

REPORT

of a

PLAN OF HIGHWAY IMPROVEMENT

in the

REGIONAL AREA OF CLEVELAND, OHIO

Based on

A SURVEY OF HIGHWAY TRAFFIC

by

THE BUREAU OF PUBLIC ROADS
U. S. DEPARTMENT OF AGRICULTURE

and

THE COUNTY COMMISSIONERS OF CUYAHOGA COUNTY, OHIO

1928

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Foreword

THIS report presents the results of highway traffic and engineering studies of the Federal-aid, State and county highway systems of the Cleveland regional area made under a cooperative agreement between the Bureau of Public Roads, United States Department of Agriculture, and the County Commissioners of Cuyahoga County, Ohio.

The investigation was undertaken in order to obtain essential facts concerning traffic and its distribution on the highways of the regional area, and the condition of present highway surfaces, structures and railroad crossings at grade, as a basis for planning the development of new arterial highways, the reconstruction and widening of present surfaces and structures, and the separation of railroad grade crossings, to serve present and expected future traffic during a period of 10 years.

The first part of the report contains a summary of the principal conclusions, the second the detailed data of the survey upon which the findings are based, and the third the plan of highway improvement.

The researches were conducted under the joint supervision of Thos. H. MacDonald, Chief of the Bureau of Public Roads, and J. R. Zmunt, J. H. Harris, and J. G. Fischer, County Commissioners of Cuyahoga County. The Board of County Commissioners was represented by J. R. Zmunt. The studies of traffic were directed by J. Gordon McKay, chief of the division of highway economics of the Bureau of Public Roads, who also supervised the preparation of the report. Dr. McKay was assisted by O. M. Elvehjem, highway economist, and E. T. Stein, J. F. Hehir, and L. E. Peabody, associate highway economists, all of the division of highway economics.

The studies of highway design and location were directed for the Federal bureau by E. W. James, chief of the division of design; the bridge studies were made by O. L. Grover, bridge engineer, and the hydrographic studies in connection with the location of bridges were made by C. S. Jarvis, highway engineer.

H. K. Bishop, chief of the division of construction of the bureau, directed the studies of the present condition of the roads and pavements, assisted by Clifford Shoemaker, highway engineer.

H. L. Beavis and C. H. Hutchinson, highway right-of-way and planning engineers, of the staff of the Cuyahoga County board, and E. J. Thobaben, assistant county prosecutor and legal adviser to the board, rendered invaluable service throughout the survey.

THE HIGHWAY TRAFFIC AND PLANNING SURVEY IN THE CLEVELAND REGIONAL AREA

REALIZING the increasing importance of the highway problems of Cuyahoga County and appreciating the value of establishing a definite plan of highway improvement to serve the steadily increasing traffic demands of the area, the Board of Commissioners of Cuyahoga County requested the cooperation of the Bureau of Public Roads, United States Department of Agriculture, in a study of the highway and traffic problems of the County and in the establishment of a scientific plan of highway improvement.

The Bureau of Public Roads agreed to cooperate in such a study under the following conditions.

1. That the study include the area in which traffic conditions are principally influenced by the City of Cleveland and its surrounding suburban area without regard to political boundaries or jurisdictions.
2. That all governmental agencies in the area having jurisdiction over highways and highway traffic cooperate in the establishment of a general highway development plan and agree to carry this plan into execution when established.
3. That the highway studies in the area be continued over a period of years in order to observe the effect which the execution of the plan will have upon the distribution of traffic and upon the efficiency with which traffic is served by a modern highway system.

These conditions were agreeable to the several highway authorities.

Formal resolutions agreeing to cooperate in the establishment and improvement of highways as determined by the survey were adopted by substantially all highway administrative organizations in the area. The cooperative survey was approved by the U. S. Bureau of Public Roads, the Ohio State Department of Highways, the boards of county commissioners of Cuyahoga, Geauga, Lake, Lorain, Medina, Portage and Sum-

mit Counties, and, within Cuyahoga County, by the cities of Cleveland, East Cleveland, Cleveland Heights, Lakewood, and forty-two villages and seven townships. The cost of the survey was shared equally by the Bureau of Public Roads and Cuyahoga County.

Throughout the entire survey excellent cooperation prevailed among all governmental agencies. Each of the counties furnished complete data regarding present highways and structures, and made available all existing records. Suggestions as to required improvements of the system based on local traffic demands were also made by each of the counties and in Cuyahoga County by a large number of the cities and villages. The officials of each of these jurisdictions manifested intense interest in the progress of the work and furnished valuable assistance.

