

Functional Classification of Roads and Streets

JOHN E. BAERWALD

Professor of Transportation and Traffic Engineering
Director, Highway Traffic Safety Center
University of Illinois, Urbana-Champaign

INTRODUCTION

The highway transportation network in the State of Indiana, like that in any other state or country, consists of a conglomerate of roads, streets, highways, paths, alleys, and freeways. The mileage of each type of facility as well as the service provided by and the use made of each section of roadway varies from region to region as well as within any particular region.

The situation is complicated by various layers of administrative responsibility of differing management, legal, technical and fiscal abilities and resources.

Conditions are further compounded by the fact that the number of drivers and vehicles utilizing various highway facilities is increasing at a much higher rate than the improvement of the facilities themselves. For example, in 1969 Americans traveled slightly more than one trillion vehicle miles and it is estimated that the amount of yearly travel will increase from 14 to 24 percent within the next five-year period. This rapid growth can easily be compared with the seemingly deliberate capability for improving our highway transport system.

Thus, it is imperative that all levels of government be able to cooperatively develop, operate, and maintain a comprehensive highway transportation network which is capable of accommodating motor vehicle travel in an efficient, safe, and economical manner.

CONCEPTS OF ROAD CLASSIFICATION

An essential component of effective highway management is the classification of roads and streets. This classification may be on such widely divergent bases as traffic volumes, administrative responsibility, method of financing, or design characteristics.

The functions of any roadway are twofold and often in opposition to each other. First, the roadway should provide for the safe and

expeditious through movement of persons and goods (mobility). Second, it must provide accessibility to abutting property (land access).

Obviously, the conflict which exists between effectively serving through traffic movements and yet providing access to a wide variety of land uses necessitates diverse types of roadways. This difference in the character of service provided by a given roadway, or its function, is the basis for a classification procedure known as functional classification.

Fundamental to this procedure is the knowledge that travel requirements are not independently served by individual roads and streets but by a network of roadways. Functional classification is used to determine how this travel can be logically and efficiently channelized along the various individual components within the roadway network.

FUNCTIONAL CLASSIFICATION IN INDIANA

Through the mandate of 1968 Federal legislation and 1969 Indiana legislation, all Indiana highway officials are required to implement two parallel programs for classifying *all* streets, roads, and highways within the state. Because these two programs have similar objectives, a thorough approach will satisfy the requirements of both programs.

Procedures have been developed to assure the uniform functional classification of all roadways within the state and nation. This activity is being coordinated through each of the State Highway District offices.

ELEMENTS OF FUNCTIONAL CLASSIFICATION

The concentration of traffic on a limited mileage of arterial roadways is a basic goal of functional classification. Therefore, the proper "function" of any roadway is determined by consideration of numerous complex factors which help to identify the relative importance of each segment in the total road network.

Consideration is given to a roadway section's contribution to traffic mobility, land access, and the general social, economic, and cultural welfare of the public. Three basic types of roads and streets are identified in the functional classification process: arterials, collectors, and locals.

The classification of a given roadway into one of these three groups involves the determination of the level or type of service that the road is expected to provide. Certain specific factors must be evaluated before the classification of a road can be established. These factors are:

1. Length of trips traveled on the road;
2. Speed of operation;
3. Directness of routing;
4. Degree of access control;
5. Degree of land service;
6. Freedom of movement;
7. Service to activity centers or traffic generators;
8. System continuity;
9. Traffic volume; and
10. Route spacing.

Characteristics which are attributable to arterial, collector, and local routes relate to these ten specific factors.

For example, arterials are expected to provide direct routings for large volumes of traffic traveling long distances at high operating speeds. Collector roads serve a dual function: they provide some degree of mobility and they also serve abutting property while servicing shorter trips and acting as feeders to the arterials. The roads in the local system provide direct access to abutting property for relatively short trips and low volumes at the expense of free-flowing movement.

WHAT HAPPENS AFTER FUNCTIONAL CLASSIFICATION?

After all of a state's roadway mileage has been functionally classified, it is then necessary to determine the administrative responsibilities of the state, counties, and cities for the resulting road classifications.

Joint discussions and hearings are held to obtain agreement on highway classifications within individual jurisdictions. One of the most controversial points is always the transferring of responsibility for existing roads from one jurisdiction to another.

