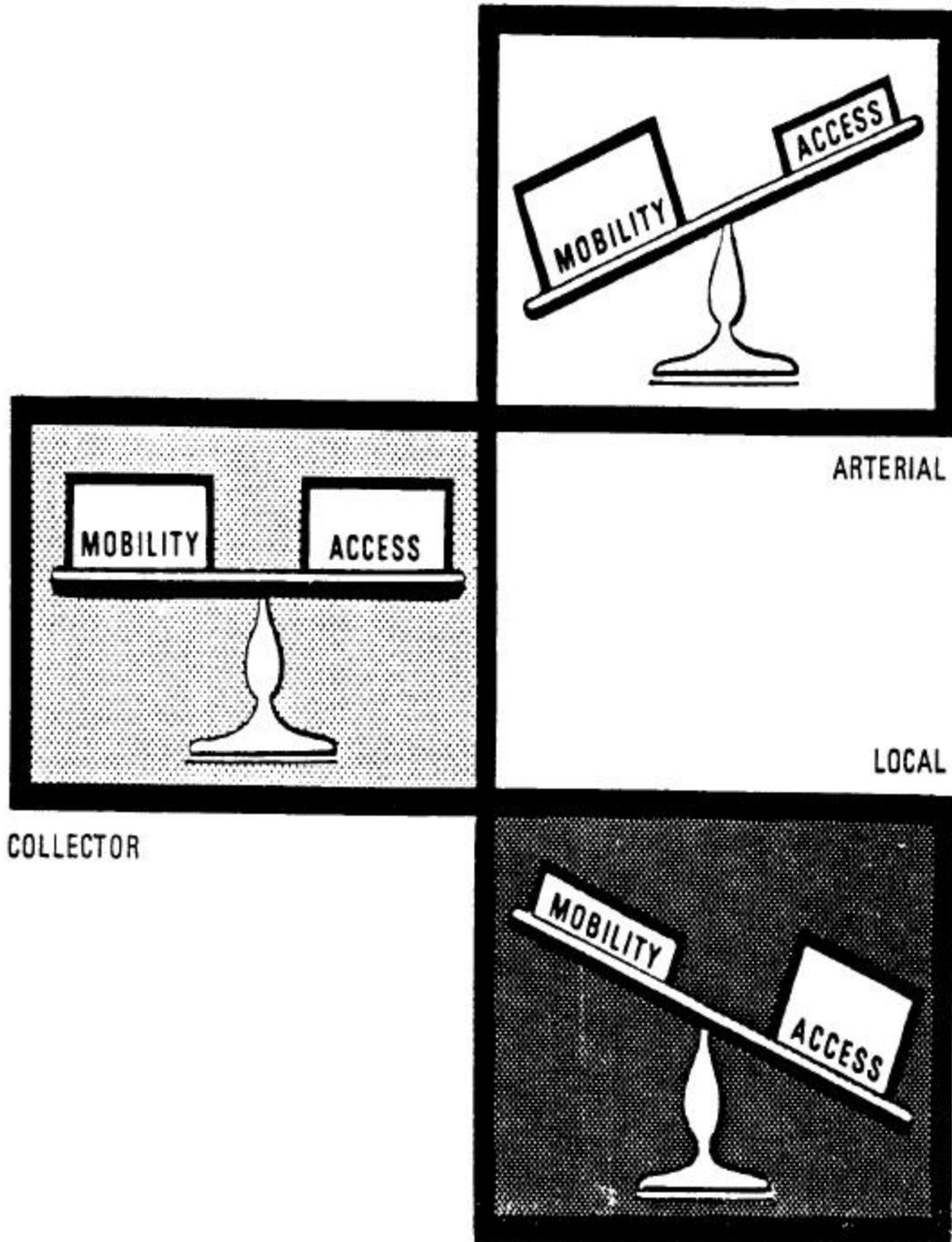


## **Appendix 3-E**

### **Highway Functional Classification Concepts, Criteria and Procedures**

# Highway Functional Classification Concepts, Criteria and Procedures



*NOTE: Credit is hereby given to "Statewide Highway Planning Procedures," NHI Course 15127.*

