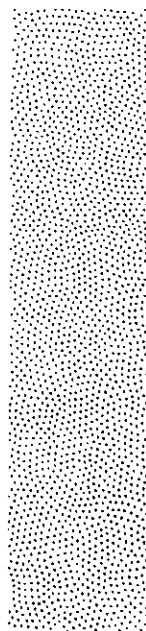
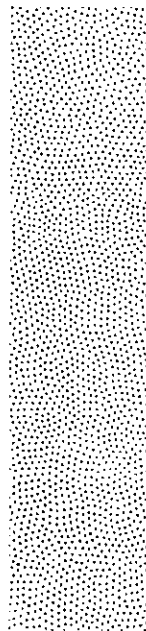
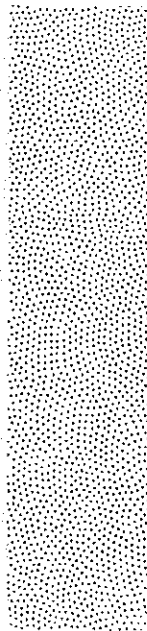
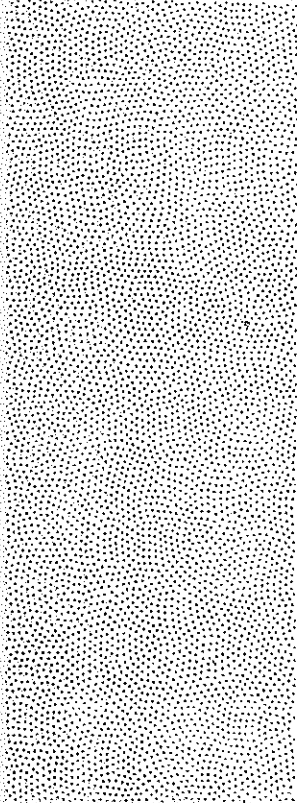


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FUNCTIONAL HIGHWAY CLASSIFICATION FOR 1970 NEEDS STUDY



*Planning
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Prepared by the Joint Coordinating Committee
and the

Michigan Department of State Highways

In Consultation With

Wilbur Smith and Associates, Consulting Engineers

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FUNCTIONAL HIGHWAY CLASSIFICATION FOR 1970 NEEDS STUDY

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**PREPARED BY THE JOINT COORDINATING COMMITTEE
AND THE
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FOREWORD

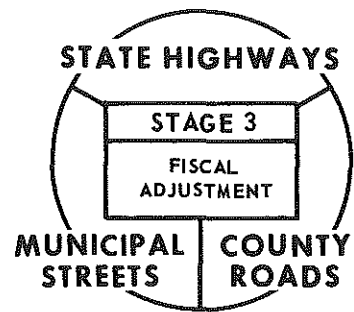
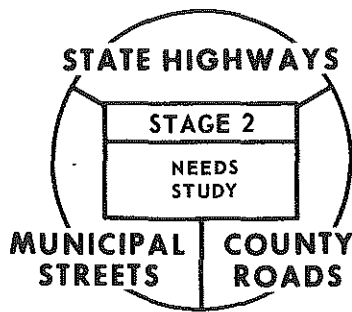
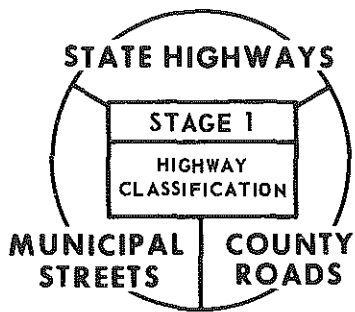
This manual has been prepared to explain the procedures to be used in executing the classification phase of the State Highway Needs Study for the twenty-year period 1970-1990, as required by the 1968 Federal Highway Act. The manual concerns itself with the need for uniform classification of highway facilities, the philosophy, scope and importance of functional classification, and the procedures to be followed in applying the concepts of functional classification.

The preparation of this manual has been aimed at achieving two objectives: first, to provide local units of government with a guide in performing the Classification Phase and using its results in the other phases of the study; and second, to serve as background information for the recipients of the study recommendations. It is also hoped that the manual will provide the basis for further analysis of future highway and street needs in a continuing updating process in the years ahead.

Due to varying topographical and land use configurations, no absolute or quantitative criteria can be determined that would uniformly fit the highway system requirements for all areas of the state. It is therefore emphasized that the primary objective of this manual is to essentially serve as a guide.

INTRODUCTION

Functional highway classification is the process by which the state's networks of roads and streets are grouped according to their predominant function and service characteristics. It represents an essential element in highway administration by providing a framework for projections of needs, construction and financing at each level of government. After properly classifying the entire highway plant, including state, county and municipal roads and streets, studies are conducted to determine the administrative, construction and maintenance needs of each system with regard to both physical and financial aspects. Using the financial needs of each system as guidelines, the State Legislature can then make whatever fiscal adjustments are necessary to assure sound highway financing.

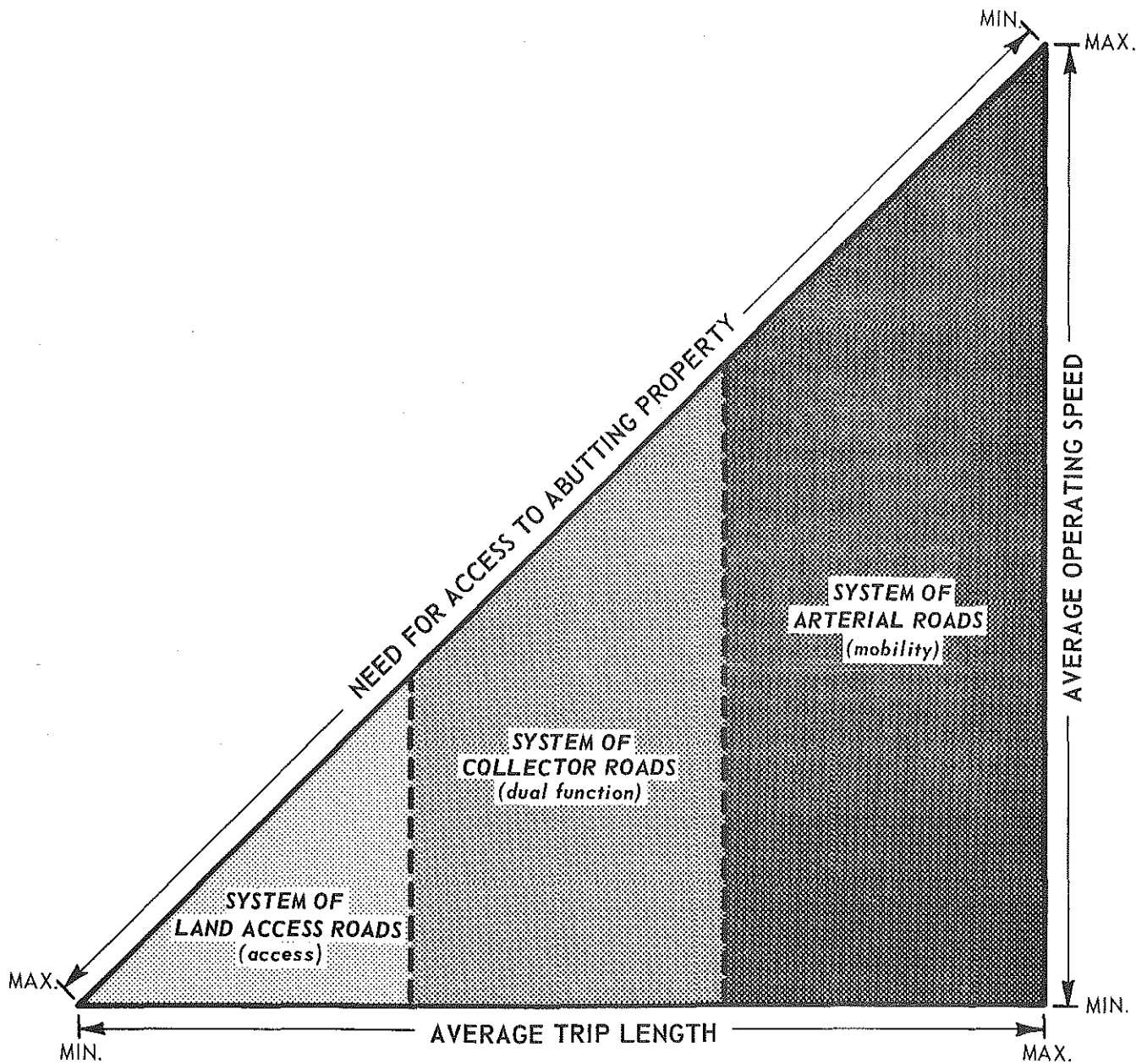


The process of functional classification can be more easily explained if one accepts the basic premise that the purpose of highways, roads and streets is twofold: first, to move traffic; and second, to provide access to property. The majority of roads and streets serves both major purposes although in varying degrees. In classifying highways functionally, it is therefore necessary to establish criteria to identify the primary function they serve and the degree to which they serve more than one function. Application of these criteria will result in the grouping of highways and streets into three broad classifications -- arterial, collector and access. A further breakdown of these classifications is necessary to take into consideration such factors as distribution of trip lengths in a given area, volume of traffic, desirable operating speed and spacing.