The present highways of the Cleveland regional area, and particularly the roads of Cuyahoga County, form an incomplete highway transportation system in that they do not provide adequately for the free and direct movement of the traffic of the area. The traffic which uses the system is primarily a movement between the suburban centers in Cuyahoga County and the City of Cleveland, and secondarily between these centers and the remainder of the regional area.

Excluding roads and streets in the cities of Cleveland and Lakewood, the survey covered in Cuyahoga County 654 miles of highways of major, medium and minor traffic importance. Major roads—those on which traffic now is or by 1937 will be over 1,800 vehicles a day—comprise 291 miles. Roads of medium traffic importance—those which now carry or by 1937 will carry between 700 and 1,800 vehicles a day—comprise 133 miles; and minor roads—those on which traffic will not exceed 700 vehicles a day in 1937—comprise 230 miles. Roads of this latter class now serve a traffic of 400 vehicles a day or less.

Of the major road mileage, 62 per cent, or approximately 179 miles, is now in satisfactory condition to serve traffic demands during the next

ten years, or is under contract for adequate improvement. Of the mileage of medium traffic routes, 53 per cent, or 70 miles, will be satisfactory for the ten-year period. Only a comparatively small mileage of minor traffic roads will require reconstruction or widening during the period of the plan.

The remainder of the principal traffic routes of the existing Cuyahoga County system is in an unsatisfactory condition. There are also, in the present system, a number of unimproved gaps and a lack of arterial routes and connections.

Outside of Cuyahoga County in the regional area the survey covered 240 miles of major, 183 miles of medium and 187 miles of minor traffic roads. In this portion of the area only the principal roads were considered.

Causes of the Unsatisfactory Condition of the Cuyahoga County Highway System

A number of major causes are responsible for the present unsatisfactory condition of the Cuyahoga County highway system. These are:

1. The lack of a common plan of highway improvement upon which all agencies responsible for road improvements could apply concerted action.

2. The lack of a common plan of highway improvement has been aggravated by the absence of centralized authority and responsibility for road improvement, due largely to the statutory division of responsibility between the county commissioners and the county surveyor, complicated by the authority of municipal corporations to control the improvement of streets within their limits. Under these conditions the development of a satisfactory highway system has been very difficult.

3. The reconstruction of the principal arterial routes, which were originally constructed for light vehicle traffic, has been too long deferred. This delay in the face of a constantly increasing traffic has resulted in the destruction of the inadequate improvements on these routes.

4. The existing arterial routes between the centers of traffic in the City of Cleveland and other expanding centers of population and traffic in the county do not provide a sufficient number of main thoroughfares for the proper distribution of traffic.

5. The main traveled routes of Cuyahoga County and the City of Cleveland converge and unite as they approach the central section of the city and create serious problems of traffic congestion.

6. Narrow surfaces on various sections of the main arterial routes in the county and within the city and obstructions to the free movement of traffic, such as unseparated grade crossings, street cars, street car loading platforms, and the parking and loading of vehicles in business and industrial areas reduce the traffic capacity of these main thoroughfares and cause congestion.

7. Unimproved or unsatisfactorily improved sections of the main arterial thoroughfares and an absence of improved connections on important routes between the suburban centers of traffic have resulted in a partially disconnected system of highways and an uneconomic, indirect movement of traffic.

8. Physical obstructions, particularly the river valleys, industrial developments, railroad yards and park area restrictions, have materially deferred the improvement of present routes and development of new routes and connections.

Basic Facts Used in Developing the Plan of Improvement

The plan of improvement for the area has been developed from the following evidence:

1. Present highway traffic.

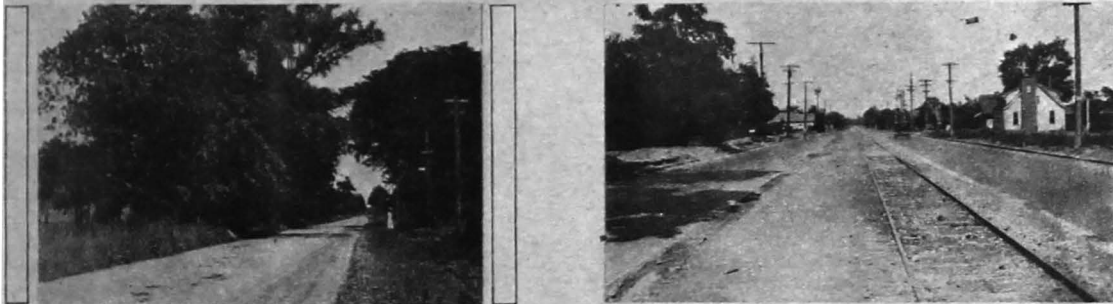
The daily volume of passenger car, truck, and bus traffic on each section of the present highway system was determined; a forecast of future traffic was made for each of these sections for five, ten and fifteen years, respectively; and each section was classified as a major, medium, or minor traffic route. This information determined the highway planning requirements necessary for their satisfactory improvement.