1. "Functional classification is the grouping of roads, streets, and highways into integrated systems, each ranked by their importance to the general welfare, the motorist, and the land-use structure."<sup>1</sup> It is used to define the role any particular road should play in serving the principal functions of a road: mobility for through movements and access to adjoining land.
2. **Importance** - This grouping implies that roads have differing levels of importance based on their function. Importance is based on economic and social values which are measured in a variety of ways. However, the basic idea is the same regardless of the method of measurement: more important roads or more critical needs deserve the most attention which, in the road context, usually means more funding.
3. Without a classification system, it is difficult to compare roads fairly. For example, a high volume, through road has different needs than a dead end street which serves a residential neighborhood. The neighborhood street is important mainly to the local residents whereas the high volume street is important to many people. If roads were ranked by importance to the most people, the local street would rarely get attention. With functional classification, the through road would be ranked with similar roads, and the local street would be ranked with other local streets. Both would then be considered for improvements, maintenance, etc. relative to competing projects on similar types of streets. In essence, functional classification allows for equal and equitable treatment where conditions are similar.

### **Historical Background**

4. "...beginning with the passage of the Federal-aid Act of 1921, functional classification concepts and criteria were used in the selection of the original Federal-aid highway system. This limited mileage, interconnected system of highways, important to interstate and intrastate motor vehicle travel, was later designated the Federal-aid Primary System (FAP). The selection in the early 1940's of the original Federal-aid secondary system (FAS), an interconnected system of principal secondary and feeder roads, with unlimited mileage, was also based on functional concepts. The most significant event in the history of functional classification occurred in the later 1940's with the selection of the National Interstate Highway System. This system of interconnected routes, very limited mileage, and the highest design standards, was created to serve the economic, social and defense needs of the Nation.

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<sup>1</sup>NAC0/NACE Guide.

5. "In the 1950's and 1960's, the States and local governments became very interested in functional classification as a management tool. A number of States used functional classification as the basis for statewide systems, needs, and fiscal studies to present to their State legislatures. The National Committee on Urban Transportation used functional classification as a key element in the development of their guide 'Better Transportation for Your City' and related procedural manuals for carrying out transportation planning and programming in urban areas. The National Association of County Engineers (NACE) also used functional classification as a key element in the development of their guide "Advance Road Programs: for efficient road planning and programming at the county level. In the mid 1960's, the American Association of State Highway Officials (MSHO), the National Association of County Officials (NACO), and NACE collaborated in the development of the MSHO-NACO-NACE "A Guide for Functional Highway Classification" which served as the basic resource document for the national functional classifications that followed in the later 1960's and early 1970's."<sup>2</sup>
6. One of the classic descriptions of functional classification and its application to urban areas is a book published in Great Britain titled, "*Traffic in Towns*," London: Her Majesty's Stationary Office, 1963. It is also known as the Colin D. Buchanan report. The book makes several good points. "*The basic principle is one of circulation. Within a hospital different corridors are used for different functions.*" In a town "*there must be areas of good environment ... and there must be a complementary network of roads.*" "*It follows that there must be a capacity relationship between the network and the environmental areas...*" "*Any new road cut through a densely developed area will, as a drain cut across a soden field, fill up.*" A hierarchy of distribution is needed whose pattern is allowed to work itself out. The Buchanan report envisioned that as a town was redeveloped, especially in dense areas, the "arterials" would be built below ground and the distributors would be built at ground level.
7. "In 1965, A Senate Joint Resolution provided a mandate by Congress for a biennial report estimating future national highway needs and a possible future Federal role in the highway program. In 1968, the first Biennial National Highway Needs Report was submitted in Congress, providing information on existing systems and deficiencies, and estimated future deficiencies through 1985. The report also pointed out difficulties in assessing needs because of the lack of nationwide uniformity in highway system classification. It recommended that a national functional classification study of all highway routes be undertaken to determine the future transportation role of all highway and streets in order to evaluate their suitability for inclusion in the Federal-aid system."

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<sup>2</sup> Highway Functional Classification, a Management Tool, Federal Highway Administration, November 1, 1982, page 3.