Exhibit 1 schematically illustrates the range in level of service provided by the three functional classes of highways. The relative importance of each classification is directly proportional to both the trip length to be made on the network and the operating speed demanded in accomplishing a trip. The level of service required of each classification is inversely proportional to the need for access to adjoining land.

Since enactment of Act 51 of the Public Acts of 1951, Michigan has had a classified road network based on these three broad categories. Within this classified system, state trunkline highways generally represent the majority of the arterial network. County primary roads and city major streets generally comprise the majority of the collector system and county local roads and city local streets in general account for the local category.

FUNCTIONAL CONCEPTS OF ACCESS VERSUS TRAVEL DISTANCE AND OPERATING SPEED



SOURCE: Wilbur Smith & Associates

Classification of the state trunkline highway system is a continuing process that is updated annually. Within this broad framework, it has been necessary to subclassify the state arterial system in an effort to further define the state's obligation and fulfill its responsibility.

Revisions to the county and municipal classified systems are also made on a periodic basis. However, it will be necessary for the local units of government to further subclassify these systems on a more specific basis, grouping together those streets and highways of similar design, construction and operation. This will necessitate a thorough analysis of all county and city roads and streets including the state trunkline highway network. These will then be classified on the basis of their primary function according to the criteria set forth in this manual. In certain instances, revisions to the existing systems will be necessary but should not be made without sufficient justification. However, it is emphasized that revisions for this study will be based solely upon functional classification and will not be bound by Act 51 of the Public Acts of 1951 (as amended and supplemented).

BENEFITS DERIVED FROM FUNCTIONAL CLASSIFICATION

Following is a listing of some of the more important advantages associated with functional classification:

1. It integrates highways into complete systems and these systems into a comprehensive network to serve the highway transportation needs of the entire state.
2. It brings together into a single system those highways that should be under the same jurisdiction because of the type and extent of demands for highway transportation service.
3. It achieves a higher degree of administrative efficiency.
4. It provides the integrated and systematic planning and orderly development of highway construction and improvement programs in accordance with actual need.
5. It groups highways basically so that they can be readily subclassified to meet special needs.
6. It permits flexibility in all aspects of highway planning and administration to meet future changing conditions and travel patterns.

Upon completion of the classification process, there are three specific areas in which the classified systems may be applied to advantageously achieve objectives. These are:

1. Providing a means by which the development of the highway system may be planned.
2. Providing a logical assignment of jurisdiction to each of the system elements.
3. Providing a sound basis for fiscal highway planning.

Planning of Highway System Development

Functional classification is useful in determining how to channelize individual trips into a practical network of highways. It defines the substance of this channelization process by defining the role of any particular road in serving the flow of trips through a highway network. This serves three important planning purposes:

1. Defines travel paths through the road network so as to achieve directness of routing in the most economical manner.
2. Provides a means of estimating the amount of traffic the facility should carry.
3. Indicates the predominant travel distances that the various segments of the network will serve and thereby establishes the level of service to be provided in terms of overall travel speed and freedom.

These concepts acquire added significance when considered in relation to the three functionally defined classes of highways -- arterials, collectors and land-access roads. Studies indicate that most trips of relatively long length originate or terminate in large cities or centers of traffic interest. Therefore, the highways that connect these places will serve the greater portion of the long-distance trips. Inasmuch as these highways must provide such a high degree of traffic mobility, they should be classified as arterial routes.

A second group of highways function^s primarily as collector-distributor roads for intra-county and intra-city traffic movements and serve the lower level population and economic centers. Highways that function in this capacity should be classified as collector routes.

The remaining roads and streets function primarily as land access routes and accommodate comparatively short trips with no through traffic.

Through the use of this process, adequate standards for highway improvements can be established more accurately for the various classifications, with emphasis on mobility, access, or a combination of both according to the degree to which each is required.

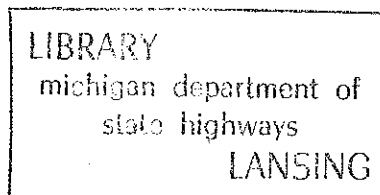
Effect of Classification on Jurisdictional Assignments

In accordance with legislative act, Michigan's roads and streets are separated into three jurisdictional systems -- state, county and municipal. The assignment of highway facilities performing a similar service or function to a single and proper jurisdictional level is based on responsiveness to public interest. When a highway problem is statewide in impact, the proper response to the public interest should come at the state level. However, in instances where highway problems are predominantly local in impact, local government will be more thoroughly familiar with such problems and more directly and conveniently responsive to the public interest.

Only when roads and streets are properly assigned to the various units of government is it possible to equitably divide the burden of highway finance and establish desirable priority schedules for highway improvements.

Effect of Classification on Fiscal Planning

One of the more important benefits derived from a classification system is the proper apportionment of highway revenues for the balanced development of public roads and streets. Where this apportionment is determined solely on



the basis of administrative jurisdiction, there is no assurance that the individual functional classes of roads will be developed in their proper relation to the overall network. Where a formally designated system is defined, based on functional characteristics, an orderly development of a balanced system can result regardless of the administrative breakdown of the various segments. Allocating the total availability of funds to the individual functional classes avoids the piecemeal pattern of road development. The ultimate effect is more efficient utilization of available funds toward meeting overall highway needs.

PROPOSED FUNCTIONAL CLASSIFICATION

In determining the proper classification of a road or street and the system to which it should logically be assigned, it is essential that certain factors be considered. These include the type of service provided: interregional, inter-area, intercommunity or local; predominant trip lengths; desirable operating speeds; access and spacing.

Through an analysis of each facility in terms of these criteria, all streets and roads can be grouped into three basic categories -- Arterials, Collectors, and Local Roads and Streets. Each category is distinguishable by the degree to which the previously mentioned criteria are accomplished. Generally, Arterial Highways provide the highest degree of travel mobility and the lowest degree of land access, serving the longest trip desires in an expeditious manner. Collector Highways offer a somewhat lesser degree of mobility and a higher degree of access to adjacent land uses. The primary function of the Local Roads and Streets, as implied, is to provide a very high degree of access movement.

Due to the concentration and complexity of traffic movement in metropolitan areas (those having a central city population of 50,000 or more) as compared to statewide or countywide concepts, the procedures for classifying urban street systems are somewhat different.

Although many of the basic concepts applicable to rural road classification are also applicable to urban street classification, conditions unique in

metropolitan areas make it necessary to employ somewhat different classification categories according to the specific functions performed. Therefore, roads and streets within metropolitan areas and urban places of less than 50,000 population will be grouped as follows:*

METROPOLITAN AREAS AND
OTHER URBAN PLACES

RURAL AREAS

ARTERIAL SYSTEM

Statewide Arterials
Regional Arterials
Metro-Area Arterials**
Local Arterials

Statewide Arterials
Regional Arterials
Local Arterials

COLLECTOR SYSTEM

Principal Collectors
Secondary Collectors

Principal Collectors
Secondary Collectors

LOCAL ROAD AND STREET SYSTEM

Residential
Local Access
Industrial-Commercial

Residential
Local Access
Industrial-Commercial

Metropolitan areas based upon the 1960 Census of Population include the following:

1. Ann Arbor Metropolitan Area
2. Battle Creek Metropolitan Area
3. Detroit Metropolitan Area

* Urban places include all incorporated and unincorporated areas having urban characteristics.

** This classification will occur only in metropolitan areas.

4. Flint Metropolitan Area
5. Grand Rapids Metropolitan Area
6. Jackson Metropolitan Area
7. Kalamazoo Metropolitan Area
8. Lansing Metropolitan Area
9. Muskegon Metropolitan Area
10. Saginaw Metropolitan Area
11. Niles (South Bend Metropolitan Area)

