Non-Vehicular Benefits from Utility Use of Streets and Highways

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•IN KEEPING with sound economic objectives, National policy in recent years has tended to support the philosophy that costs of Federal-aid highways should be paid for by those who receive benefits from these highways, whether this applies to vehicular users or other categories that might emerge. But measurement of these benefits has proved to be difficult. When the Congress passed legislation to provide for the new National system of Interstate highways, it was believed that neither the public nor the Congress was able to judge as to the degree of benefits which highways provided to the various groups within the Nation. To obtain the necessary data to act intelligently on this matter, the Congress directed the Bureau of Public Roads to initiate studies to develop background information on highway benefits and to provide this information to the Congress and the Nation. Thus, the immediate cause for this study was the request of the Congress that the Bureau of Public Roads undertake a series of studies of benefits to vehicular and non-vehicular users of the Nation's highways. The specific request was made of the Bureau in Section 210 of the Highway Revenue Act of 1956.

It is well known that utilities provide a multitude of services in the extensive networks of the street and road system of the country. Obviously, many of these streets and roads are parts of the Federal highway system. For this reason, it was deemed desirable to investigate the benefits that utilities received through use of streets and highways as locations for these service facilities, and to provide as much information as possible about the social, economic, and legal framework of these activities.

Along with the industrialization and urban development which have encouraged the expansion of the highway network, the United States has experienced tremendous growth in its "utility" plant. As this utility plant has grown, it has generally used streets and roadways within municipalities as locations for service lines. Also, when utility services have extended beyond urban areas, the same pattern of roadway use has been followed in many instances. With the development of major transmission-type activity over long distances, both for electric and other types of services, a pattern of cross-country installation has arisen so that a large amount of these transmission lines has ceased to follow roadways. Individual customer service, however, which is commonly called distribution service, must of necessity reach the customer's house, building, or other location, and in a majority of cases these individual service installations ultimately make use of streets or roads.

Throughout the history of this country, it has been almost universally accepted without question that utility companies may use streets and roads as rights-of-way for their installations, and in a large number of instances, no specific charge or fee is paid as a result of such street use. It is true that in a number of cases, utilities have developed patterns of payments to local government units, which to some extent can be considered payment for use of streets and roads, but there is no common or universal pattern of payment which is considered normal or standard.

Method

It is difficult to establish a money cost or price for a service or benefit not customarily priced in the market place. In economic analysis, the approach generally

deemed most appropriate for investigations of this type is a study of alternative possibilities. As Stigler (1, p. 102) has stated:

> The generally accepted explanation of costs is contained in the alternative (or opportunity) cost theory. The cost of any productive service X in the production of any commodity A is the maximum amount that X would produce of any other product (B, C, ...). If capital funds can earn 4 percent elsewhere, that is their cost to the automobile industry. If an acre of land can earn $6 a year in oats, that is its cost in producing wheat.

Thus, if it is possible to measure the value of the best alternative solution, product, or other item, such a value can be attached to the basic service, or area, as a workable estimate of its value. In this study, then, it was decided to seek the value of benefits to utility operations from the use of street and highway rights-of-way by discovering the alternative cost of other rights-of-way. Such an approach obviously demands the accumulation of specific data, but it was quite impossible to collect data on all utility activity throughout the entire Nation. Neither did it seem feasible to use a simple random sample for the Nation. A different approach was chosen, in that specific sectors in four different States (Fig. 1) were used in an effort to secure representative data which would produce meaningful information.

In addition to the specific cost data that was sought, other information was to be collected to shed light on the social, economic, and legal patterns that were found to be in existence in the areas under examination. As the study has developed, these aspects to the problem have taken on added significance to the extent that they sometimes tend to overshadow the statistical measurements found within the study areas.

To provide as much diversity as possible, utility activity in urban and rural areas was examined, and the study disclosed that there were a variety of forms, or methods,

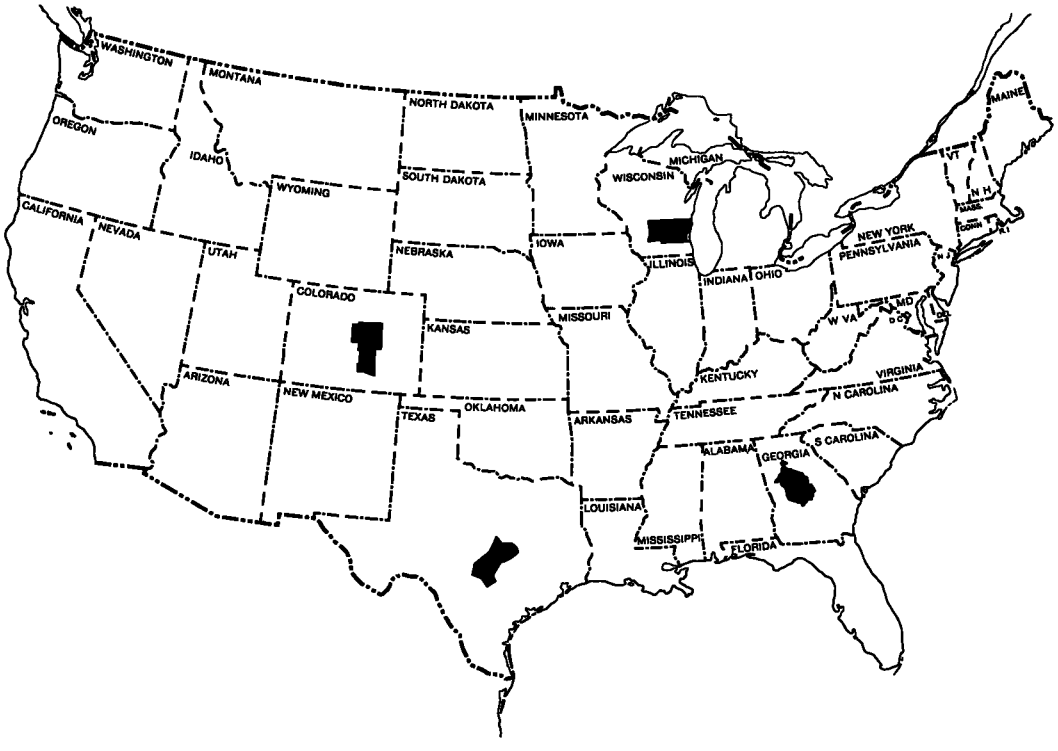

Figure 1. Map of United States showing the four study sectors.

of organization in existence. Typical corporate structures were found alongside municipal ownership activity, as well as government-sponsored cooperatives oriented to rural areas and some State-owned activities. In some other instances, manufacturing corporations were found to own or control mill villages, and in some of these, utility services were provided as an auxiliary feature of the primary corporate activity.

In addition, it was discovered that a diversity of ownership patterns for streets and highways existed. Streets in some mill villages belong to the corporation, whereas some subdivision developers still own the streets serving their units. In other cases, municipalities owned their streets and other governmental units owned their roads and highways, but in a number of instances there was no way of knowing what width of street or highway might be owned by the various governmental units. There existed also the problem of "assumed" easements, in which rights-of-way might be provided by subdividers for utility services, and over time, the rights-of-way cease to be thought of as owned by anyone, but available for utility service locations.

The Areas Studied

The Georgia Area.—To secure a diversity of urban and rural situations, the Georgia area included Atlanta, the State's largest city, and Macon, its neighbor some 90 miles south along the future path of Interstate 75. All the territory between these cities was included as well as the rural sectors of the counties in which Atlanta and Macon lie (Fig. 2). The sectors were made up of counties in order to provide opportunity for use of census and other data which are developed by governmental units. Within the Georgia area, the counties included in the study were Bibb, Butts, Clayton, Crawford, De Kalb, Fayette, Fulton, Henry, Jasper, Jones, Lamar, Monroe, Newton, Pike, Rockdale, Spalding, and Upson.

The Texas Area.—The area selected within Texas consists of the eight counties located in the vicinity of, and including, Austin and San Antonio (Fig. 3). The counties in the area are Bastrop, Bexar, Caldwell, Comal, Guadalupe, Hays, Travis, and Wilson.

The Colorado Area.—In Colorado, the area chosen was the central region running north and south which includes Denver and Pueblo, and the eight counties needed to fill out the sector (Fig. 4). The counties were Adams, Arapahoe, Denver, Douglas, Elbert, El Paso, Jefferson, and Pueblo.

The Wisconsin Area.—To use relatively comparable areas, the Wisconsin sector included Milwaukee and extended to Madison at the western limit. Again, county units were selected and eight counties were included (Fig. 5). They were Columbia, Dane, Dodge, Jefferson, Milwaukee, Ozaukee, Washington, and Waukesha.

In addition to the provision of widely dispersed areas, the four study sectors produced other advantages. There is a regional diversification, and there are important regional differences which are apparent. Wisconsin and Colorado have more extensive winter problems than do the Georgia and Texas sectors. Wisconsin has a multitude of farm operations within the study area, where Colorado and Texas have a much smaller number. In addition, there are problems of terrain, although the Colorado sector chosen is not exceedingly mountainous. The Texas sector happens to include a rather large State-owned public power-generating authority which is a dominant force in the electric utility pattern in that region. No other sector has this major public power generation feature, although all sectors have extensive REA operations. The Texas sector also provides a region relatively free of timber obstructions, which is definitely not true of Georgia and Wisconsin. On the whole, it was felt that the four study sectors were large enough to be significant and that they were sufficiently diverse, as well as separated widely enough to provide worthwhile evidences of utility patterns across the Nation.

To determine the value of land used by utilities for rights-of-way, the intent was to secure, as nearly as possible, a total inventory of utility service lines that exist within each study sector. Although some small utility units did not provide data, it is felt that approximately 90 percent of the service lines in each area were reported and used in the tabulations that follow.

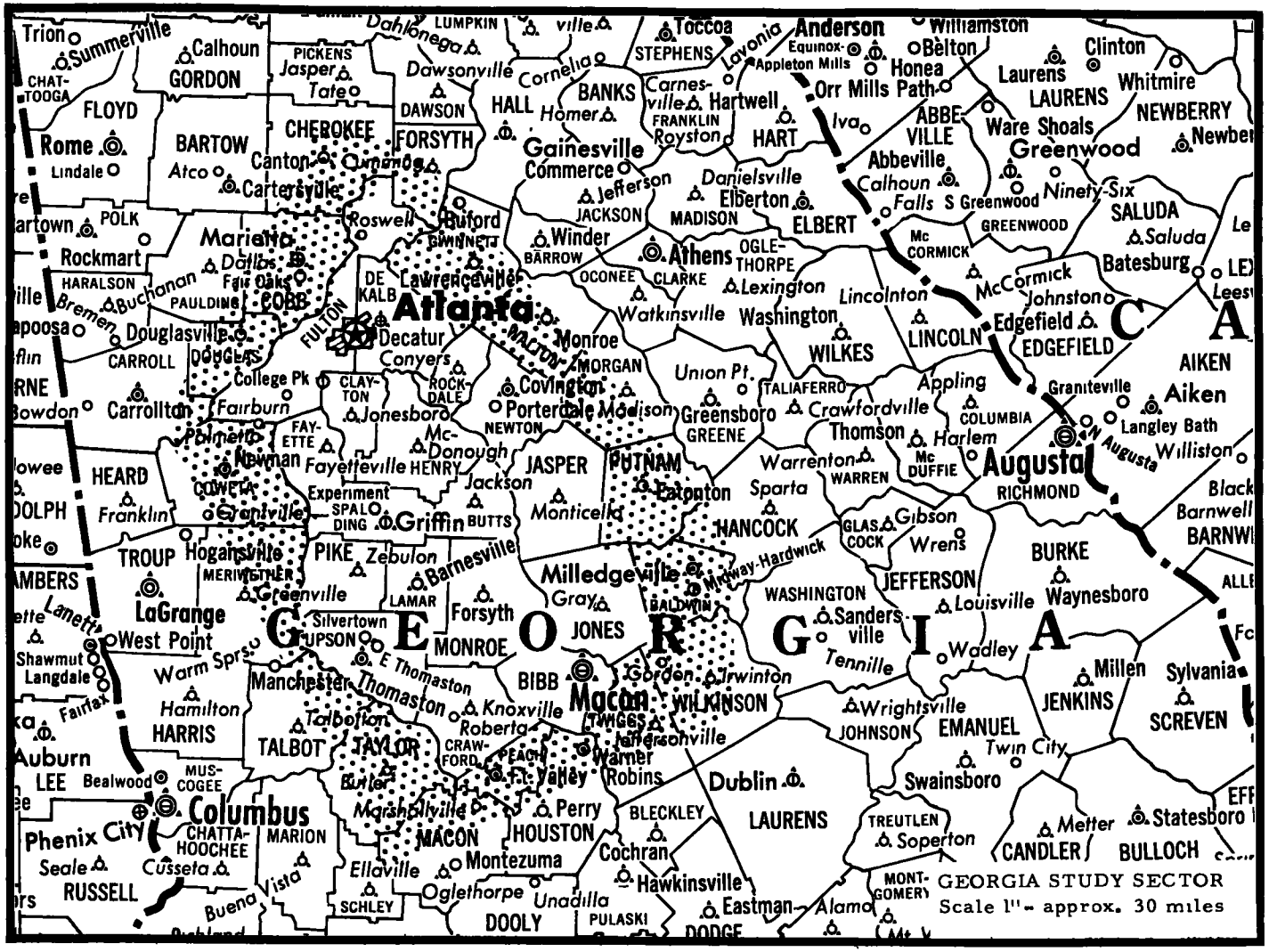

Figure 2. Map of Georgia with study area marked.