In Illinois, for example, the Highway Study Commission recommended the following changes in current mileage responsibilities:

Jurisdiction	Existing System Mileage-1967	Recommended System Mileage-1970
State	16,321	12,564
County	16,962	17,847
Township	73,205	76,603
City	21,991	21,465

In order to assist local jurisdictions to properly undertake their new responsibilities under the reclassified systems, the Study Com-

mission recommended modifications in user imposts and their allocation among the various governmental jurisdictions.

The Commission also recommended the following annual mileage allowances for a five year period for transfers from the State system to local jurisdictions:

1. \$2,500 per mile for transfers to cities and urban counties (counties with populations of 180,000 persons or more according to the 1960 U.S. Census);
2. \$2,000 per mile for transfers to other counties;
3. \$1,000 per mile for transfers to townships and road districts; and
4. An additional \$1,000 per mile for transfers of 4-lane pavements.

It was estimated that the mileage transferred from the State system would be 900 miles to cities, 925 miles to urban counties, 2,385 miles to other counties, and 700 miles to townships. Total costs over the five year period were expected to be approximately \$52 million.

The Illinois legislature has not acted on these recommendations of the Highway Study Commission concerning functional classification.

Another problem which faces the different governmental units is the case where an existing road will be reclassified to a lower system as soon as a new roadway is developed. In their interim period, which governmental unit should be responsible for the existing roadway?

For example, suppose an existing rural state highway now classified as an arterial, will be paralleled by a programmed freeway development. When completed, the freeway will then become the arterial and the existing route reclassified as a collector. If the state has responsibility for arterials and the county has responsibility for collectors, should the state or the county be responsible for the old road while the freeway is being built?

Problems such as these clearly indicate the necessity for close cooperation and continuous, full participation in functional classification by all units of government.

BENEFITS DERIVED FROM FUNCTIONAL CLASSIFICATION

In general, the development of integrated state, county, and city roadway systems provides state and local legislators, highway administrators, engineers, and planners with a firm foundation for:

1. The establishment of administratively practical highway systems;

2. The designation of minimum design and safety standards for each of the functional highway systems;
3. A logical and orderly basis for determining and evaluating present and future highway needs and improvement priorities; and
4. The equitable apportionment of highway fiscal resources.

Stated another way, the functional classification of streets, roads and highways produces several administrative advantages:

1. It allows consistency of planning, design and operation for similar types of facilities;
2. It allows units of government more efficiently and economically to provide for construction, maintenance and traffic operation because responsibilities are limited to particular classes of facilities;
3. It allows more uniform assignment of responsibilities to the same type of governmental unit; and
4. It prevents inefficient "skip" maintenance and operation.

All of the basic premises of functional classification—the "level of service" concept—the trip length—and the extent of access control are designed to accomplish one result, the most efficient total highway network. In other words, functional classification is intended to result in the "highest and best" use of highway funds.

Functional roadway system classification is not a static plan. It provides an orderly basis for the gradual reallocation of roadway responsibility among the various governmental units. It must be applied to existing and proposed routes.

When combined with highway needs determinations and fiscal plans, present and future functional classification of roadway enables the development and implementation of the most desirable highway policies by all levels of government.

BIBLIOGRAPHY

"Developing and Analyzing Functionally Classified Networks Utilizing Traffic Simulation—Phase I," *Highway Planning Technical Report* No. 3, U. S. Department of Commerce, Bureau of Public Roads, Washington, D. C., February 1966.

"1968 National Highway Functional Classification Study Manual," U. S. Department of Transportation, Federal Highway Administration, Bureau of Public Roads, Washington, D. C., April 1969.

Illinois' Complete Highway Plan 1970/1990, report of the Illinois Highway Study Commission to the 76th General Assembly, February 1969.

System Considerations for Urban Arterial Streets, Institute of Traffic Engineers, Washington, D. C., October 1969.

Reed, Marshall F., Jr., and Granum, James O., *Functional Highway Classification in Urban Areas*, Automotive Safety Foundation, Washington, D. C., July 1967.

Brown, Ralph D., Jr., "Highway Planning's Role in Developing Standards for Future Highways," unpublished paper presented to AASHO Highway Planning Committee, December 4, 1968.