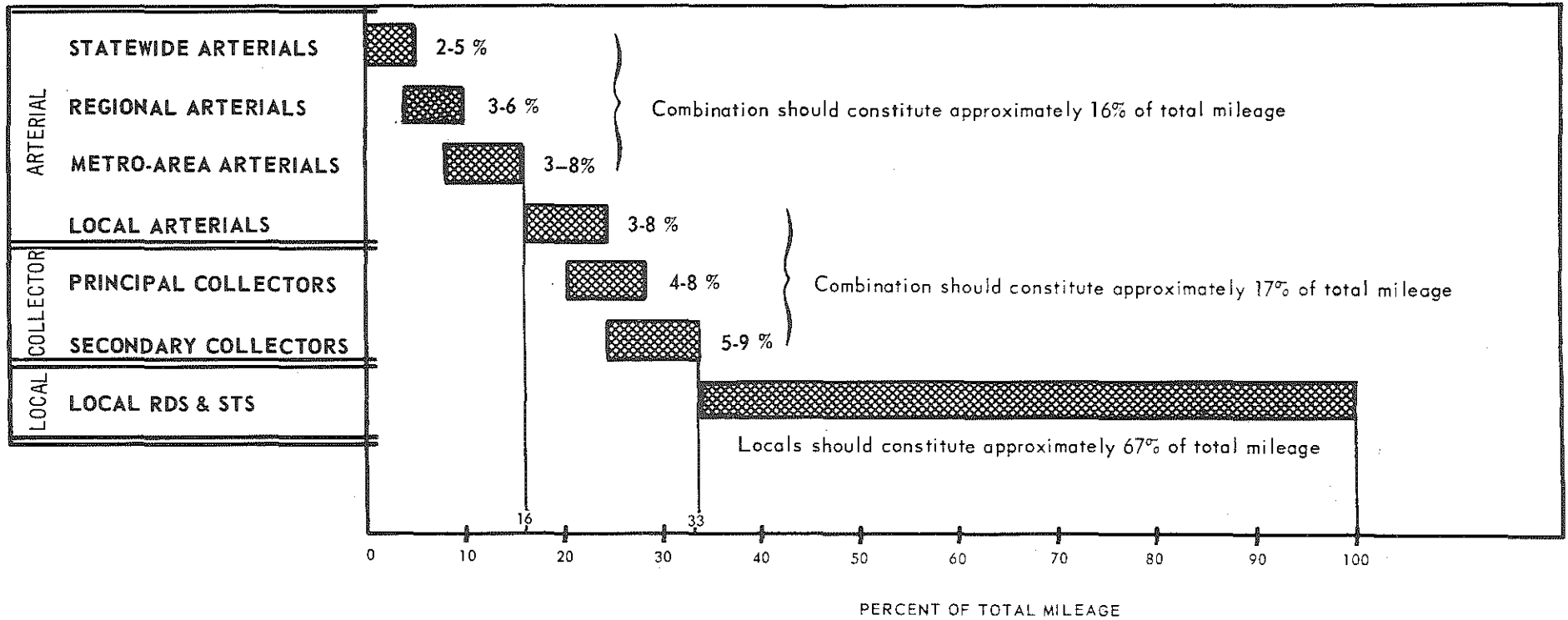
Exhibits 2, 3 and 4 graphically indicate a percentage range of mileage for individual areas which, in most instances, will be applicable to the various classifications. However, exceptions to these assigned percentages are expected to occur. For example, the size of an urban area is generally inversely proportional to the percentage of street mileage comprising the higher classified systems -- in other words, the larger the area, the smaller the percentage of mileage in the higher classified systems. This can be attributed in part to the higher density of streets in the more populous areas and the superior design characteristics required on the higher classified facilities. Therefore, the extent of mileage in the various functional classifications is by no means fixed but will serve as a guide in providing a well balanced network.

Statewide Arterials

The primary function of Statewide Arterial Highways is to provide the highest level of traffic mobility available on the total highway system. These provide direct and unrestricted routings between major metropolitan centers and principally serve movements between rather than within activity areas. These are

MILEAGE PERCENTAGES FOR FUNCTIONAL HIGHWAY CLASSIFICATION IN METROPOLITAN AREAS

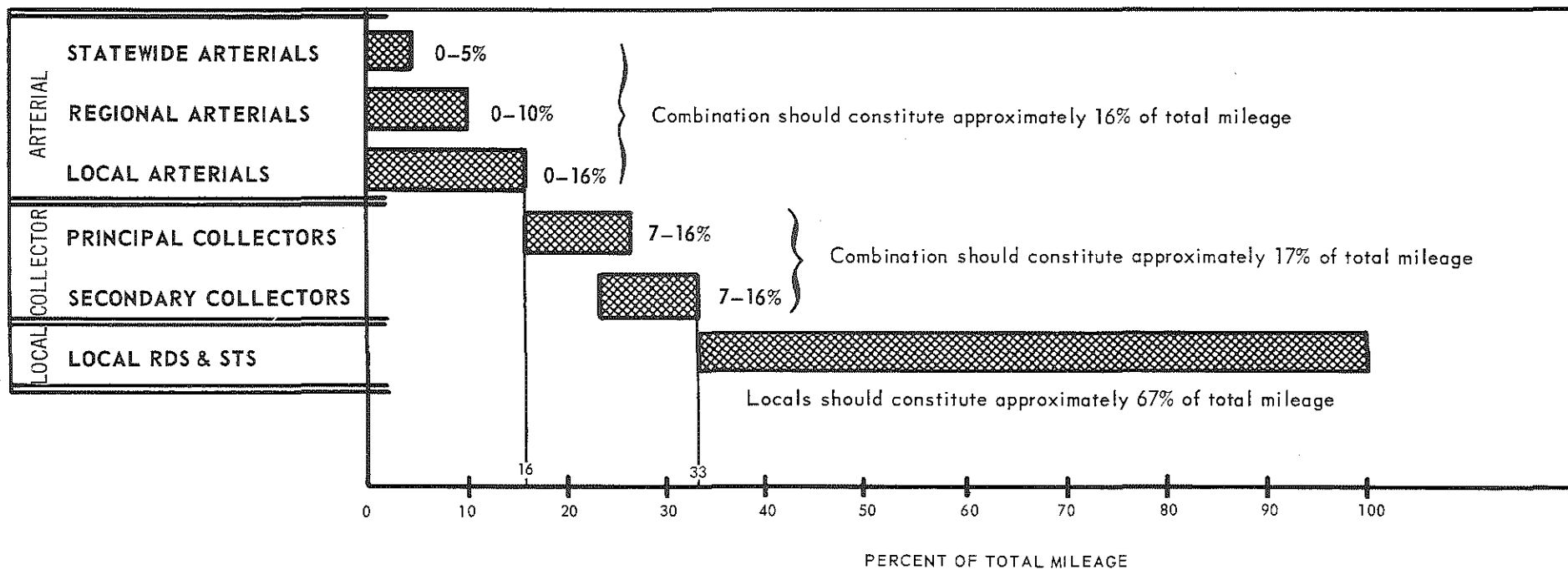
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Note: Under normal conditions, Statewide and Regional Arterials should not exceed 8 percent of the total mileage.

MILEAGE PERCENTAGES FOR
FUNCTIONAL HIGHWAY CLASSIFICATION IN

URBAN PLACES-LESS THAN 50,000 POPULATION

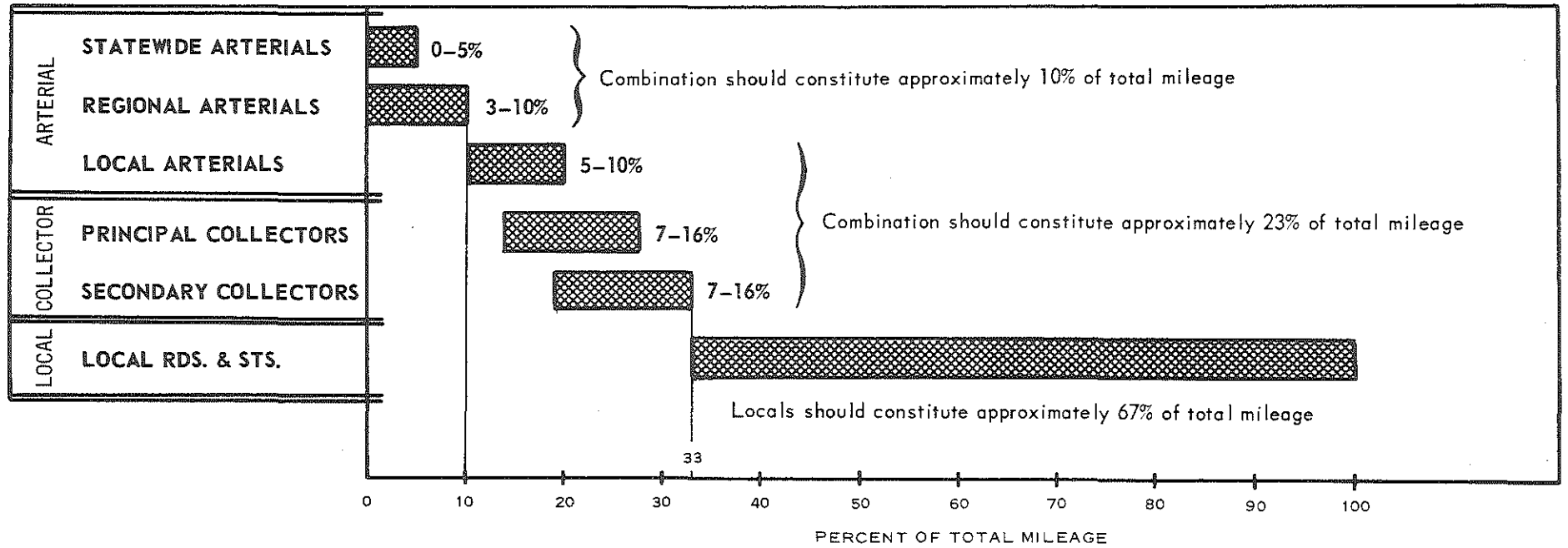


Note: Each individual area will not necessarily contain all three classes of arterials. Many small cities or villages will have only one arterial.

