826,653,502
NORTON	$0	$0	$0	$40,185,014	$40,185,014
PETERSBURG	$0	$0	$0	$67,680,676	$67,680,676
POQUOSON	$0	$0	$0	$16,248,076	$16,248,076
PORTSMOUTH	$0	$248,000	$0	$248,200,018	$248,448,018
RADFORD	$0	$0	$0	$14,358,673	$14,358,673
RICHMOND	$0	$0	$0	$165,971,432	$165,971,432
ROANOKE	$0	$8,864,154	$0	$329,507,766	$338,371,920
SALEM	$0	$0	$0	$105,287,996	$105,287,996
SOUTH-BOSTON	$0	$2,259,042	$0	$28,594,370	$30,853,412
STAUNTON	$0	$0	$0	$89,408,360	$89,408,360
SUFFOLK	$231,390,000	$161,688,860	$56,005,000	$239,874,022	$688,917,882
VIRGINIA-BEACH	$18,375,968	$0	$0	$735,949,008	$754,324,976
WAYNESBORO	$0	$0	$0	$27,660,553	$27,660,553
WILLIAMSBURG	$0	$0	$0	$13,745,120	$13,745,120
WINCHESTER	$0	$465,000	$0	$30,096,000	$30,561,000
LOCALITY	$1,012,812,484	$183,614,056	$56,005,000	$4,255,743,992	$5,508,175,532

HIGHWAY CONSTRUCTION NEEDS
(DHT ASSESSMENT)
FY 1982-2005

LOCALITY=COUNTY

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
ACCOMACK	$0	$6,718,000	$23,062,000	$0	$29,780,000
ALBEMARLE	$0	$59,986,000	$201,839,000	$0	$261,825,000
ALLEGHANY	$40,000,000	$38,419,000	$31,212,000	$0	$109,631,000
AMELIA	$0	$2,375,000	$26,714,000	$0	$29,089,000
AMHERST	$0	$72,250,000	$79,710,000	$0	$151,960,000
APPOMATTOX	$0	$22,197,000	$16,883,000	$0	$39,080,000
ARLINGTON	$29,900,000	$57,190,000	$0	$0	$87,090,000
AUGUSTA	$0	$103,060,000	$161,536,000	$0	$264,596,000
BATH	$0	$41,564,000	$42,788,000	$0	$84,352,000
BEDFORD	$0	$51,805,000	$117,109,000	$0	$168,914,000
BLAND	$0	$12,372,000	$22,162,000	$0	$34,534,000
BOTETOURT	$6,755,000	$54,678,000	$51,703,000	$0	$113,136,000
BRUNSWICK	$0	$8,466,000	$37,232,000	$0	$45,698,000
BUCHANAN	$0	$109,999,000	$165,289,000	$0	$275,288,000
BUCKINGHAM	$0	$15,593,000	$49,253,000	$0	$64,846,000
CAMPBELL	$0	$98,141,000	$52,167,000	$0	$150,308,000
CAROLINE	$15,060,000	$8,161,000	$40,510,000	$0	$63,731,000
CARROLL	$0	$10,156,000	$72,621,000	$0	$82,777,000
CHARLES-CITY	$0	$5,185,000	$13,215,000	$0	$18,400,000
CHARLOTTE	$0	$9,585,000	$23,936,000	$0	$33,521,000
CHESTERFIELD	$157,149,000	$265,603,000	$176,155,000	$0	$598,907,000
CLARKE	$0	$6,366,000	$31,249,000	$0	$37,615,000
CRAIG	$0	$6,255,000	$23,249,000	$0	$29,504,000

HIGHWAY CONSTRUCTION NEEDS
(DHT ASSESSMENT)
FY 1982-2005

LOCALITY=COUNTY

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
CULPEPER	$0	$31,807,000	$55,674,000	$0	$87,481,000
CUMBERLAND	$0	$3,630,000	$35,670,000	$0	$39,300,000
DICKENSON	$0	$129,318,000	$59,399,000	$0	$188,717,000
DINWIDDIE	$0	$5,045,000	$41,200,000	$0	$46,245,000
ESSEX	$0	$14,827,000	$20,288,000	$0	$35,115,000
FAIRFAX	$0	$199,350,000	$753,580,000	$0	$952,930,000
FAUQUIER	$0	$77,611,000	$66,352,000	$0	$143,963,000
FLOYD	$0	$31,263,000	$56,933,000	$0	$88,196,000
FLUVANNA	$0	$14,900,000	$15,333,000	$0	$30,233,000
FRANKLIN	$0	$54,702,000	$78,692,000	$0	$133,394,000
FREDERICK	$0	$44,418,000	$62,866,000	$0	$107,284,000
GILES	$0	$35,992,000	$42,756,000	$0	$78,748,000
GLOUCESTER	$0	$2,805,000	$19,270,000	$0	$22,075,000
GOOCHLAND	$0	$35,703,000	$36,981,000	$0	$72,684,000
GRAYSON	$0	$12,222,000	$54,045,000	$0	$66,267,000
GREENE	$0	$14,020,000	$23,438,000	$0	$37,458,000
GREENSVILLE	$200,000	$12,697,000	$15,150,000	$0	$28,047,000
HALIFAX	$0	$64,916,000	$43,286,000	$0	$108,202,000
HANOVER	$0	$26,632,000	$96,171,000	$0	$122,803,000
HENRICO	$171,225,000	$229,610,000	$0	$0	$400,835,000
HENRY	$0	$56,847,000	$61,857,000	$0	$118,704,000
HIGHLAND	$0	$1,506,000	$23,499,000	$0	$25,005,000
ISLE-OF-WIGHT	$0	$14,337,000	$33,273,000	$0	$47,610,000

HIGHWAY CONSTRUCTION NEEDS
(DHT ASSESSMENT)
FY 1982-2005

LOCALITY=COUNTY

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
JAMES-CITY	$0	$57,256,000	$61,560,000	$0	$118,816,000
KING&QUEEN	$0	$14,929,000	$19,826,000	$0	$34,755,000
KING-GEORGE	$0	$21,456,000	$10,913,000	$0	$32,369,000
KING-WILLIAM	$0	$1,881,000	$20,182,000	$0	$22,063,000
LANCASTER	$0	$12,985,000	$9,077,000	$0	$22,062,000
LEE	$0	$176,724,000	$56,218,000	$0	$232,942,000
LOUDOUN	$0	$80,792,000	$123,301,000	$0	$204,093,000
LOUISA	$0	$16,796,000	$31,662,000	$0	$48,458,000
LUNENBURG	$0	$2,663,000	$41,780,000	$0	$44,443,000
MADISON	$0	$6,894,000	$38,469,000	$0	$45,363,000
MATHEWS	$0	$1,358,000	$10,036,000	$0	$11,394,000
MECKLENBURG	$0	$17,366,000	$52,376,000	$0	$69,742,000
MIDDLESEX	$0	$9,275,000	$9,562,000	$0	$18,837,000
MONTGOMERY	$0	$44,949,000	$61,946,000	$0	$106,895,000
NELSON	$0	$21,426,000	$58,766,000	$0	$80,192,000
NEW-KENT	$0	$4,149,000	$10,320,000	$0	$14,469,000
NORTHAMPTON	$0	$50,000	$3,018,000	$0	$3,068,000
NORTHUMBERLAND	$0	$18,590,000	$9,814,000	$0	$28,404,000
NOTTOWAY	$0	$6,474,000	$17,143,000	$0	$23,617,000
ORANGE	$0	$7,013,000	$40,037,000	$0	$47,050,000
PAGE	$0	$6,843,000	$46,070,000	$0	$52,913,000
PATRICK	$0	$45,522,000	$72,434,000	$0	$117,956,000
PITTSYLVANIA	$0	$77,432,000	$137,096,000	$0	$214,528,000

HIGHWAY CONSTRUCTION NEEDS
(DHT ASSESSMENT)
FY 1982-2005

LOCALITY=COUNTY

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
POWHATAN	$0	$567,000	$17,941,000	$0	$18,508,000
PRINCE-EDWARD	$0	$30,549,000	$33,758,000	$0	$64,307,000
PRINCE-GEORGE	$90,661,000	$19,521,000	$10,538,000	$0	$120,720,000
PRINCE-WILLIAM	$40,995,000	$168,182,000	$100,804,000	$0	$309,981,000
PULASKI	$0	$11,729,000	$58,797,000	$0	$70,526,000
RAPPAHANNOCK	$0	$6,807,000	$33,001,000	$0	$39,808,000
RICHMOND	$0	$1,156,000	$9,281,000	$0	$10,437,000
ROANOKE	$3,460,000	$111,229,000	$58,855,000	$0	$173,544,000
ROCKBRIDGE	$0	$38,021,000	$91,756,000	$0	$129,777,000
ROCKINGHAM	$1,310,000	$72,740,000	$171,185,000	$0	$245,235,000
RUSSELL	$0	$89,811,000	$97,417,000	$0	$187,228,000
SCOTT	$0	$62,364,000	$114,072,000	$0	$176,436,000
SHENANDOAH	$0	$18,427,000	$93,593,000	$0	$112,020,000
SMYTH	$0	$36,202,000	$52,101,000	$0	$88,303,000
SOUTHAMPTON	$0	$44,192,000	$24,880,000	$0	$69,072,000
SPOTSYLVANIA	$41,491,000	$56,083,000	$127,060,000	$0	$224,634,000
STAFFORD	$39,233,000	$86,476,000	$121,640,000	$0	$247,349,000
SURRY	$0	$3,018,000	$12,593,000	$0	$15,611,000
SUSSEX	$0	$4,753,000	$18,744,000	$0	$23,497,000
TAZEWELL	$0	$81,006,000	$60,601,000	$0	$141,607,000
WARREN	$0	$26,641,000	$33,984,000	$0	$60,625,000
WASHINGTON	$4,790,000	$89,370,000	$82,739,000	$0	$176,899,000
WESTMORELAND	$0	$14,025,000	$15,885,000	$0	$29,910,000

HIGHWAY CONSTRUCTION NEEDS
(DHT ASSESSMENT)
FY 1982-2005

LOCALITY=COUNTY

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
WISE	$0	$132,387,000	$72,624,000	$0	$205,011,000
WYTHE	$24,730,000	$15,071,000	$63,844,000	$0	$103,645,000
YORK	$0	$47,733,000	$45,491,000	$0	$93,224,000
LOCALITY	$666,959,000	$4,101,165,000	$5,720,097,000	$0	$10,488,221,000

HIGHWAY CONSTRUCTION NEEDS
(DHT ASSESSMENT)
FY 1982-2005

LOCALITY=TOWN

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
ABINGDON	$0	$0	$0	$7,933,728	$7,933,728
ALTAVISTA	$0	$0	$0	$0	$0
ASHLAND	$0	$3,163,000	$210,000	$0	$3,373,000
BIG-STONE-GAP	$0	$3,188,874	$0	$17,580,515	$20,769,389
BLACKSBURG	$0	$25,585,018	$0	$52,340,001	$77,925,019
BLACKSTONE	$0	$0	$0	$4,379,782	$4,379,782
BLUEFIELD	$0	$6,561,000	$0	$14,028,735	$20,589,735
CHRISTIANSBURG	$0	$4,640,135	$0	$10,282,323	$14,922,458
CULPEPER	$0	$0	$0	$28,650,119	$28,650,119
FARMVILLE	$0	$0	$0	$3,249,178	$3,249,178
FRONT-ROYAL	$0	$0	$0	$12,290,400	$12,290,400
HERNDON	$0	$0	$0	$4,503,723	$4,503,723
LEESBURG	$0	$0	$0	$2,006,000	$2,006,000
LURAY	$0	$604,120	$0	$10,706,615	$11,310,735
MARION	$0	$0	$0	$12,934,602	$12,934,602
PULASKI	$0	$0	$0	$14,001,800	$14,001,800
RICHLANDS	$0	$4,611,969	$0	$4,575,137	$9,187,106
ROCKY-MOUNT	$0	$0	$0	$4,241,481	$4,241,481
SMITHFIELD	$0	$3,000	$0	$6,380,000	$6,383,000
SOUTH-HILL	$0	$0	$0	$18,644	$18,644
TAZEWELL	$0	$0	$0	$18,901,901	$18,901,901
VIENNA	$0	$0	$0	$80,560	$80,560
VINTON	$0	$0	$0	$11,123,892	$11,123,892

HIGHWAY CONSTRUCTION NEEDS
(DHT ASSESSMENT)
FY 1982-2005

LOCALITY=TOWN

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
WARRENTON	$0	$0	$0	$17,249,747	$17,249,747
WISE	$0	$0	$0	$15,705,607	$15,705,607
WYTHEVILLE	$0	$0	$0	$10,488,851	$10,488,851
LOCALITY	$0	$48,357,116	$210,000	$283,653,341	$332,220,457
	$1,679,771,484	$4,333,136,172	$5,776,312,000	$4,539,397,333	$16,328,616,989

APPENDIX C

HIGHWAY CONSTRUCTION NEEDS
(LOCALITY ASSESSMENT)
FY 1982-2005

LOCALITY=CITY

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
ALEXANDRIA	$0	$0	$0	$100,446,366	$100,446,366
BEDFORD	$0	$0	$0	$48,926,866	$48,926,866
BRISTOL	$0	$0	$0	$41,139,052	$41,139,052
BUENA-VISTA	$0	$0	$0	$12,486,838	$12,486,838
CHARLOTTESVILLE	$0	$0	$0	$31,130,431	$31,130,431
CHESAPEAKE	$35,652,760	$985,000	$0	$512,318,192	$548,955,952
CLIFTON-FORGE	$0	$0	$0	$21,739,303	$21,739,303
COLONIAL-HEIGHTS	$0	$0	$0	$39,614,785	$39,614,785
COVINGTON	$0	$0	$0	$35,586,483	$35,586,483
DANVILLE	$0	$0	$0	$32,271,000	$32,271,000
EMPORIA	$0	$0	$0	$1,407,112	$1,407,112
FAIRFAX	$0	$0	$0	$8,679,100	$8,679,100
FALLS-CHURCH	$0	$0	$0	$6,392,436	$6,392,436
FRANKLIN	$0	$0	$0	$6,227,530	$6,227,530
FREDERICKSBURG	$0	$0	$0	$8,656,000	$8,656,000
GALAX	$0	$0	$0	$36,501,071	$36,501,071
HAMPTON	$28,193,756	$0	$0	$197,054,544	$225,248,300
HARRISONBURG	$0	$0	$0	$17,718,709	$17,718,709
HOPEWELL	$28,000,000	$0	$0	$29,198,770	$57,198,770
LEXINGTON	$0	$0	$0	$10,308,322	$10,308,322
LYNCHBURG	$0	$9,104,000	$0	$146,304,000	$155,408,000
MANASSAS	$0	$0	$0	$19,169,252	$19,169,252
MANASSAS-PARK	$0	$0	$0	$571,976	$571,976