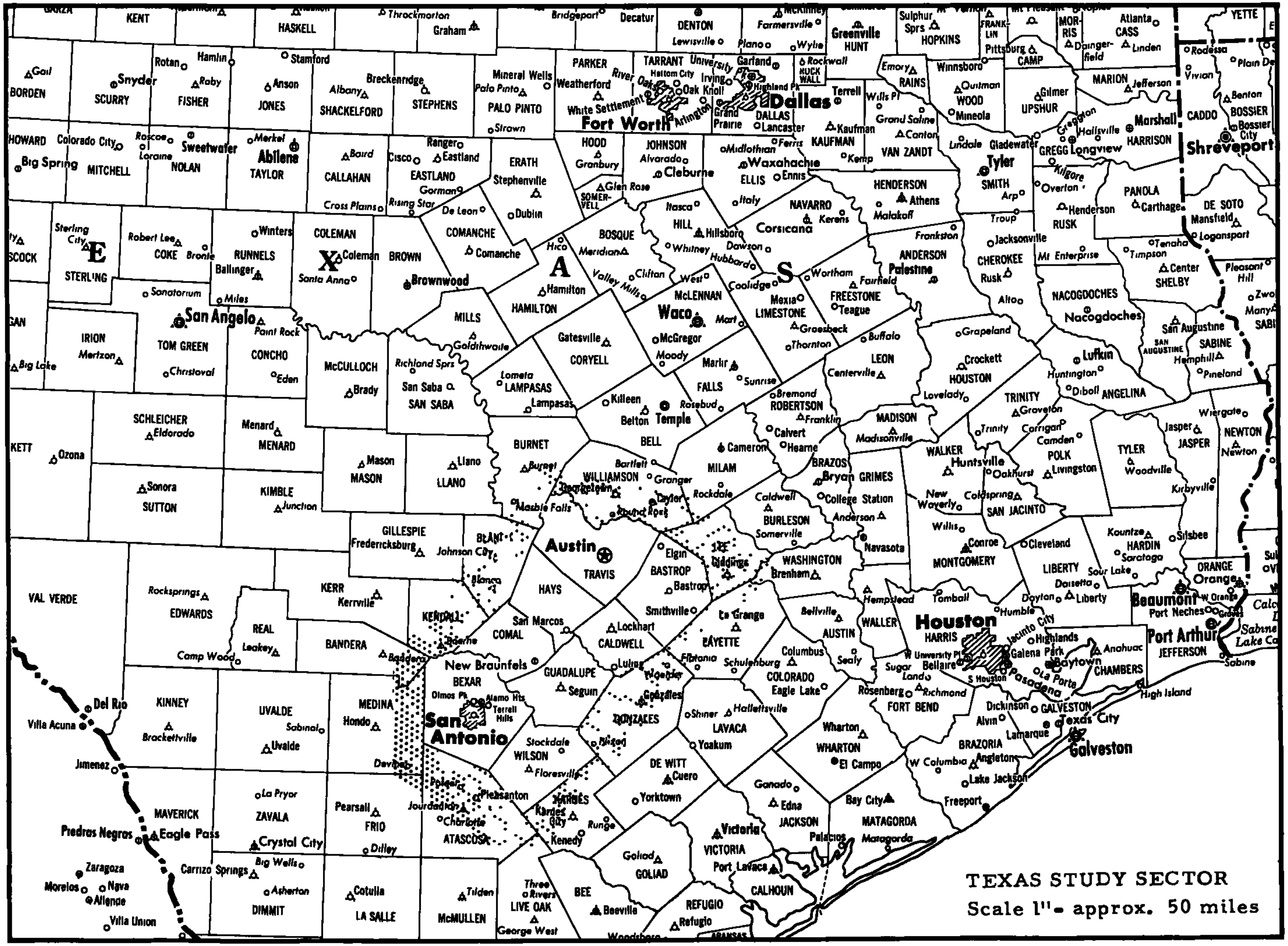

Figure 3. Map of Texas with study area marked.

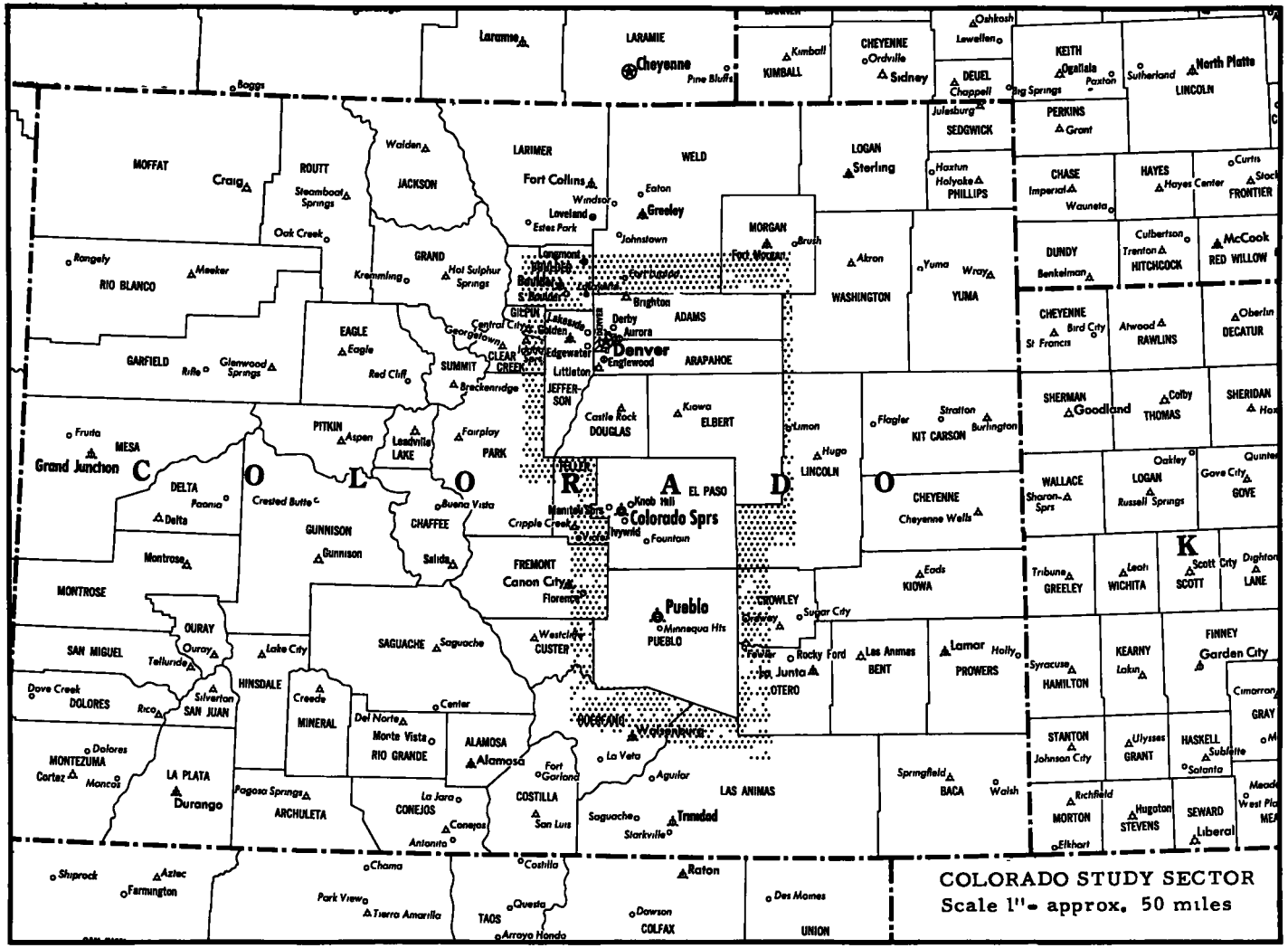

Figure 4. Map of Colorado with study area marked.

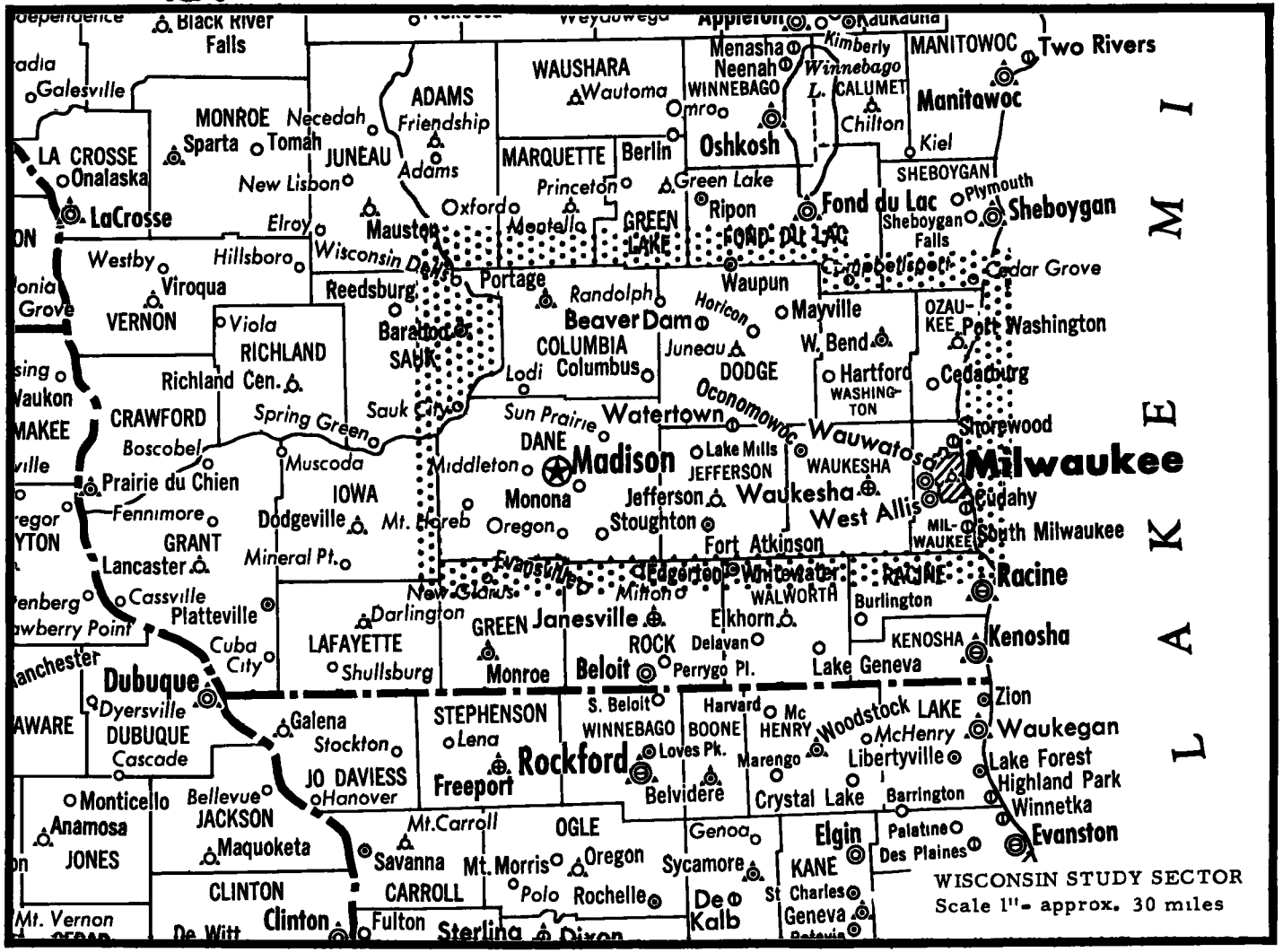

Figure 5. Map of Wisconsin with study area marked.