Under normal conditions, Statewide and Regional Arterials should not exceed 10 percent of the total mileage.

MILEAGE PERCENTAGES FOR FUNCTIONAL HIGHWAY CLASSIFICATION IN RURAL AREAS

16



generally located in widely spaced corridors of concentrated travel desire and are characterized by: high capacity design thereby facilitating sustained high speeds; minimal ingress and egress; and, continuity of routing for regional or interregional travel movements. These facilities should serve the longest trip desires in an expeditious manner. These should also link and serve major sections of metropolitan areas, carrying a majority of the total arterial travel on a minimum mileage with the highest degree of service. This system of highways should include all sections of the Interstate Highway System.

Regional Arterials

Regional Arterial Highways interconnect and augment the Statewide Arterial Highways, forming a continuous, high-mobility network of highways which will efficiently serve major travel desires in all areas of the state. A primary function is to interconnect major population and economic activity centers not served by Statewide Arterial Highways. These highways also provide service to other large areas of special interest and recreation areas which generate or attract a substantial amount of traffic, occasionally subordinating directness of routing in order to perform this secondary function. However, these offer a high degree of trip continuity either alone or as an extension of the Statewide Arterial System.

Metro-Area Arterials

Highways in this classification exist only in metropolitan areas. These routes provide arterial service to areas not directly served by the higher arterial classifications. Metro-Area Arterials are intended to provide a moderate-to-high level of traffic mobility and an intermediate level of land

access. These provide for intra-area traffic mobility, serving high volumes of traffic. In addition, these routes will provide trip continuity between other arterial highways and between arterial highways and routes of lower classification.

Local Arterials

Streets in this classification provide service to trips of moderate length at a somewhat lower level of travel mobility than the major arterials. They distribute travel within geographic areas which are smaller than those identified with the higher systems. Local Arterials include those facilities which serve a secondary arterial function at the local level, placing more emphasis on land access than the higher systems and offering a lower level of traffic mobility. They also provide service between smaller cities and connect these cities with the higher arterial systems. They should not, however, penetrate identifiable neighborhoods.

Principal Collectors

County Roads - These roads function primarily as collector-distributor roads for relatively large areas. These also provide service between minor population and economic centers within the county. Traffic mobility and trip continuity are not as essential as on Local Arterials and serving through traffic may not be a major consideration. Access controls are not provided on these routes thereby permitting a high level of service to adjacent properties. These streets may also serve secondary traffic generators such as schools, parks and areas with high population densities.

City Streets - These streets serve as extensions to their rural counterparts, subordinating traffic mobility and continuity to land access. The primary function of these streets is to serve substantial traffic volumes, the majority of which are intra-city in character. These may provide proximity service to commercial, industrial and residential land uses. Accordingly, in commercial and industrial areas, these streets may be designed and constructed to accommodate heavy vehicles with provisions for additional illumination, pedestrian movements, parking lots and loading docks. These streets may also serve secondary traffic generators such as schools, parks and areas with high population densities. These also serve as extensions to the rural collector routes.

Secondary Collectors

The prime function of Secondary Collector Roads and Streets is to provide traffic service between Local Roads and Streets and higher classified routes. Traffic served will essentially be generated from a relatively small area or a specific traffic attraction. In residential areas, these facilities should be designed to discourage commercial and industrial, as well as through traffic. Ease of access is a major consideration in the design of these streets. Route continuity is of limited importance since traffic will utilize these routes for only a small portion of their total trip length.

Residential Streets

The major function of these streets is to provide access and service to the residential developments adjacent to them. These streets carry practically no through traffic and route continuity is of minimum importance.

Local Access Streets and Roads

Local access streets (urban areas) primarily differ from residential streets in that they may possess a somewhat higher degree of trip continuity and provide service within specific land uses, such as parks and various institutions.

Local access roads (rural areas) provide access to homes, farms and other low intensity land uses. These routes are usually the remaining section or quarterline roads and not rural subdivision streets. Traffic desires are local in nature and thus these roads do not require trip continuity for an extended length.

Commercial/Industrial Streets

The function of these streets is similar to that of local residential streets except these streets serve commercial and/or industrial establishments. Route continuity is not important as traffic desires are local in nature. These streets should be constructed to carry heavy vehicles if conditions warrant.

Generalized Criteria

Tables 1, 2 and 3 list the criteria to be used as guidelines in classifying roads and streets. These should not be interpreted as precise requirements inasmuch as they will vary according to conditions in each specific area.

Table 1
FUNCTIONAL CLASSIFICATION OF HIGHWAYS
METROPOLITAN AREAS

CLASSIFICATION	PRIMARY SERVICE FUNCTION	ACCESS CONTROL	DESIRABLE OPERATING SPEEDS (mph)	TRIP LENGTH (miles)
<u>ARTERIAL SYSTEM</u>				
Statewide Arterials	Through traffic	Full or none	45-70	4 - 20
Regional Arterials	Through traffic, limited land service	Usually none	30-45	10 or less
Metro-Area Arterials	Intra-area traffic, connect other arterials, moderate level of land service	Usually none	30-45	10 or less
Local Arterials	Lesser arterial service at local level, more emphasis on land access	None	30-45	10 or less
<u>COLLECTOR SYSTEM</u>				
Principal Collectors	Connect local systems to arterials	None	25-40	2 or less
Secondary Collectors	Connect local systems to arterials and other collectors	None	25-35	1 or less
<u>LOCAL ROAD AND STREET SYSTEM</u>				
Residential	Access to residences	None	20-25	1/2 or less
Local Access	Land service, local access	None	20-25	1/2 or less
Industrial-Commercial	Service to industrial and commercial land areas	None	20-30	1 or less

Table 2
 FUNCTIONAL CLASSIFICATION OF HIGHWAYS
 URBAN PLACES OF LESS THAN 50,000 POPULATION

CLASSIFICATION	PRIMARY SERVICE FUNCTION	ACCESS CONTROL	DESIRABLE OPERATING SPEEDS (mph)	TRIP LENGTH (miles)
<u>ARTERIAL SYSTEM</u>				
Statewide Arterials	Through traffic	Full or none	45-70	4 - 20
Regional Arterials	Through traffic, limited land service	Usually none	35-45	1 - 15
Local Arterials	Lesser arterial service at local level, more emphasis on land access	None	30-45	10 or less
<u>COLLECTOR SYSTEM</u>				
Principal Collectors	Connect local systems with arterials	None	25-40	2 or less
Secondary Collectors	Connect local systems with arterials and other connectors	None	25-35	1 or less
<u>LOCAL ROAD AND STREET SYSTEM</u>				
Residential	Access to residences	None	20-25	$\frac{1}{2}$ or less
Local Access	Land Service, local access	None	20-25	$\frac{1}{2}$ or less
Industrial-Commercial	Service to industrial and commercial land areas	None	20-30	1 or less

Table 3
FUNCTIONAL CLASSIFICATION OF HIGHWAYS
RURAL AREAS

CLASSIFICATION	PRIMARY SERVICE FUNCTION	ACCESS CONTROL	DESIRABLE OPERATING SPEED (mph)	TRIP LENGTH (miles)	DESIRABLE SPACING (miles)
<u>ARTERIAL SYSTEM</u>					
Statewide Arterials	Through traffic	Complete	45-70	20 or more	20-40
Regional Arterials	Through traffic, some land service	Usually none	55-65	10 or more	10-20
Local Arterials	Lesser arterial service, more emphasis on land access	None	45-60	5 - 20	5-10
<u>COLLECTOR SYSTEM</u>					
Principal Collectors	Connect local system with arterials	None	40-50	1 - 10	3-5
Secondary Collectors	Connect local system with arterials and other collectors	None	35-40	-	-
<u>LOCAL ROAD AND STREET SYSTEM</u>					
Residential	Residential land access	None	20-25	1 or less	-
Local Access	Land access, local distribution, recreational land service	None	20-30	5 or less	-
Industrial-Commercial	Industrial and Commercial land access	None	20-30	2 or less	-

PROCEDURAL GUIDELINES

Functional classification is becoming generally accepted as the proper basis upon which classification of road and street systems should be made. The Michigan Department of State Highways has recently completed such a study on all roads and streets which are under state jurisdiction. However, this procedure has not been extended to the county and city systems. It is therefore necessary for those involved in this activity to become thoroughly familiar with the principles of functional classification contained in the manual. Only by completely understanding the concepts and objectives of the process and the definitions of the individual classifications will it be possible to apply the degree of logic necessary in the classification process.

To achieve uniformity in the classification process, it was determined by the Joint Coordinating Committee (comprised of representatives from city, county and state governments) that the Michigan Department of State Highways should initiate the classification procedure by conducting an "office classification" of the road and street systems in each county and city involved. This procedure will be applied only to the arterial and collector systems.