HIGHWAY CONSTRUCTION NEEDS
(LOCALITY ASSESSMENT)
FY 1982-2005

LOCALITY=CITY

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
MARTINSVILLE	$0	$0	$0	$21,793,500	$21,793,500
NEWPORT-NEWS	$355,980,000	$0	$0	$266,103,468	$622,083,468
NORFOLK	$315,260,000	$0	$0	$581,293,502	$896,553,502
NORTON	$0	$0	$0	$40,185,014	$40,185,014
PETERSBURG	$0	$0	$0	$67,680,676	$67,680,676
POQUOSON	$0	$0	$0	$16,248,076	$16,248,076
PORTSMOUTH	$0	$248,000	$0	$260,200,018	$260,448,018
RADFORD	$0	$0	$0	$15,030,673	$15,030,673
RICHMOND	$0	$0	$0	$165,971,432	$165,971,432
ROANOKE	$0	$8,864,154	$0	$330,507,766	$339,371,920
SALEM	$0	$0	$0	$113,927,996	$113,927,996
SOUTH-BOSTON	$0	$2,259,042	$0	$29,094,370	$31,353,412
STAUNTON	$0	$0	$0	$89,408,360	$89,408,360
SUFFOLK	$231,350,000	$166,788,860	$74,380,000	$265,294,022	$737,812,882
VIRGINIA-BEACH	$18,375,968	$0	$0	$800,433,008	$818,808,976
WAYNESBORO	$0	$0	$0	$27,660,553	$27,660,553
WILLIAMSBURG	$0	$0	$0	$13,745,120	$13,745,120
WINCHESTER	$0	$465,000	$0	$30,096,000	$30,561,000
LOCALITY	$1,012,812,484	$188,714,056	$74,380,000	$4,498,521,692	$5,774,428,232

HIGHWAY CONSTRUCTION NEEDS
(LOCALITY ASSESSMENT)
FY 1982-2005

LOCALITY=COUNTY

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
ACCOMACK	$0	$6,718,000	$23,362,000	$0	$30,080,000
ALBEMARLE	$0	$59,986,000	$201,839,000	$0	$261,825,000
ALLEGHANY	$40,000,000	$38,419,000	$32,012,000	$0	$110,431,000
AMELIA	$0	$2,375,000	$26,714,000	$0	$29,089,000
AMHERST	$0	$72,250,000	$79,710,000	$0	$151,960,000
APPOMATTOX	$0	$32,697,000	$16,883,000	$0	$49,580,000
ARLINGTON	$29,900,000	$72,690,000	$0	$0	$102,590,000
AUGUSTA	$0	$103,060,000	$161,536,000	$0	$264,596,000
BATH	$0	$41,564,000	$42,788,000	$0	$84,352,000
BEDFORD	$0	$51,805,000	$117,109,000	$0	$168,914,000
BLAND	$0	$12,372,000	$22,162,000	$0	$34,534,000
BOTETOURT	$6,755,000	$54,678,000	$51,703,000	$0	$113,136,000
BRUNSWICK	$0	$8,466,000	$37,232,000	$0	$45,698,000
BUCHANAN	$0	$109,999,000	$165,289,000	$0	$275,288,000
BUCKINGHAM	$0	$15,593,000	$49,253,000	$0	$64,846,000
CAMPBELL	$0	$98,456,000	$52,167,000	$0	$150,623,000
CAROLINE	$15,060,000	$8,161,000	$40,510,000	$0	$63,731,000
CARROLL	$0	$10,156,000	$72,621,000	$0	$82,777,000
CHARLES-CITY	$0	$5,185,000	$13,215,000	$0	$18,400,000
CHARLOTTE	$0	$9,585,000	$23,936,000	$0	$33,521,000
CHESTERFIELD	$157,149,000	$265,603,000	$181,395,000	$0	$604,147,000
CLARKE	$0	$6,366,000	$31,249,000	$0	$37,615,000
CRAIG	$0	$6,255,000	$23,249,000	$0	$29,504,000

HIGHWAY CONSTRUCTION NEEDS
(LOCALITY ASSESSMENT)
FY 1982-2005

LOCALITY=COUNTY

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
CULPEPER	$0	$31,807,000	$55,674,000	$0	$87,481,000
CUMBERLAND	$0	$3,630,000	$35,670,000	$0	$39,300,000
DICKENSON	$0	$129,318,000	$59,399,000	$0	$188,717,000
DINWIDDIE	$0	$5,045,000	$41,200,000	$0	$46,245,000
ESSEX	$0	$14,827,000	$20,288,000	$0	$35,115,000
FAIRFAX	$126,972,000	$553,431,000	$805,250,000	$0	$1,485,653,000
FAUQUIER	$0	$77,611,000	$66,352,000	$0	$143,963,000
FLOYD	$0	$31,263,000	$56,933,000	$0	$88,196,000
FLUVANNA	$0	$14,900,000	$15,333,000	$0	$30,233,000
FRANKLIN	$0	$54,702,000	$80,192,000	$0	$134,894,000
FREDERICK	$0	$44,418,000	$62,866,000	$0	$107,284,000
GILES	$0	$35,992,000	$42,756,000	$0	$78,748,000
GLOUCESTER	$0	$2,805,000	$19,270,000	$0	$22,075,000
GOOCHLAND	$0	$35,703,000	$36,981,000	$0	$72,684,000
GRAYSON	$0	$12,222,000	$21,653,000	$0	$33,875,000
GREENE	$0	$14,020,000	$23,438,000	$0	$37,458,000
GREENSVILLE	$200,000	$12,697,000	$15,150,000	$0	$28,047,000
HALIFAX	$0	$64,916,000	$43,286,000	$0	$108,202,000
HANOVER	$0	$34,632,000	$96,521,000	$0	$131,153,000
HENRICO	$171,225,000	$229,610,000	$0	$0	$400,835,000
HENRY	$0	$57,347,000	$61,857,000	$0	$119,204,000
HIGHLAND	$0	$1,540,000	$23,499,000	$0	$25,039,000
ISLE-OF-WIGHT	$0	$14,337,000	$33,273,000	$0	$47,610,000

HIGHWAY CONSTRUCTION NEEDS
(LOCALITY ASSESSMENT)
FY 1982-2005

LOCALITY=COUNTY

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
JAMES-CITY	$0	$57,301,000	$61,575,000	$0	$118,876,000
KING&QUEEN	$0	$14,929,000	$19,826,000	$0	$34,755,000
KING-GEORGE	$0	$21,456,000	$10,913,000	$0	$32,369,000
KING-WILLIAM	$0	$1,881,000	$20,182,000	$0	$22,063,000
LANCASTER	$0	$12,985,000	$9,077,000	$0	$22,062,000
LEE	$0	$176,724,000	$56,218,000	$0	$232,942,000
LOUDOUN	$0	$99,619,550	$124,137,520	$0	$223,757,070
LOUISA	$0	$16,796,000	$31,662,000	$0	$48,458,000
LUNENBURG	$0	$2,663,000	$41,780,000	$0	$44,443,000
MADISON	$0	$7,594,000	$38,469,000	$0	$46,063,000
MATHEWS	$0	$1,358,000	$10,036,000	$0	$11,394,000
MECKLENBURG	$0	$17,366,000	$52,376,000	$0	$69,742,000
MIDDLESEX	$0	$9,275,000	$9,562,000	$0	$18,837,000
MONTGOMERY	$0	$44,949,000	$61,946,000	$0	$106,895,000
NELSON	$0	$21,426,000	$58,766,000	$0	$80,192,000
NEW-KENT	$0	$4,149,000	$10,320,000	$0	$14,469,000
NORTHAMPTON	$0	$50,000	$3,018,000	$0	$3,068,000
NORTHUMBERLAND	$0	$18,590,000	$9,814,000	$0	$28,404,000
NOTTOWAY	$0	$6,474,000	$17,143,000	$0	$23,617,000
ORANGE	$0	$7,013,000	$40,037,000	$0	$47,050,000
PAGE	$0	$6,843,000	$46,070,000	$0	$52,913,000
PATRICK	$0	$55,522,000	$72,434,000	$0	$127,956,000
PITTSYLVANIA	$0	$77,432,000	$137,096,000	$0	$214,528,000

HIGHWAY CONSTRUCTION NEEDS
(LOCALITY ASSESSMENT)
FY 1982-2005

LOCALITY=COUNTY

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
POWHATAN	$0	$567,000	$17,941,000	$0	$18,508,000
PRINCE-EDWARD	$0	$30,549,000	$33,758,000	$0	$64,307,000
PRINCE-GEORGE	$90,661,000	$26,453,000	$12,288,000	$0	$129,402,000
PRINCE-WILLIAM	$40,995,000	$187,878,000	$125,976,000	$0	$354,849,000
PULASKI	$0	$11,729,000	$58,797,000	$0	$70,526,000
RAPPAHANNOCK	$0	$6,807,000	$33,001,000	$0	$39,808,000
RICHMOND	$0	$1,156,000	$9,281,000	$0	$10,437,000
ROANOKE	$3,460,000	$111,229,000	$61,868,000	$0	$176,557,000
ROCKBRIDGE	$0	$38,021,000	$91,756,000	$0	$129,777,000
ROCKINGHAM	$1,310,000	$72,740,000	$184,601,000	$0	$258,651,000
RUSSELL	$0	$89,811,000	$97,417,000	$0	$187,228,000
SCOTT	$0	$62,394,000	$114,422,000	$0	$176,816,000
SHENANDOAH	$0	$18,427,000	$93,593,000	$0	$112,020,000
SMYTH	$0	$36,202,000	$52,101,000	$0	$88,303,000
SOUTHAMPTON	$0	$44,192,000	$24,880,000	$0	$69,072,000
SPOTSYLVANIA	$41,491,000	$56,083,000	$127,170,000	$0	$224,744,000
STAFFORD	$39,233,000	$86,476,000	$122,840,000	$0	$248,549,000
SURRY	$0	$3,018,000	$12,593,000	$0	$15,611,000
SUSSEX	$0	$4,753,000	$18,744,000	$0	$23,497,000
TAZEWELL	$0	$81,006,000	$60,601,000	$0	$141,607,000
WARREN	$0	$26,641,000	$33,984,000	$0	$60,625,000
WASHINGTON	$4,790,000	$89,370,000	$82,739,000	$0	$176,899,000
WESTMORELAND	$0	$14,025,000	$15,885,000	$0	$29,910,000

HIGHWAY CONSTRUCTION NEEDS
(LOCALITY ASSESSMENT)
FY 1982-2005

LOCALITY=COUNTY

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
WISE	$0	$132,387,000	$72,624,000	$0	$205,011,000
WYTHE	$24,730,000	$15,071,000	$67,522,000	$0	$107,323,000
YORK	$0	$47,733,000	$45,491,000	$0	$93,224,000
LOCALITY	$793,931,000	$4,546,325,550	$5,797,105,520	$0	$11,137,362,070

HIGHWAY CONSTRUCTION NEEDS
(LOCALITY ASSESSMENT)
FY 1982-2005

LOCALITY=TOWN

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
ABINGDON	$0	$0	$0	$9,693,728	$9,693,728
ALTAVISTA	$0	$0	$0	$0	$0
ASHLAND	$0	$3,163,000	$8,960,000	$0	$12,123,000
BIG-STONE-GAP	$0	$3,188,874	$0	$17,580,515	$20,769,389
BLACKSBURG	$0	$25,585,018	$0	$52,530,001	$78,115,019
BLACKSTONE	$0	$0	$0	$4,879,782	$4,879,782
BLUEFIELD	$0	$6,561,000	$0	$14,028,735	$20,589,735
CHRISTIANSBURG	$0	$4,640,135	$0	$13,725,323	$18,365,458
CULPEPER	$0	$0	$0	$28,938,119	$28,938,119
FARMVILLE	$0	$0	$0	$3,249,178	$3,249,178
FRONT-ROYAL	$0	$0	$0	$12,290,400	$12,290,400
HERNDON	$0	$0	$0	$5,647,723	$5,647,723
LEESBURG	$0	$0	$0	$2,006,000	$2,006,000
LURAY	$0	$604,120	$0	$10,706,615	$11,310,735
MARION	$0	$0	$0	$13,007,602	$13,007,602
PULASKI	$0	$0	$0	$14,001,800	$14,001,800
RICHLANDS	$0	$4,611,969	$0	$4,575,137	$9,187,106
ROCKY-MOUNT	$0	$0	$0	$4,241,481	$4,241,481
SMITHFIELD	$0	$3,000	$0	$6,380,000	$6,383,000
SOUTH-HILL	$0	$0	$0	$18,644	$18,644
TAZEWELL	$0	$0	$0	$18,901,901	$18,901,901
VIENNA	$0	$0	$0	$110,560	$110,560
VINTON	$0	$0	$0	$11,123,892	$11,123,892

HIGHWAY CONSTRUCTION NEEDS
(LOCALITY ASSESSMENT)
FY 1982-2005

LOCALITY=TOWN

NAME	INTERSTATE NEEDS	PRIMARY NEEDS	SECONDARY NEEDS	URBAN NEEDS	TOTAL
WARRENTON	$0	$0	$0	$17,249,747	$17,249,747
WISE	$0	$0	$0	$15,705,607	$15,705,607
WYTHEVILLE	$0	$0	$0	$17,388,851	$17,388,851
LOCALITY	$0	$48,357,116	$8,960,000	$297,981,341	$355,298,457
	$1,806,743,484	$4,783,396,722	$5,880,445,520	$4,796,503,033	$17,267,088,759

APPENDIX D

RESPONSES TO THE EXPOSURE DRAFT

As part of an extensive data validation process, local governments and other organizations interested in JLARC's review and evaluation effort were given the opportunity to comment on an exposure draft of this report. The exposure draft was distributed to 150 reviewers. Written responses were received from 15 organizations, and those responses are printed in the following pages. The written comments from the City of Portsmouth are on file and may be inspected on request.

In addition, the Joint Legislative Audit and Review Commission held a public hearing to receive comments on the draft at its regular meeting on December 13, 1982. Representatives from 24 local governments and other organizations made statements. Written statements provided at the hearing also have been printed as a part of this report. No written statements were provided by the following speakers:

- Prince William County
- Wythe County
- James City County

Appropriate technical corrections resulting from the written responses and the public hearing have been made in the final report. Page references in the responses relate to the exposure draft and may not correspond to page numbers in the final report.

COMMONWEALTH of VIRGINIA
DEPARTMENT OF HIGHWAYS & TRANSPORTATION
1221 EAST BROAD STREET
RICHMOND, 23219

December 8, 1982

Highway Construction Allocations
in Virginia
JLARC Report - November 8, 1982

Mr. Ray D. Pethtel, Director
Joint Legislative Audit and Review
Commission
910 Capitol Street, Suite 1100
Richmond, Virginia 23219

Dear Mr. Pethtel:

I appreciate the opportunity to offer our preliminary comments on the JLARC Exposure Draft "Highway Construction Allocations in Virginia." While these comments are intended to raise several questions of interpretation and fact for your consideration, let me first say that we view the Draft as a thorough examination of a highly complex policy issue.

General Comments

In your briefing to the Commission on November 8, the staff concluded that "the formulas no longer accomplish the construction policies and legislative interests intended by the General Assembly." This finding appears to be based primarily on an analysis of total system construction need, now estimated at just under $16 billion in current dollars. The staff then recommended a formula revision based on the total need estimate, less interstate and unpaved roads, which would divide available funds equally among the three highway systems. Such an approach assumes that each of the highway systems despite differing functions and levels of utilization is of equal importance to the citizens and economy of the Commonwealth.