It has been said that these areas are not statistically perfect samples, and it is obvious that they are not exactly equal in size, importance, etc. There were, however, some important reasons for these selections. Atlanta is the major city of Georgia, as well as being the capital of the State. It was felt that substantial assistance could be secured within Atlanta from the various State offices which would thus expedite the study activity. When the Georgia area was chosen, it was decided to choose the remaining areas on a somewhat similar basis. Thus, a major city not too far from one million population was to be sought. It was desirable to have a State capital included within the study area, and it was deemed necessary to have a college or university within the study area which would agree to secure information within each sector. Milwaukee, Madison, and the University of Wisconsin fitted these specifications admirably. Austin, and the University of Texas did likewise, and the same is true for Denver and the University of Denver.

SOME INTERRELATIONSHIPS BETWEEN HIGHWAYS AND STREETS, AND UTILITIES

Vehicular Purposes of Streets and Highways

Highways and streets, spoken of as a common consolidated grouping, constitute one important element in an assemblage of factors that provide an important benefit or service to the citizens of the Nation. These highways and streets together provide the path over which many types of vehicles move in giving people and goods a high degree of mobility.

Historically, the streets of towns and cities have been of more importance than the highways, because the streets have been there "always," whereas the highways, at least of the present type, have been a development of the 20th Century. At present, however, an important part of the highway mileage is quite similar to the street system. This is true because much of the highway network, after construction as rural mileage, has, in reality, become urban mileage, as structures fronting these roadways have multiplied to city-like proportions. For these and other reasons, many of the highways have "inherited" the advantages and disadvantages of the street network.

This similarity of streets and highways in the public mind has been carried over to theoretical studies as well. D. P. Locklin (2, p. 659), and citing C. L. Dearing as a supporting authority (3, pp. 158-163, 209-212), has said,

> ...it is necessary to recognize that highways serve three more or less distinct purposes. One of these purposes is to provide a means of access to land, without which land would be practically unusable and worthless. Thousands of miles of country and township roads principally serve to provide access to farm lands. City streets perform the same function for city property.
>
> A second function of roads is commonly described as a "community-service function." This function cannot be entirely separated from the first, but, in this capacity, roads provide for the local movement of persons and property in the performance of the processes of production, marketing, buying supplies, going to school, and carrying on numerous social and other activities.
>
> The third function of the highway under modern conditions is to provide a means of intercommunity mobility and long-distance transportation. This is the function, as we have noted that came into prominence with the development of the automobile.

Actually, the first and second purposes are functions of streets, and of course, in the past, the third purpose, that of intercommunity mobility and long-distance transportation has been grafted onto the already overburdened street system.

Before the development of motor vehicles and highways, the rail net was the most important factor in providing intercommunity mobility and long-distance transportation, but this has continued to change as the newer system of motor vehicular traffic has become more versatile and ubiquitous.

As railroads learned many years ago, there is a sharp conflict of interest between local traffic and long-distance movement. Local service desires freedom of maneuver for stopping, starting, parking, turning, and the like; whereas long-distance movement seeks speed, freedom from obstacles, etc. As the need for long-distance movement has grown, special-purpose roads have begun to be provided to serve these demands, and it has come to be realized that these ways must be designed in such a manner that they become inimical to street usage. The freeway design of today is approaching the ultimate in evolution away from the city "street." In essence, these freeways are single-purpose facilities which, in reality, are quite similar to a tunnel or bridge over local areas connecting points relatively widely separated.

Non-Vehicular Purposes of Streets and Highways

The urban street system as it has evolved has served other purposes in addition to vehicular or pedestrian traffic. From the very inception of utility services such as water supply and sewage disposal, the city streets have provided a path for these facilities. With the coming of other services such as gas, telephone, and electricity, the city street has become invaluable as a path for these installations. Urban communities would be vastly different if other provisions for rights-of-way for utility services had been necessary. In addition, the real cost of providing these utility services would have been appreciably increased if special rights-of-way had been required.

In relatively recent years, these utility-type services have been extended throughout widespread rural areas to large numbers of structures, which usually front on State-provided highways, with the result that the former rural highways have taken on more of the characteristics of city streets. This has been desired by those who use the structures so served, but at the same time, the highway which generally was provided at State or Federal expense has been less able to discharge its function of providing long-distance movement.

Utility services, like highways and streets, provide important benefits or services to the citizens who have them available. Where highways and streets provide mobility for people, often making it possible for people to move toward "goods" or locations, the utility service company provides mobility of goods toward specific locations. Thus, the utilities take their services to their customers rather than requiring their customers to come to them for service. This type of organization, of necessity, calls for special-purpose paths so these goods can be distributed. If the existing ways to homes and businesses were not available, a separate provision of such ways would be essential, thus increasing the cost of providing these services. For this reason, as urban-type civilization has evolved, it generally has been deemed desirable to combine the two necessary paths by allowing the utilities to install their lines and services within the street system of the community so served. In some instances, it would be almost impossible to provide separate ways for streets and utilities.

It must be said that aesthetically some utility service installations leave much to be desired and in some communities where advance planning has allowed it, alleys or rear serviceways have been provided. This pattern has been successful in some communities but in others it has been so lightly regarded that services have been moved to front areas to avoid the costs of duplicate land provision and the costs of inaccessibility.

Highway Development and Utility Installations

There are three basic observations which seem pertinent here. First, it can be said that generally in the American governmental system, there is no long-standing

pattern of moral obligation of a State government to provide purely local road or street service, either inside municipalities or outside them. Theoretically this is a function of the local city or county governmental unit. Custom and the necessities of political organization have caused States (often supported by Federal funds) to engage in such activity extensively in rural areas, but this is not quite equal treatment to the urban dweller who pays city taxes to provide his purely local street needs. In recent years, as the political power of urban population has increased, a somewhat corresponding increase in highway department activity in urban areas has appeared.

The second observation about highway activity pertains to utility services in rural areas, and not highway construction as such. Logically, governmental units should provide similar treatment to utility lines, whether they are located within municipalities or outside them, unless there are significant differences in operating conditions. This implies, of course, that if cities provide free rights-of-way for utility services, that the same treatment should be expected in rural areas. In situations of this type, however, the American practice of separation of governmental units causes confusion, because, in general, municipal governments own and control streets, whereas in the ordinary county pattern there is a mixture of county and state ownership of roads and rights-of-way.

Also, as a general rule, State governments do not establish local control policies for city and county governments. As a result, there is no method of guaranteeing equal treatment to different utilities within separate geographical units, nor is it possible to guarantee equal treatment to the same utility within separate geographical units. Many States have tried to provide similar treatment, at least in taxation patterns, but it is still possible to find widespread differences in a number of areas.

The third point also pertains to differences between urban and rural areas. It is quite apparent that on a strictly economic basis, sparse development makes for greater cost of utility service as customers obviously will be located at greater distances apart, thus tending to cause higher costs for construction and delivery of the service to each structure. For this reason, any precipitate decline in the provision of new and improved rural roads or any imposition of special charges for utility installations along rural rights-of-way would drastically curtail rural development as contrasted with urban expansion. State highway departments whether intentionally or not, have been vital factors in the decentralization of cities and it would be difficult for many of them to reverse their activities at this time.

In spite of the problems outlined, any theoretical consideration of the separation of duties between local and State governmental units will indicate that provision of local streets is not logically a function of a State government as long as local units are in existence. Certainly there is no theoretical or moral obligation for the State or Federal governments to provide rights-of-way either in cities or in rural areas which are of sufficient width to provide paths for utility services, if the the objective of the State and Federal governments is to provide paths for intercommunity mobility and long-distance transportation. The problem is an entirely different one if the objective of the larger governmental units is to provide street-type services. If this latter sentiment ever does become of paramount importance, then drastic revisions in philosophy and in taxing power should precede such actions.

UTILITY SERVICES WITHIN THE STUDY SECTORS

Georgia Area

As explained earlier the Georgia area (Fig. 2; Table 1) is composed of 17 counties located largely within the northwestern quarter of the State. Macon is very near to the geographic center of the State, while Atlanta is considered the center of the northwestern quarter. Terrain within the study area may be described as rolling or hilly, with extensive woodlands, and some abandoned farmland which is slowly reforesting itself. Farming activity is carried on throughout much of the area, with most of the more valuable agricultural land lying within the lower half of the study sector. There are no massive terrain problems, such as mountains or swamps. These features exist in other parts of the State, but do not pose a problem for this study.

Approximately 30 percent of all the residents of Georgia live within the study sector. Of the 1,168,716 people within the study area, approximately 1,000,000 of them live within the urban centers of Atlanta and Macon. The metropolitan Atlanta area is itself

TABLE 1

GEORGIA STUDY SECTOR, SUMMARY OF MILES OF SERVICE FACILITIES ON PUBLIC AND PRIVATE RIGHTS-OF-WAY

Service Facility	Right-of-Way (mi)				Number of Customers
	Public	Private	Public	Private	
Electric:	Transmission Lines		Distribution Lines		
Urban	21.44	5.84	1,854.90	224.13	193,276
Suburban	22.17	254.73	1,548.47	556.21	104,991
Rural	3.56	656.12	517.14	4,794.80	39,043
Total	47.17	916.69	3,920.51	5,575.14	337,310
Gas:	Supply Mains		Distribution Lines		
Urban	109.84	19.50	2,115.12	1.50	186,997
Suburban	67.36	11.81	996.25	--	89,445
Rural	97.77	25.25	28.02	--	1,485
Total	274.97	56.56	3,139.39	1.50	277,927
Telephone.	Toll Lines		Exchange Lines		
Urban	13.20	--	1,197.00	225.90	204,565
Suburban	42.65	--	725.85	532.95	89,333
Rural	120.75	542.95	895.15	2,387.35	19,592
Total	176.60	542.95	2,818.00	3,146.20	313,490
Water:	Supply Mains		Distribution Lines		
Urban	35.25	3.75	2,921.70	35.10	182,419
Suburban	28.25	--	1,016.00	--	60,380
Rural	30.63	12.57	111.63	3.75	2,829
Total	94.13	16.32	4,049.33	38.85	245,628
Sewage:			Disposal Lines		
Urban	--	--	2,438.45	307.90	--
Suburban	--	--	73.00	12.00	--
Rural	--	--	6.00	31.00	--
Total	--	--	2,517.45	350.90	--

slightly over the one million mark according to preliminary census figures, but two of the counties which are included in the metropolitan area are excluded from this study sector.

Telephone Service.—Southern Bell Telephone and Telegraph Company provides the vast majority of telephone service in the study area. Practically without exception, all toll lines are owned by Southern Bell and American Telephone and Telegraph Company. There are three small independent rural telephone companies, and one small city company at Thomaston. The rural lines of these companies are financed through the Rural Electrification Authority and they adhere to right-of-way policies developed for REA activity.

Power Service.—Georgia Power Company is the dominant supplier of electric power in the study sector, supplying Atlanta, Macon, and most of the other towns in this area. Within the study area there are 10 REA cooperatives which serve some or all of the 17 counties. (These 10 cooperatives also serve in 24 counties outside the study area.) Power for these cooperatives is secured through the transmission lines of Georgia Power Company and is purchased from Georgia Power or Southeastern Power Administration. There are 14 municipalities within the 17-county area which operate electric power distribution systems. These municipalities also secure power through the transmission lines of Georgia Power Company and from the generation facilities of the same company.

Georgia Power Company is a large, integrated company which has many hydroelectric plants along the rivers of the State. It also, by itself, and with its sister company, Alabama Power Company, operates a number of large steam generation plants.

Southeastern Power Administration markets power from a number of hydroelectric plants in Georgia. These are flood control and river flow stabilization installations primarily, although there is navigation on the lower reaches of both the Chattahoochee-Apalachicola and the Savannah waterways. There is no freight navigation within the study area.

The power company sought, unsuccessfully, to operate the generation facilities within these Federal projects. Georgia Power Company has been successful, however, in serving as the power transmission agency for all current generated at these installations. Apparently its functions as wholesaler and retailer are not causing serious public relations problems at the present time.

