1963

# The Solution to the Budgetary Support Problem Based on Highway Needs

James W. Martin

Roy W. Bahl
*Georgia State University*, rbahl@gsu.edu

Don M. Soule



## Recommended Citation

Martin, James W., Roy W. Bahl, and Don M. Soule. The Solution to the Budgetary Support Problem Based on Highway Needs. Lexington, Ky.: Bureau of Business Research, University of Kentucky, 1963. reprinted in Martin, James Walter, and Richard E. Gift. State Tax Systems Under Changing Technology : the Problems of the Roadways : Collected Papers (303-310). College of Business and Economics, University of Kentucky, 1980.

# F. The Solution to the Budgetary Support Problem Based on Highway Needs

# 1963



The problem of context lingers on. This selection reflects the conviction that the distinction between direct-user benefit and general-public benefit must be dealt with in a satisfactory manner. Dr. Martin had two co-authors in the piece, Roy W. Bahl, Jr. and Don M. Soule.

**Budgetary Support for Kentucky Highways by Systems* (1963), Chapter 3.

# THE SOLUTION BASED ON HIGHWAY NEEDS

The Automotive Safety Foundation study concluded that insufficient development of the state's highway system in relation to traffic needs resulted by 1954 in failure of more than two-thirds of the main traveled highways to measure up to conditions tolerable for current traffic.[1] Further, the same report suggested that one cause of this qualitative shortcoming was that "Kentucky's roadway network is not grouped into functionally workable systems."[2] After careful analysis of the total state highway network, the foundation proposed such a classification to replace the current one (described in Chapter I) as a requisite to allocating expenditures among systems.

**Proposed Automotive Safety Foundation Classification**

Since there are statewide, community, and local type of highway travel, the study report concluded that a highway system should be selected and developed on the basis of the travel service which it performs. It was proposed that the Department of Highways classify roads and streets into a state trunk line system, providing routes for all considerable movements of statewide and interstate travel; a county arterial system, providing main routes for principal traffic within and between counties; and feeder routes, which generally have low traffic density and function primarily as access roads. It recommended that city streets be likewise classified as trunk line, arterial, or feeder systems.

***Description of proposed systems***[3]

A basic rural trunk line network of 5,135 miles, including interstate routes, was identified to serve directly all the counties and all but twelve of the cities with populations exceeding 1,500 people. The network, while it represented only 9 percent of all rural road mileage, carried approximately three-fourths of total rural traffic.

The 13,628 miles of county arterial highways comprised about 23 percent of the total rural road mileage and was to carry 20 percent of all rural traffic.

Thus, the trunk line and county arterial routes, though they comprised but 31 percent of the state rural mileage, would together carry 94 percent of rural traffic. This mileage was to be included under the state maintained highway system while the remainder of approximately 41,000 miles of rural roads (which carried only 6 percent of the total traffic) would continue under county responsibility.

The classificiation of city streets was accomplished in a similar manner. About 356 miles of city streets were classified as state trunk line routes and an additional 706 miles were selected as an arterial street system. These two systems combined accounted for 31 percent of the total urban mileage. The remaining city street mileage was primarily for residential access and carried light traffic. It was to remain a local responsibility.

### *Estimation of construction expenditures*

The Automotive Safety Foundation established engineering standards for design, definition of tolerable conditions, and determination of motor vehicle size and weight requirements of each system. It estimated construction and maintenance needs for each system in terms of meeting the highway needs with alternative 10-, 15-, or 20-year programs. In addition, since the needs on each system were not of the same magnitude or order of priority a table of urgency of construction for each system was set up. At that time, Congress had not yet appropriated funds to provide a nine-to-one matching basis for interstate facilities, and there was no basis then to forecast the rapidity of the expansion of the interstate construction program. (Therefore, in the analysis below, the interstate program is omitted or handled separately from the programs for other systems.)

Based on the 20-year construction program, according to the Automotive Safety Foundation estimates, annual expenditures would have been required as set out in Table 10.