What is not explicitly addressed in the Draft, however, is the fact that the costs of our total highway construction need are unfundable under any realistic range of revenue projections, construction cost inflation rates, and maintenance demands over the next 23 years. Therefore, we believe a more appropriate State funding policy is one which seeks to allocate available revenue on the basis of prioritized need, i.e., that which can reasonably be expected to be funded. If one proceeds from this prioritized need base, we question whether the subject staff recommendation for formula revision would be sustained.

Our second general concern focuses on the staff recommendation that primary allocations be by planning district rather than construction district. We believe that the practical impact of such a change would be to divide an already fragmented allocation program into 22 pieces rather than eight. Since the Department would still be required to accumulate project funds in a manner consistent with the intent of HB 565, the staff recommendation would significantly complicate the orderly scheduling of major primary projects throughout Virginia.

Specific Comments

The following comments relate to specific portions of the report.

* Page 1, second paragraph

The context of the paragraph suggests that the interstate system had been brought substantially near completion, and much of the arterial system built, between 1977 and 1982. This is an overstatement of accomplishment within that short time period.

* Page 3, last paragraph, second sentence

It is suggested that this sentence be revised to read "These are (1) interstate federal-aid."

* Page 4

Figure 1 suggests that transit needs are a factor in distributing urban funds. As you are aware, transit needs are funded from the direct appropriations as reflected in the Appropriations Act.

Page 7

It is suggested that the entire second paragraph be written to indicate that a single public hearing is required for the interstate, primary, and urban systems before the Commission finalizes allocations. Further, we feel a more precise definition of the roles of the boards of supervisors, cities, and Highway and Transportation Commission in the prioritization of projects is needed.

* Page 47, first full paragraph

It is suggested that the second sentence read "This fund was intended to focus efforts on paving the 6,000 miles of dirt roads in the Commonwealth carrying fifty or more vehicles per day."

* Page 47, second full paragraph

It is suggested that the second sentence be modified to read "The fund must be used exclusively for reconstructing and paving non-surfaced treated secondary roads."

Page 65, second paragraph

The report should reflect that prior to the enactment of House Bill 1041, the Department's Resident Engineers consulted with the counties in the development of the annual secondary road allocations. In the current context no mention is made of this fact, which suggests the total decision lies with the Resident Engineers.

Page 67

We believe the graph showing the construction allocations to Roanoke County for the period 1973-1977 is biased by the annexation of a portion of the county system by the City of Roanoke.

Page 85, first paragraph

We would suggest that the urban system be defined as "extensions of primary routes and other major highways in the cities and towns over 3500."

* Pages 86-87 - Current Allocation Process

The procedure outlined in this section of the report suggests that allocations to specific projects are made only after the project development process. This is invalid in that allocations are made to initiate preconstruction and throughout the project development to include the construction phase.

Page 93

The Department's urban planning process, which was initiated in the early 1960's, is widely recognized as one of the most comprehensive in the country. Studies in all urban areas with populations in excess of 5,000 have been developed and updated in cooperation with the local governments commensurate with the staff capabilities of the Department. It is further pertinent in relation to the urban program that the Department has never failed to program a project that was warranted and in a municipality which was entitled to funding under the program. This study makes little reference to the fact that the initiation of urban projects rests with the local governments and that they must be in a position to match funding available through our urban construction program. The implementation of the JLARC recommendation to annually allocate funding to municipalities would lead to the allocation of funds to jurisdictions with no needs or without the ability to provide local match. Further, we question if the Commission under the JLARC proposal would be able to allocate sufficient funds for the initiation of a major project in a municipality.

Page 108, third paragraph

The last sentence relative to the function of the primary system appears to contradict the second paragraph on page 39.

Page 109, second paragraph

We can find no supporting documentation for the conclusion that planning district boundaries represent a basis for the allocation of primary system funding. Further, as you are aware, the planning district and highway construction district boundaries are not coterminous.

Page 109, fourth paragraph

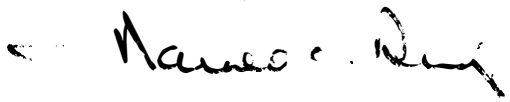
Projects are prioritized by the Department's staff based on our planning process and the collective judgments of all involved internal to the organization. The priorities are discussed with the individual members of the Highway and Transportation Commission, with additional local input provided in the preallocation hearings held in each of the construction districts and the Northern Virginia Division.

* Page 127

Throughout the document there is reference to the statewide transportation plan which by JLARC definition is now to be a policies plan. The term "highway needs assessment" should be referenced in lieu of the statewide plan.

We appreciate the opportunity to review the draft report, and would be glad to discuss the aforementioned comments with your staff at your convenience.

Sincerely,



Harold C. King, Commissioner

cc: Honorable Andrew B. Fogarty

JLARC NOTE:

Technical corrections and revisions of the wording of this report have been made for those items marked with an asterisk (*).

COMMONWEALTH of VIRGINIA
COUNTY OF PRINCE WILLIAM
9250 Lee Avenue Manassas, Virginia 22110 (703) 369-9200 Metro 631-1703

COUNTY EXECUTIVE
Robert S. Noe, Jr.

BOARD of COUNTY SUPERVISORS

Kathleen K. Seefeldt, Chairman
Donald L. White, Vice Chairman
Eileen M. Barnes
John D. Jenkins
Donald E. Kidwell
G. Richard Pfitzner
Joseph D. Reading

December 21, 1982

Ray D. Pethtel, Director
Joint Legislative Audit
and Review Commission
Suite 1100
910 Capitol Street
Richmond, Virginia 23219

Dear Mr. Pethtel:

You and your staff are to be commended for providing the General Assembly with a sound and objective analysis of the equity of the current highway construction allocation process. I believe that the report confirms that significant imbalances in the allocation process do exist. Consequently, many of the Commonwealth's rapidly growing local governing jurisdictions are not receiving their fair share of highway construction funds. In an era of increasing fiscal austerity, it is critical that this imbalance be redressed.

I was disappointed to learn that no action on the report is anticipated in the 1983 meeting of the General Assembly. Expanding the scope of the study to include an analysis of the federal gas tax increase and funding of public transportation is unlikely to alter the validity of the conclusions in the present report.

I understand that the results of the expanded study are anticipated in August 1983. I would hope that action by the General Assembly can be accomplished no later than the 1984 legislative session.

In summary, I believe that the present JLARC study merits serious consideration by the 1983 General Assembly. However, since it appears that additional analysis will be performed by your staff, I would suggest that you continue to provide for a high level of involvement by local government. Accordingly, I would be pleased to participate in JLARC's efforts in the coming year.

Very truly yours,

Richard G. Noble
Deputy County Executive

Southeastern Virginia Planning District Commission

MEYERA E. OBERNDORF. . . . . CHAIRMAN
JOHN T. MAXWELL. . . . . VICE CHAIRMAN
W. B. OWEN. . . . . TREASURER

16 KOGER EXECUTIVE CENTER · SUITE 100
NORFOLK, VIRGINIA 23502 · (804) 461-3200
ARTHUR L. COLLINS · EXEC. DIR/SECY.

December 16, 1982

Mr. Ray D. Pethtel, Director
Joint Legislative Audit and
Review Commission
910 Capitol Street, Suite 1100
Richmond, Virginia 23219

Re: Southeastern Virginia
JLARC Highway Allocation
Study (LEG:VA)

Dear Mr. Pethtel:

The Southeastern Virginia Planning District Commission Executive Committee, during its December 15, 1982 meeting, endorsed the attached statement regarding the JLARC Highway Allocation Study. As indicated during the public hearing of December 13, 1982, we understand that no action will be taken until proposed Federal participation with regard to the increased fuel tax has been fully analyzed. As suggested by many during the public hearing, we urge you to weigh the comments received during this period and to fully analyze both the short- and long-range effects of implementing statutory regulations as recommended in your Exposure Draft and subsequent modifications.

I would also like to take this opportunity to extend our appreciation for the assistance and cooperation you and your staff have given us during the study. The study represents an outstanding effort to collect and analyze a vast amount of complex data in an extremely short period of time.

If we can be of additional assistance, please do not hesitate to give me a call.

Sincerely,

Arthur L. Collins
Executive Director/Secretary

DLF:ve
Attachment

Comments by the Staff
of the
Southeastern Virginia Planning District Commission

The Southeastern Virginia Planning District Commission (SVPDC) has been presented with the summary and an overview of the findings and recommendations of the JLARC Highway Allocation Exposure Draft. At its November 17, 1982 meeting, the SVPDC requested its staff, with the assistance of representatives from the cities of Chesapeake, Norfolk, Portsmouth, Suffolk and Virginia Beach, to develop a response to the study with regard to its findings and recommendations.

The following is a summary of what we feel are significant issues relating to the equity of the distribution of highway construction funds between administrative funding categories as well as among the localities throughout the State.

The first issue concerns a consistent assessment of needs and the use of a factor which best measures the demand on the highway system. It was a major conclusion of the JLARC report that vehicle miles of travel was in fact the best indicator of need for the primary and secondary system. However, because of confusion over the availability of traffic counts, no effort or analysis was presented which would determine if vehicle miles of travel is also a better factor of needs on the urban system. It is our recommendation that vehicle miles of travel be investigated to determine its applicability in the urban system formula. In addition, it is our recommendation that Vehicle Miles of Travel be utilized in an evaluation of urban system needs as compared with the needs of the primary and secondary systems.

A second issue which has caused concern is the allocation of unused or unmatched urban system funds. VDH&T staff has indicated that there are several localities which either do not have a need or are unable to match Federal and State Urban System funds during a particular year. It is our recommendation that the future allocation system include a provision to allow these unused funds to be placed back into the urban fund for reallocation.

Our last comment relates to the study recommendation that Federal Interstate Match and Bridge replacement funds not be counted toward a locality's normal allocation. It is understood that in the past VDH&T made an effort to match all Federal funds as they become available, however, we feel that Bridge Replacement and Interstate funds are the result of special targeting efforts to solve particular problems and were not intended to be a part of the normal allocation. We, therefore, support the study recommendation that these funds be allocated separately and not counted as part of a locality's or construction district's normal allocation.

City of Hampton

OLDEST CONTINUOUS ENGLISH SPEAKING SETTLEMENT IN AMERICA
HAMPTON, VIRGINIA 23669

December 16, 1982

Mr. Glen Tittermary
Joint Legislative Audit & Review Commission
910 Capitol Street, Suite 1100
Richmond, VA 23219

Dear Mr. Tittermary:

Thank you for the opportunity to comment on the Joint Legislative Audit and Review Commission Exposure Draft on Highway Construction Allocations in Virginia. We apologize for the lateness of these comments but, as you are aware, we have been reviewing the implications of various alternatives well into December and, in fact, additional alternatives were presented at the public hearing. The City of Hampton has found the need for allocations review and general proposals to be timely and in the best interest of transportation improvement in Virginia.

With regard to the recommended changes, we would like to make the following comments:

Recommendation 3 - We support establishing a special bridge replacement fund, placing priority of these funds based on needs and not deducting funds from localities' regular system allocations. The repair and upkeep of these facilities are critical to transportation needs of this and other localities.

Regular System Allocations - The division of these funds (1/3 primary, 1/3 secondary, and 1/3 urban) is more reflective of roadway needs in Virginia. The City of Hampton supports this recommendation.

Urban System Allocations - It would not be in the best interest of cities or the state to legislatively require annual equity in fund distribution. An urban project typically takes a minimum of six years from initiation to construction commencement. Due to complicated environmental, right-of-way acquisition and design requirements, many projects are delayed even longer. The Virginia Department of Highways and Transportation must maintain the flexibility to react to these delays and be allowed to make allocations where projects can be moved forward. Additionally, there must be some allowance for the determination of a critical project by Virginia Department of Highways and

Transportation. A ten-year cycle for equity in allocations is understandable in light of the time required to complete a project. Maintaining this type of flexibility provides Virginia with the competitive edge necessary to retain maximum federal dollars.

Recommendation 7 - This recommendation lists several alternatives for fund allocation and statistically compares each with the predetermined urban needs. The comparison is accurately accomplished; however, the basic needs survey may be in question.

The needs survey was based on the Transportation Thoroughfares Plan and was reviewed by each locality. There, however, was not a uniform basis for needs identification. The needs may have been based on existing traffic problems, need for new roads for existing traffic or growth, industrial access, etc. Therefore, unless some uniform criteria can be established for developing needs, the comparison may be invalid. Furthermore, there is the question of whether the generated need tabulations in the JLARC staff report are adequately representative of the statutory allocations.

Population and traffic density may be most indicative of current needs. Hampton and many other cities have a backlog of current needs to relieve existing traffic problems that must be addressed prior to construction of new roads to allow for growth and expansion.

The use of area as an allocation factor directly reflects needs for new roads for growth and should be a minimal factor when used with population and traffic density. Additionally, the elimination of inter-city waterways ignores the expensive cost of transportation facilities across these barriers.

In conclusion, the City of Hampton supports the establishment of a separate bridge replacement fund, the 1/3-1/3-1/3 allocation distribution, flexibility for the Virginia Department of Highways and Transportation in the timely distribution of funds, and a distribution formula emphasizing population and traffic density which better reflects existing roadway needs.

Thank you for the opportunity to provide comments.

Sincerely,

Frank H. Miller, Jr., P.E.
Director of Public Works

FHM:ra

pdc 9
Rappahannock-Rapidan Planning District Commission
121 West Locust Street, Culpeper, VA. 22701 Telephone: (703) 825-6140

MEMORANDUM

TO: Joint Legislative Audit and Review Commission

FROM: Rappahannock-Rapidan Planning District Commission
V. Wayne Cilimberg, Regional Planner VWC

DATE: December 13, 1982

SUBJECT: Exposure Draft: Highway Construction Allocations in Virginia

The Rappahannock-Rapidan Planning District Commission (RRPDC) sees JLARC's exposure draft report concerning the equity of current statutory provisions for allocating highway construction funds as a major step forward in creating a fair and efficient allocation system. RRPDC commends JLARC for the thorough and comprehensive nature of this study.

RRPDC supports JLARC's concept of basing highway allocations on deficiencies and needs. We feel it is a desirable alternative to the present system which seems to be at least partially the product of somewhat arbitrary decisions over the last 50 years. Because of ever changing conditions impacting highway needs, however, it is important that highway deficiencies be periodically re-evaluated and needs updated. Such a process must actively involve review and comment from local government and PDC's.

Among the recommendations contained in JLARC's report, RRPDC supports: 1) An interstate match set-aside; 2) Increasing the unpaved roads fund; 3) Creation of a bridge replacement fund; 4) Allocation to the primary, secondary, and urban systems based on need; 5) The concept of allocating primary road funds on a planning district boundary basis rather than construction district basis; 6) The concept of allocating urban system funds on a formula basis rather than the current system of "ten-year equity." Furthermore, RRPDC feels that changes in the formula distribution of secondary and primary road funds should be closely scrutinized and emphasize allocation by need.

RRPDC hopes the state will closely review the findings and recommendations of this JLARC study. In a period of declining revenues and increasing needs, it represents a logical and equitable approach to highway construction funding and deserves the utmost consideration. The RRPDC is thankful for the opportunity to comment on JLARC's work.