Gas Service.—Georgia does not have a pattern of rural gas service comparable to its REA or telephone service pattern. It is true, however, that natural gas pipeline companies often provide service in rural areas relatively close to their transmission facilities. There are eight municipalities within the study area which operate their own natural gas service or use a small local supply company.

The majority of natural gas service in the study area is supplied by Atlanta Gas Light Company, which is a distribution company exclusively. It buys its gas from the major pipeline firms located within the State. Atlanta Gas Light Company operates a great majority of its lines within streets and alleys of the municipalities it serves.

There are two small companies which operate transmission lines and local service within the study area. Both of these companies buy their gas from the major transmission lines serving the State.

Two major gas transmission companies extend through the study area. Southern Natural Gas Company is the principal supplier of Atlanta Gas Light Company in this area and has approximately 284 mi of transmission lines extending through the study area. These lines are almost wholly on private rights-of-way which are secured through easement, as a regular policy. Transcontinental Gas Pipeline Corporation pipes gas through the State and is not a principal supplier in the State.

There are two petroleum products, pipelines that cross this study area. Both of these are located on private rights-of-way exclusively. Plantation Pipeline Company has approximately 68 mi of line through the study area and Southeastern Pipeline Company has approximately 122 mi of line through the study area. These lines are not normally thought of as public utilities in the conventional sense of the word and do not serve local customers as this term is commonly used.

Water Service.—Within the study sector 22 municipalities provide water service. In almost all cases, the lines of these systems are located in public streets and alleys although there are mains bringing water from nearby sources which utilize private rights-of-way in some instances.

Two water companies provide service within the study area. The operating pattern of these units is similar to that of municipal water operations except that in some instances private rights-of-way have been secured to protect the corporate interests sponsoring the water service.

Sewerage Service.—Sewage disposal services are maintained by 20 municipalities within the study area. Because of the characteristic that sewerage systems operate on the gravity principle primarily, these systems are greatly influenced by new street or highway activity. Insofar as is known, there are no commercial sewage disposal facilities within the study area in Georgia.

Texas Area

The Texas study area (Fig. 3; Table 2) is composed of eight counties located in south central Texas. These counties generally lie about 150 or more miles west of Houston; and Travis, the northernmost county of the study area, is about 180 miles south of Fort Worth. Austin, the capital of Texas, is situated in Travis County and metropolitan San Antonio occupies most of the area of Bexar County, which is at the southern end of the study sector. These eight counties, in the main, lie just east of the Balcone's Escarpment which extends roughly north to south through central Texas and which marks the limit of the gulf coastal plain. Much of the western areas of the study sector consist of hilly regions bordering the well-known sheep-grazing section known as the Edwards Plateau. These areas fall away to the east into rolling hills and level land. It is estimated that about two-thirds of the land area consists of mildly rolling hills. Rainfall in the study sector is relatively light, but extensive farming, as well as grazing, is carried on throughout most of the area.

Austin is well known as the site of the capital of Texas and of the State University. In addition to these major achievements, the city is a center for local distribution and light industry tied to farming activity of the region.

San Antonio, one of Texas' oldest cities, is a major transportation and marketing center for agricultural produce from the nearby areas, as well as the major marketing center for livestock products coming from the Edwards Plateau. It has major oil refineries, although it is not the dominant oil city of the State.

Because of the massive size of Texas, the study sector is a very small part of the total land area, but it constitutes a larger percentage of the population group. Slightly more than 2 percent of the land area of Texas is in the study sector, whereas about 11 percent of the residents of Texas live within the study sector. Again, as in the case of Georgia, a large majority of the people within the study sector live within the two metropolitan areas of San Antonio and Austin. Approximately 900,000 of the 1,000,000 people within the study sector reside in the two largest metropolitan centers.

Telephone Service.—Southwestern Bell Telephone Company provides the major proportion of telephone service within the study sector, but General Telephone Company is active in the area north and west of San Antonio. Toll lines, in the main, are owned by Southwestern Bell and American Telephone and Telegraph. There are at least three small telephone companies operating within the Texas study sector, but it was not possible to obtain significant information from these units.

Power Service.—Three REA Cooperatives are active in the Texas study sector. Power for these cooperatives is secured through the transmission lines of the Lower

TABLE 2

TEXAS STUDY SECTOR, SUMMARY OF MILES OF SERVICE FACILITIES ON PUBLIC AND PRIVATE RIGHTS-OF-WAY

Service Facility	Right-of-Way (mi)				Number of Customers
	Public	Private	Public	Private	
Electric:	Transmission Lines		Distribution Lines		
Urban	42.00	106.60	1,800.00	46.00	213,009
Suburban	22.50	28.33	1,500.00	200.00	95,696
Rural	3.00	563.67	702.00	4,067.40	19,917
Total	67.50	698.60	4,002.00	4,313.40	328,622
Gas:	Supply Mains		Distribution Lines		
Urban	--	--	2,018.10	3.50	162,358
Suburban	--	--	1,716.00	--	72,275
Rural	--	--	13.51	--	785
Total	--	--	3,747.61	3.50	235,418
Telephone:	Toll Lines		Exchange Lines		
Urban	5.04	10.27	1,814.00	--	156,845
Suburban	10.77	12.87	1,444.50	--	65,551
Rural	135.55	357.78	2,024.10	363.10	9,287
Total	151.36	380.92	5,258.60	363.10	231,683
Water:	Supply Mains		Distribution Lines		
Urban	2.68	7.19	2,068.85	21.85	154,872
Suburban	--	--	765.00	1.00	45,187
Rural	--	--	2.50	0.50	288
Total	2.68	7.19	2,836.35	23.35	200,347
Sewage:			Disposal Lines		
Urban	--	--	1,199.70	143.50	--
Suburban	--	--	875.00	115.00	--
Rural	--	--	--	--	--
Total	--	--	2,074.70	258.50	--

Colorado River Authority. There are eight municipalities within the eight-county area which operate electric power distribution systems. These municipalities secure most of their power through the transmission lines of LCRA, except that San Antonio, which has a municipal distribution system, also generates a major portion of its power locally. There is no dominant privately-owned power activity within the Texas study sector.

LCRA is a State-owned hydroelectric generation system. Its dams are located along the Colorado River of Texas. This Authority was created as an independent operating unit many years ago by the Texas legislature. Its objective was to take over unfinished dams which were abandoned in the collapse of the Insull utility empire many years ago. From a small beginning, this Authority has grown to be a principal producer of electric power and a dominant force in the economic life of south central Texas. It is publicly owned, but is managed along independent lines, and it has been financed through the sale of bonds, as well as re-investment of revenues. It acts much as a private utility in its management decision pattern.

Gas Service.—The larger of the major cities, San Antonio, provides natural gas distribution service through municipal activities. The Southern Union Gas Company supplies metropolitan Austin. In the other counties, the distribution division of United Gas Corporation is the principal supplier. United Gas serves Bastrop, Comal, Guadalupe, and Hays Counties, and not other gas activity has been reported in these areas. Southwest Natural Gas Company handles distribution in the two principal municipalities in Caldwell County. The pipeline division of United Gas Company is the principal supplier, both for the distribution division of United Gas and for the municipal operation in San Antonio and the separate distributing company in Austin.

Water Service.—Water service within the Texas study sector apparently is provided by a large number of small units. It has been estimated that as many as 200 separate suppliers exist within Bexar County. (Public Health authorities do not require the reporting of water activities in Texas.) Most of these, of course, are very small and provide water service to a subdivision or other minute geographic sector. Seventeen communities provided information about their water supply activities, and it is felt that these 17 units constitute the bulk of the water supply activity. The two major communities of Austin and San Antonio have reported the number of customers which they supply, and it is logical to assume that most of the population of these two major areas are represented in the data available.

Sewerage Service.—Thirteen communities provided information pertaining to sewage disposal service within the study area. Again the two large communities of Austin and San Antonio constitute a large majority for this service.

Colorado Area

The Colorado area (Fig. 4; Table 3) is composed of eight counties and includes Denver, the capital of the State, which dominates the northern part of the study sector, and Pueblo at the southern part. It will be recognized that, in general, this tier of counties lies on the plateau running immediately east of the Rocky Mountain ranges which extend through the center of the State and westward. Terrain within most of the study area may be described as high plains, although in some minor areas, foothills and rough terrain exist.

Denver is the dominant city in the Rocky Mountain region and is a major center for meatpacking and agricultural processing in general. It is also a major transportation center for the entire Rocky Mountain region. Colorado Springs, south of Denver, is predominantly a health and tourist resort center, as well as the commerical center for many of these activities. Pueblo is Colorado's second largest city and is an active manufacturing center. It is the site of one of the West's largest iron and steel manufacturing complexes because of its good transportation and its nearness to both coal and iron ore deposits of the region. In the rural areas, farming, including grazing and cattle-raising, are the dominant activities, with irrigated land in the area being especially productive and highly valuable.

Approximately 1,115,000 people live within the eight counties of the study sector. It is estimated that approximately 1,000,000 people live within the three metropolitan

TABLE 3

COLORADO STUDY SECTOR, SUMMARY OF MILES OF SERVICE FACILITIES ON PUBLIC AND PRIVATE RIGHTS-OF-WAY

Service Facility	Right-of-Way (mi)				Number of Customers
	Public	Private	Public	Private	
Electric:	Transmission Lines		Distribution Lines		
Urban	1.91	24.48	1,677.42	381.98	245,825
Suburban	52.15	287.33	573.00	1,066.00	81,400
Rural	42.75	567.76	1,013.92	6,113.92	18,868
Total	96.81	879.57	3,264.34	7,561.90	346,093
Gas:	Supply Mains		Distribution Lines		
Urban	1.00	20.40	1,701.90	7.30	195,276
Suburban	2.10	6.30	1,381.20	25.60	86,637
Rural	--	--	--	--	--
Total	3.10	26.70	3,083.10	32.90	281,913
Telephone:	Toll Lines		Exchange Lines		
Urban	38.10	2.00	1,001.60	296.70	278,738
Suburban	40.00	40.00	63.80	--	--
Rural	332.40	446.00	844.20	984.10	12,196
Total	410.50	488.00	1,909.60	1,280.80	290,934
Water:	Supply Mains		Distribution Lines		
Urban	2.50	109.30	2,064.69	42.20	195,485
Suburban	66.89	1.00	429.21	24.90	37,250
Rural	--	105.49	54.00	2.00	2,971
Total	69.39	215.79	2,547.90	69.10	235,706
Sewage:			Disposal Lines		
Urban	--	--	1,607.00	243.50	--
Suburban	--	--	270.95	51.55	--
Rural	--	--	--	--	--
Total	--	--	1,877.95	295.05	--

areas of Denver, Colorado Springs, and Pueblo. More significantly, well over 60 percent of the entire population of the State is located in these eight counties, out of the State's 64.

Telephone Service.—Mountain States Telephone and Telegraph Company provides the vast majority of the telephone service within the study area. As is true for the Southern Bell Company in Georgia, practically all toll lines are owned by Mountain States and American Telephone and Telegraph Company. There are five independent telephone companies in the study sector. Four of them provided information for this study, and of the four, only one reported that it is financed through the Rural Electrification Authority.

Power Service.—Within the study area, there are three REA Cooperatives, each of which serves various areas within one or more of the seven counties outside of Denver County. Power for these cooperatives is secured from (a) the major generating companies within Colorado, (b) from the Bureau of Reclamation, or (c) from the Colorado-Wyoming Power Pool. Apparently, only two municipalities within the eight-county area operate electric power distribution systems. These municipalities also secure power in the same manner as do the rural cooperatives.

Gas Service.—Gas service within the Colorado study sector is provided by the two major utilities, Public Service Company and Pueblo Gas and Fuel Company. (Pueblo Gas and Electric Company, while a subsidiary of Public Service, is a large operating unit and as such deserves separate consideration in a report such as this.) Natural gas in part of the Colorado Springs area is provided by Pueblo Natural Gas Company, with the city of Colorado Springs providing some of its citizens with gas service as it

does electric service. According to information gathered, there are no small localized gas operations within the Colorado study sector. The major pipeline transmission companies are Colorado Interstate Gas Company and Colorado-Wyoming Gas Company.

Water Service.—Within the Colorado study sector, 20 communities or smaller units provide water service in the area. Denver apparently obtains much of its water from catchment basins in the mountains, but the other localities use surface streams or deep wells as sources of supply. Apparently there has been a tendency to provide water service in a few, newly developed subdivisions or other urban areas. These activities are minor in relation to the total water supply service.