8. "The late 1960s were the peak of the activity on the 3-C process in urbanized areas. Efforts were made to use the computerized assignments to help with functional classification. One promising technique was to weight each trip by its trip length, assign it, and plot the results by band width. The links with wide band widths were important to serving both traffic and long distance trips."<sup>3</sup>
9. "In response, the Federal-aid Highway Act of 1968 stipulated that the report to Congress to be submitted in 1970 include the results of a nationwide functional highway classification study of existing facilities. This to be made in cooperation with State highway departments and local governments with particular attention to the establishment of highway system categories, rural and urban, according to the functional importance of routes, desirable as one of the basis for realigning Federal highway programs to better meet future needs and priorities. The functional classification study was conducted without regard to the existing Federal-aid system or jurisdictional responsibility. The 1970 National Highway Needs Supplement Report included the results obtained from the data collected during the 1968 classification study and concluded that adjustments in the Federal-aid systems would be desirable.
10. "In the Federal-aid Highway Act of 1973, Section 148, Congress specified that the classification of all streets and highways and the realignment of the Federal-aid systems be based on anticipated functional usage in 1980. By July 1976, the realignment of the Federal-aid Highway Systems was completed. The extensive level of effort required for the functional classification study and the Federal-aid highway system realignment was provided by the State highway agencies in cooperation with appropriate local agencies."<sup>4</sup>

## **Concepts**

11. The entire concept of functional classification is based on certain key characteristics which can be used to differentiate between different kinds of highway facilities. First, urban and rural areas exhibit different characteristics -- including the density and types of land uses, the density of street and highway networks, the nature of travel patterns, and the way that the highway network itself relates to these characteristics. Therefore, the functional classification scheme used throughout the nation provides separate classification systems for urban and rural facilities. For clarity, urban areas are subdivided into two categories -- urban and small urban. Urban areas are defined to be population centers of 50,000 or more. Small urban areas are defined by the population threshold of 5,000. This latter threshold was established based on observations that rural arterial and collector routes provide an adequate arterial street network in places of less

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<sup>3</sup> REFERENCE James Gruver, "Test Comparison between Functional and Volume Concepts of Delineating Traffic Corridors," FHWA Highway Planning Technical Report No. 6, August 1967. (See also Report No. 3, February 1966).

<sup>4</sup> op. cit., *Highway Functional Classification, a Management Tool*, page 4.

than 5,000 population. Hence, rural classifications apply to roads in all areas of less than 5,000 population.

12. Second, functional classification differentiates between different types of highway service. The two most general types of highway service are mobility and land use access. As can be seen on Exhibit 4C-1, arterials emphasize a high degree of mobility, high speeds for long trips which means limited access. Local facilities emphasize the land use function with low speeds and many access points. Collectors more-or-less half-way serve both functions.