Classification Work Maps

Accompanying the manual are two sets of work maps on which these classifications are indicated. One set represents a functional classification of the existing systems or those routes which are presently under construction or programmed

for construction in the very near future. The other set of work maps includes future (1990) systems. All maps should be reviewed by the individual counties and cities and, where necessary, revised. Classification of the local road and street system will also be conducted at that time by the counties and cities.

In addition to the classification systems, the work maps also show two separate urbanized area boundaries for each city of over 5,000 population. One represents existing urbanized limits as approved by the U. S. Department of Transportation, Bureau of Public Roads, and the other represents the projected 1990 urbanized limits. These boundaries are determined by the extent of actual urbanization which has occurred (Existing Urbanized Boundary) and that which is expected to occur by the year 1990 (1990 Urbanized Boundary). These are not, however, necessarily influenced by existing corporate limit lines. These urbanized boundaries will define the point where design standards will change from rural to urban specifications.

As previously indicated, all systems under state jurisdiction have recently been classified. These include all Statewide Arterials and the majority of Regional Arterials. Some highways under county or city jurisdiction may also qualify as Regional Arterials and will be designated accordingly. All remaining streets and roads will be classified according to a reasonable application of the general principles developed in the classification manual.

During the process of subclassifying the existing county and city road and street systems, it is expected that some revisions will be necessary. It is recommended that these revisions be made within the framework of the manual -- the recommended percentage ranges of mileage for the various systems should be reasonably maintained.

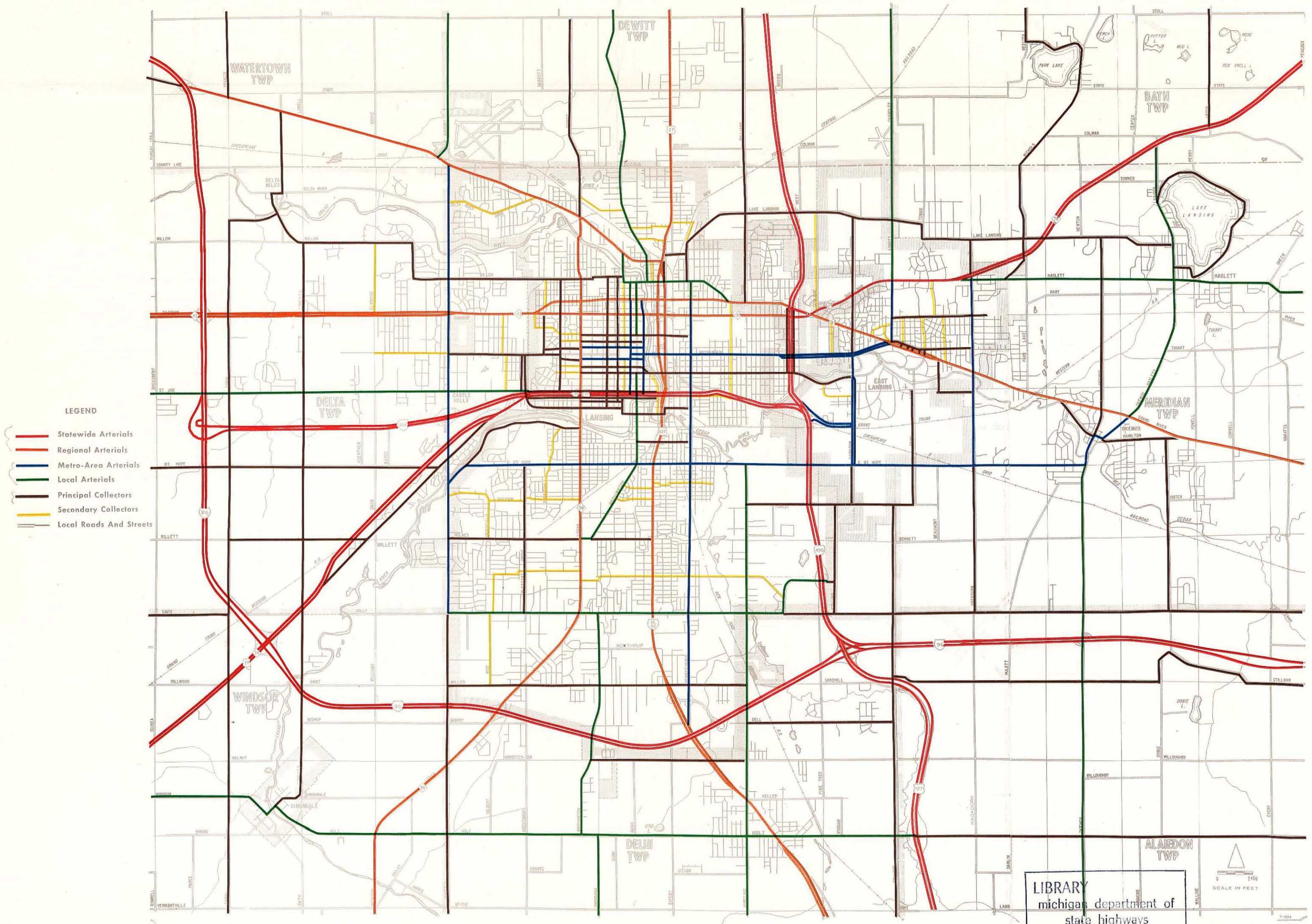
To assist in understanding the technical procedures used in preparing the office classification of the various road and street systems, excerpts from a report prepared by the Joint State-County Committee have been included in Appendix A. Appendix B includes a listing of the basic fields of information which were used in conducting the study. This material should prove beneficial to those responsible for reviewing the work maps provided and in preparing the future classified system maps.

It is difficult to define a specific procedure for determining the appropriate extent of the three major street classifications -- arterial, collector and local. Although Exhibits 2, 3 and 4 (pages 13, 14 and 15) show the approximate percentage of the total system that each of these classifications should comprise, individual cities and counties may vary considerably from a state-wide average due to variations in terrain, road pattern, land use, and density and distribution of population.

Sample Classification Maps

Included herein are sample maps to illustrate the functionally classified systems. These samples correspond to the three separate categories to be used in classifying all roads and streets. Exhibit 5 (Lansing Metropolitan Area) depicts the use of the various classifications in a metropolitan area, Exhibit 6 (City of St. Johns) is an example of the systems which may occur in an urbanized area of less than 50,000 population, and Exhibit 7 (Tri-County Region) shows the various systems in a rural area.