Sewerage Service.—Sewage disposal agencies are maintained by the three municipalities or communities within the study area. The dominant water and sewage disposal activity in the whole region is carried on by Denver, which provides service not only to Denver City and County, but to the metropolitan area surrounding the central city.

Louviers is apparently a wholly-owned community provided by the DuPont Company for employees living in El Paso County. Because it is wholly owned by the corporation, it does not fit the normal description of a municipal activity.

Wisconsin Area

The Wisconsin study sector (Fig. 5; Table 4) is composed of eight counties situated in the southeast quarter of the State. The area is roughly a rectangle made up of two tiers of four counties each. Milwaukee County, on the east, is on the shore of Lake Michigan about 80 mi north of Chicago. Dane County is some 60 mi west of Milwaukee

TABLE 4

WISCONSIN STUDY SECTOR, SUMMARY OF MILES OF SERVICE FACILITIES[a] ON PUBLIC AND PRIVATE RIGHTS-OF-WAY

Service Facility	Right-of-Way (mi)				Number of Customers
	Public	Private	Public	Private	
Electric:	Transmission Lines		Distribution Lines		
Urban	4.98	26.66	2,517.78	1,508.55	403,089
Suburban	0.40	4.50	735.00	640.00	71,529
Rural	549.48	723.66	5,873.15	1,605.34	47,678
Total	554.86	754.82	9,125.93	3,753.89	522,296
Gas:	Supply Mains		Distribution Lines		
Urban	4.40	--	2,492.96	20.67	252,611
Suburban	--	--	888.32	3.48	75,364
Rural	37.62	73.27	181.25	55.54	4,454
Total	42.02	73.27	3,562.53	79.69	332,429
Telephone:	Toll Lines		Exchange Lines		
Urban	39.90	0.10	1,324.47	989.45	368,537
Suburban	24.90	0.10	143.20	195.55	28,000
Rural	626.34	256.00	4,350.30	630.20	29,796
Total	691.14	256.20	5,817.97	1,815.20	426,333
Water:	Supply Mains		Distribution Lines		
Urban	30.92	1.68	2,305.67	26.62	247,361
Suburban	0.25	--	954.18	--	47,200
Rural	--	--	59.81	1.73	3,966
Total	31.17	1.68	3,319.66	28.35	298,527

[a]Data not available on sewage service facilities.

and about 30 mi north of the Illinois border. Terrain within much of the study sector is composed of rolling hills and level fields, but in some areas, large hills formed in the Glacial Age are found. Rainfall in the region is adequate for general farming, and dairying is the dominant activity in the rural areas.

Milwaukee is the largest city in Wisconsin and is the largest city in any of the four study sectors. Because of its location on Lake Michigan, it is an important harbor site. The city is a major industrial center which is noted for its metal workers and other skilled employees. The manufacture of heavy machinery and other tools for numerous aspects of the National economy is an important part of Milwaukee's business activity.

Madison is the State capital, the site of the University of Wisconsin, and a chief city of the important Wisconsin dairying industry which dominates rural activity in Dane County. The rural areas, particularly around Madison, are heavily populated, as is attested by the large number of village-type utility installations in Dane County. (In addition to Wisconsin Telephone Company and General Telephone Company, there are 15 smaller telephone operations; there are 3 larger electric utilities in the County and 15 smaller ones; and there are 24 water service units in Dane County.) This, of course, is contrary to the situation that exists in much of the land area of the other study sectors.

From the standpoint of land area, the study sector is slightly more than 8 percent of the total area of the State; but about 40 percent of the State's population lives within these eight counties. As is true of the other areas, a large majority of the people in the study sector live within the urban areas. Approximately 1,400,000 people live in Milwaukee, Waukesha, and Dane Counties, and Waukesha is considered almost an extension of the urban activity in Milwaukee County.

Telephone Service.—Wisconsin Telephone Company provides the major proportion of telephone service within the study sector and General Telephone provides some service in seven of the eight counties studied. In addition to these larger units, there are 29 small companies or cooperatives in the Wisconsin study sector. As is true in the other regions, the Bell System's units, Wisconsin Telephone and American Telephone and Telegraph, own almost all of the toll lines in the area.

Power Service.—There are four REA Cooperatives which are active in the Wisconsin study sector, and 18 units listed as municipal electric companies, with four units listed as municipal electric departments, and six units listed as private corporations. The larger of these are (a) the Wisconsin Electric Power Company with headquarters in Milwaukee, (b) the Wisconsin Power and Light Company, and (c) Madison Gas and Electric Company. Both of these last two have their headquarters at Madison.

Gas Service.—In contrast to the large number of suppliers of telephone, electric, and water service, there are only five distributors of natural gas and all of these are listed as private corporations. Two of them, Madison Gas and Electric and Wisconsin Power and Light, provide both gas and electric service in some areas, whereas Milwaukee Gas Light Company and Wisconsin Natural Gas Company supply gas service only. The other supplier is a local community unit, Stoughton Light and Fuel Company. All natural gas for the area is supplied by Michigan-Wisconsin Pipe Line Company.

Water Service.—Water service within the Wisconsin study sector is provided by 87 different supply units. Three of these seem to be private corporations, while the other 84 are publicly owned. Communities in the vicinity of Lake Michigan generally secure their supply from the lake, whereas others use surface streams or wells.

Sewerage Service.—No data pertaining to sewage disposal service were collected in Wisconsin. It was felt that collection and tabulation would prove difficult because of the large number of municipal units, and there was no State agency available to render the type of assistance that came from the Public Service Commission of Wisconsin.

LEGAL AND MONETARY PROVISIONS FOR STREET AND ROAD USE

General Legal Provisions

Each of the four States in the study has State laws that control or allow the use of State and county roads for utility operations. Within municipalities, State law gen-

erally is permissive, and a further action by the municipal governing body normally is required. There are exceptions to this situation because some State laws provide statewide franchise coverage. The major utility companies have been quick to point out the existence of all of these laws in any discussion of the legal basis for their operation. These laws, in most instances, spell out the fact that utilities may, under specified circumstances, use streets and roads as locations for lines, poles, etc. (No attempt has been made to collect the provisions of State laws which pertain in general to use of streets and roads by utilities. It is felt that such a tabulation probably should be a separate operation handled by someone more familiar with legal terminology and sources.)

Monetary Provisions

It is also true that each of the four States has some form of legal provision for the assessment of charges on utility activities within the State. Most of these provisions refer to the use of streets and roads along with other aspects of utility operation. Some are more specific than others. For example, one Texas statute is called a Street Rental Tax Law. Some of the statutes are merely permissive, allowing cities or other political subdivisions to work out their own arrangements for financial compensation in this area of activity.

Georgia Study Sector.—Within the Georgia study sector, Georgia Power Company pays a 3 percent gross revenue franchise tax to each municipality in which it provides retail electric service. This tax is collected on all services except industrial accounts. The company makes no payment of this type to counties or to towns that receive wholesale service from the company.

The power company has franchises granted by practically all municipalities in which it serves, and the standard franchise agreement lists street use as one of the benefits that the company is to receive as a result of these payments.

The Atlanta Gas Light Company has franchises in all but two of the 67 communities in Georgia which it served on September 30, 1959. Some, but not all, of the franchises recently granted include a franchise tax provision, usually effective after a five-year development period, at a 3 percent rate, whereas others start at 1 percent and increase ½ percent annually to a maximum of 3 percent.

The Southern Bell Telephone and Telegraph Company also has agreements covering its service in practically all of the municipalities in Georgia. The consideration the company gives to the city for such permission varies among the various communities. In practically every instance, the ordinance calls for the furnishing by the company to the city of space on each pole for wires to police- and fire alarm-signaling systems of the city, and in some instances, ducts in underground conduits are provided for fire- and police-signaling devices. In addition, in some instances, the company furnishes telephone service free of charge or at reduced rates for municipal activity. The only city in which a monetary payment is required by ordinance is the City of Atlanta, which receives 1 percent on all gross exchange and miscellaneous receipts from business done wholly within the county of Fulton and the City of Atlanta. In addition, Atlanta receives rate reductions on municipal service amounting to approximately $85,000 per year.

Beginning in the year 1960, the rural electrification units in Georgia will start making payments comparable to those made by Georgia Power Company where the rural cooperative serves customers within a municipality. This was an important part of a compromise agreement reached between the cooperatives and the municipalities of Georgia. The municipalities wanted to exclude the cooperatives from the urban areas and remove the cooperatives from areas to be annexed in the future. Under this agreement, the cooperatives can keep their existing customers and territory.

The municipalities, in large measure, operate their systems in approximately the same pattern as do the private companies. Obviously, the municipality does not make any tax payment to itself for the use of its streets and alleys. The rate structure within these municipalities varies, and in some instances, "profits" from some electric services find their way into municipal budgets. There is no established pattern through which these municipalities secure general funds from utility operations.

Texas Study Sector.—There is no major electric utility company operating within the Texas study sector. Electric generation facilities are controlled principally by the Lower Colorado River Authority, or by the City of San Antonio. These units, insofar as can be discovered, make no payments which could be construed as franchise tax payments.

Southwestern Bell Telephone Company evidently operates in approximately the same manner as Southern Bell in Georgia, but specific data in this regard are not available.

United Gas Company, as well as Southwest Natural Gas Company, follows the rather universal Texas pattern of paying 2 percent on all gross revenues to the municipalities involved. This payment is made possible through an action of the Texas Legislature, which permits municipalities to collect up to 2 percent in gross revenues from all utilities providing service within the State. Apparently, some old franchise agreements, which provide for larger payments, have not been disturbed under these provisions.

No information is available about any payments from either rural electrification cooperatives or municipal utility activities within the Texas sector.

Colorado Study Sector.—The Colorado Municipal League has provided information pertaining to franchise financial agreements with utilities within the Colorado study sector. It is apparent from this information that the electric companies pay approximately 2 or 3 percent in gross revenues per year to municipalities which they serve, and gas companies apparently range from 1 to 3 percent in payments.

The Mountain States Telephone and Telegraph Company operates in the Colorado study sector under a variety of franchise, occupational, license taxes, and other special agreements. The provisions and terms of these vary widely. In general, the company pays to municipalities in which it operates, an amount equivalent to just about 2 percent of gross exchange revenues.

No information is available about any payments from either rural electrification cooperatives or municipal utility activities within the Colorado study sector.

Wisconsin Study Sector.—Within Wisconsin, no municipality as such collects any franchise tax payments from utilities. Wisconsin, however, does collect taxes from all utility activities within the State except municipally owned operations which do not extend beyond the city proper. Apparently, municipalities do pay taxes on utility installations that they own outside of their own corporate limits.

In the year 1958, the telephone companies of Wisconsin paid gross earnings taxes of $8,150,886 to the State. This tax is in lieu of all other forms of tax for the telephone companies of the State. Hence, it is not specifically comparable to franchise or gross receipt taxes in other States where ad valorem taxes are assessed on real property.

Specific figures for electric utilities are not available, but it is realistic to assume that the tax pattern will be roughly comparable, at least, to that of telephone companies. Also, cooperatives in Wisconsin pay what is, in effect, a 3 percent operating revenue tax to the State, and, as has been implied, municipalities owning electric, water, gas, or other utility services outside their corporate units are taxed in the same manner as the private companies within the State.

Wisconsin has developed a rather complicated formula by which it shares its revenue from utility services with the various municipal and other political subdivisions of the State.

BENEFITS TO UTILITIES AS A RESULT OF USE OF STREETS AND ROADS

It has been said that "the benefits to a public utility of free use of highways can be measured, conceptually at least, by the net added costs they would be required to incur if they could not use highways and were forced to use the next best alternative" (4). Of course this statement can be expanded to cover the use of city streets and secondary rural roads, as well as highways, for there is no difference in the basic concept of any type of vehicular right-of-way being used as a right-of-way for other services at the same time. In fact, a vast majority of utility customers, and therefore utility services, are located in urban areas, so the street is a much more common right-of-way for utility services than the rural road.