## Current Classification of Highways Compared with Automotive Safety Foundation Functional Classification

In the above section and in the preceding chapter, alternative solutions to the problems of the allocation of highway resources among systems have been offered in the form of the Automotive Safety Foundation's estimate of needs based on a functional classification and the present solution. By way of synthesis, if there is a reasonable degree of agreement between the Automotive Safety Foundation system and the actual system, regarding both physical and functional criteria, then it is feasible that a projection of the Automotive Safety Foundation expenditure pattern to the existing system would yield a solution in terms of today's finances.

### *Physical and functional comparisons*

Chart 2 reveals that mileage on the proposed state trunk line and county arterial systems exceeds that which comprises the federal aid primary and secondary systems by some 4,000

TABLE 10

Automotive Safety Foundation "Average Annual Program Costs" and Actual Current Construction Expenditures by Systems

| Automotive Safety Foundation Estimates | | | Actual Expenditures | | |
|---|---|---|---|---|---|
| System | Amounts | Percentage of Total | System | Amounts | Percentage of Total |
| FAI | $ 19,383,000 | 18% | FAI | $ 33,940,935 | 31% |
| State trunk line | 34,642,000 | 33 | FAP | 17,626,743[a] | 16 |
| County arterial | 20,541,000 | 20 | FAS | 11,502,238[a] | 10 |
| County feeder | 19,611,000 | 19 | NFA | 37,984,181[b] | 35 |
| Arterial streets | 5,125,000 | 5 | Urban | 8,825,933 | 8 |
| Feeder streets | 5,639,000 | 5 | | | |
| Annual state construction program cost for a 20-year period | $104,941,000 | 100 | | $109,880,030[c] | 100 |

[a]Federal aid primary and federal aid secondary totals include that portion of the federal aid urban which was spent on the respective systems. For the average of fiscal 1960 and 1961, these expenditures were: federal aid primary, $2,857,505.76; federal aid secondary, $313,260.27; amounting to a total urban fund of $3,170,766.03.

[b]This figure includes rural secondary highway construction, nonfederal aid state maintained road construction, and county construction expenditures. (See Table 8.)

[c]This total excludes federal aid, miscellaneous expenditures, since it is essentially an administrative related expense, and the Automotive Safety Foundation did not include it in the construction expenditure estimates.

SOURCE: Automotive Safety Foundation, *A Highway Program for Kentucky,* 1955, chap. iv; Table 8; and Kentucky Department of Highways, Division of Accounts, *General Ledger and Subsidiary Ledger Disbursements,* Form MR-2, for years ended June 30, 1960 and 1961.