SAMPLE FUNCTIONAL HIGHWAY CLASSIFICATION OF THE LANSING METROPOLITAN AREA



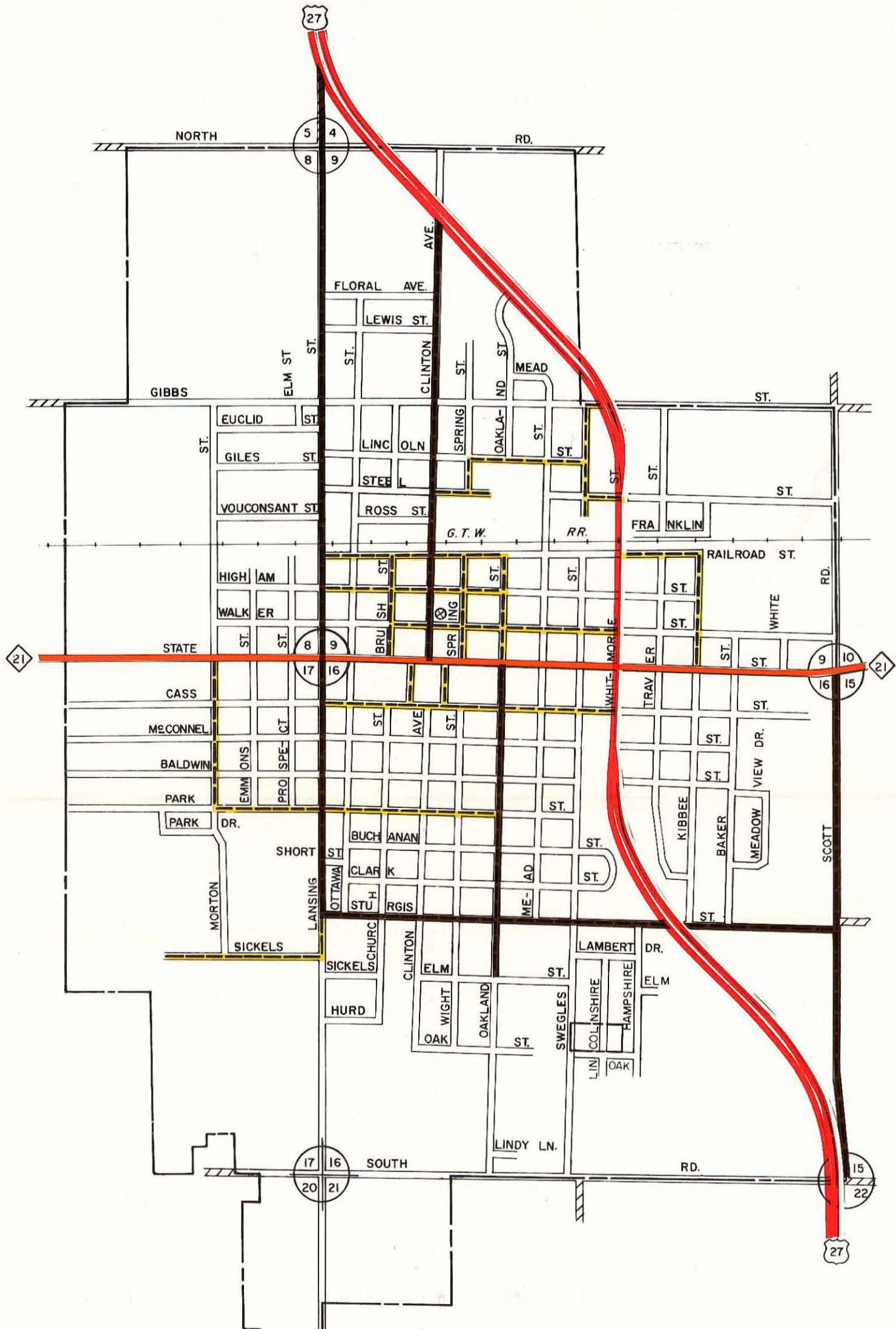
LEGEND

- Statewide Arterials
- Regional Arterials
- Metro-Area Arterials
- Local Arterials
- Principal Collectors
- Secondary Collectors
- Local Roads And Streets

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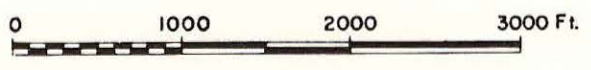
SAMPLE FUNCTIONAL HIGHWAY CLASSIFICATION OF THE ST. JOHNS URBANIZED AREA



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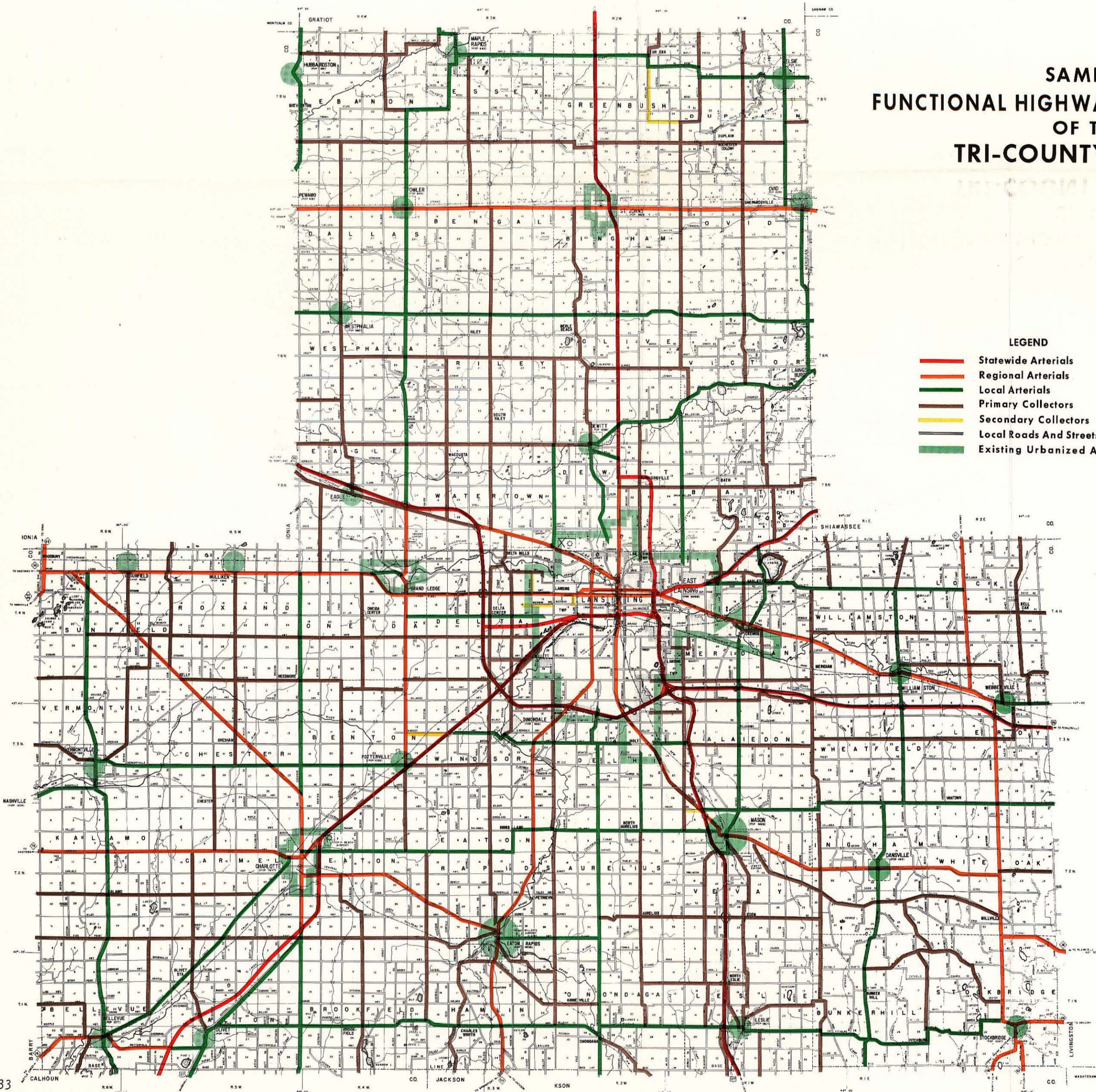
- Statewide Arterials
- Regional Arterials
- Local Arterials
- Principal Collectors
- Secondary Collectors
- Local Roads And Streets

SCALE



SAMPLE FUNCTIONAL HIGHWAY CLASSIFICATION OF THE TRI-COUNTY REGION

- LEGEND**
- Statewide Arterials
 - Regional Arterials
 - Local Arterials
 - Primary Collectors
 - Secondary Collectors
 - Local Roads And Streets
 - Existing Urbanized Area Boundry



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Following is an explanation of the application of the criteria to the various systems and to certain specific routes:

Statewide Arterials

The routes on the sample maps shown in red represent the Statewide Arterials. These routes, which include M-78, US-27, US-127, I-96 and I-496 are routes of statewide and interstate importance. They provide the highest degree of service to long-distance travel desires and connect the major metropolitan centers within the region. These facilities serve the majority of arterial traffic.

Regional Arterials

These routes shown in orange interconnect and augment the Statewide Arterial System in providing a high-mobility highway network to the major population and economic centers in the area. These offer a high degree of trip continuity to high volumes of traffic. This classification is exemplified by M-21, M-50, M-99, M-36 and M-43. Former US-127 between Holt and Lansing is also included in this system due to the type and degree of service which it provides.

Metro-Area Arterials

Inasmuch as this classification is restricted to metropolitan areas, examples of these routes are shown in blue on Exhibit 5 which depicts the Lansing Metropolitan Area. Examples of Metro-Area Arterials include:

1. Michigan Avenue (an east-west route between Lansing's central business district and East Lansing) This route forms a connecting link between two Regional Arterials -- M-99 and M-43.

It provides service between two areas of high population density and accommodates high volumes of traffic. Included are the one-way streets which form the extension of this route through Lansing's central business district. The north-south one-way streets also provide an exceptionally high degree of service into the central city and are therefore also included in the system.

2. Waverly Road (a north-south route along the west city limits of Lansing)

Mt. Hope Avenue-Hagadorn Road (from Waverly Road to M-78 in East Lansing)

Pennsylvania Avenue (a north-south route from Cedar Street, formerly US-127, to M-43)

Each of these three routes serves areas of high population densities. These provide arterial service through the metropolitan area offering a high degree of trip continuity. These routes serve high volumes of traffic, provide a high level of traffic mobility and form connecting links between other major arterial routes.

Local Arterials

These routes are shown in green on Exhibits 5 and 7. No routes in the St. Johns urbanized area appear to meet the criteria for Local Arterials.

In rural areas (See Exhibit 7) these routes provide service between the smaller population centers and connect them to the higher arterial systems.

They place more emphasis on land access than the higher systems and offer a lower level of travel mobility. These routes carry a moderate volume of traffic and have considerable trip continuity, often extending across an entire county.

These often serve as penetrators into a metropolitan area. Examples include:

1. Price Road (an east-west route in Clinton County extending through Westphalia) This route has a high degree of route continuity extending from Saranac in Ionia County to Vernon in Shiawassee County. It connects several north-south arterial routes and serves moderate traffic volumes.

2. Meridian Road (a north-south route located immediately east of the Lansing Metropolitan Area) This road possesses a high degree of continuity extending through Ingham County and into Jackson County. It serves the community of Meridian and the recreation area at Pleasant Lake in Jackson County and interconnects three regional arterials.