Theoretical Framework for Measurement of Benefits

If, for some reason, utility lines were not located in streets and roads, the preferred alternative, in most instances, would be a location just alongside the street or road but outside the public right-of-way. If the utility managers were given a choice, they would logically select this type of location, for it would provide almost all of the freedom of the roadway without many of its problems. For example, the pavements of streets are expensive to cut and patch, and utility managers would be most appreciative of a situation that might avoid this problem. Such a location alongside roads or streets would also provide convenient access, as well as the ability to make visual inspections from moving vehicles on the road alongside. For these and other reasons, utility managers who can do so locate their lines in this manner. The most notable examples are the rural cooperatives which provide a large share of electric service in many rural areas. In most instances a vast majority of the REA lines within the four study sectors are located on private property and most often they are found just behind the farmer's fence line along the road that serves the farmer's home.

Another location which has been used by a number of utilities is a rear line location. This is used most often in subdivisions with uniform lot size for pole-type services that are installed at the time of development of an area rather than after development has taken place.

If utilities in any given area were told at a specific time that their lines or services would have to be removed from roadways, their only alternative would be to seek a new right-of-way nearby. Hence, an agreement of some type would be sought to allow the placement of the utility service on private land. (Actually the term should be customer's land, which in many cases might be "public" land, owned by any of a vast number of governmental agencies which must have utility services just as much as individuals or corporate enterprises.) In every instance, the customer needing to retain the service would try to provide some form of right-of-way for his own service. The difficulty would arise from the fact that no one customer would be happy about providing a right-of-way for "through" service for his neighbor, or for other customers located at some distance away. Because of the complexities that would arise, the development of new rights-of-way for utility service in congested areas would be just as difficult as the provision of new rights-of-way for highway and street development, and the problems of acquisition would be identical except that a utility right-of-way, in most instances, would need less width.

Currently there is no feasible alternative to utility use of street rights-of-way in congested, previously developed areas. For this reason, it would not prove worthwhile to investigate the hypothetical costs of securing such a right-of-way through congested, heavily built-up communities. Urban communities could not exist without utility service, as has been said before. The absolute needs of health and welfare, to say nothing of convenience, would force a decision to reconsider any attempted plan to remove utility services from the public streets.

It is possible, however, to analyze the situation that might have developed if, for some reason, utilities had never been allowed to use street rights-of-way but, from the beginning of utility service, had provided their own separate rights-of-way. (Provision of such separate rights-of-way would have been highly uneconomic, especially in early periods when streets were unpaved and movement along them was slow and light.) For the purpose of measuring theoretical benefits, such an exercise appears to be both valid and workable, and this is the approach that has been used in this study.

To develop such an analysis, it was necessary to determine the existence of utility lines in the areas studied, and the results of this examination are summarized in Tables 1 through 4. Once the extent of lines was known by territories, and by types and variations of service patterns, the next step was to determine what kind of an alternative right-of-way would be required. For the purposes of this study the simplest and least costly substitute seemed to be called for, because this would be the choice of a prudent manager who was forced to secure such a right-of-way.

Once the question of the size of rights-of-way was settled, the only remaining problem was to compute the area needed per mile of line and then to determine what values

should be assessed for these alternative rights-of-way in the various communities under investigation. Because these hypothetical rights-of-way would have to develop along with the community they were to serve, the land needed would be unoccupied, in the most part, because it would not be built on generally until utility service was provided. For this reason, prices of vacant land have been used throughout this study.

On the basis then of a value, an acreage, and a location, it was possible to construct tables that provide hypothetical values and annual charges for substituted rights-of-way for utility service both in urban and rural areas. If one is able to accept the reports of the length of line, the area specifications, and the value figures assigned, a workable estimate of the value of substituted or alternative right-of-way thus becomes available.

Gross Monetary Benefits

For Individual Utility Service Classification. —Table 5 gives the estimated current value of land necessary for providing alternative rights-of-way within the Georgia study sector as $68,332,695. If, as in Table 6, an interest rate of 7 percent is applied to this value, then an annual expenditure of $4,783,290 would be necessary to meet the charges for owning these rights-of-way. (The figure of 7 percent has been used in the computation of annual charges that would be necessary if alternative rights-of-way were provided by the utilities. This figure perhaps is slightly higher than the rate of return that most utility regulatory commissions sanction, but it is not as high as the return that urban property owners in general seek from their ownership of land. In order not to be too controversial, a substitute figure of 6 percent has been used in the text itself. Thus, the choice of figures is left to the reader.)

An interest rate of 6 percent would produce a figure of $4,099,962. In the conceptual point of view taken in this study, this amount then might be considered the value of the gross benefits in money terms which would accrue to the utilities as a result of the "free" use of street and road rights-of-way within the Georgia study sector.

As shown earlier, the Georgia study sector has a population of 1,168,716 and a land area of 4,740 sq mi. There are 14,853 farms in the sector and a number of small towns which provide a tendency to dispersion. Throughout the rural areas especially, private rights-of-way for pole-type utility service are used extensively. Within the total sector, about 59 percent of the 9,495 mi reported as electric line mileage is on private rights-of-way, and slightly more than 90 percent of the rural electric mileage is on private rights-of-way. The total percentage of telephone mileage is somewhat less, but about 53 percent of the 5,964 mi of telephone line is reported on private rights-of-way. The rural mileage is 3,282 and of this, 2,387 mi or about 73 percent is on private rights-of-way. The other services reported (gas, water, and sewage) are located predominantly on public rights-of-way and in urban areas. This is the expected pattern, because operating requirements for below ground services are substantially different from pole-type installations.

In the same manner, Table 7 shows $74,548,557 as the value of alternative rights-of-way in the Texas study sector. Interest at 7 percent provides a sum of $5,218,403 as the annual charge, whereas the 6 percent figure is $4,472,912 (Table 8).

The Texas study sector has a population estimated in 1960 as 1,000,000 and a land area of 6,445 sq mi. There are 13,050 farms in the sector and this area also includes a number of small towns which are dispersed throughout the sector. The Texas reports show a smaller number of rural customers in that sector than in Georgia, but not far from equal rural mileage. There is less private right-of-way in electric service in Texas than in Georgia and in the case of telephone mileage, the ratio of public right-of-way is a phenomenal 93 percent. The reports for gas, water, and sewage service show again that these lines are almost exclusively located on public rights-of-way.

Table 9 gives similar evidence of values for the Colorado study sector. The estimated value of substituted rights-of-way is $53,401,911 and the interest charges at 7 percent amount to $3,738,130, whereas the figure at 6 percent is $3,204,115 (Table 10).

As shown earlier, the Colorado study sector has a population estimated at 1,115,600 and a land area of 10,210 sq mi. This sector is substantially larger even than the Texas sector and is more than twice as large as the Georgia and Wisconsin sectors. There are 6,255 farms, and the number of towns is smaller than in any other area

TABLE 6

GEORGIA STUDY SECTOR, SUMMARY OF TOTAL CHARGES DEVELOPED FROM COMPUTATION OF CHARGES FOR SUBSTITUTED RIGHTS-OF-WAY

Service Facility	Total Charges (dollars)			
	Urban	Suburban	Rural	Total
Electric:				
Transmission	19,693	19,217	37	38,947
Distribution	1,056,303	583,480	4,154	1,643,937
Subtotal	1,075,996	602,697	4,191	1,682,884
Gas:				
Main	19,505	7,630	250	27,385
Distribution	375,502	109,243	57	484,802
Subtotal	395,007	116,873	307	512,187
Telephone:				
Toll	2,880	16,398	1,374	20,652
Exchange	815,170	266,610	14,139	1,095,919
Subtotal	818,050	283,008	15,513	1,116,571
Water:				
Main	3,102	3,048	170	6,320
Distribution	572,015	101,919	539	674,473
Subtotal	603,017	104,967	709	680,793
Sewage disposal	782,769	7,895	191	790,855
Total	3,674,839	1,114,840	20,911	4,783,290

TABLE 5

GEORGIA STUDY SECTOR, SUMMARY OF TOTAL VALUES DEVELOPED FROM COMPUTATION OF CHARGES FOR SUBSTITUTED RIGHTS-OF-WAY

Service Facility	Total Value (dollars)			
	Urban	Suburban	Rural	Total
Electric:				
Transmission	281,330	274,540	524	556,394
Distribution	15,090,046	8,335,425	59,350	23,484,821
Subtotal	15,371,376	8,609,965	59,874	24,041,215
Gas:				
Main	278,647	109,008	3,560	391,215
Distribution	5,364,320	1,560,615	816	6,925,751
Subtotal	5,642,967	1,669,623	4,376	7,316,966
Telephone:				
Toll	41,135	234,263	19,625	295,023
Exchange	11,645,275	3,808,712	201,966	15,655,953
Subtotal	11,686,410	4,042,975	221,591	15,950,976
Water:				
Supply	44,325	43,542	2,429	90,296
Distribution	8,171,622	1,455,979	7,704	9,635,305
Subtotal	8,215,947	1,499,521	10,133	9,725,601
Sewage disposal	11,182,420	112,787	2,730	11,297,937
Total	52,099,120	15,934,871	298,704	68,332,695

TABLE 7

TEXAS STUDY SECTOR, SUMMARY OF TOTAL VALUES DEVELOPED FROM COMPUTATION OF CHARGES FOR SUBSTITUTED RIGHTS-OF-WAY

Service Facility	Total Value (dollars)			
	Urban	Suburban	Rural	Total
Electric:				
Transmission	1,272,600	204,510	45,450	1,522,560
Distribution	15,788,724	7,393,200	253,848	23,435,772
Subtotal	17,061,324	7,597,710	299,298	24,958,332
Gas:				
Main	--	--	--	--
Distribution	5,958,890	2,830,490	812	8,790,192
Subtotal	5,958,890	2,830,490	812	8,790,192
Telephone:				
Toll	17,453	60,200	20,422	98,075
Exchange	17,188,132	8,026,450	300,876	25,515,458
Subtotal	17,205,585	8,086,650	321,298	25,613,533
Water:				
Supply	2,209	--	--	2,209
Distribution	5,541,517	1,319,500	82	6,861,099
Subtotal	5,543,726	1,319,500	82	6,863,308
Sewage disposal	5,884,042	2,439,150	--	8,323,192
Total	51,653,567	22,273,500	621,490	74,548,557

TABLE 8

TEXAS STUDY SECTOR, SUMMARY OF TOTAL CHARGES DEVELOPED FROM COMPUTATION OF CHARGES FOR SUBSTITUTED RIGHTS-OF-WAY

Service Facility	Total Charge (dollars)			
	Urban	Suburban	Rural	Total
Electric:				
Transmission	89,082	14,316	3,181	106,579
Distribution	1,105,210	517,524	17,769	1,640,503
Subtotal	1,194,292	531,840	20,950	1,747,082
Gas:				
Main	--	--	--	--
Distribution	417,124	198,134	57	615,315
Subtotal	417,124	198,134	57	615,315
Telephone:				
Toll	1,222	4,215	1,430	6,867
Exchange	1,203,169	561,852	39,820	1,786,082
Subtotal	1,204,391	566,067	41,250	1,792,949
Water:				
Main	155	--	--	155
Distribution	387,906	92,365	6	480,277
Subtotal	388,061	92,365	6	480,432
Sewage disposal	411,884	170,741	--	582,625
Total	3,615,752	1,559,147	62,263	5,218,403

TABLE 9

COLORADO STUDY SECTOR, SUMMARY OF TOTAL VALUES DEVELOPED FROM COMPUTATION OF CHARGES FOR SUBSTITUTED RIGHTS-OF-WAY

Service Facility	Total Value (dollars)			
	Urban	Suburban	Rural	Total
Electric:				
Transmission	57,900	338,600	4,567	401,067
Distribution	16,490,877	2,672,166	69,724	19,232,767
Subtotal	16,548,777	3,010,766	74,291	19,633,834
Gas:				
Main	2,880	3,861	--	6,741
Distribution	5,395,060	2,441,933	--	7,836,993
Subtotal	5,397,940	2,445,794	--	7,843,734
Telephone:				
Toll	461,800	146,046	17,719	625,565
Exchange	9,665,045	392,836	49,209	10,107,090
Subtotal	10,126,845	538,882	66,928	10,732,655
Water:				
Supply	6,470	122,090	--	128,560
Distribution	6,074,350	755,947	1,467	6,831,764
Subtotal	6,080,820	878,037	1,467	6,960,324
Sewage disposal	7,827,405	403,959	--	8,231,364
Total	45,981,787	7,277,438	142,686	53,401,911