CHART 2.—Comparison of Actual Mileage to Proposed ASF Mileage by System

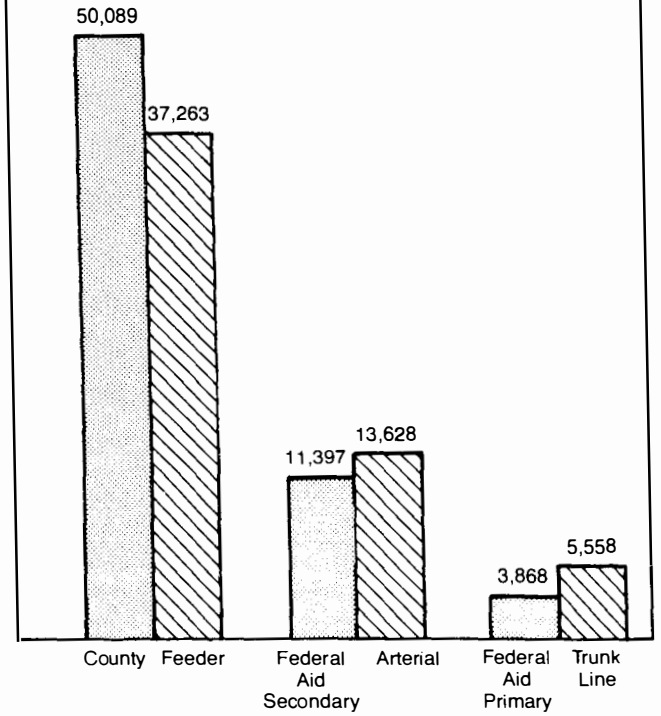
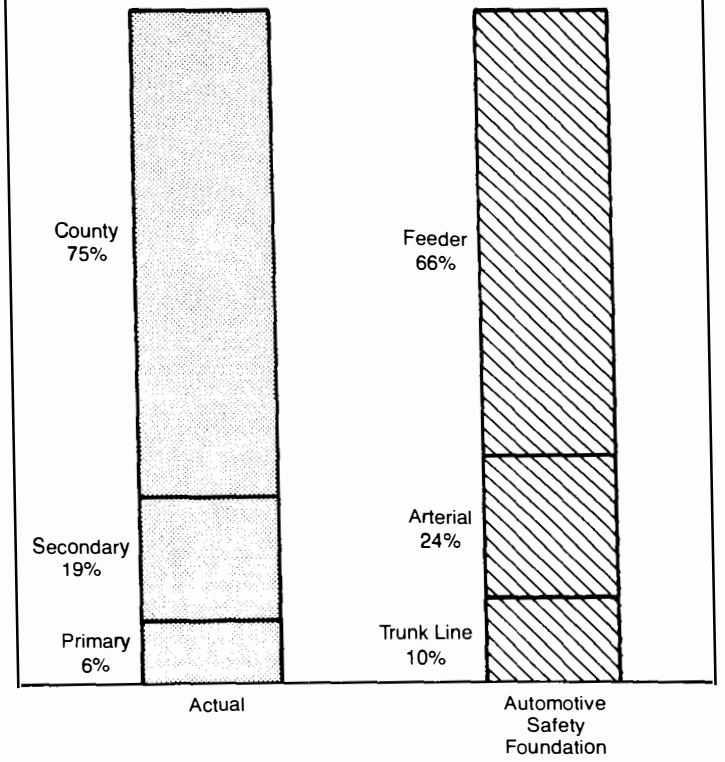



CHART 3.—Percentage Comparison of Distribution of Actual and Proposed Mileage by System



miles, while the proposed feeder system is about 12,000 miles less than the county road network. Included in this "county road network" are 45,016 miles of roads of the county road class and 5,073 miles of nonfederal aid roads presently on the state maintained system. In toto the existing system is approximately 10,000 miles greater in extent than the proposed system.

Chart 3 depicts mileage on each system as percentages of mileage on the total system. Expressed in this manner, the alternative methods of classification exhibit considerable similarity.

The Automotive Safety Foundation's trunk line network was designed to carry about 75 percent of all rural traffic while the trunk line and arterial systems together would carry 94 percent. An investigation of current traffic density patterns on the total state maintained system[4] reveals strikingly similar results. Chart 4 displays this marked congruency in function between the proposed and actual systems.

Thus, despite important limitations, there appears to be some justification for a projection of the proposed expenditure pattern to the mileage on the actual system.

### Allocation of Current Highway Construction Expenditures According to the Proposed Functional Classification

In comparing the allocation of construction expenditures among systems where neither the total mileage nor the total expenditures are in exact agreement (Table 10 and Chart 2), projections are, nevertheless, reasonably meaningful.

The basic projection, a pro rata mileage expense analysis, is accomplished by finding the average annual expenditure per mile on the proposed system and multiplying the figure by the existing number of miles on the system. The result describes how expenditures for the actual system would have been distributed among classes of highways had the Automotive Safety Foundation average program costs per mile been applied to the present mileage. The apparent advantage of this procedure is that it adjusts for differences in mileage. However, it yields a total expenditure figure quite different from the actual total current expenditure. An application of the percentages from the mileage prorate to the actual total expenditure yields meaningful dollar-and-cents figures.

This approach rests on major assumptions: that there is a sufficient degree of conformity to justify regarding the proposed state trunk line system as a roughly similar system to the federal aid primary and the county arterial network as about the same as the federal aid secondary system. The method also involves treating the nonfederal aid, state maintained and local secondary highways together as approximating the proposed feeder system.