In urbanized areas (see Exhibit 5) these routes often serve as urban extensions of their rural counterparts. These offer a somewhat lower level of arterial service than the other arterial routes. As in the rural areas, these routes serve as connectors between higher arterial routes, offer service to trips of moderate length, serve moderate volumes of traffic and should not penetrate identifiable neighborhoods. Examples include:

1. Jolly Road (an east west road between Waverly Road and I-496 including Dunkel Road which functions as the connector to the freeway) This road accommodates relatively high volumes of traffic. It extends through an area of moderate to high population density due to large subdivision and apartment complex developments in this area and interconnects with several higher arterial routes.
2. Aurelius Road (a north-south route between Holt and Lansing) This road serves as an urban extension of the route which extends approximately 16 miles through Ingham County, serves the community of Holt, interconnects with other local arterial routes and several higher arterial classifications, and carries moderately high volumes of traffic.
3. Washington Avenue (a generally north-south route penetrating the Lansing central business district from the south) By utilizing a short segment of Holmes Road, this route provides minor arterial service between Logan Street and the Lansing central business district. It carries high volumes of traffic generated by the downtown area, adjacent commercial development, a large shopping center complex and the residential development which is rapidly expanding in this section of the metropolitan area.

Principal Collectors

Roads and streets in this classification are indicated on the maps in brown.

In rural areas (see Exhibit 7) these routes may connect smaller population centers which are not served by routes of a higher classification. Generally, these will lack the continuity common among the higher classifications but will possess more than the Secondary Collectors. These routes will function primarily as collector-distributors, feeding traffic to the higher classified routes from the secondary collectors and local roads. Examples include:

1. Shepardsville Road (a north-south road in eastern Clinton County) This road has a considerable amount of continuity, extending through much of Clinton County and into Gratiot County. It connects the small communities of Bannister and Shepardsville and provides the primary access route between these centers and the higher classified systems. It carries low traffic volumes.
2. Five Point Highway (an east-west route extending west from Eaton Rapids) Although this route possesses a high degree of trip continuity, it functions only as a collector route. The arterial function through this area is provided by paralleling routes such as M-50 and M-79. Traffic volumes are very low.
3. Chester Road (a north-south road extending through the small community of Chester, located northwest of Charlotte) This road collects traffic from the local road system and distributes it to the two arterial routes which it connects. It serves low traffic volumes and has limited continuity.

In urbanized areas (see Exhibits 5 and 6) these routes generally serve intra-city traffic movements and provide access to commercial, industrial and residential land uses. These provide a higher degree of land access and less mobility than the higher classified routes. These routes also serve as extensions of the rural collectors. Routes of this classification include:

1. Pleasant Grove Road (a north-south street in southwest Lansing) This street provides service to a densely populated residential area. It collects high volumes of traffic from secondary collectors and local streets and distributes this traffic to the two arterials which it connects.

2. Miller Road (an east-west route in south Lansing) This street collects traffic from the local street system and distributes it to the several major arterials which it connects. It serves moderate volumes of traffic.
3. Harrison Road (a north-south route into East Lansing) The north part of this road functions as a principal collector route, collecting and distributing high volumes of traffic into and within the East Lansing-Michigan State University area. It connects with major arterial routes and provides access to adjacent residential development.
4. Lansing Street (a north-south street in St. Johns -- see Exhibit 6) This street collects local traffic and distributes it to the two arterial routes which it connects. It provides a very high degree of access to abutting properties.

Secondary Collectors

Streets in this classification are shown in yellow on the sample maps.

In rural areas, these routes will generally comprise the remainder of the County Primary Road System. In most instances, these roads will be short connectors between other collectors or between another collector and a higher classified route. They have very limited continuity and serve low traffic volumes. These routes often serve as penetrators into sizable residential developments in predominantly rural areas or spurs into a resort area. As such, design characteristics should discourage their use by through traffic. In some counties, routes of this classification may not exist. Examples of secondary collectors in rural areas are shown on Exhibit 7 and include:

1. Pryor Road (an east-west road northwest of the City of Mason in Ingham County) This section of Pryor Road serves as a connector between College Road and Cedar Street. It serves low traffic volumes and lacks route continuity, extending less than a mile between the collector and arterial routes which it connects.

2. Windsor Road (an east-west road northeast of the Village of Potterville in Eaton County) Although this section of Windsor Road connects two arterial routes, it serves only as a Secondary Collector. The major traffic movement on Windsor Road exists on the section east of US-27, providing access to the Village of Dimondale. However, the portion west of US-27 carries only low volumes of traffic, serving as a collector for the local roads which it connects and offers access to abutting properties.

In urbanized areas, these routes will generally comprise the remainder of the City Major Street System. These routes provide service to low volumes of traffic between local streets and the higher classified systems, and offer a high degree of access to abutting properties. Route continuity is generally very limited, having design characteristics which discourage through traffic movements. Examples of Secondary Collectors in urbanized areas include:

1. Brush Street and Spring Street (both are north-south streets in the central business district of St. Johns) These streets provide circulation movement in and around the central business district, collecting and distributing traffic to the higher classified systems. These offer little continuity but provide a high degree of access to abutting commercial and residential properties.
2. Boston Boulevard, Victor Street, Deerfield Avenue (all are located in the southwest section of Lansing) These three streets all penetrate large residential areas and provide distribution between the local streets of the neighborhoods and the higher classified routes around the perimeter. These routes are designed to discourage through traffic movements.

Local Roads and Streets

As previously indicated, an "office classification" of the Local Road and Street System will not be made on the work maps. Classification of these roads and streets will be the responsibility of the individual counties and cities. However, to achieve uniformity, the following colors should be used to designate the various classifications on the maps:

City Maps

County Maps

Residential	No Color	Residential	Pink
Local Access.	Purple	Local Access.	No Color
Industrial/Commercial . .	Black	Industrial/Commercial . .	Black

All other classifications, or revisions to those shown on the work maps, should correspond to the following color code which appears on the sample maps.

Statewide Arterial. . .	Red
Regional Arterial . . .	Orange
Metro-Area Arterial . .	Blue
Local Arterial.	Green
Principal Collector . .	Brown
Secondary Collector . .	Yellow

APPENDIX A

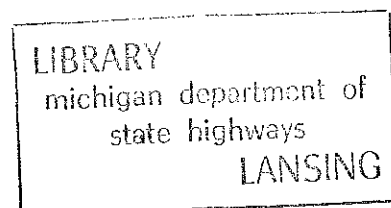
The following excerpts were taken from "A Guide for Functional Classification," a report prepared in 1966 by the Joint State-County Committee on Highways, American Association of State Highway Officials-National Association of County Officials-National Association of County Engineers:

Laying Out an Arterial Network

1. Rank population centers on a basis which will indicate, to the extent practicable, their relative radius of traffic attraction.

Population alone may suffice for the above ranking. Data on wholesale and retail trade, bank deposits, newspaper circulation, etc., are sometimes included and do add a degree of refinement. However, these data are not always readily available for smaller centers, and considering the supplementary classification criteria also needed, (area service, large recreational traffic generators, identifiable corridor movements, etc.) urban place ranking factors other than population are not considered absolutely essential.

Treat any single urbanized area (use Bureau of Census definition) as one center, using total population, even if a part of this population is in an adjoining state.



2. Plot centers graphically, in order of ranking, and divide into groups, with centers of similar size in each grouping. While no hard and fast rules apply, six to eight groupings will usually be typical. Too many are better than too few, particularly toward the lower end of the scale, where some centers will qualify for the arterial system and some may not.
3. Identify and rank pertinent population centers in adjoining states. Judgment is needed as to which centers to include. Larger out-of-state centers have traffic attraction relationships over a considerable distance. Smaller out-of-state centers may be pertinent only when close to the state boundary.