VWC/mhm

Fairfax County Chamber of Commerce

10 December 1982

Mr. Raymond Pethtel
Executive Director
Joint Legislative Audit
and Review Commission
Suite 1100, 910 Capitol Street
Richmond, Virginia 23219

Dear Mr. Pethtel:

This letter will comment on and compliment the JLARC staff for its Exposure Draft concerning Highway Construction Allocations in Virginia dated 8 November 1982. The report is such an excellent job that the compliments come first, and the comments second. It is not just because the study supports the contentions made by a number of us with respect to the inadequacy and inequity of the existing formula that we compliment the work. It should be comforting to your staff to know that a study with an emphasis on statistical rigor and mathematical validity also is rational and equitable. For the production of a superior report over a short period of time, your staff is to be complimented.

With respect to comments:

It may be appropriate to add another special fund prior to county allocations. This would be a fund from which counties develop/raise funds to pay for secondary roads such as the $50 million that Fairfax County has now raised through bonds (my understanding is that Henrico County has also raised a significant amount through bond issues) would be matched as there is the Interstate match. It is anticipated that this fund would phase out as the impact of the more fair allocations begin to overcome the inequities of the last 25 years.

A second special fund which specifically addresses the inequities of the last 25 years of allocation, perhaps titled "A Retroactive Equity Fund," might also be established. This also would phase out over the next 10-15 years as the significant discrepancies which now exist as a result of the previous system are worked off.

While the realignment of fund allocations from the current 50-25-25 break on primary, urban and secondary roads is more equitable as a 1/3-1/3-1/3 split, it may be more reasonable to realign the system to one based upon traffic volumes rather than on historical function. As

8550 Arlington Boulevard, Fairfax, Virginia 22031 (703) 573-9450

pointed out in our testimony previously, Fairfax County has "secondary" roads carrying twice the Commonwealth's average Interstate volume. (Since the moniker of primary, urban and secondary roads do have importance, it is imperative now, however, to focus on equitable distribution than logical terminology.)

It would appear equitable to allocate Arlington and Henrico County funds the same way other counties similarly situated would be allocated if they were within the state system.

A technical question: Why are the primary allocation coefficients in the .5 range while the ones for the urban and secondary systems are in the more significant .8 and .9 range?

Since the basis for need was such an important part of our original discussion it would be helpful to us if you would provide a comparison between the two needs allocations which are now used in the study (and which have high statistical correlations) and the original needs list which we felt to be less than adequate.

The above comments in no way detract from the respect we have for the study as a whole and the importance we feel it should be given and the immediate attention as reflected in our letter to the Chairman of the Joint Legislative Audit and Review Commission.

Sincerely,

E. M. Risse, Chairman
Transportation Committee

EMR:cl

MOUNT ROGERS PLANNING DISTRICT COMMISSION

C. PAUL KINKADE, Chairman
RICHARD B. GORDON, Vice Chairman
P. WESLEY HAMBRICK, JR., Treasurer
THOMAS G. TAYLOR, Executive Director

1021 Terrace Drive • Marion, Virginia 24354 • Phone (703) 783-5103

December 8, 1982

Mr. Gary T. Henry
Chairman, Advisory Network
Joint Legislative Audit and Review Commission
Suite 1100, 910 Capitol Street
Richmond, Virginia 23219

Dear Mr. Henry:

Enclosed please find a resolution in support of changes in highway construction allocations in Virginia adopted by the Executive Committee of the Mount Rogers Planning District Commission on December 2, 1982. Please enter this resolution into the record of public comments at the Joint Legislative Audit and Review Commission public hearing of December 13, 1982.

Mr. L. Martin Britt of our staff will not be giving testimony at the hearing as indicated in Mr. Robert E. Johnson's letter of November 16, and his (Mr. Britt's) name should be removed from the register.

Sincerely,

Thomas G. Taylor
Executive Director

bmh

Enclosure

SERVING LOCAL GOVERNMENTS IN
BLAND • CARROLL • GRAYSON • SMYTH • WASHINGTON • WYTHE
BRISTOL • GALAX

RESOLUTION IN SUPPORT OF
CHANGES IN HIGHWAY CONSTRUCTION ALLOCATIONS
IN VIRGINIA
PUBLIC HEARING
DECEMBER 13, 1982

WHEREAS, the Joint Legislative Audit and Review Commission is currently examining highway construction allocations in Virginia; and

WHEREAS, Joint Legislative Audit and Review Commission is proposing that highway construction allocations be more sensitive to the highway construction needs of the Commonwealth; and

WHEREAS, highway construction allocations in the Mount Rogers Planning District generally have not met the highway construction needs of the region; and

WHEREAS, secondary system highway needs are in particular need of attention; and

WHEREAS, the general changes to the highway allocations formulas proposed by Joint Legislative Audit and Review Commission would more equitably address the highway construction needs of the jurisdiction within the Mount Rogers Planning District than does the current formula;

BE IT THEREFORE NOW RESOLVED, that the Mount Rogers Planning District Commission supports the examination of the highway construction allocations formula currently being conducted by the Joint Legislative Audit and Review Commission and that the Mount Rogers Planning District Commission supports the establishment of a highway construction allocation formula which will more equitably meet the needs of the jurisdiction within the Mount Rogers Planning District and the Commonwealth of Virginia.

ADOPTED: 2 Dec 82

C. Paul Kinkade, Chairman

Thomas G. Taylor, Executive Director

RUTH HODGES SMITH, CMC
CITY CLERK

City of Virginia Beach

MUNICIPAL CENTER
VIRGINIA BEACH, VIRGINIA 23456-9002

December 7, 1982

Mr. Ray D. Pethtel
Director
Joint Legislative Audit and Review Commission
Commonwealth of Virginia
Suite 1100
910 Capitol Street
Richmond, Virginia 23219

Dear Mister Director:

The Virginia Beach City Council, at its regular meeting December 6, 1982, adopted the attached Resolution supporting the staff recommendations outlined in the JLARC Report entitled "Highway Construction Allocations in Virginia, November 8, 1982" and urging the Virginia General Assembly to enact these recommendations into law.

The recommendations were reviewed by the City Manager, Mr. Thomas Muehlenbeck, and forwarded with his recommendation for approval to the Members of the Virginia Beach City Council. We look forward to favorable legislative action in the next session of the General Assembly.

Respectfully yours,

Ruth Hodges Smith

Ruth Hodges Smith, CMC
City Clerk

RHS:etd

cc: Mayor Jones
Councilman Robert Jones
Mr. David Grochmal
Virginia Legislators

R E S O L U T I O N

WHEREAS, in 1982, the Virginia General Assembly directed the Joint Legislative Audit and Review Commission (JLARC) to conduct a study of the reasonableness, appropriateness, and equity of the current statutory provisions for allocating highway construction funds among the several highway systems and the individual cities and counties of the Commonwealth; and

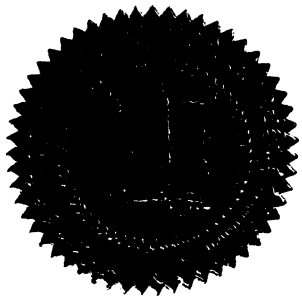
WHEREAS, the JLARC study considered equity in terms of highway construction needs and stated that an equitable distribution of construction funds occurs when the relative proportion of funds allocated to a locality is equivalent to the relative proportion of construction needs in the locality; and

WHEREAS, the Virginia Department of Highways and Transportation has estimated the present and future highway construction needs for Virginia Beach at a total cost of $785,837,976, which is 4.1% of the total highway construction needs of the entire state; and

WHEREAS, JLARC staff has used this State Highway Department needs information to develop recommendations for changing the highway construction allocation formula as outlined in a draft report dated November 8, 1982; and

WHEREAS, the only way to achieve equity in the distribution of highway construction funds to localities is to base the distribution totally upon highway construction needs within each locality.

NOW, THEREFORE, BE IT RESOLVED by the Council of the City of Virginia Beach that the Council supports all of the staff recommendations outlined in the JLARC report entitled "Highway Construction Allocations in Virginia November 8, 1982," and urges the Virginia General Assembly to enact those recommendations into law.



City of Chesapeake
Virginia

Office of the City Manager

November 30, 1982

Mr. Ray D. Pethtel, Director
Commonwealth of Virginia
Joint Legislative Audit and Review Commission
Suite 1100, 910 Capitol Street
Richmond, Virginia 23219

RE: HIGHWAY CONSTRUCTION ALLOCATIONS IN VIRGINIA

Dear Mr. Pethtel:

Chesapeake's staff has reviewed the exposure draft of Highway Construction Allocations in Virginia and generally concurs with its overall findings and recommendations.

The recommendation to create a "Bridge Replacement Fund" in addition to the existing allocations is welcomed. Perhaps the name "Bridge Rehabilitation/ Replacement Fund" would be more appropriate. The need to replace bridges exists. However, a bridge rehabilitation may be more cost effective than waiting until it has deteriorated to the point that replacement is required. Chesapeake is aware of this need as a result of the 60 bridges in its road system. At present, funds to rehabilitate or replace these bridges are in direct competition with other needed highway and road improvements.

Chesapeake's urban highway construction allocations must fund primary and secondary roads in addition to bridge rehabilitations and/or replacement. There are 273.65 lane miles of primary roads, 1,115.30 lane miles of secondary roads, and 4.4 centerline miles of unpaved roads in the City's road system. Most of these roads are in need of improvement or reconstruction resulting from increased traffic demands, both vehicle volume and increased legal loads for trucks, and inadequate funding of both construction allocations and maintenance payments.

Chesapeake stands to benefit from the primary system allocations. Option P-3 is in the City's long term best interests considering the overall primary allocation reduction proposed.

RE: Highway Construction Allocations In Virginia

In summary, Chesapeake comments are:

1. that it supports the creation of a "Bridge Replacement Funds" allocation but requests that rehabilitation of bridges be included in the fund,

2. that it supports Option U-1 for urban allocations,

3. that it supports Option P-3 for primary allocations, and

4. that it supports the readjustment of proportions of funds to each system to one-third.

Sincerely,

John T. Maxwell
City Manager

JTM/THW:lil

RICHMOND REGIONAL PLANNING DISTRICT COMMISSION

November 30, 1982

Mr. Gary T. Henry, Chairman
Advisory Network Joint Legislative
Audit and Review Commission
Suite 1100, 910 Capitol Street
Richmond, VA 23219

RE: Highway Construction Allocations
of Virginia

Dear Mr. Henry:

We appreciate this opportunity to provide technical comments on the above referenced document. These comments represent the opinions of the RRPDC staff and should not be considered as expression of an official policy position or viewpoint of the Commission and its member governments.

On the whole, we believe the study represents a very good effort at addressing the critical issue of highway construction funding allocations. Our region firmly believes that a more equitable system is needed and supports your efforts to address this problem.

We would like to make the following comments on the study for your consideration:

1. Needs and Allocation

Though your analysis shows a high correlation between physical factors (i.e., population, employment, etc.) and highway construction needs for each system, it does not show how needs and allocation by jurisdiction compare to total state needs and allocation by system. This comparison may reveal other equity problems. For example, the Richmond region (PDC 15) has 13.1% of the State's primary road construction needs; however, under Options P-1, P-2, and P-3, the region would receive only 9.5%, 9.5%, and 10.1% respectively of the total allocation statewide for primary highways.

6 NORTH SIXTH STREET, SUITE 500, RICHMOND, VIRGINIA 23219 • PHONE (804) 644-8586

2. Existing and Future Needs

A question arises whether existing and future needs should be lumped together, particularly since most future needs represent only long range projections of traffic demand. This problem is apparently one explanation why accident rates show such a weak relationship with system needs. Furthermore, an allocation system which does not emphasize existing over long term needs promotes less than cost-effective investment in development oriented, underutilized highway facilities.

3. Primary Highway Funds Allocation

In making your recommendation (No. 9) on changing the geographic base for distribution of primary highway construction funds, you may also want to recommend changing construction district boundaries, where needed, to correspond to planning district commission boundaries. This recommendation would help minimize coordination problems between construction district offices in administering projects.

We hope our comments will be of benefit to your agency and again thank you for this opportunity.

Sincerely,

John P. Kidd, AICP
Executive Director

JPK/tb

CITY OF COVINGTON
VIRGINIA

OFFICE OF THE CITY MANAGER
158 NORTH COURT AVENUE
COVINGTON, VIRGINIA 24426
703-962-4984

GEORGE W. NESTER
CITY MANAGER

November 30, 1982

Mr. Glen S. Tittermary, Project Director
Highway Allocations Study
Joint Legislative Audit and Review Commission
Suite 1100, 910 Capitol Street
Richmond, VA 23219

Dear Mr. Tittermary:

This letter is written to express the City of Covington's grave concern over the JLARC proposal to divide funding equally among the three (3) highway systems.

At the present time, the City of Covington is expending funds on street and highway maintenance at the following levels:

Street Department	$ 321,066
Motor Pool Maintenance	54,517
Street Paving	76,000
Street Lighting	111,600
Street Cleaning	1,474
Traffic Engineering	38,270
Snow & Ice Removal	8,127
TOTAL	$ 611,054

This amount is used to maintain streets at Department of Highway standards and is distributed over 15.42 miles of Primary Streets, and 61.34 Secondary Streets. From the allocation from the Virginia Department of Highways, we receive maintenance funds in the estimated amount of $279,186.60 per fiscal year. The JLARC proposal would reduce this funding level for Covington to $216,612.

It is therefore very essential that you recognize that the state's assistance will be significantly reduced, while at the same time the current costs to the City to continue these services will continue to rise. It appears that the funding ratio in our City would increase to 65% City, and decrease to 35% State in financing the maintenance of our street and highway system.

This hardly seems equitable when one considers that the Virginia Department of Highways maintains the whole road system in county's.

The City of Covington would therefore appeal that the funding allocation for City Urban and Secondary systems increase to permit us to offset the increasing burden that the maintenance of streets is placing on us.

If you have questions or need additional information on this matter, please feel free to call on me.

Sincerely,

George W. Nester
City Manager

kwt

cc: File

County of Stafford

P.O. BOX 339
STAFFORD, VIRGINIA 22554-0339

November 30, 1982

Mr. Gary T. Henry
Advisory Network
Joint Legislative Audit and
Review Commission
Suite 1100
910 Capitol Street
Richmond, VA 23219

RE: JLARC MEETING
DECEMBER 13, 1982

Dear Mr. Henry:

Thank you for sending the JLARC Exposure Draft to our County for review and comment.

Stafford County strongly endorses option S-3 for the secondary road allocation formula and option P-1 for the primary allocation formula. Mr. Phillip E. Hornung, Chairman of the Board of Supervisors for Stafford County will represent the County at the public meeting on December 13.

Thank you for allowing our input during the preparation of this report.

Sincerely,

R. E. Bain
County Administrator

REB/PTW/dsg

cc: Reading File

The City of Lynchburg, Virginia

CITY HALL [illegible] VIRGINIA 24505

THE CITY OF SEVEN HILLS

CITY COUNCIL

November 30, 1982

Mr. Glen Tittermary
Joint Legislative Audit & Review Commission
910 Capitol Street, Suite 1100
Richmond, VA 23219

Dear Mr. Tittermary:

The City of Lynchburg welcomes the opportunity to submit comments on the JLARC Exposure Draft Report on the equity of allocating highway funds.