The first two columns of Table 11 show respectively the recommended distribution of "annual program costs" adjusted to current system mileage and the percentages of the total proposed for each system. Column (3) applies the latter to the actual current annual expenditure total to show the adjusted Automotive Safety Foundation recommendation proposal in terms of these larger aggregates.

TABLE 11

Automotive Safety Foundation "Average Annual Program Costs" Pattern as Applied to Actual Mileage and Actual Total Expenditure



| System | (1) Adjusted to Actual Mileage | (2) Adjusted Figures Expressed as a Percentage of Total | (3) Adjusted Percentages Applied to Actual Total Expenditure |
|---|---|---|---|
| FAI | $21,167,864 | 21% | $ 23,074,806 |
| FAP[a] | 22,395,607 | 23 | 25,272,407 |
| FAS | 17,178,293 | 17 | 18,679,605 |
| NFA | 26,361,146 | 26 | 28,568,808 |
| Urban | 12,866,072 | 13 | 14,284,404 |
| TOTAL[a] | $99,968,982 | 100 | $109,880,030 |

[a]Excludes interstate totals.
SOURCE: Computed from Table 10.

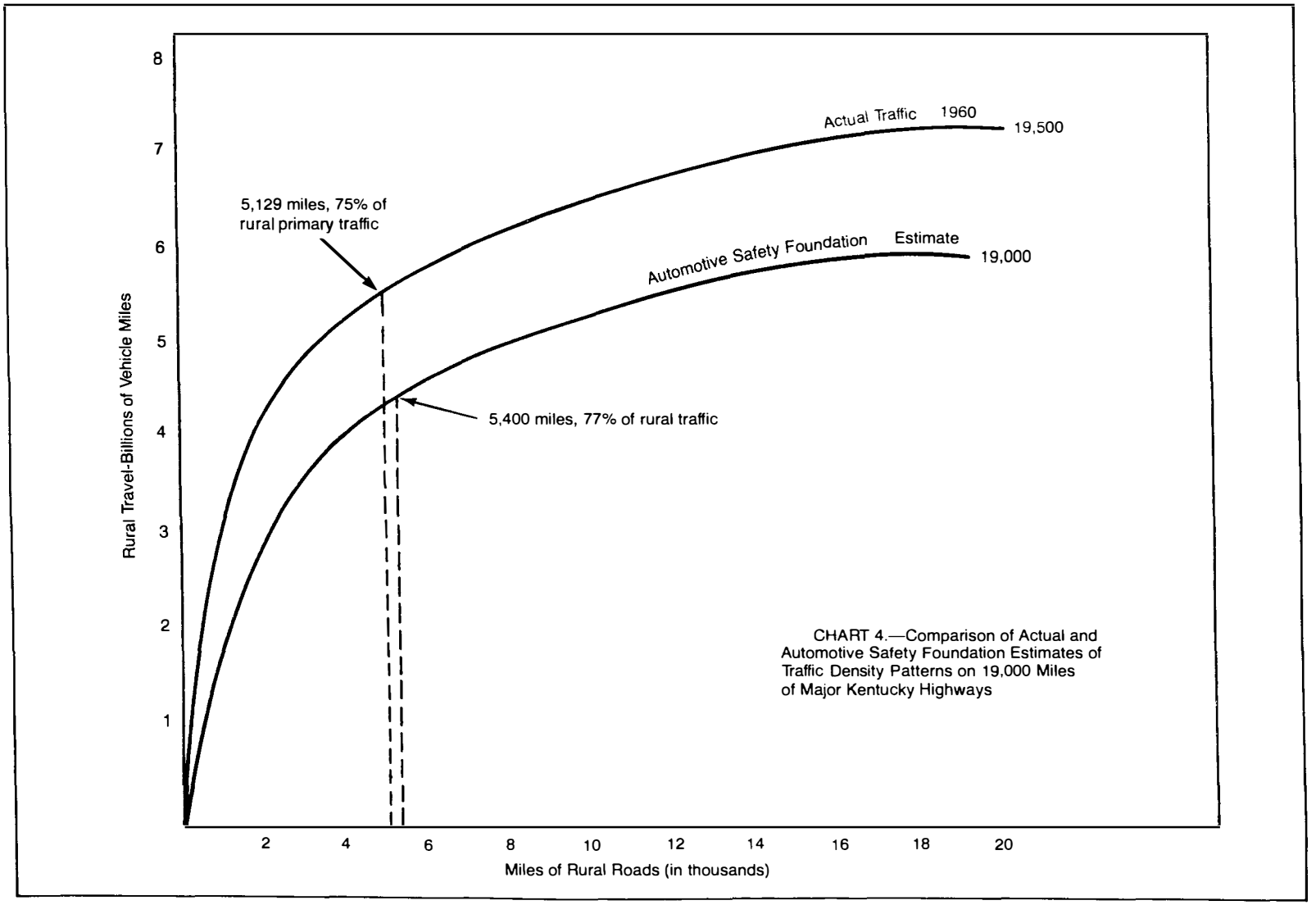
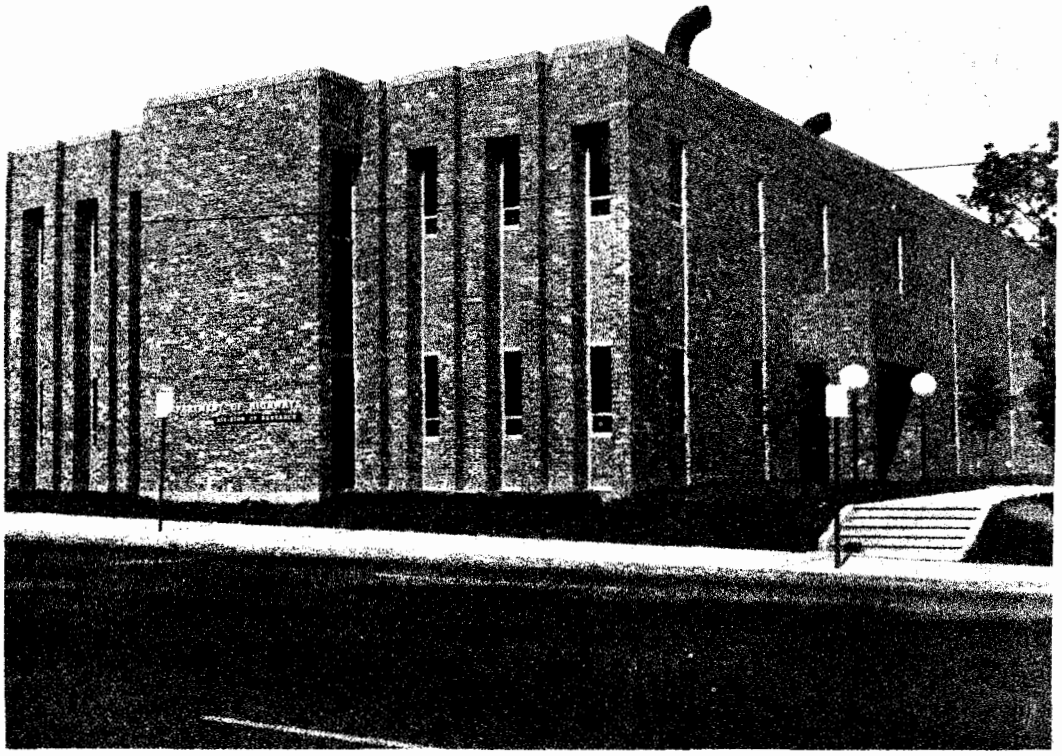



CHART 4.—Comparison of Actual and Automotive Safety Foundation Estimates of Traffic Density Patterns on 19,000 Miles of Major Kentucky Highways



New Highway Research Facility—Lexington, Kentucky



*Ky. Dept. of Highways*