### **Characteristics of Different Functional Classifications**

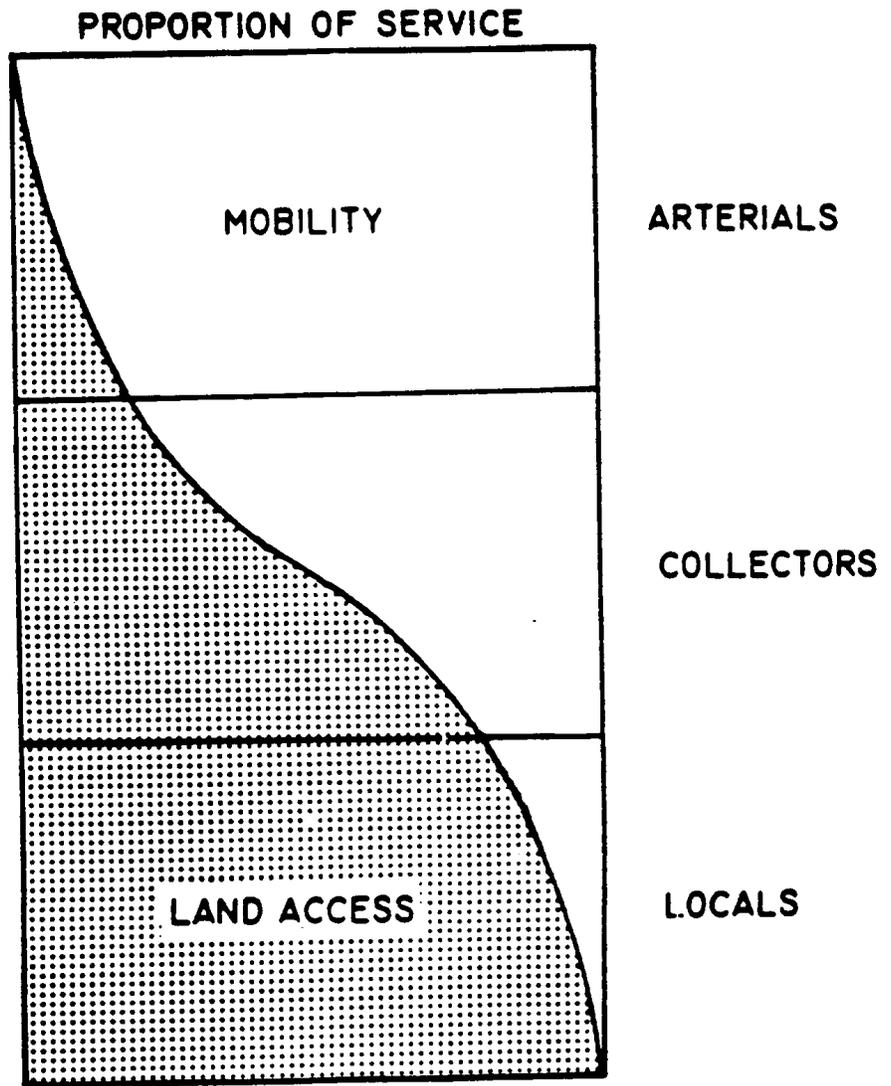
13. Most users of a highway system already have some concept of functional classification. For example, they use their "neighborhood" street to get to the "main" road to commute to work. They tend to take an interstate or U.S. road for a long trip instead of county roads. They tend to live on small, low volume streets rather than on congested roads.
14. The above words incorporate some of the concepts of functional classification but also indicate an important point: functional classification is not precise. That is, functional classification has elements of subjectivity; no single quantitative measure can be used to classify roads. Judgement and relativity are important factors in functional classification. Functional classification is to highways as land use planning is to land and architecture is to interior building design.
15. Even though precise definition of different categories of roads cannot be given, the Federal Highway Administration has published general characteristics of different categories of roads. Exhibit 4C-2 summarizes the different categories according to the Federal system which is used in varying degrees by most states.
16. **Uses** - Some of the uses of functional classification are to:
  - \* Provide the framework of highways for serving mobility and connecting regions, cities, and ports within a state.
  - \* Provide a basis for assigning jurisdictional responsibility according to overall importance of the road.
  - \* Provide for minimum design standards according to function.
  - \* Provide a basis for evaluation of present and future needs.
  - \* Provide a basis for the apportionment of scarce fiscal resources.

## **Formulating Administrative Responsibility**

17. "Assigning road responsibilities to government jurisdictions is a basic policy matter that must be clearly and consistently established with a high degree of permanence if the total road development program is to be effectively organized. Transportation agencies can function far more efficiently if their responsibilities are confined to streets and highways having similar functions and levels of service.



**Relationship of Functionally Classified Systems  
in Serving  
Traffic Mobility and Land Access**



## Characteristics of Different Functional Classes

<u>SYSTEM</u>	<u>CHARACTERISTICS</u>
<i>RURAL</i>	
1. Rural Principal Arterial	<ol style="list-style-type: none"> <li>1. Serve corridor movements having trip lengths and travel densities indicative of substantial statewide or interstate travel.</li> <li>2. Serve virtually all urban areas of 50,000 and over and large majority of those with population over 25,000. Generally, rural arterials penetrate the urban boundary or are within 10 miles of the urban center and are within 20 minutes travel time from the center.</li> <li>3. Provide an integrated network without stub connections.</li> </ol>
a. Rural Interstate	<ol style="list-style-type: none"> <li>1. Principal arterial already designated as part of Interstate System.</li> </ol>
b. Rural Other Principal Arterial	<ol style="list-style-type: none"> <li>1. All non-interstate principal arterials.</li> </ol>
c. Rural Minor Arterial	<ol style="list-style-type: none"> <li>1. Link cities and larger towns (or major resorts) and form an integrated network providing interstate and intercounty service.</li> <li>2. Spaced at intervals so that all developed areas are within a reasonable distance of an arterial.</li> <li>3. Provide service to corridors with trip lengths and travel density greater than those served by rural collector or local systems. They should have high overall travel speed with minimum interference to through movements.</li> </ol>
2. Rural Collector importance.	<ol style="list-style-type: none"> <li>1. Serve travel primarily of intracounty</li> <li>2. More moderate speeds may be typical.</li> </ol>
a. Rural Minor Collector	<ol style="list-style-type: none"> <li>1. Provide service to any county seat, larger towns, and other traffic generators not served by higher systems. Example generators include consolidated schools, county parks, mining, agricultural areas, etc.</li> </ol>