(1) The report reveals that the Percentage of Construction needs to be approximately equal for the primary, secondary and urban systems. The City concurs with the recommendation to adjust the proportion of funds provided to one-third for each system.

(2) A separate bridge replacement fund is needed to ensure the use of available federal bridge funding and to relieve regular system allocations of high cost bridge projects. While we support and recognize the need for a separate bridge fund, it may prove of very little benefit to the City of Lynchburg if administered as proposed. City Council in 1979 adopted a very comprehensive bridge program that attempted to address all bridge needs. Since that time three (3) of the worst bridges have been replaced (two used 100% local funds which were in excess of $1.5 million) and it is planned that one additional bridge will be replaced each year until most of basic needs are met. If these proposed JLARC funds are dispursed based on current federal ratings which relate to condition and need, the City will be penalized for having an effective program of replacing worst bridges first. The most serious bridge replacement need that is completely beyond the funding capability of the City under current statues or under your proposed changes is the Williams Viaduct Bridge Replacement.

The City respectfully request that the final JLARC Report indicate the very unique nature of the Williams Viaduct Bridge Replacement as this is by far the largest single bridge project in central and western Virginia. A $40 million dollar project in a city such as Lynchburg, with a current highway allocation of $1.3 million is entirely different from some of the other large bridges in the eastern part of the State, where current and proposed highway allocations are much larger.

(3) The City concurs with the recommendation to establish a statutory formula for allocating urban system funds to ensure equity of distribution to cities and towns. A formula using factors of population, area and lane mileage would seem to be a fair measure of a locality's needs.

(4) While the use of primary system funds in each district to match interstate federal funds does impact the Primary System Construction Program, these districts and urban areas do receive a high designed facility constructed with interstate funds allocated off-the-top. It would not be equitable for districts with interstate routes to also receive a full share of primary system funds. It is recommended that if funds to match Federal Interstate Aid be separate from a district's primary system allocation, then a larger share of primary funds be given to those districts with little or no interstate routes. The Lynchburg District is the only district in Virginia that does not have any interstate highways.

Attached is a resolution adopted by the Lynchburg City Council at its meeting on November 23, 1982 which supports the above comments.

We request that time be alloted at your December 13, 1982 public hearing for two individuals from Lynchburg to present these and other comments.

We appreciate the dedication and insight exhibited by the JLARC Staff in objectively dealing with a very complex issue.

Sincerely,

Joan W. MacCallum (pw)

Joan W. MacCallum
Council Member and
Chairperson of Physical
Development Committee

Attachment

#R-82-248

RESOLUTION

WHEREAS, the Joint Legislative Audit and Review Commission is conducting a study of the reasonableness, appropriateness, and equity of the current statutory provisions for allocating highway construction funds among the several highway systems and the individual cities and counties of the Commonwealth; and,

WHEREAS, the Joint Legislative Audit and Review Commission study includes recommendations for the allocation of highway construction funds; and

WHEREAS, the City of Lynchburg feels that revisions are needed to the current statutory provisions for the allocation of highway construction funds.

NOW, Therefore, be it resolved that the Council of the City of Lynchburg offers the following recommendations for the allocation of highway construction funds:

1. The proportion of funds provided to the primary, secondary and urban systems be adjusted to one-third for each system.
2. Establish a bridge replacement fund for funding special bridge needs and the fund be separate from the regular system allocations.
3. Establish a statutory formula for allocating urban system funds.
4. Funds to match Federal Interstate Aid should be separate from a District's primary system allocation only if compensation is made to those districts with little or no interstate routes.

Adopted: November 23, 1982

Certified: Barbara J. Sage
Clerk of Council

TOWN OF WYTHEVILLE

COUNCIL-MANAGER FORM OF GOVERNMENT SINCE 1924

COUNCIL MEMBERS
DR. CARL E. STARK
MAYOR
GENE K. BAUMGARDNER
VICE-MAYOR
THOMAS A. BRALLEY, JR.
ANNE B. CROCKETT
JAMES R. HUDSON, JR.

"The Hub of Southwest Virginia"

TOWN MANAGER
CARTER W. BEAMER
TOWN TREASURER
MARY M. BOURNE
TOWN CLERK
LUCILLE V. MILGRIM
CHIEF OF POLICE
W. Z. McALLISTER

DRAWER 533
WYTHEVILLE, VIRGINIA 24382
TELEPHONE 228-3111

OFFICE OF: Town Manager

November 24, 1982

Mr. Glen Tittermary
Joint Legislative Audit and Review Commission
910 Capitol Street, Suite 1100
Richmond, Virginia 23219

Dear Mr. Tittermary

We have received information through the Virginia Municipal League concerning the JLARC staff recommendations for revisions in highway construction allocations. Also, we understand that these revisions have no bearing on the present arrangement for lane mileage payments which are paid to the towns and cities. With this understanding, and reviewing the estimated allocations under the proposed system, we would be somewhat benefited. It was estimated that we would be allocated $234,285 for fiscal year 1983 if the plan were in place. On the average we have been receiving considerably less than this amount in aid on construction projects.

We do have some concern with the statement that the urban need seems to be fairly determined by consideration of the population and area factors.

It seems to us that the existing street mileage, which must be maintained, and in many cases reconstructed, should be an important factor.

Concerning the primary system, we fail to see that planning district boundaries have any relationship to the manner in which highway and street funds are allocated.

Trusting the above comments may be of some value, I am,

Very sincerely

Carter W. Beamer
Town Manager

152

CWB/pjc

TOWN of MARION

P. O. Box 1005
MARION, VIRGINIA 24354

(703) 783-4113

November 19, 1982

OFFICE OF THE

Mr. Richard F. Weeks, Jr.
Virginia Municipal League
P. O. Box 753
Richmond, Virginia 23206

Dear Mr. Weeks:

This is in reference to your letter dated November 11, 1982 concerning the Joint Legislative Audit and Review Commission's recommendation pertaining to allocation of highway funds for the Marion area. After careful study of other recommendations stated in the letter, I, as an elected official of the Town of Marion cannot agree on any point of recommendations as set forth by the JLARC.

It appears from the Highway Allocation Options Summary, Secondary System FY1983 dollar figures, the only ones to suffer a reduction are the small cities and towns in the lower and southwest sections of the state while the northern and coastal cities allocation is increased by as much as 100% because of their population. This Summary shows marked increases in allocated funds for six (6) of the seven (7) counties noted with the Fairfax current allocation being more than doubled.

Marion favors allocating highway funds based on traffic count surveys instead of on the population of areas. The JLARC must realize that for an area to grow and prosper, even rural areas, good all weather roads and bridges must be constructed and maintained for all, and we do not think that Marion could continue to grow with an urban system funds loss of $110,000.00.

Respectfully,

TOWN OF MARION

W. W. Scott, Jr.
Mayor

WWSJr/s

cc: Mr. Glen Tittermary

STATEMENT OF DELEGATE VIVIAN WATTS

COMMONWEALTH OF VIRGINIA

HOUSE OF DELEGATES

RICHMOND

VIVIAN E. WATTS
[illegible]
[illegible]
FIFTY-FIRST DISTRICT
[illegible]

HIGHWAY CONSTRUCTION ALLOCATIONS IN VIRGINIA

Statement to
The JLARC Commission
December 13, 1982

I will focus my remarks on just two major points made in the JLARC Staff Exposure Draft:

(1) "Declining revenues and the requirement for secondary allocations to be based on amounts allocated in FY1977 have resulted in inequitable allocations to the counties. This provision, which once acted as a 'hold harmless' provision, now contributes to an increasingly inequitable distribution of funds." (page i)

(2) Whatever changes in the formulas are made should not be viewed as permanent solutions.

Some might be appalled at the magnitude of road needs in Fairfax County shown in the JLARC report, which any one of the staff recommendations would go a long way to address. I have made the trip here this morning to make sure that the perspective is clear as to why our backlog of needs has reached these crisis proportions. I assure you, you are not being asked to put the fox in the hen house, rather to provide all citizens of the Commonwealth have an adequate place to roost.

By accident of location -- and a few Virginia court decisions -- Fairfax now houses approximately one in every eight Virginia residents. (Fairfax City and Falls Church included) If highway districts were purely on the basis of population, we would have one to ourselves.

Fairfax collects close to one-fifth of the gasoline tax revenues, due in no small measure to the fact we have 22% of the vehicle miles traveled on secondary roads...secondary roads such as one in my district which carries 62,000 vehicles a day, twice the volume of the average interstate.

In 1977 the General Assembly recognized the need to address the obvious road needs stemming from these statistics. It didn't take a sophisticated computer, just the common sense of elected officials wanting to assure equity and continued economic growth. If the expressed will of this body had been carried out, Fairfax's list of road needs would be considerably shorter.

However, because a large number of sidewalks were repaired in 1977, the 1977 "hold harmless" provision has hurt Fairfax far more than any other jurisdiction. Not just in actual dollars, which would be natural given our size, but in proportion to our needs. We have received considerably less than half of what was agreed to be a fair share under the 5-Factor secondary road formula. Other counties have seen their shares cut 30%, 20%, 10%. These loses are not to be sneezed at even on a year or two temporary basis, but they are devasting in their cumulative effect over the last five years.

According to data provided to me by Spotsylvania, 52.8% of the population in the counties which make up the secondary road system have been thus penalized. This does not represent a majority of the General Assembly, however, and we will be dependent upon a sense of fair play for the support of those members representing cities to at least partially address this five year inequity by eliminating the 1977 "hold harmless" in the 1983 General Assembly. To prevent even greater inequities from mounting, it is important to honor the 5-Factor formula even for one year should there be general agreement that the more equitable changes which have been documented by the JLARC staff study should not be approached until 1984 when all transportation funding issues can be looked at as a whole.

One observation in passing: there does seem to be a basis for substantially more understanding of equity issues between counties and cities than may have existed even a few years ago, despite the fact funding mechanisms in the Code differ. Several cities are experiencing the rapid growth of suburban jurisdictions, while Fairfax as the urban area in the county road system, has begun pouring substantial local dollars into our roads. Voters have approved $55 million in general obligation bonds for road construction over the last two years. We have begun the Dulles Toll Road. Furthermore, we continue to build 1000's of miles of subdivision streets mony of which are used as four lane thoroughfares.

I will be brief in addressing my second point. I hope the General Assembly will cast all our deliberations on the JLARC recommendations for road funding formula changes in light of Recommendation #10. To the degree the cumulative inequities of the 1977 "hold harmless" provision are gradually addressed through any new formula, eventually that formula will have to be changed lest the picture become skewed in another direction. Furthermore, in the Appendix you will note a 50% difference in the road needs projected by Fairfax County and those projected by the state. This is not the result of our trying to pave our streets with gold! The Springfield By-Pass -- a major series of secondary road improvements which would serve a cross-county corridor that currently carries as much traffic as the entire length of I-81 in Virginia -- was not included in the state's list.

Road building must be regarded as a dynamic process. It may not make it any easier politically, but the Commonwealth will be well-served by each step we take towards equity.

STATEMENT FOR ROANOKE COUNTY

On November 8, 1982, the Joint Legislative Audit and Review Commission (JLARC) received a briefing from the JLARC Staff on the appropriateness of the existing method of Allocating Highway Construction Funds. The Staff also made specific recommendations on possible changes that would result in more equitable Construction Allocations to Cities and Counties throughout Virginia.

After reviewing the proposed changes, Roanoke County is pleased to see the possibility of much more equitable allocations in the future. The JLARC Staff addressed every issue of concern to Roanoke County, but left several questions to be answered.

We would like to see a study as to the appropriateness of Henrico and Arlington Counties receiving a "flat percentage" for allocations rather than allocations based on equitable formulas. Roanoke County also questions the percentage that these two counties take of the total construction fund.

The proposal to create a separate bridge fund appears to be an excellent method of replacing sub-standard bridges, but several questions remain to be answered. Namely, where will the fund come from, how will the priorities be set, and who will set the priorities?

Roanoke County also feels that more information is needed prior to using Planning District Boundaries for Primary Highway Allocations rather than Virginia Department of Highways and Transportation District Boundaries. For instance, what changes, if any, would result in Primary Allocations?

With the information available on the two unpaved roads options, Roanoke County would prefer to use unpaved roads as a factor in Secondary Highway Allocations. By doing this, the local Board of Supervisors would be able to choose which roads would be most beneficial to be paved. If the General Assembly were to use this option, they need to increase the proportion of the allocation for Secondary Highways to 40 percent in order to reflect the needs of both unpaved and secondary roads.

In closing, Roanoke County wishes to commend the JLARC Staff on the manner in which they have conducted this study and the alternatives that they have recommended.

STATEMENT FOR PRINCE GEORGE COUNTY

This Study is very comprehensive and can provide many improvements in the allocation of State Highway funds. Developing a system that is more equitable for all localities should be the number

one priority of this JLARC study. Prince George County supports that official position of the Virginia Association of Counties. That position stipulates that no County be allocated less secondary road construction funds than currently being received. With the escalating costs of construction, a reduction for any County should not occur.

Changing the funding formula and yet not reducing any County's secondary road budget or any City's urban fund can occur if the major divisions recommended by the JLARC Staff are followed. We support the recommendation that would change the funding formula from 50% primary construction funding - 25% Secondary Road Construction Funding and 25% Urban Construction to an even 33 1/3% allocation to each of these major areas. In most Counties, particularly those experiencing growth, Secondary Road impprovements and additions are usually the most essential to the locality's road intrastructure.

As recommended by the JLARC Staff, we strongly recommend that Special Funding Categories be provided for off the top prior to allocations in the three major categories. Inter-state 10% matching funding should be taken off the Statewide funding allocation prior to division into the three major categories. It is certainly fair that a Highway District not be unfairly burdened by interstate matching funding requirements. Interstate systems are for the entire State and should be treated that way. Ninety percent of all State interstate roadways are complete, and we need to finish the remaining 10% as soon as possible.

Greater priority should be given to paving unpaved roads. The percentage of funding should be increased from 3.75% to at least double that amount. Allocations should be based on construction needs. Funding for unpaved roads and bridges should be provided for off the top prior to division of funds into the three major areas.

Lastly, I would certainly not argue that the current method for allocating Secondary Funds is fair. Basing these allocations on 1977 funding limits is creating an unequitable situation. If the five factor formula were used excluding the 1977 funding limit data, a major improvement would occur. After reviewing the three options for secondary funding, we would recommend the third option, S-3. Since vehicle usage is the truest measuring source for road-use demand, a formula that combines secondary road mileage and vehicle density within a locality is surely the fairest to Counties of all sizes. Even smaller localities that are growing must have the funding necessary to construct the secondary roadways necessary for the growth that is occurring. Large or small counties should not be given an undue advantage and it appears that large localities would have such a decided edge if options 1 and 2 of the draft document were followed.

STATEMENT FOR THE CITY OF LYNCHBURG

System Allocations

The report shows the percentage of construction needs to be approximately equal for primary, secondary, and urban systems. We support the recommendation to adjust the proportion of funds to one-third for each system.

Urban System Allocations

We support the recommendation to establish a statutory formula for allocating urban funds. Factors of population, area, and lane mileage are suggested to develop a formula for allocating the funds. With nearly 400,000 people living in the Lynchburg highway district--more than 7 percent of the State's population, the Lynchburg district will receive only 4.3 percent of Virginia's highway construction money this year.