TABLE 10

COLORADO STUDY SECTOR, SUMMARY OF TOTAL CHARGES DEVELOPED FROM COMPUTATION OF CHARGES FOR SUBSTITUTED RIGHTS-OF-WAY

Service Facility	Total Charge (dollars)			
	Urban	Suburban	Rural	Total
Electric:				
Transmission	4,053	23,698	320	28,071
Distribution	1,154,361	187,052	4,882	1,346,295
Subtotal	1,158,414	210,750	5,202	1,374,366
Gas:				
Mains	202	270	--	472
Distribution	377,654	170,936	--	548,590
Subtotal	377,856	171,206	--	549,062
Telephone:				
Toll	32,326	10,224	1,240	43,790
Exchange	676,552	27,499	3,444	707,495
Subtotal	708,878	37,723	4,684	751,285
Water:				
Mains	453	8,546	--	8,999
Distribution	425,204	52,916	102	478,222
Subtotal	425,657	61,462	102	487,221
Sewage disposal	547,919	28,277	--	576,196
Total	3,218,724	509,418	9,988	3,738,130

TABLE 11

WISCONSIN STUDY SECTOR, SUMMARY OF TOTAL VALUES DEVELOPED FROM COMPUTATION OF CHARGES FOR SUBSTITUTED RIGHTS-OF-WAY

Service Facility	Total Value (dollars)			
	Urban	Suburban	Rural	Total
Electric:				
Transmission	41,935	3,715	332,009	377,659
Distribution	19,994,737	4,324,932	923,880	25,243,549
Subtotal	20,036,672	4,328,647	1,255,889	25,621,208
Gas:				
Main	26,675	--	17,236	43,911
Distribution	6,620,965	1,625,409	13,056	8,259,430
Subtotal	6,647,640	1,625,409	30,292	8,303,341
Telephone:				
Toll	329,070	159,200	147,311	635,581
Exchange	10,454,346	735,138	666,194	11,855,678
Subtotal	10,783,416	894,338	813,505	12,491,259
Water:				
Supply	28,116	480	--	28,596
Distribution	5,805,247	1,684,854	10,033	7,500,134
Subtotal	5,833,363	1,685,334	10,033	7,528,730
Sewage disposal	--	--	--	--
Total	43,301,091	8,533,728	2,109,719	53,944,538

studied. As one might expect, the mileage of electric lines in Colorado is greater than either Georgia or Texas. Of the 10,825 mi of electric line reported in the Colorado sector, about 66 percent is in rural areas and about 70 percent of all the electric mileage is reported as being on private rights-of-way. Telephone service in Colorado seems to be much less ubiquitous than electric service and of the mileage reported, less than 50 percent is on private rights-of-way. The gas, water, and sewage service activities seem definitely to be confined to urban areas and are seldom found on private rights-of-way.

Estimates for the Wisconsin study sector are shown in Table 11. The value assigned to that sector is $53,944,538, whereas the interest charges at 7 percent are $3,776,126 and at 6 percent are $3,236,672 (Table 12).

The Wisconsin study sector is substantially larger in population than the other units studied. It is estimated that 1,640,672 people live in the Wisconsin sector within a land area of 4,887 sq mi; 21,658 farms are reported in the area; and there is substantially more rual mileage of electric and telephone lines than in any of the other sectors. Wisconsin reported 12,878 mi of electric lines, of which 7,478, or 58 percent, was rural mileage. In contrast to Georgia, Texas, and Colorado, most of this rural mileage (79 percent) was on public rights-of-way rather than private. The same general pattern was found in telephone service, with 87 percent of the rural mileage being on public rights-of-way. In the case of gas and water service, these activities were not generally available to the rural areas and almost all of these lines were found on the public rights-of-way, as has been true in the other three study sectors.

For Grouped Utility Service.—If, over time, no utility service could have used streets or roads for service installations, it is extremely likely that the whole group of utility suppliers would have arranged some joint plan for combined rights-of-way. They would, by their common needs, be forced to get together and provide a new "pathway for utilities" separate from, but close to, the existing street system.

TABLE 12

WISCONSIN STUDY SECTOR, SUMMARY OF TOTAL CHARGES DEVELOPED FROM COMPUTATION OF CHARGES FOR SUBSTITUTED RIGHTS-OF-WAY

Service Facility	Total Value (dollars)			
	Urban	Suburban	Rural	Total
Electric:				
Transmission	2,935	260	23,242	26,437
Distribution	1,399,636	302,744	64,670	1,767,050
Subtotal	1,402,571	303,004	87,912	1,793,487
Gas:				
Main	1,867	--	1,208	3,075
Distribution	463,467	113,779	915	578,161
Subtotal	465,334	113,779	2,123	581,236
Telephone:				
Toll	23,035	11,144	10,312	44,491
Exchange	731,805	51,460	46,633	829,898
Subtotal	754,840	62,604	56,945	874,389
Water:				
Supply	1,970	34	--	2,004
Distribution	403,367	117,940	703	525,010
Subtotal	405,337	117,974	703	527,014
Sewage disposal[a]	--	--	--	--
Total	3,028,082	597,361	147,683	3,776,126

[a]Data not available.

From this, it may be assumed that a more realistic substitution than the one developed in the previous section would be the creation of a new right-of-way in which would be located all utility lines in a given vicinity. To develop an adequate substitution figure for such a right-of-way, a width must be assumed, and for this purpose 25 ft has been adopted. This figure is excessive for some needs, but is almost totally inadequate for others, such as electric transmission purposes. Nevertheless, it has been used as a workable compromise figure.

A composite right-of-way of the type envisioned here would not be suitable for all situations in all areas. Certainly these composite rights-of-way would not be used in sparsely settled or rural areas where none of the below ground type of service lines are found at the present time. The cost of facilities such as water, gas, and sewage lines is prohibitive unless a relatively large number of customers is available in a small area. This contention is supported by clear evidence that the pole-type services (i.e., telephone and most often electricity) are offered more widely throughout more of the Nation than other types. For these reasons, then, a composite 25-ft right-of-way usually would be suitable only in urban or suburban areas.

It is not possible to test these conclusions in each of the four study sectors, but to have one example of this procedure—the Georgia sector was tested in this manner. All streets within the Georgia sector that were classed as ubran were assumed to require utility services of all types; therefore, the composite substitute right-of-way procedure would be applicable in the case of all urban streets.

In Table 13, urban streets in Georgia have been subdivided into city streets and Federal-aid roads. To secure total composite alternative right-of-way figures for all urban roads in the Georgia sector, it has been necessary to combine the value and annual charge figures from Tables 14 and 15.

TABLE 13

GEORGIA STUDY SECTOR, ROADS AND STREETS IN URBAN AND RURAL AREAS

County	Mileage							
	State Highway System	Estimate State System Urban	City Streets	Total Urban Mileage (2) + (3)	State System - Urban (1) - (2)	County Roads	Total Rural Roads	Total State Roads
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bibb	100.31	20.35	186.29	206.64	79.96	396.91	476.87	683.51
Butts	55.32	3.66[a]	21.80	25.46	51.66	304.03	355.69	381.15
Clayton	82.49	14.13[a]	76.78	90.91	68.36	341.63	409.99	500.90
Crawford	70.01	2.71[a]	5.09	7.80	67.30	337.10	404.40	412.20
De Kalb	139.29	46.74	270.00[a]	316.74	92.55	760.56	853.11	1,169.85
Fayette	87.57	5.82[a]	13.54	19.36	81.75	362.15	443.90	463.26
Fulton	244.96	118.31[a]	2,399.04[b]	2,517.35	126.65	1,345.27	1,471.92	3,989.27
Henry	101.91	6.39[a]	20.52	26.91	95.52	623.72	719.24	746.15
Jasper	129.88	5.30[a]	9.68[c]	14.98	124.58	388.51	513.09	528.07
Jones	87.14	4.04[a]	8.40	12.44	83.10	406.59	489.69	502.13
Lamar	52.28	5.98[a]	25.91	31.89	46.30	321.23	367.53	399.42
Monroe	137.69	5.38[a]	27.41	32.79	132.31	452.99	585.30	618.09
Newton	115.42	14.10[a]	42.24	56.34	101.32	423.00	524.32	580.66
Pike	54.14	2.05[a]	12.80	14.85	52.09	371.61	423.70	438.55
Rockdale	53.21	4.10[a]	18.49	22.59	49.11	238.94	288.05	310.64
Spalding	60.67	8.98	65.56	74.54	51.69	441.48	493.17	567.71
Upson	73.02	7.28[a]	33.14	40.42	65.74	433.89	499.63	540.05
Total	1,645.31	275.32	3,236.69	3,512.01	1,369 99	7,949.61	9,319.60	12,831.61

[a]Highway statistics for urban highways not tabulated for cities under 5,000 population. These items have been developed from other highway tabulations (DHP 215 3-1-58).
[b]Subject to revision based on newer estimates being developed by highway department.
[c]Town of Shady Dale omitted.

TABLE 14

GEORGIA STUDY SECTOR, COMPUTATION OF CHARGES FOR SUBSTITUTED RIGHT-OF-WAY 25 FT WIDE, COMPOSITE RIGHT-OF-WAY FOR ALL UTILITIES ALONGSIDE ALL URBAN STREETS OTHER THAN FAP ROADS

County	Length (mi)	Percent Acre per Mi	No. of Acres in R/W	Value per Acre ($)	Total Value R/W ($)	Annual Charge[a] ($)
Bibb	186.29	3.03	564.46	5,000	2,822,300	197,561
Butts	21.80		66.05	2,000	132,100	9,247
Clayton	76.78		232.64	4,000	930,560	65,139
Crawford	5.09		15.42	1,000	15,420	1,079
De Kalb[b]	700.00		2,121.00	6,000	12,726,000	890,820
Fayette	13.54		41.03	1,500	61,545	4,308
Fulton[b]	1,500.00		4,545.00	10,000	45,450,000	3,181,500
Henry	20.52		62.18	1,500	93,270	6,529
Jasper	9.68		29.33	1,500	43,995	3,080
Jones	8.40		25.45	1,200	30,540	2,138
Lamar	25.91		78.51	2,000	157,020	10,991
Monroe	27.41		83.05	1,500	124,575	8,720
Newton	42.24		127.99	2,000	255,980	17,919
Pike	12.80		38.78	1,000	38,780	2,715
Rockdale	18.49		56.02	1,500	84,030	5,882
Spalding	65.56		198.65	3,000	595,950	41,717
Upson	33.14		100.41	2,000	200,820	14,057
Total	2,767.65		8,385.97		63,762,885	4,463,402

[a]At 7 percent.
[b]Estimates of urban street mileage seemed so unrealistic that adjustments to figures were made. Following figures are earlier estimates for these counties:

De Kalb	270.00	3.03	818.00	6,000	4,908,600	343,602
Fulton	2,399.04		7,269.09	10,000	72,690,900	5,088,363
With these figures, the totals would be						
	3,236.69		9,807.16		83,186,385	5,823,047

TABLE 15

GEORGIA STUDY SECTOR, COMPURATION OF CHARGES FOR SUBSTITUTED RIGHT-OF-WAY 25 FT WIDE, COMPOSITE RIGHT-OF-WAY FOR ALL UTILITIES ALONGSIDE ALL FAP ROADS IN URBAN AREAS OF COUNTIES UNDER STUDY

County	Length (mi)	Percent Acre per Mi	No. of Acres in R/W	Value per Acre ($)	Total Value R/W ($)	Annual Charge[a] ($)
Bibb	20.35	3.03	61.66	5,000	308,300	21,581
Butts	3.66		11.09	2,000	22,180	1,553
Clayton	14.13		42.81	4,000	171,280	11,990
Crawford	2.71		8.21	1,000	8,210	575
De Kalb	46.74		141.62	6,000	849,720	59,480
Fayette	5.82		17.63	1,500	26,445	1,851
Fulton	118.31		358.48	10,000	3,584,800	250,936
Henry	6.39		19.36	1,500	29,040	2,033
Jasper	5.30		16.06	1,500	24,090	1,686
Jones	4.04		12.24	1,200	14,688	1,028
Lamar	5.98		18.12	2,000	36,240	2,537
Monroe	5.38		16.30	1,500	24,450	1,712
Newton	14.10		42.72	2,000	85,440	5,981
Pike	2.05		6.21	1,000	6,210	435
Rockdale	4.10		12.42	1,500	18,630	1,304
Spalding	8.98		27.21	3,000	81,630	5,714
Upson	7.28		22.06	2,000	44,120	3,088
Total	275.32		834.20		5,335,473	373,484

[a]At 7 percent.