## Characteristics of Different Functional Classes

<u>SYSTEM</u>	<u>CHARACTERISTICS</u>
	<ul style="list-style-type: none"> <li>2. Link these places with nearby larger towns or with roads of higher class.</li> <li>3. Serve most important intracounty corridors.</li> </ul>
b. Rural Minor Collector	<ul style="list-style-type: none"> <li>1. Be spaced at intervals to collect traffic from local roads and bring all developed areas within a reasonable distance of a collector.</li> <li>2. Provide service to remaining smaller communities.</li> <li>3. Link locally important traffic generators with rural hinterland.</li> </ul>
3. Rural Local	<ul style="list-style-type: none"> <li>1. Serve primarily access to adjacent land.</li> <li>2. Provide service over relatively short distances.</li> </ul>
<i>URBAN</i> 1. Urban Principal Arterial	<ul style="list-style-type: none"> <li>1. Serve major centers of activity, highest traffic volume corridors, and longest trip desires.</li> <li>2. Carry high proportion of total urban travel on minimum of mileage.</li> <li>3. Integrated internally and between major rural connections.</li> <li>4. Carry major portion of trips entering and leaving urban area as well as through movements.</li> <li>5. Serve significant intra-area travel.</li> <li>6. Provide continuity for rural arterials which intercept urban boundary.</li> <li>7. Service to adjoining land is subordinate to major travel movements.</li> </ul>
a. Urban Interstate	<ul style="list-style-type: none"> <li>1. Principal arterial already designated as part of Interstate System.</li> </ul>
b. Urban Other Freeways/	<ul style="list-style-type: none"> <li>1. Non-interstate, controlled-access facilities. Expressways</li> </ul>
c. Other Principal Arterials	<ul style="list-style-type: none"> <li>1. Principal arterials without control of access.</li> </ul>

## Characteristics of Different Functional Classes

### SYSTEM

### CHARACTERISTICS

- |                         |   |
|-------------------------|---|
| 2. Urban Minor Arterial | <ol style="list-style-type: none"><li>1. Interconnect with and augment principal arterial system.</li><li>2. Provide service to trips of moderate length.</li><li>3. Distribute travel to smaller geographic areas.</li><li>4. Place more emphasis on land access.</li><li>5. Provide urban connections to rural collectors.</li><li>6. Should not penetrate neighborhoods.</li></ol> |
| 3. Urban Collector      | <ol style="list-style-type: none"><li>1. Provide both land access and traffic circulation within residential neighborhoods, commercial or industrial areas.</li><li>2. May penetrate residential neighborhoods.</li><li>3. Distribute trips from arterials to locals and collect trips from locals and channel them to arterials.</li></ol>   |
| 4. Urban Local          | <ol style="list-style-type: none"><li>1. Provide direct access to adjoining land.</li><li>2. Provide access to higher systems.</li><li>3. Lowest level of mobility; discourages through traffic movement.</li></ol>   |

SOURCE: Highway Functional Classification - Concepts, Criteria and Procedures, Transmittal 155, Volume 20, Appendix 12, Federal Highway Administration, July 1974.

18. "Many state highway systems have grown through the years without regard for highway function. They may include the entire range of functional classes -- even local-access streets. Such heterogeneous grouping not only extends the scope of design and maintenance standards that must be utilized by the state highway department, but also the range of problems facing state highway administrators. At one extreme the administrator might deal with the overflow of water from a culvert on a strictly local road. At the other, he might be involved in a multi-million dollar interchange project affecting the jobs of hundreds of people and the economy of an entire urban region.
19. *"In urban areas, responsibility for road administration may be divided among several levels of government. This may result from lack of any well-defined criteria or methodology for determining respective responsibilities. Functional classification can provide a proper basis for solving this problem on a more logical and equitable basis."*<sup>5</sup> This was demonstrated in recent studies of jurisdictional administration in Utah and Washington State. Key findings from those studies are summarized in the following paragraphs.
20. The advantages of using functional classification as a basic structure for highway system designation have been stated as follows:

*"Functional classification...can be directly related to logical jurisdictional assignment. A class of roads serving travel that extends beyond the boundaries of local government can most logically be planned and administered by an agency whose powers extend beyond such local boundaries - that is, by the State. Roads that primarily serve more localized travel, how ever, can be planned and administered locally. Also, local government is closer to the problems and to the consistency and, hence, in a better position to be responsive than State government."*<sup>6</sup>
21. Inherent in the concept of assigning jurisdictional responsibilities on the basis of functional classification is the realization that a jurisdiction controls the way in which highway agencies implement policies. Since the State Government is typically concerned with Statewide issues, they should control roadways and streets which are used for Statewide travel. Counties should control roadways and streets which are important to counties, and cities should control routes which are important to cities. In this fashion, the agencies most concerned with mobility on a given route will be permitted to establish speed limits, traffic controls, and signage according to local desires and needs, within the bounds of accepted engineering practices.
22. It is also important to understand the difference between urban and rural classifications. There are differences in the density and types of land uses found in the two settings.

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<sup>5</sup> op.cit., *Functional Highway Classification in Urban Areas*.

<sup>6</sup> op. cit., *Highway Jurisdiction*, page 8.

Obviously, urban areas have significantly higher densities of residential and commercial land uses. Rural areas are more likely to contain certain types of industry, special recreational areas, and undeveloped tracts of land. As a result, there is a significant difference in the density of urban and rural street and highway networks. As an example, the spacing between streets is much smaller in urban areas than the rural hinterlands. Additionally, there is a big difference in the nature of urban and rural travel patterns. Rural trip lengths are generally long, while urban trips include substantially more short distance trips within the urban environment.

23. These urban/rural differences are recognized within functional classification schemes. As a result, the definitions for individual classes of roadways varies between urban and rural settings. For example, rural principal arterials primarily serve Statewide or interstate travel. On the other hand, principal arterials in large urban areas may primarily serve travel movements within the urban area. Therefore, methods for identifying and assigning jurisdiction must recognize the difference in urban and rural characteristics. Therefore, separate principles will be needed for urban and rural areas.
24. **Rural Principles** - Those roads which provide services which are of statewide importance (i.e., traversing the rural areas) logically should be administered by a state agency, in this case, the State Department of Transportation. Routes of statewide importance include arterial highways. Within the functional classification scheme the various classes included are:
  1. Interstate highways;
  2. Other principal arterials; and,
  3. Minor arterials.
25. Major intercounty routes require authority for planning and development which transcend local boundaries. A State agency is the most appropriate arrangement for administering these routes, which are typically designated as major collectors. Not all major collectors do serve intercounty travel, since some are almost solely used by intracounty traffic. As such, those facilities would more appropriately be the responsibility of local county government.
26. Minor collectors generally provide intracounty service. In addition, they form an integrated network with routes of higher functional classification, which serve the longer trips in rural areas. Occasionally, these facilities form connections between counties, but these routes are not used by significant volumes of traffic. Therefore, minor collectors should also be the responsibility of local county governments.
27. There can be no question but that local rural roads logically should be the responsibility of counties. These routes provide access to farm properties and rural residences and are of purely local interest.

28. **Urban Principles** - Jurisdictional responsibilities within urban areas can be established using the same basic principles. Extensions of rural arterials into and through urban areas serve an important function in terms of long- distance travel. Accordingly, the concept of system continuity suggests that the state should have jurisdictional responsibility for these facilities. On the other hand, arterials and collectors which serve travel exclusively within the urban areas (i.e., do not serve as extensions of rural arterials) should be the responsibility of a local community or the county. Clearly, local streets providing access to residences and commercial or industrial areas should be a local responsibility.
29. **Rural Criteria** - The general criteria previously described should apply and take precedence in these discussions. Beyond interstates and US numbered routes, the State should provide and maintain State highways in a number or other instances which are identified and discussed in the following paragraphs:
30. *Principal Arterials* - Since by definition rural principal arterials have "trip length and travel density characteristic of substantial statewide or interstate travel,"<sup>7</sup> all of these facilities should be administered by the State.
31. *Minor Arterials* - Following the same logic, all rural minor arterials should be part of the State highway system since they form an integrated network of roadways providing interstate and intercounty service, and are spaced at such intervals so that all developed areas of the State are within a reasonable distance of an arterial highway.<sup>8</sup>
32. *Major Collectors* - Rural major collectors which cross county lines and are significant intercounty travel routes should be designated as part of the State highway system, since their importance to the region transcends importance to a single county. To qualify for inclusion in the State highway system, the route should serve two clearly identifiable and significant traffic generators which are not located in the same county. All routes which do not meet this criterion will not be eligible for inclusion on the State system.
33. *County Seats* - Since these towns and cities serve as the center of local government within each county, it is symbolically and practically important to link them. This will facilitate intergovernmental travel and communication. As a result of this criteria, each county will be guaranteed service by a State highway.
34. *Rural Population Centers of 1000 or More Population* - The analyses determined that there is a natural and logical break in city population around 1,000 residents. In general, these areas are significant traffic generators and depend on the flow of people and goods,