Bridge Replacement Fund

A separate bridge replacement fund is needed to establish a program for replacing deficient bridges throughout the State. However, it is important that an equitable means for distribution of these funds be developed. The City of Lynchburg has a comprehensive bridge program which provides for the replacement and repair of the most needed structures. Since 1979, three of the worst bridges in the city have been replaced; one by State Urban Project and two bridges with 100% local funds costing in excess of $1.5 million. Other bridges are scheduled for replacement in the City's Capital Improvement Program.

However, we have a very unique bridge replacement need in the City of Lynchburg: The Williams Viaduct Bridge crossing the James River between the City of Lynchburg and Amherst County which is in a seriously deteriorating condition and is estimated to cost $40 million. This is certainly beyond the funding capability of the City of Lynchburg with our annual allocation of $1.3 million and probably beyond the scope of this bridge replacement fund. This bridge is the largest project of any type in Central and Western Virginia and is completely unique to this part of the state. This bridge serves as one of two crossings of the James River serving the entire Central Virginia area and serves as the one and only access to several major industries within the city. In addition, the approaches to this bridge on the north are somewhat hazardous as the recent accident involving the death of two University of Virginia students indicated. We respectfully request that JLARC recognize the uniqueness of this project and recommend special funding. The Virginia Department of Highways and Transportation has currently requested Federal bridge discretionary funds for three bridges in Virginia with the Williams Viaduct being third and last priority. We would request that the Highway Department be directed to move up the priority of the Williams Viaduct as the two

other bridges will be constructed under the current allocation process even if Federal funds are not obtained. However, the Williams Viaduct can only be build if Federal funds are obtained or special funds are provided by the General Assembly.

Interstate Matching Funds

We oppose the JLARC recommendation to allocate interstate matching funds off the top unless additional funding could be provided to the Lynchburg area. Some of the reasons are:

A. The Lynchburg district is the only district within the State of Virginia which has no interstate highways.

B. The Lynchburg SMSA is the only major SMSA in Virginia and believed to be one of only three SMSA's in the entire United States that does not have an interstate connection. The City of Lynchburg is one of only two cities in the United States of over 50,000 population that does not have an interstate highway.

C. Areas with interstate routes receive a highway system built to superior standards with basically all Federal funds.

D. Allocating the funds off the top will decrease the remaining primary system funds for all areas and will especially impact the Lynchburg district.

E. A majority of the funds being provided by the new 5¢ gasoline tax being considered presently by Congress will be used for the construction of new interstate routes and repaving of existing interstate route. This will further widen the gap of funding for the Lynchburg district which has no interstate roads.

F. We strongly recommend that areas with no interstate funds receive a larger share of primary and urban system allocations.

Our problems in the Lynchburg area, and throughout the Lynchburg Highway District, are not the fault of the General Assembly or the Highway Department or even any sinister force hidden from view. Rather our plight is an accident of history. Because we missed out on the interstate system--with I-81 running far to the west and I-64 rainbowed around us to the north--we have been penalized doubly ever after by allocation formulas based on the interstate system. The final insult and injury come when practically all the costs of maintaining the interstate come from Federal funds and the remaining state allocation of highway funds places a premium on the amount of interstate mileage you have in your district. In effect, every other district in the state is given a bonus for their good fortune.

We hope JLARC will encourage the General Assembly to correct this grievous injustice.

STATEMENT FOR THE CITY OF NEWPORT NEWS

The City of Newport News is grateful to the JLARC Commission for providing this opportunity to comment on the Exposure Draft Report for the Highway Construction Allocations Study. The City appreciates the magnitude and complexity of the task undertaken by JLARC and would like to compliment both the Commission and its staff on their efforts to date. In particular, the City has been impressed by the frankness and openness of JLARC staff in sharing data and results on such a sensitive subject as the equity of highway construction allocations in Virginia.

Given the magnitude and complexity of the task at hand, it is hoped that the Commission will not abandon the thoroughness of its investigation in favor of some "quick fix" answer in order to meet the statutory deadline for reporting to the Governor and General Assembly prior to the 1983 Session. In light of some of the issues raised by the statements at this public hearing and the new information provided by JLARC staff today, there is a continued need for soliciting comments within a reasonable time frame and maintaining dialogue with the local governments concerned. Adequate opportunity for discussion of options and recommendations will insure that the Final Report provided to the Governor and General Assembly will be sound basis for subsequent legislative consideration. Although all technical questions cannot be answered by the time the document must be submitted, the JLARC forum should be utilized to its fullest extent in developing concrete recommendations which will narrow the scope of inquiry on this difficult subject for the General Assembly.

More specifically, the City of Newport News would like to offer the following comments concerning the original JLARC Exposure Draft on Highway Construction Allocations in Virginia (dated November 8, 1982):

1) Increasing the system allocation for "urban" roads to 1/3 of the total State amount available for highway construction is appropriate in light of the information identified in the Draft Report. Since urban highways carry about 32% of the statewide VMT and have about 33.5% of the identified project needs in terms of cost, they should be allocated a corresponding share of the available funds. Thus, the City of Newport News strongly supports this change.

2) The creation of a special Interstate match fund of a sufficient amount set aside from the total statewide highway construction budget, rather than from a Virginia Department of Highways and Transportation (VDH&T) district's allocation for primary roads, will assure the completion of this national as well as state highway priority. Interstate projects, by their very name and nature, benefit the whole state as well as national highway system and thus should be directly funded on a statewide basis. This will also avoid penalizing local areas by limiting the amount of allocated funds available to them for other highway projects. We, therefore, endorse this staff proposal.

3) Reclassification of highways for purposes of the "primary" funding category should be considered by VDH&T. The "primary" highway system is supposed to include all "principal arterial highways in urban areas which are extensions of rural arterials". However, in practice, very few of these urban extensions are so classified. For example, JLARC staff was given by VDH&T a primary lane mileage figure of 17.1 for Newport News. This figure does not even come close to the over 60 lane-miles of federal-aid primary for the City currently recognized by the U.S. Department of Transportation as a result of the functional classification study completed in 1976.

4) In light of the fact that we have been provided with new information by JLARC staff today, the City of Newport News is not prepared at this time to go on record as favoring any particular formula option for allocating "urban" highway funds. The City does, however, have some general comments concerning the factors being considered in the current formula options:

a) Individual factors which by themselves show very little, if any, relationship to "urban" highway need should not be considered further in combination with other factors in a formula option. Two of these factors which should be excluded from further consideration are "vehicle density" and "population density".

b) Although the "area" factor may be somewhat useful in predicting the need for new construction of urban highways in largely undeveloped localities, it does not account for the correspondingly sizable needs of largely developed cities to update and maintain their dense existing road networks. In fact, if the "area" factor is defined to include only "land area", there may be considerable difficulty in interpreting what constitutes "land". Ideally, "land" should only include buildable or usable land, exclusive of all inland waterways, marshes, wetlands, etc. However, it is recognized that many internal bodies of water could be drained (or dry up) and be filled in over the years. For Newport News, existing "land area" measurements differ by as much as 9%, depending upon whether the source is the U.S. Bureau of the Census or the Tayloe Murphy Institute of the University of Virginia. Although these differences may seem insignificant, they could translate into a difference of over $100,000 per year in funds for Newport News under the current "urban" formula option #1.

For the above reasons it is recommended that, if the "area" factor is included in a formula, it be greatly deemphasized in importance in terms of the relative weight it receives. A weighting of as much as 50% in one of the options does not appear justified.

c) Although reliable data by municipality for a vehicle miles travelled (VMT) factor apparently is not available at this time, this factor should be considered for inclusion in future formula options. These future formula options should then be made available for discussion in a public forum such as the one today. VMT, by including both resident and non-resident vehicles using a City's highway system, accounts for both commuter traffic and tourist traffic. Such non-resident traffic places heavy burdens upon the road networks of many cities throughout Virginia and is not accounted for by any of the factors being used in the current formula options. Since VMT is such a comprehensive measure of travel demand, it can be expected to show as close a relationship to need for the urban system as it did for the primary and secondary highway systems.

In conclusion, the City of Newport News would like to reiterate the need for continuing dialogue on the subject of highway construction fund allocations between JLARC and local government jurisdictions throughout Virginia. The prospect of increased federal funding with the proposed 5¢ per gallon gasoline tax increase under consideration in the present U.S. Congress only serves to reinforce this need. However, it cannot be expected that this dialogue can be completed by the statutory deadline because of the additional issues raised by testimony at today's hearing and the new information presented by JLARC staff. By continuing as long as necessary the spirit of cooperation and discussion that has characterized the JLARC efforts to date, the best possible solution to this highly sensitive and difficult subject can be achieved.

STATEMENT FOR VIRGINIA MUNICIPAL LEAGUE

The Virginia Municipal League supports the basic recommendations of the JLARC staff and we commend the General Assembly for trying to achieve equity in the distribution of highway construction funds. We support the recommendation to allocate highway construction funds by formula to each locality to ensure equity. We also support the redistribution of highway construction funds among the three systems; since, the needs of the three systems are not in proportion to the current 50.25.25 distribution among the three systems.

We strongly support the establishment of a separate bridge fund. There is a need to ensure that all federal funds are matched and that costly bridge construction does not place an excessive burden on a locality's other transportation needs.

We do have one concern which we would like you to consider before finalizing your recommendations. The lack of data on vehicle miles traveled in the urban system is a critical problem for our municipalities. The factors of population and area do not reflect the

heavy traffic of nonmunicipal residents commuting into the municipality for jobs and services. This affects not only large cities but all municipalities in the urban system.

We understand that vehicle miles traveled was not used because not all cities and towns collect this data. However, it is also our understanding that the state compiles this data for the secondary and primary systems. We believe that this data is critical to determining urban system needs and the needs of each municipality in the urban system. We therefore take the position that to achieve equity the State Department of Highways and Transportation should collect data on vehicle miles traveled for the urban system. Also, this data should be included in the calculation of the urban system needs and in the formula for allocating funds within the urban system.

Again, we would like to commend you for undertaking this difficult task and allowing us to present our comments.

STATEMENT FOR FAIRFAX COUNTY

Fairfax County is keenly interested in, and has closely followed, the study of highway construction allocations conducted by your staff. We agree with the JLARC Study findings regarding the equity of the existing highway allocation formulas for Fairfax County and we believe that most of the changes recommended by the JLARC staff should be implemented.

I would like to focus my remarks today in two areas. First, I would like to present some information which we believe clearly demonstrates the inequities of the current formulas. Secondly, I would like to convey the position taken by the Fairfax County Board of Supervisors with regard to the recommended changes to the formulas.

First, I would like to advise you that the Board of Supervisors has specifically endorsed the basic findings of the study as presented on the summary handouts for the November 8 briefing. These findings indicate that:

> the current statutory provisions for allocating highway construction funds do not reflect construction needs by system nor by locality,
>
> the formulas no longer accomplish the construction policies and legislative interests intended by the General Assembly, and
>
> funds are not allocated on an equitable basis among localities.

To emphasize the inequitable impact of the existing formulas on Fairfax County, I would like to present some data that was also made available to your staff earlier in the study.

At a statewide level, Fairfax County accounts for 10.7% of the total State population and 11.4% of the total State vehicle registrations. We feel that these measures are good indicators of need. Yet, during the period between FY 75 and FY 82, the total Primary and Secondary System funds allocated to projects in Fairfax County amounted to only 4% of the total of Primary, Secondary, and Urban Systems improvement allocations Statewide. (Fairfax County receives no urban system funds.)

At the specific level of the Secondary System, the data is similar. Fairfax County has 20.3% of the population of all counties within the secondary system, 20.3% of the vehicle registrations, and accounts for 23.7% of the vehicle miles of travel on the Secondary System. Yet, the County received only 7.3% of the Secondary System improvement allocations during the period between FY 75 and FY 82.

The JLARC staff study attempted to deal with actual highway improvement needs, rather than some of the indirect measures such as population, which were cited earlier. This analysis also demonstrated the inequities of the current formulas. For example, the DHT's own needs study indicated that Secondary Road improvements in Fairfax County account for 13.1% of the total Secondary Road improvement needs statewide. Despite our concerns that the DHT needs supply appears to overstate rural needs, our percentage of need as determined by the study remains much higher than current allocation percentages. With Fairfax now receiving about 7% of the State Secondary improvement allocations, it is evident that an equitable situation does not exist.

The JLARC staff has proposed a total of ten recommended changes to the existing allocation formulas. The Fairfax County Board of Supervisors has reviewed these recommendations and supports most of them. A few of the recommendations, however, warrant more specific comment.

The existing Secondary System Improvement allocation is based upon the use of FY 1977 as a base year for establishing minimum allocations among counties. In Fairfax County, construction expenditures in that year were unusually low simply as a result of administrative decisions by the local resident engineer. This situation is clearly stated in the JLARC report, as is the impact on Fairfax County. However, it should be stressed that in FY 76 and FY 77, the secondary construction budgets in Fairfax County were only one-third of the county's secondary allocation, while in previous years it had been over 61%. Had another year been selected as the base, the County could have received a considerably larger allocation. Thus, the Board of Supervisors strongly supports the adoption of Recommendation (5), to end the use of the FY 77 allocation as a base amount.

The Board also supports the change in regular system allocations among the Primary-Secondary-Urban Systems from 50-25-25 to one-third each (Recommendation 4). In addition, the Board supports the revision of the Secondary System formulas to reflect such factors as population and vehicle-miles of travel as presented by several alternatives (Recommendation 6).

However, it should be stressed that the Board strongly opposes any increase in the unpaved road fund unless these funds are then included back into the general Secondary System account prior to allocations to specific counties. Alternative options for allocating both general secondary funds and unpaved road funds to the counties through a combined and enlarged Secondary System fund are included as inserts in the exposure draft and should be given priority consideration. If the existing percentage of funds for unpaved roads were to be simply increased, with no other changes to be formulas, then Fairfax County would be adversely affected in two ways. First, because the County receives only 0.3% of the unpaved road funds statewide, the existing funding inequities such as those described earlier would be magnified. Secondly, funds which would be available for other secondary allocations would be reduced, and this would further reduce other allocations to Fairfax County.

The Board does not support the establishment of a separate bridge replacement fund (Recommendation 2). Occasions have arisen in Fairfax County and elsewhere wherein DHT proposed to replace relatively modest bridges with structures which were built to a much higher design standard. In some cases the proposed replacement bridge was of such magnitude that it was not acceptable to the community. It is therefore felt that the creation of this fund could promote a certain extravagance in bridge replacement by DHT by assuring a continuous funding source.

The Board also supports the recommended changes to Primary System allocations (Recommendations 9 and 10). However, we urge that caution be used in allocating Primary System funds on the basis of the geographic boundaries of planning district commissions. If factors such as vehicle registrations are computed based on the total of all jurisdictions within the PDC, then excessive weight may be given to cities which do not receive Primary funds, and the relative Primary System allocations could be distorted. For example, the Southeastern Virginia PDC consists of the cities of Norfolk, Portsmouth, Virginia Beach, Chesapeake, and Suffolk, and Southampton and Isle of Wight Counties. Of these jurisdictions, only the two counties and a portion of the City of Suffolk receive Primary funds. Yet, if vehicle registrations within the entire PDC are counted in the formula, a disproportionate allocation of Primary funds results because of the enormous influence of the cities which are in the PDC.