Tables 14 and 15 provide the results of this composite alternative right-of-way procedure. According to these tables, the composite rights-of-way in Georgia would be valued at $69,098,358 and, at a 7 percent annual charge, $4,836,886 would be necessary to pay for the use of these rights-of-way. At 6 percent, the figure would be $4,145,901.

These figures are slightly larger than those presented for the Georgia sector under the individual right-of-way pattern. It seems that the procedure under the individual right-of-way pattern should produce a larger figure than the one that uses urban streets and omits rural roads. If the figures were developed in a precise manner and on exactly equal terms the results seemingly should be reversed. It must be remembered, however, that these methods, as well as the data reports, are estimates and it should also be kept in mind that some few units did not report utility mileage, whereas it can be assumed that the street mileage used would be as accurate as engineering tests can be.

For Rights-of-Way Along Federal-Aid Highways.—The use of the composite 25-ft rights-of-way along urban roads allows a further development of special interest in this study. State highway departments maintain accurate records of the extent of Federal-aid highways in urban areas. It is apparent that the land abutting any conventional Federal-aid highway in an urban area is going to be so built up that utility service will be necessary. From the facts thus available, a value for composite rights-of-way alongside all primary Federal-aid highways can be developed and such a figure was found for the Georgia sector used in this study. (Federal-aid secondary roads can be treated in a similar manner, except that some secondary mileage in some urban areas might not justify the use of a composite alternative right-of-way; therefore, these roads were left out of this tabulation.) According to these calculations (Table 15), such composite substitute rights-of-way in the Georgia sector would have a value of $5,335,473, and annual charges at 7 percent would be $373,484. The charges at 6 percent would be $320,128.

This computation appears to have real significance, especially at the Federal level. It seems to be a reasonable method and one easily understood; at the same time, it presents in clear fashion an estimate of the general benefits that utilities of all types receive as a result of being able to locate on the rights-of-way occupied by primary Federal-aid highways.

In pursuing the idea of the 25-ft composite alternative right-of-way along Federal-aid highways, nothing has been said about utility service along rural Federal-aid high-

ways. The reason for the omission is that a different set of circumstances exists in rural as contrasted with urban areas. It is reasonable to assume that more utility service in total is required along Federal-aid highways located in rural areas than along isolated rural roads, but no authentic measurement of this situation is available at this time. Because of this void in the basic information, the only applicable measure of utility service in rural areas would be a percentage comparison of rural utility services existing along public roads compared with the total mileage of rural roads. Such a measure would be patently inaccurate or inconsequential; therefore, no effort has been made to develop it in this report.

The State Highway Department of Georgia reports that, in the past year, it has collected data as to the units of property alongside State highways, but these data have not been consolidated into usable statistical reports. If these figures could be made available, it is likely that results could be devised by relating known rural population to dwelling units along highways. By this device a more realistic estimate of utility service along rural highways might be developed.

DISADVANTAGES TO UTILITIES FROM USE OF HIGHWAYS

This discussion of disadvantages to utilities from use of highways is designed to explore some of the problems utilities face in using public rights-of-way. Many of the problems mentioned as difficulties that utilities face are problems that highway and street officials and motorists face also, but generally from the opposite side of the question. One of the most time-consuming and unpleasant tasks of road and street improvement projects is waiting for the removal of utility lines. Also, all motorists seemingly are almost constantly harassed by the everlasting problem of cut, blocked, or patched streets and roads. Unfortunately, almost all building or expanding of facilities for home or business, whether it be road improvement or utility installation, causes discomfort and dislocation during the construction period. Up to now, at least, no one seems to have found an answer to these problems. Perhaps this is a permanent price to be paid for growth and progress.

Utility services of all categories encounter a number of disadvantages which result from placing their service facilities on highway or street rights-of-way. Perhaps the most important of these disadvantages is the cost of relocating lines when highway and street improvement projects require this. In urban areas, of course, the cost of cutting and replacing pavements can become extremely heavy. In some instances, also, it is difficult to find room to perform maintenance or installation work within street and highway rights-of-way. One other problem that often arises is the desire on the part of the general public to develop trees alongside streets for the sake of appearance and shade. Under other situations, tree trimming need not be a matter of art, but rather of efficiency.

Relocation Costs

No specific investigation of relocation costs was made in this study, but in every contact with utility personnel, the problem of relocation costs was uppermost in their minds. All utility officials contacted, whether of public or private units, and whether in urban or rural areas, were unhappy about relocation problems and relocation costs. One might think that officials of publicly owned utilities would not worry about relocation costs because, in most instances, road improvement projects pay what are thought of as total costs of relocation of publicly owned lines when highway improvement is being carried out. However, in this instance, at least, money costs or money outlay is by no means the only item that burdens the mind of the utility executive. It seems to be true that the degree of administrative effort which goes into relocation is great, and that little or no compensation is provided to cover this area of activity. If this were not true, there would seem to be no real reason for municipal water and sewage officials to be as vehement as they are about the problems connected with highway improvement.

The problem of relocation costs is discussed more fully by Koplin and Watson (4). Because of the seriousness of this problem, various utility groups and governmental agencies have developed much information about relocation problems and expenses. One major study that presents extensive material on this subject is (5).

Relocation costs, along with operating preferences, have helped to create a standard operating technique for rural electric and telephone development in Georgia, and to a

lesser degree in Texas and in Colorado. (Apparently this pattern in Wisconsin is by no means as strong as in these other States, because much of Wisconsin's rural electric development preceded the creation of the Rural Electrification Administration.) Rural cooperatives, which receive financial assistance and administrative counseling from the Rural Electrification Administration, have established a pattern of location on private rights-of-way whenever possible. This is feasible for rural cooperatives for a number of reasons. In the first place, land values are relatively low and the type of installation is inexpensive and usually inconspicuous. Because these cooperatives generally provide only electric distribution service or telephone exchange service on a local level, and because the cooperatives do not produce profits as such, it has been possible in almost every instance for them to secure private rights-of-way without payments to the land owners. In fact, the agreement to serve a rural customer normally includes a right to install lines anywhere within the property of the person accepting the service. Such right also is assumed to provide the right to trim or cut trees at the discretion of the operating managers involved. This feature, more than any other, has tended to create dissatisfaction within the ranks of REA customers because, in some instances, tree trimming has become tree slashing and in some cases, at least, valuable timber has been sacrificed to provide a utility right-of-way which might have been located elsewhere with little expense.

In the Georgia study sector, at least, Southern Bell Telephone and Telegraph Company has extended rural lines in many parts of the State and it has been able to establish a pattern very similar to that of the electric cooperatives. Apparently, this has not proved feasible in Texas because a large majority of all telephone mileage is on public rights-of-way in that area.

Tree Trimming Costs

Measurement, for comparative purposes, of tree trimming costs along public and private rights-of-way does not seem to offer much empirical evidence to support either position. In some areas where highway development has removed trees, then trimming costs along the highway rights-of-way would be nonexistent, but as has been implied, trimming in urban areas could be much more expensive along a street of attractive residences that it would need to be at the rear of properties of this type. It is felt that the question of trimming offers little or no basis for comparison or contrast in a discussion of advantages or disadvantages of the use of public or private rights-of-way.

Costs of Cutting and Replacing Pavements

In urban areas, of course, streets and sidewalks, normally parts of public rights-of-way, are almost always paved. If a utility service line could be installed on unpaved, private rights-of-way, the expense of installing lines beneath the ground would be appreciably reduced. It is probable, however, that installations of piping below ground would present serious problems in many instances if they were not located on public streets or roads. In any event, there is little evidence that might be obtained in this situation which could be presented as authoritative and thus worthy of specific analysis and comparison.

Payment of Street Use Taxes or Franchise Taxes by Utilities

Evidence has been presented that utilities in a majority of urban communities make payments to the governments of those urban communities in the form of franchise taxes, street rental taxes, or special utility taxes under some other name. In attempting to measure net benefits for utility use of streets and roads, it would be necessary to reduce the gross monetary benefits by some amount that is part of the annual franchise tax payment.

Certainly most municipalities would object to the idea that the entire payment made to a municipality by a privately owned utility was a payment for use of streets or roads alone. As stated earlier, different municipalities use many and diverse patterns in collecting revenue from utilities that operate in their midst. It is not possible to ex-

amine these patterns in detail in this study because the legal bases for these payments are varied and, apparently, not at all constant.

On the other hand, the utility company involved certainly would feel that the major benefit obtained as a result of franchise tax payments is the use of public streets and roads. No way has been found to decide how to reconcile this conflict of interest. A very real conflict exists, however, because of the size of some of the payments that are made to some of the municipalities. In the Georgia sector, for example, payments in the form of franchise taxes to the City of Atlanta for the year 1959 ran as follows: Atlanta Gas Light Company, $189,966.02; Southern Bell Telephone and Telegraph Company, $208,372.87; and Georgia Power Company, $875,502.83; for a total of $1,273,841.72. In addition to its monetary payment to the City of Atlanta, Southern Bell provides, on many of its poles, space for the installation of fire and police signaling systems.

Because of the way in which the figures for this study have been developed, it is not possible to extract from the total for Fulton County the amount of the benefits which should be available to the City of Atlanta proper. (Obviously, a major part of this total would accrue to the City if an equitable division were made because, as has been said many times, utility service is a function of urban development, in the main.) The fact that stands out, however, is that Georgia Power Compnay paid over $875,000 to the City of Atlanta during the year 1959. From any viewpoint this sum appears to be an appreciable contribution in lieu of the hypothetical benefits computed for all electrical operations in Fulton County, which is figured at $1,183,803. The computation for electrical operation benefits in Fulton County shows, at 7 percent, an annual charge of $15,793 for rights-of-way for transmission lines and $1,168,010 as the annual charge for rights-of-way for distribution lines.

That there are advantages to utility use of street or road rights-of-way is apparent. If this were not true, the REA units, for example, would not seek to locate on private rights-of-way. Specific measurement of these advantages, however, would be difficult because of the complexities of the task, and because no two utilities would face exactly the same problems or difficulties.

For all of these reasons, this study has pointed out the areas where major disadvantages are likely to exist, but has made no attempt to provide quantitative measurements in money terms of the extent of disadvantages that utilities suffer as a result of occupying highway and street rights-of-way.

NET BENEFITS RESULTING FROM USE OF STREETS AND ROADS

It has been shown earlier that both publicly and privately owned utilities receive benefits in the form of lower costs as a result of using streets and roads as locations for service facilities. Estimates have been presented that indicate the magnitude of these benefits within certain areas. Also, from the utilities standpoint, there are disadvantages in using certain public roads as rights-of-way, and this use often demands specific expenditures as a result. No attempt has been made to attach definite value figures to these disadvantages because (a) it is very difficult to estimate costs of this type, and (b) the estimate of benefits was a hypothetical one rather than an attempt at an actual current cash measurement.

Although it is not possible to measure the exact extent of net benefits to utilities, the belief strongly remains that there are benefits to utilities as a group as a result of their use of public streets and roads. The next question that must come to mind is the extent of specific individual monetary benefits that accrue as a result of this situation. It must be said that if a privately owned utility were known to be making excess profits, and if these profits were allowed either to be distributed as dividends or were retained to improve the value of the business, thereby increasing stock values, specific benefits would be accruing to stockholders from such a situation. If, however, the privately owned utility is making only reasonable profits and if the regulatory body controlling the utility is requiring a high level of performance and efficiency, it is hard to see how anyone could feel that a specific benefit would be accruing under this condition to the stockholder of the utility. Actually, any specific benefit that might be apparent in this

instance would be chargeable to the utility rate payer rather than to the company rendering the service.

It is possible to make a similar analysis of publicly operated utilities if evidence is available that excess profits are received by such units. The only difference here is that the general taxpayer presumably is benefiting in this instance rather than stockholders, as is the case for the private utilities. One other possibility remains, of course. If the governmental unit is being mismanaged, and if funds are being drained off from public services to private uses, then it is clear that through this devious route some specific benefit from utility service is being passed on to the recipient of municipal favors. To assess this benefit, however, would be most difficult indeed.

CONCLUSION

In the final analysis then, it appears that net benefits accrue from utility use of streets and roads, but under conditions of efficient management and effective regulation, these benefits would appear to pass on to the general utility rate-paying public as general benefits, rather than specific benefits to utility managements or utility stockholders

Under these circumstances, any action to assess "user charges" for road use would result in shifting the impact of payments from payers or road taxes or general taxes to the general utility service user. Such an action would make some reduction in highway tax requirements but certainly would result in higher utility service charges. The question then becomes one of equity and National policy and thus outside the scope of this study.

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