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<sup>7</sup> *Highway Functional Classification - Concepts, Criteria and Procedures*; USDOT/FHWA; July 1974; page II-8.

<sup>8</sup> op. cit., *Highway Functional Classification - Concepts, Criteria and Procedures*, pages II-9 and II-10.

which in turn can be vital to the State's economy. They often are the termini of the more heavily traveled rural corridors as well, and as a result are of statewide interest.

35. Major Industrial and Commercial Complexes - (Identified as the group of larger employers and having a population equivalency of 1000 or more). Since these complexes are vital to the State's economy, it is logical that they be served by the State highway system.
36. Major Recreation Areas - This category includes all developed national parks, monuments, and recreation areas as well as those State facilities with population equivalencies of 1000 or more which should be served by the State highway system since they attract and entertain substantial numbers of visitors from outside the local jurisdiction.
37. Any Area or Dense Cluster of Areas Having a Population Equivalency of 1000 or More - This includes military installations, State hospitals, State correctional centers, and State universities which may qualify for service by the State highway system. However, these institutions must be significant regional traffic generators, and the existing local jurisdiction roads must be deemed unable to provide adequate access.
38. Continuity of System - Routes which provide a major cross connection between two existing state highways may be designated as state highways. In the development of a state highway system, it may be necessary to add a limited number of routes which do not in themselves meet any of the preceding criteria. Inclusion of these routes, however, is desirable for the efficient and economic movement of people and goods on a statewide basis. These routes or "cross connections" should be on the state highway system. They should not be indiscriminately designated merely for the sake of establishing a cross connection, but should serve a regionally significant traffic desire line between trip generators as indicated by its functional class.
39. All routes which are found to be ineligible for inclusion within the State highway system through application of the previously defined criteria, and which are not roadways under Federal jurisdiction, will be the responsibility of the appropriate local government agencies. In unincorporated areas, the appropriate local government agency will be the county. Within corporate limits, these roadways will be administered by the municipal government. Exceptions to these designations between cities and counties can be worked out between the appropriate local government officials in the same fashion as is presently done.
40. Urban Criteria - The general criteria that the State highway system include all elements of the Interstate and US numbered route systems should apply and take precedence over all other criteria in the urban areas. This primary tier of roadways should be augmented by facilities which meet the criteria described in the following sub-paragraphs:

41. Principal Arterials - This includes roads which form connecting links between two or more State highways and serve regionally oriented through traffic in urbanized areas (50,000 or more people) or a spur which serves travel to and from essential governmental centers. Generally, these links should provide necessary alternate routing of regionally oriented through traffic and benefit truck routing, decrease local arterial volume to capacity ratios, lessen business congestion, and mitigate local street system deficiencies. Spurs must provide critical access to major regionally oriented public facilities or traffic generators (with population equivalencies of 50,000).
42. Minor Arterials - One facility which links individual communities of more than 5,000 people to the State highway system should be a State maintained arterial, in order to facilitate travel within urban areas. Because of the probability for conflicting jurisdictions if administered at the local level, and in consideration of benefit to the State in maintaining good circulation within urbanized areas, these roadways should be within the State's jurisdiction.
43. Other Urban Extensions of Rural State Highways - This includes routes into or through an urban area which are necessary to form an integrated system of State highways. For a route to function in this manner, it should be continuous into or through an urban area. Typically, these routes would function as arterial highways from which other local arterials within the urban area would feed and disperse traffic.