The Board supports the other recommendations of the JLARC draft, with the exception of Recommendation 7 dealing with Urban System funds. Because Fairfax County receives none of these funds, the Board has taken no position regarding this issue.

In closing, we appreciate the opportunity to present our views on this matter before you today. As I hope I have indicated, Fairfax County believes that the existing allocation formulas are not equitable and that most of the changes recommended in the Exposure Draft should be implemented. Thank you.

STATEMENT FOR SPOTSYLVANIA COUNTY

Spotsylvania County appreciates the opportunity to comment today on the recommendations of your staff regarding highway allocation formulas. Your staff has been very helpful in providing me materials to supplement the exposure draft and in answering my questions.

Spotsylvania is a medium-sized county but is growing very rapidly. In fact, it had the highest growth rate in the 70's of any county in the Commonwealth--109%. From 1970 to 1980, our population more than doubled. In what was once almost a totally rural area, we have developed a significant suburban area and a busy commercial and industrial sector. As usually happens in areas of rapid growth, our road system has not kept pace with our growth. I have not been directly associated with local government very long, but in that short period, I have been impressed with the importance of road issues to local citizens. If any of you have ever served on a local governing body or even attended meetings on a regular basis, you know that road problems are the single most important item of concern for citizens, and usually generate the most emotion.

We applaud the tone and general conclusions of the exposure draft. There have been inequities in the way highway funds have been allocated, with the rapidly growing localities generally the ones being shortchanged. It is a positive step to analyze the needs objectively and to use rational statistical tools to determine formulas, rather than impressionistic approaches.

The largest inequity, from our point of view, has been the existence of the 1977 "no loss" provision for the allocation of secondary construction funds. Because the funds available for secondary construction have increased only slightly since 1977, the effect of that provision has been that a very insignificant portion of the funds were allocated by formula. The general public and many elected officials have been misled into believing that construction funds are allocated by formula, when in reality they are not. We are happy to see your staff recommending the elimination of that provision.

We agree with a couple of other recommendations, also. Separating the interstate matching funds from the primary construction allocations is a good idea. These highways are a great benefit to the state as a whole, and the match should not be taken out of a district's primary funds.

As your staff's analysis has shown, the highway needs of the state have changed and the state's priorities should change correspondingly. No longer do the primary and interstate roads constitute the biggest need. The secondary and urban systems are of equal stature. We support allocating the funds equally among the systems.

Let me make a suggestion you may wish to pursue. The needs data reflect long-term need--over the next 20 years. Immediate needs differ from region to region. While the long-term projections of a locality may show secondary roads to be equally important, the most pressing immediate need may be for primary roads. I suggest allowing localities to shift their allocations among the systems; for example, a county would be allowed to designate a portion of its secondary allocation to be applied toward a primary project in its boundaries. I realize this idea is more complex than it might first appear, and it may very well be impossible to administer. But I also know the bureaucracies reflexively say "no" whenever an idea that would require new ways of doing things is broached. I think it is an idea worth exploring.

I was intrigued by your staff's recommendation that primary allocations be made on the basis of planning districts. Was any consideration given to possibility of giving the PDC's some sort of role in establishing priorities for primary construction projects? That is another issue that I suggest JLARC explore.

That is what we like about the report--and there is a great deal to like. Now, on to what we don't like. There is something wrong with the formulas used to allocate funds among the localities for secondary construction. I'm not sure what is wrong; I can only point to the results which seem out of kilter.

To clearly see these results, let's look at the staff's definition of equity--"an equitable distribution of construction funds occurs when the relative proportion of funds allocated to a locality is equivalent to the relative proportion of constructions needs in the locality." The secondary construction needs, as determined by VDH&T, for Spotsylvania County equal 2.23% of the state's total secondary construction needs. For 1982-83, the county will get barely over 1% of the secondary construction money available--clearly an inequitable situation. Under the JLARC staff's three options, the best we get is 1.25% of the available funds--better than the present but still a long way from equity. If we were to get the proportion of funds corresponding to our proportion of the need, under option S-3, we would get more than $1.4 million, instead of $806,000--a difference of almost $600,000 (more than our present allocation).

Mr. Chairman, I have prepared a short table comparing the percentage of funds received under option S-2 with the percentage of need for ten localities. Some of the counties were chosen arbitrarily, others obviously were not. As you can see, equity was achieved for only one county.

I apologize to you and the staff for not raising these objections earlier, but I only discovered the problem this past weekend when I was playing with the numbers.

There is a procedure whereby one can plot the regression line against the actual data points. This shows how good a fit the regression equation is. I don't know if that was done with these equations.

In conclusion, we have heard that you may not recommend any legislation this year because of the complexities and the need for a complete airing of the issues. We commend you for your caution and desire to have a thorough examination and discussion. However, we think that at least two changes are clearly needed and we strongly urge you to support them in the upcoming session--the abolishment of the 1977 "no loss" provision and the establishment of a separate interstate matching fund.

In addition to these changes, we support or recommend:

1. Allocating construction funds to the three systems equally

2. Consideration of allowing localities to shift their allocations between systems

3. Revising the secondary allocation options currently in the exposure draft.

Comparison of relative need for construction funds with relative allocations under JLARC option S-2, selected counties:

County	Relative Need	Relative Funds	Percent of Need
Spotsylvania	.0223394	.0122396	54.8
Stafford	.0213864	.0126015	58.9
Louisa	.0055667	.0079196	142.3
Fairfax	.1324928	.1767475	132.9
Albemarle	.0354868	.0192892	54.3
Buckingham	.0086595	.0068488	79.1
Halifax	.0076104	.0133275	175.1
Scott	.0200558	.0084416	42.1
Frederick	.0110529	.0107089	96.9
James City	.0108233	.0055949	51.7

STATEMENT FOR CHESTERFIELD COUNTY

Chesterfield County has followed the development of JLARC's highway construction allocation study with a great deal of interest. The JLARC staff recommendations have been developed in a consistent and professional manner in accordance with the General Assembly's direction. However, we are greatly concerned about the key assumption and basis of the study - the question of equity.

The equity issue was established in a JLARC circular dated July 14, 1982, which said:

> "An equitable distribution of construction funds occurs when the relative proportion of funds allocated to a locality is equivalent to the relative proportion of construction needs in that locality."

This statement is, in essence, saying that all identified construction needs statewide are equal, and it further implies that the future of the Commonwealth is best served by "equitably" spreading the money throughout the state. This approach causes us tremendous concern because all road needs are not equal and must be judged on their relative importance to communities and the Commonwealth as a whole.

Just as localities are continually faced with needs that exceed funds and must decide which needs are most important, the State must make an effort to tdetermine which highway improvements are priorities.

Unfortunately, the only mention of priorities in the JLARC study is that the General Assembly previously established unpaved roads and interstate highways as priorities. There is no evidence in the JLARC study of any effort, past or current, to determine which highway improvements are most important on a statewide basis, and deserve priority status.

Increasing traffic congestion and declining revenues certainly paint a bleak picture for the future. Now, more than ever, it is critical that vision and courage be employed. We firmly believe that a totally new approach must be initiated to tackle the seemingly insurmountable highway issues. Simply switching monies from one fund to another, based on the same old "equity" approach will not get us where we need to go.

In conclusion, the Chesterfield County Board of Supervisors is very concerned about the lack of attention given to ranking of needs and establishing priorities in the JLARC study. The highways built today will continue to serve for the next 25 to 50 years and, with our limited funds, it is imperative that the money be spent on those highway improvements that are most important to the future of Virginia. We look to the General Assembly to address these important issues and to assure the best possible future for Virginia's highways.

STATEMENT FOR THE CITY OF RICHMOND

On balance, the JLARC exposure draft Highway Construction Allocations in Virginia is an excellent report and contains recommendations for much needed improvements in the allocation of highway funds.

However, there are several issues that have not been adequately addressed and one proposal that is believed to be based upon the misinterpretation of past legislative actions.

The Unpaved Road Fund was established as a part of the 1979 Annexation Immunity Package to aid rural counties that would not gain immunity and was sized to equal the increase in maintenance funds to be provided towns and cities. The 1982 addition to the 3.75 percent of the construction fund was related to the excise tax on oil companies. There is no justification for increasing the Unpaved Road Fund above the current level.

The report could be improved by the addition of a detailed discussion of the differences between construction and maintenance. The cost of major maintenance projects can be greater per mile than the paving of non-surface treated secondary roads.

The needs for highway construction funds, as structured in the study, is probably the best that can be developed but it does not reflect previous expenditures of local funds by cities and towns. As an example, the City of Richmond has contributed some thirty-five million dollars to the Richmond Metropolitan Authority and local residents are paying toll to use the facilities. If the facilities had not been built from these funding sources, the city's needs would be at least twice the current amount. The city's needs have been reduced by the local effort to provide transportation facilities. This should not result in a reduction in State assistance.

Vehicle miles traveled has a very high correlation coefficient and this factor should be used in all allocation formulas. There should be immediate steps taken to obtain this data for the urban system. This is of the utmost importance as highway revenue is derived chiefly from gasoline taxes and the use of this factor will provide for State funds being expended where they are generated.

Area, as used as a measure of size, should be the same as used in calculating population density. The establishment of a separate Bridge Replacement Fund is compatible with this determination. In addition, national park lands and military bases should be excluded as they do not require State or local road construction. The annexation immunity statute (Sec. 15.1-977.21c) provides for the exclusion of such lands in determining population density.

The use of Vehicle Density in Alternative U-3 is believed to be inappropriate as the factor is a combination of demand and size, rather than a factor of demand as listed on Table 2.

Urban funds should be allocated on the basis of U-1, population and area or possibly population and centerline miles if the latter has an equally high coefficient of multiple determination. Alternative U-2 should be rejected as it consists of two size factors. Incidentally, there is a confusion on the 11/15 revision to page 96 as to whether population is weighted 50 or 60 percent.

It is believed unfortunate that the General Assembly limited JLARC's study to the allocation of construction funds. The adequacy of the State aid that towns and cities receive for the maintenance should receive an equally thorough evaluation. Hopefully, this will be part of the HJR 105 study or will be authorized by the 1983 session.

Currently, the maintenance funds are paying only about half of local cost when construction and/or debt service cost for other town and city streets are included. Counties that do no share the cost of road maintenance receive revenue from motor vehicle licenses and property taxes.

There are many fine points in the draft report, and we indicate our support by not occupying your time by discussing them.

STATEMENT FOR THE COUNTY OF LOUDOUN

For two centuries, Loudoun County's population remained stable - at about 20,000. During the 1970's, nearly 25,000 persons moved into the County, primarily in the eastern end of the County. This growth was accompanied by increased needs and demands for more and improved public facilities and services. Estimates in Loudoun for the next ten years indicate another 25,000 to 40,000 persons.

Primarily, this growth will take place in eastern Loudoun and in the Leesburg area. Under current highway funding allocation formulas, Loudoun County finds that the Highway Department has been unable to provide funding for several critical primary road improvements. In addition, one of the recommendations under consideration today is to reduce the construction funds that will be available for primary roads.

Many counties in the State have had their major highway corridors improved by the accelerated use of interstate funds. There is no interstate highway within the County and this has placed heavy reliance on our primary roads and many of our secondary roads.

The major transportation corridor needs in Loudoun have been dependent on limited primary and secondary road funding. Forty-four percent of all the secondary roads in Loudoun are not paved.

Loudoun has more unpaved secondary roads, carrying more than 50 cars a day, than any other county in the State.

Within Loudoun, only the Town of Leesburg, the county seat, receives urban road construction funds.

Our arterial system is not complete; some of our incorporated towns do not have the long promised bypasses; our urbanizing eastern end suffers from ever-increasing traffic congestion on a daily basis.

At the same time, much of the County remains rural and our secondary roads require safety improvements and general upgrading to a reasonable level of service.

The recommendation seems to divide construction funds equally between the three road systems in the State. The estimated construction costs for each system - urban, primary, and secondary roads - are projections that go into the 21st century.

While we would not argue this, we do note that the JLARC recommendation to cut primary road funding fails to take into account the State's past commitments to completing the 1,700-mile arterial road network and commitments to improving other primary roads carrying heavy traffic. Route 7 in Loudoun County was placed on the arterial highway system by the General Assembly in 1964.

Under current funding formulas for primary roads, not all the improvements needed on Route 7 to bypass our western towns appear in the State's Six Year Construction Plan.

There is now a proposal to cut even further the construction funds available. Reducing the funds available for primary roads at this time fails to recognize the eighteen year commitment by the General Assembly and the Highway Department to complete the arterial highway system in State.

These commitments did not come easily; they should not be easily voided.

Another critical primary highway need in Loudoun is Route 28, which is a two lane primary road running from Route 7 in Loudoun to Interstate Route 66 in Fairfax.

The Route 28 corridor is one of the chief spines leading to Dulles Airport on which we plan to build our needed economic tax base expansion.

Construction of the Dulles Toll Road will be beneficial to commuters in both Loudoun and Fairfax Counties; however, when the toll road is completed next year, traffic on Route 28 will increase beyond its capacity.

The Route 28 improvements, although recognized by the Highway Department as necessary, do not yet appear on the State's Six Year Construction Plan. The needs escalate oblivious as to whether the funding to meet the needs is planned.

The next vital primary highway need in Loudoun is Route 50, a two lane road with an alarmingly high accident rate and an unacceptable amount of congestion through the Town of Middleburg.

Our secondary road needs, in light of any of the JLARC options, will be receiving less funding than is currently available.

This prospect is obviously not pleasing.

It is a situation that will continue to exacerbate.

The County works closely with the developers to seek contractual agreements where private contributions are used to construct road improvements, but by legal constraint, getting off-site highway improvements from the developer is limited.

Of all the options presented by the JLARC staff for secondary roads, Loudoun County is interested in learning more about the proposal to combine the secondary road funds with the unpaved road construction funds. We find this option attractive, if it is designed to allow construction funds from all sources to secondary projects of highest priority regardless of whether the roads are paved or unpaved.

The road is long.

The needs are many.

The funds are short; local patience is strained.

There is no perfect solution.

Do move cautiously. Consider new federal funds that may become available to the State.

The farmer in the mud, the commuter in line, the industrialists holding up on development; the County treasury hoping for a broadened tax base - all of these segments in Loudoun ask only for a just and fair consideration as their needs continue to escalate.

STATEMENT FOR THE CITY OF NORFOLK

We have reviewed the subject draft and compliment the staff for identifying a number of concerns that are most troublesome to the communities in Virginia in connection with highway construction. It is clear that available dollars for highway construction will not meet the needs identified in the report in any significant manner. For this reason, caution must be exercised in using these relatively fewer dollars to achieve the greatest beneficial effect.

We support a number of your recommendations. We have some constructive comments on others. Attached to this statement is a letter I forwarded to Mr. Glen S. Tittermary, Project Director, dated November 30, 1982, on the same subject. I request that this letter be entered into the record of the meeting as well. In that way, I will not have to repeat comments on certain technical corrections of report data during this presentation.