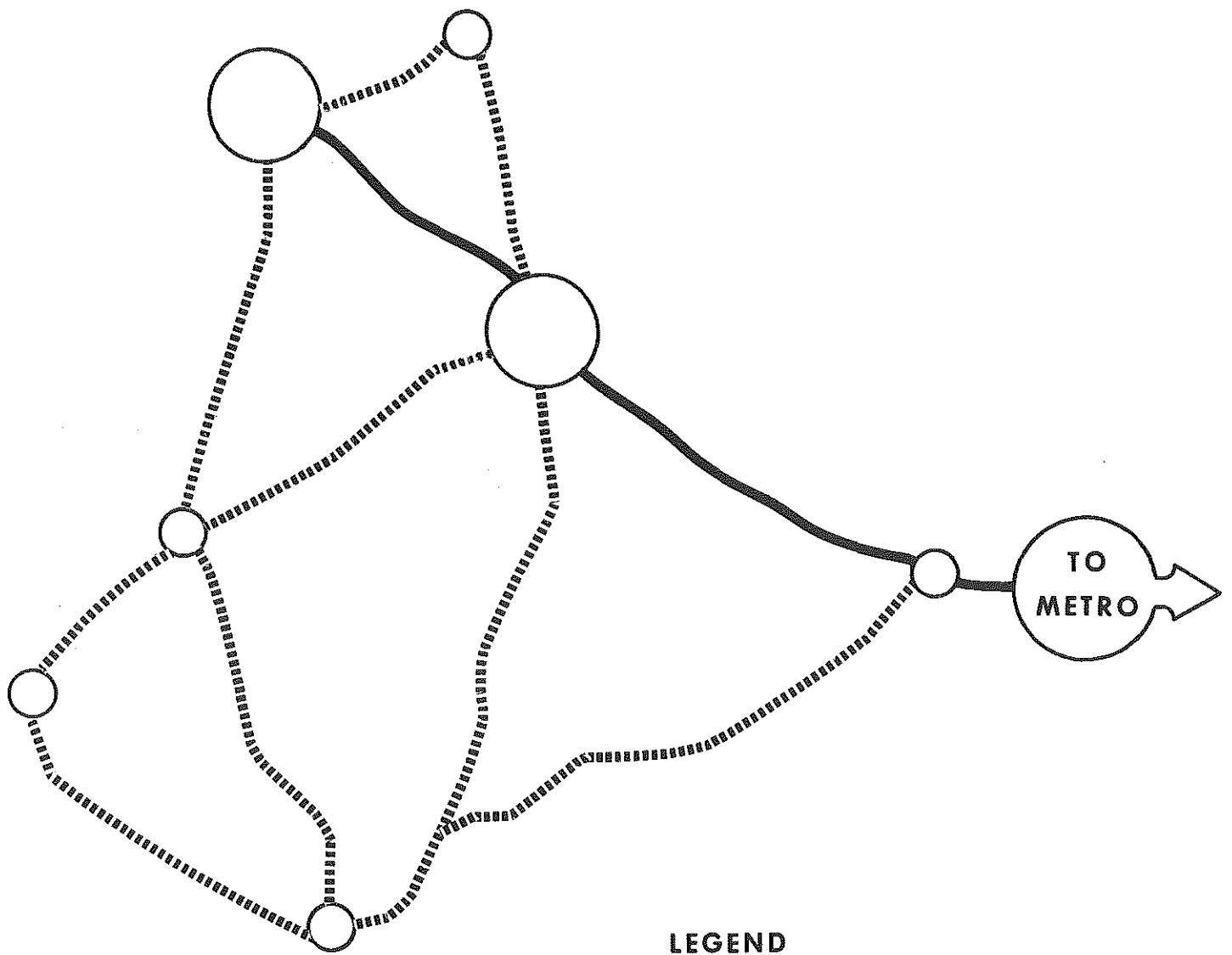
Fit out-of-state centers into appropriate size group determined for in-state centers under item 2.

4. Develop map symbol (a simple open or lightly shaded circle is suggested) for each group of population centers, with size of map symbol being indicative of size of centers in the group. Plot centers on statewide map (preferably a tracing overlay on a statewide road map).

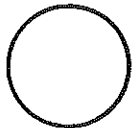



The few larger out-of-state centers which may fall off the map can be dealt with by reference to a larger scale map with appropriate arrows placed at the state lines on the statewide map, once the pertinent routings have been selected.

5. Connect centers of the largest size by the most direct and logical routes. Connect next largest group and continue working down through smaller centers (see Exhibit 8). Judgment must be exercised in determining which, among all possible connections, should be made, especially

USE OF POPULATION CENTERS IN CLASSIFYING HIGHWAYS



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-  Group I Centers
-  Group II Centers
-  Group I Connections
-  Group II Connections

when dealing with medium and smaller sized centers. It will be helpful to keep in mind that this procedure is based on an indirect and inferential approach to the traffic attraction between centers. Therefore, the traffic flow map is helpful in indicating which of all the possible connections are most significant at whatever level or size of centers is under consideration. Another point, particularly with regard to medium-sized and smaller centers, is that connection to the nearest center in a larger size group is usually more significant than connections to a center of the same size. Good judgment on these points is an essential part of the process as it is not a purely mechanical procedure.

6. Determine point of termination, that is, smallest size of population centers that will be served as a group by the arterial system. (Some additional routes may yet be added on the basis of other criteria, as indicated in item 7) Determining at what size of population centers to terminate the system involves:
 - a. quantitative indications that a point has been reached at which miles are being added faster than service, or
 - b. visual inspection indicating that the radius of importance of the places being added to the system (implied by their orientation in regard to larger places) or the amount of travel they generated (from traffic flow map) no longer fits system criterion of serving most of the longer distance trips.

7. Add such other routes to system as required by the defined system characteristics. Such routes will include:
 - a. Service to other traffic generators of magnitude comparable to population centers already served (major recreation areas or military installations, for example). Infer from traffic flow data if basic origin-destination data are not available.

- b. Corridor movements of length and volume indicative of substantial statewide or intercounty character of service (from traffic flow data).
 - c. Service to all areas of state, with spacing of routes at reasonable consistent intervals, as tempered by consideration of population density.
 - d. Such additions as are clearly needed for adequate continuity of statewide circulation (but only where logical travel patterns, rather than any desired neatness of the map, serve to justify them).
8. Consideration of alternate routes is a problem that will arise in some instances. In most cases, a single connection between two centers is all that is needed. Some instances where alternate routes may have to be considered are:
- a. Where total through movement cannot practicably be handled by one facility.
 - b. Where two apparently alternate routes are separated by geographic barriers and each is needed for arterial service to some qualified intermediate center or for connection to another intersecting arterial route.

Laying Out a Collector Network

The step-by-step procedure previously described for laying out an arterial network can be extended, in a qualitative sense, to the development of a collector network. However, precise quantitative data as to size of traffic generators and amount of traffic movement are usually not available to the same degree at the collector level. Also, population density and distribution and basic road patterns vary widely at this level. Accordingly, the procedure as described here is somewhat more generalized than that described for the arterial system.

In many instances, a beginning at delineating a collector network can be made on the statewide map which was used to delineate the arterial network. This is a practical matter of working with whatever map offers the most convenient scale. In most instances, however, completion of the collector classification will be done on maps of the county highway series. This should be done using mosaics of several counties, including the particular one being concentrated on, plus the adjacent counties.

The first step in working with the county maps is to transfer designated arterial routes to the county map, as well as any collector routes already designated on the statewide map.

As already pointed out, it is difficult to spell out in detail a step-by-step classification procedure that will neatly fit all of the wide variations in road patterns and population patterns. In any case, it should be borne in mind that what is being laid out is the backbone network of circulation at the local or county level. As a general approach that should fit most cases, the following steps are suggested:

1. A preliminary visual and mental assessment of the entire local picture, before selecting any routes, considering the following:
 - a. Location of population centers not already served by the arterial system.
 - b. Location of any heavier-than-average corridor movements within the county, from traffic flow data.
 - c. Location of existing freeway interchanges or important river crossings that may be key controls with regard to the collector system.
 - d. Location of important local traffic generators other than population centers -- grain elevators, shipping points, county parks, etc.

- e. Rural population and land-use distribution within the county as regards uniform or non-uniform density of development.

2. A selection of collector routes in the following sequence:

- a. Connect population centers not served by arterial system (see item 1a) with the arterial system and/or directly with larger population centers served by that system.
- b. Serve corridor movements mentioned in item 1b.
- c. Connect population centers mentioned in item 2a with one another to provide internal intra-county circulation, to the extent that such connections are logical, considering intervening terrain, population density, and land-use density.
- d. Considering jointly other important local traffic generators (see item 1d) and the requirement of area service and collection of traffic from tributary roads, select such additional routes as will fulfill these criteria, either jointly or separately, in the most practical way.

APPENDIX B

Following is a list of the basic data sources which were used in determining the functional classification assigned to the various roads and streets on the work maps. The listing is general in nature and is not intended to be all inclusive. However, it should adequately form the basis of all information necessary in reviewing the existing system maps and preparing the future classification maps.

1. Population data by county, rural and urban: Population density helps to determine the extent to which service is required in individual areas. Spacing requirements are generally close in high density and further apart in sparsely populated areas.
2. Population Projections: These are analyzed to determine their impact on expanding urban areas, and to delineate additional future traffic generators.
3. State, County and City Maps: These will form the basic tools of classification, providing such information as the location of traffic generators, significant terrain features, extent of network development, pavement types, governmental boundaries, etc., and on these maps will be plotted the classification selections.
4. Committed and Contemplated Road and Street Construction and Improvement Programs: These will be utilized in determining their impact on the selection of the various levels of classifications.
5. Land-Use Data: The knowledge of present and future land use is of great importance in locating traffic generators and in determining what classification of facilities are or will be needed to serve the area.
6. Industrial Area, Recreational Area, and Tourist Attraction Locations: Although frequently these developments are removed from major centers of population, they can have a very significant impact on travel.
7. Traffic-flow Maps and Data for most recent and prior years: This data will indicate the development of the pattern of traffic and therefore assist in selection of a proper classification.

8. Origin and Destination Surveys: In addition to those surveys included in the various area transportation studies, any additional information concerning origin and destination should be reviewed.
9. Major Land Use Changes: Such items as new industrial sites, shopping centers, subdivision development, or other construction should be considered in light of their impact on additional or changed segments of the highway network.