1) We agree with your recommendation that the Legislature should consider an Interstate Construction fund set aside for the Commonwealth, and these funds should not be deducted from a highway district's primary allocation. The Interstate system serves statewide needs and the development of this system is often directed by the location of major traffic generators that lie outside of district and state boundaries. For this reason, the need for interstate roadways in certain corridors are not the doing of the locality or district, but the fulfillment of a state or national priority. As such, the localities should not be responsible for major through traffic generated by these facilities or cost of accommodating them.

2) We concur with the need to establish a Bridge Replacement Fund, and have commented in the past upon the traumatic cost of constructing and maintaining bridges on localities. A substantial portion of Norfolk's current allocations are devoted to replacement and upgrading of obsolete and deteriorated structures. Our primary concern is that the fund size does not relate well to the total program need of these essential facilities. A bridge in need of repair constitutes a greater emergency than a roadway in similar state.

3) We support the staff recommendation to amend the Code of Virginia for adjusting the proportion of funds provided to each of the three systems (primary, secondary and urban) so that they would share equally in the construction funds available. As you are well aware, urban system funds are applied only to about 20% of the mileage of streets in the urban areas. Needs for primary and secondary roads relate to the entire system. It is anticipated that available urban system funds will address something less than 1% of the needs of the eligible roadways in this system. A more equitable allowance of funds to urban system priorities is appropriate and justified.

There are six other comments that are appropriate concerning your alternate recommendations for allocation of urban funds as follows:

1) Vehicle Miles of Travel: Your report indicates that allocations to urban area roads should be based upon two or three need factors that included: population characteristics, road system size, and area of the local jurisdiction. Further, you indicated these criteria were used because they were the best available information for urban systems.

It hardly seems appropriate that one should create the distribution of so large and important a fund over a significant number of years on the basis of less important criteria because they are the only data available today. In fact, the report identifies vehicle miles of travel as an important and relevant criterion for each of the other systems.

The indication that such data is not available for urban systems and, therefore, is not recommended to be used, falls short of an important mark.

The Highway Department has a substantial amount of travel information on vehicle miles of travel expended in urban areas. With relatively little effort (through a system of key station counts and computerized techniques available) they can simulate a fair approximation of this factor in urban areas and on the urban system. We recommend that you reconsider the use of vehicle miles traveled as an important need factor.

2) You recommend a categorical fund allocation under each of your three alternate urban system options. It is intended that each urban area receive a certain amount of money per year based upon the proportion of their population to the total urban population, and/or the proportion of their road system size or area compared to other urban communities. A statutory allocation formula would then be mandated for distribution of these funds annually.

Statutory allocation of funds creates two major problems for proper use of urban funds in Virginia.

A) Historically, the Virginia Department of Highways and Transportation has made a determination of the need for urban funds in each community that eligible to receive them. In many cases, they found that the need for funds does not exist in certain urban communities each year. At the same time, other urban communities have fund needs that substantially exceed available allocations. In their judgment, the Virginia Department of Highways and Transportation has reallocated funds from communities with no or low priorities to communities with pressing needs thus making the most effective use of urban funds available in Virginia.

Statutory allocation would prohibit this flexibility. It would encourage communities to develop a use for urban funds based upon their right to draw them when projects are identified. We believe this will not serve Virginia well.

B) A statutory allocation of funds to urban areas also will limit the ability of the Virginia Department of Highways and Transportation to leverage the maximum available federal funds. For example, in certain systems where the Federal Government participates, money is reallocated at the end of the fiscal year state by state. Funds that are over budgeted in any one area can be redistributed to other states with outstanding needs.

In addition, certain target date restraints are established at times by Federal Highway Administration which requires that funds be expended in certain categorical systems or be lost to that state. To date, the Virginia Department of Highways and Transportation has adjusted their use of State funds to leverage the maximum federal dollars to the benefit all of the citizens of the Commonwealth. An artificial restraint imposed by statutory allocations would severely hamper their ability to continue to do this, and, in fact, could lose millions of dollars for the State of Virginia. The forthcoming federal

gas tax bill is a very current example of the importance of this flexibility to Virginia. I am sure Virginia Department of Highways and Transportation staff can comment on this in further detail.

3) Your staff has accepted the current legislative definition of an Urban System contained in Section 33.1-41 of the Code of Virginia. This definition indicates that roads and highways in all cities and towns over 3,500 population, who desire to maintain their own streets, constitute eligible urban areas. I draw to your attention that the population density of urban communities under this definition varies over an extremely wide range.

For example, there are certain areas designated as urban in Virginia which have population densities of 100 persons per square mile while population densities in other communities range between 1,000 and 5,000 per square mile. A similar wide dispersion of densities exists within individual urban limits.

We suggest that this definition is obsolete and staff should propose a more appropriate definition for an urban area to be recommended to the Assembly. Example: the U. S. Census Bureau defines the boundary of an urbanized area as a population concentration of at least 50,000 inhabitants generally consisting of a central city and the surrounding closely settled contiguous territories. It may be desirable to further define an urban area population for the purpose of distribution of these funds as one which has the above general description, and more than 500 persons per square mile within the urbanized area limit.

4) We were interested in and impressed with the staff's preparation and inclusion of a comprehensive list of urban system needs. Therefore, we are concerned that staff's recommendation does not reflect any correlation between the generated need tabulation and the statutory allocations. If one compares the allocations suggested under each of the three alternates against the identified needs of the community, one derives strange figures.

In the case of certain of the larger urban areas: Norfolk, Virginia Beach, Portsmouth, Roanoke, Hampton, etc., we find that the funds provided these communities represents between 1/2% and 2% of their annual needs. For a significant number of other communities, between 5% and 10% of their needs are served annually.

At the top of the list, the formula produces a certain number of communities who receive many times their identified needs per year based upon their area or lane miles of road.

The difficulty of employing mandated authorizations or academic criteria thus becomes apparent and leads to our greatest concern:

5) Staff has recommended the use of surface area of a community as a definer of need or basis of allocation of urban funds. The justification for this is contained on page 94 of the report which states, and I quote, "Construction needs in urban areas were also found to relate to the overall area of the municipality. The total surface area of cities and towns would seem to affect the need for new construction by increasing the demand for linking distant communities with a city or town." The quote goes on, "Another relationship between area and construction need is that cities with greater land areas have more room for development and correspondingly more need for roads." I submit that the proposal will create a major distortion of the purpose of urban funds and has no basis in current nor traditional uses of urban funds.

Your report to the Legislature submitted on November 30, 1981, titled Highway Construction Maintenance and Transit Needs in Virginia stated, and I quote "Virtually all proposed construction in urban areas is intended primarily to expand the capacity of existing roadways or relieve congestion by developing new corridors as bypasses or expressways. These include projects designed to improve traffic flow by adding new lanes to existing roadways. In several cases, the proposed projects will reconstruct narrow bridges or underpasses or create a grade separation at a railroad crossing."

This statement lays a reasonable foundation for use of urban system funds. Note that it does not relate at all to linking distant communities within cities having vast land areas through development of rural connector roadways nor address land development goals.

What does one think of when the words "Urban Streets" appear? One thinks of curbs, sidewalks, traffic signals, turn lanes, driveways, gridiron street patterns, congestion, one-way street systems, street lights, air pollution, sewers not ditches, etc. Please keep this picture in mind as you consider recommending use of Urban System funds.

If one needs a model, I reluctantly point to the Federal Highway Administration's use of Urban System funds in the past 20 years or so. It is not perfect, but it is better targeted.

6) Finally, I submit to you that the responsibility for managing allocation of Urban System funds should be retained as a function of the Virginia Department of Highways and Transportation with the flexibility reserved to them to respond to frequent changes in needs, funding shifts by the Federal Government, etc. We believe they have done a relatively good job of managing this responsibility and should continue to receive our support. Communities that have priority projects have the ability to voice their needs to the Highway Department at various times during the year. The Highway Department has been and can be responsive to these needs.

To conclude, the material we have presented is convincing evidence that further analysis of the data and further consideration of the material presented herein is required. We believe the staff did a fine job in the limited time available to deal with an immense subject. However, more analysis is required. We strongly recommend that the General Assembly not be requested to take action on this report. Rather that the staff should renew its efforts during the forthcoming calendar year to investigate the problems identified today so that the General Assembly possibly will have a comprehensive and supported report on allocations for highway construction for its next full session.

City of Norfolk
Department of Public Works

December 1, 1982

Mr. Glen S. Tittermary, Project Director
JLARC Highway Allocations Study
Suite 1100, 910 Capital Street
Richmond, Virginia 23219

Re: LEGISLATION - STATE (Highway Construction Allocations in Virginia)

Dear Mr. Tittermary:

In regard to your draft exposure dated November 8, 1982, titled "Highway Construction in Virginia," we have reviewed this document and believe there are certain inaccuracies in the basic data which have been furnished about Norfolk. Further, we do not agree with the methodology of the proposed alternate allocations for the urban system. To assist you in reviewing our comments and recommendations, we have placed them under categorical headings. This will supplement the information we discussed and provided to you at our meeting of November 19, 1982.

* CONSTRUCTION NEEDS

The list provided to you by the VDH&T for the highway needs of Norfolk's urban system was incomplete. It did not include the cost of projects in the Alternate Plan Area which total in excess of $160 million of construction needs in the central area of Norfolk. The VDH&T has estimated that Norfolk's needs based on the prices used in your report are $573 million instead of the $413 million indicated on page 134.

VEHICLE REGISTRATION

Your report did not include vehicles which are owned by the military in the Norfolk area which exceed 47,000 in number. In the Hampton Roads area, a high volume of traffic, particularly for Norfolk, is generated by the extensive military complexes.

EMPLOYMENT

In addition to the omission of the military, you did not include federal, state, city civil service employees. In our area, this total is in excess of 95,000 employees or close to half of our employment. If included in the report that you provided, this would give a total in excess of 200,750 for employment instead of 104,750 as you reported.

** TRAFFIC COUNTING PROGRAM FOR URBANIZED AREA

The report states that the VDH&T does not have a traffic counting program for the urban area. We are aware that VDH&T has for many years maintained a traffic counting program on a regular basis for most of the urban system. The data

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available statewide is adequate to develop estimates of the daily vehicle miles traveled for each jurisdiction. This may require some development, though not great, on the part of the Highway Department, but we believe it is vital for your report to have this data available especially as the report states that the "daily vehicle miles traveled is the best measure of real demand which is the most obvious characteristic relating to the need for highway construction." From this statement of your report, we believe recommendations are incomplete without obtaining this necessary data for the urbanized area.

CENTERLINE LANE MILEAGE

It is our understanding that you have obtained lane mileage of all streets, both primary and secondary, for urbanized areas to be included in this component of your report. However, the needs which are being identified are only those for the thoroughfares of the urban area. In Norfolk, the thoroughfare system covers 152.6 centerline miles of our total 710 mile system. Thus, only 21 percent of the total demand on our system is recognized and an inconsistency exists in the data.

EQUITY OF CURRENT SYSTEM

For the last five years, Norfolk's allocation varied from $6,938,000 to $4,635,000. Norfolk's percent of the total allocation varied from 8.2 percent to 12.3 percent with an average of 10.3 percent which is in line with our total proportion of the urban population. Your report states that cities allocated funds in years when urban populations were artifically low received less funding on a ten year cycle basis. Our evaluation of the current system used by VDH&T is that it reasonably meets the needs of the urbanized areas as it allows the administrators of the program to adjust, where justified, funds to be directed to meet the most important deficiencies in the urbanized system.

In FY'83, 30 percent of the communities or cities in the urban system did not desire or have a project requiring funds from this source. These monies then were directed to those communities with the most urgent needs. A measure of the use of the monies is based upon the wishes (needs) of the local officials wherein they identify their important projects. Where the elected officials have not deemed that need exists, the funds are redirected to the localities where crucial needs exist for which there is an immediate need for attention. Each of your alternatives mandate that all urban communities receive funds every year regardless of need.

AREA AS A FUNCTION OF NEED

Page 94 of your report sets out that the total surface area of cities and towns would seem to effect the need for new construction by increasing demand for linking distant communities within a city or town. Another relationship between area and construction need which the report purports is that cities with greater land areas have more room for development and correspondingly more needs for roads.

In your study of "Highway Construction, Maintenance and Transit Needs in Virginia," dated November 30, 1981, presented to the legislature in 1982, on page 70, you stated,

"Virtually all proposed construction in urban areas is intended primarily to expand the capacity of existing roadways or relieve congestion by developing new corridors as bypasses or expressways. These include projects designed to improve traffic flow by adding turn lanes, traffic signal systems, realignment or widening lanes, or adding new lanes to existing roadways. In several cases, the proposed projects will reconstruct narrow bridges or underpasses or create a grade separation at a railroad crossing." That, we believe, is the proper direction of the urban highway program, rather than the position taken in your report. The program is not meant to address development needs. We cannot justifiably build streets totally to meet forecast demand for future land development or to connect distant communities when we are living with a high percentage of unsafe roadways that do not meet today's demand.

URBAN SYSTEM FUNCTIONS

You state that the urban system serves primarily as a local network because historically improvements have been made only on the thoroughfare system of high volume roads. If so, the urban system should be evaluated in a similar manner to that which you use for the primary rural system.

ISSUES NOT ADDRESSED

There are certain areas which your report has not addressed which we believe would be helpful if they were given attention. Some of the issues are:

The meaning of the category "urban." In the Commonwealth of Virginia, there are areas and cities with densities in excess of 6,800 persons per square mile while there are others with densities of approximately 100 persons per square mile. Such discrepancies have developed as cities merged or have evolved through the merger of smaller cities with the adjacent rural counties. In Southeastern Virginia, four of the seven cities have had this experience. It is difficult to ignore such a variation in densities when considering urban highway needs. The U.S. Census identifies an urban area as one which has in excess of 1,100 persons per square mile. This may be a better criterion of an urban area rather than the current legal description which is any community with over 3,500 persons within its geographical boundary. We believe that this issue should be addressed in depth with the legislature.

The lack of an urban secondary system. The needs identified in your report are only for about 20 percent of the roads within the urbanized areas known as thoroughfares. While, on the other hand, the report provides that the systems identified for the rural areas be addressed at a level of 100 percent of the needs both in the existing paved roadway systems as well as the unpaved roads. Similar needs for lower used urban streets should be addressed for the urban system.

Correllation of state funding programs with the federal funding categorical programs. The report does not address the need to parallel the state program with the federal program which is the source of considerable highway construction funds. It is important to garner the maximum dollars available from these programs without artificially restricting VDH&T's ability to leverage these dollars in their selection of

projects to be funded.

We encourage you to continue with your studies to determine the best way to expend highway dollars provided by our highway users. We conclude and recommend that the present criterion of population is the most appropriate basis for allocation of urban funds found to date.

Finally, Norfolk will be represented and provide a formal statement at your meeting of December 13, 1982 in Richmond. In the meantime, staff of the City will be reviewing the report and the apparent concerns with the City Council and others who have much interest in our street and highway present and future adequacy.

Very truly yours,

Lawrence Gassman, P.E.
Director

JLARC NOTES:

* Urban system needs were corrected to $511,393,502.

** While DHT and some cities do conduct traffic counts on a periodic basis, DHT reports that the counts are insufficient to prepare estimates of vehicle miles of travel in cities and towns.

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