2. Distribution of highway traffic.

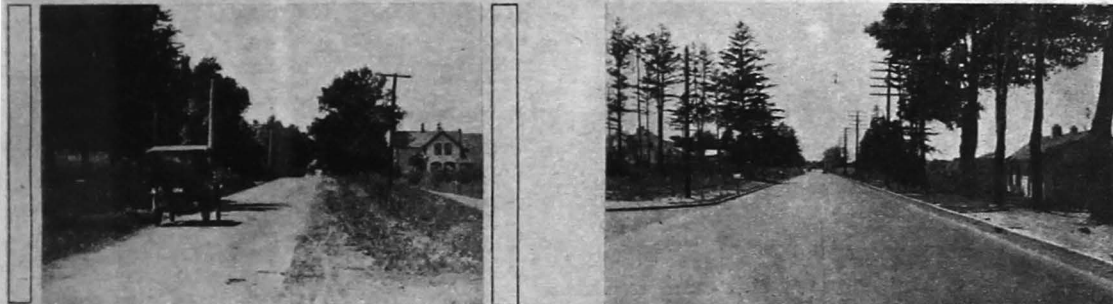
The points of origin and destination of traffic operating between the various sections of the area were analyzed to determine the necessity for new routes or connections, and results of the study constitute the basic evidence in support of the plan of new routes and connections.



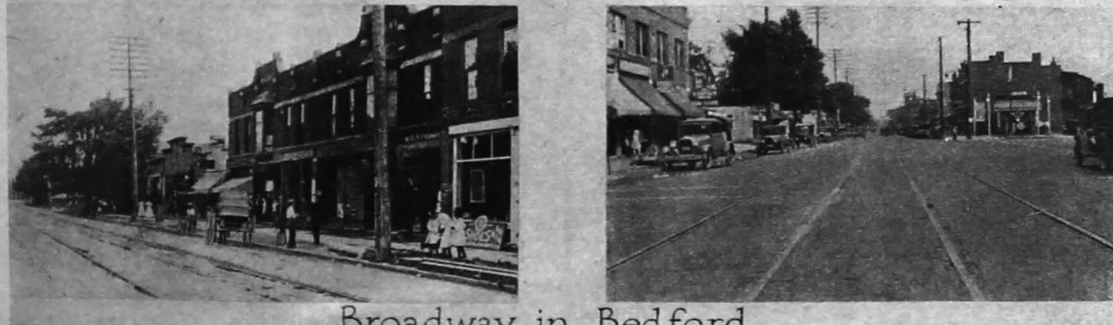
The Euclid Creek Bridge on Lake Shore Boulevard



Lorain Avenue



Detroit Road near Clague Road



Broadway in Bedford

HOW GREAT HAS BEEN THE CHANGE IN THE ROADS AND THE HIGHWAY TRAFFIC OF CUYAHOGA COUNTY IN THE LAST TWENTY YEARS IS SHOWN BY THESE VIEWS OF FOUR HIGHWAYS AS THEY WERE IN 1909 AND AS THEY ARE TODAY

3. Present condition and estimated life period of existing surfaces and structures.

Each section of the highway system was inspected, analyzed, and classified as satisfactory for ten years, salvable as subbase in place, salvable as material, or of no value for reconstruction.

Bridges were classified as satisfactory, requiring replacement, or in need of widening.

Railroad grade crossings were classified as requiring separation or the installation of modern methods of warning and protection to traffic.

4. Basis of proper surface width of new routes, present highways, and structures.

Traffic capacity analyses of road surfaces of various widths were made to determine the economic width of surface required for each section of highway. These studies, which were made on surfaces ranging from 18 to 40 feet in width, included observations of vehicular speed and transverse distribution on the roadway.

5. The present type, width of surface, and the width of right of way.
6. Studies of the density, distribution and trend of population and industrial growth in the cities and suburban areas.
7. Special studies of arterial, lateral, belt, and by-pass routes, relocations of sections of highway, unimproved gaps in the present system, time studies of traffic and train movement at railroad grade crossings, separation of grade at the intersection of heavy traffic routes, and topographic and hydrographic surveys.
8. Conferences with the several county boards and county surveyors and with the officials of the cities and villages of Cuyahoga County to receive their suggestions and plans for highway improvement.
9. Detailed studies of the cost of construction, using surfaces and structures of modern design, and average prices of construction in the region. This evidence was used as the basis for estimating the cost of the planned improvements.

The resulting plan involving the proposal of new routes and connections, of new construction on existing routes, and reconstruction and widening of present surfaces, of bridge construction and railroad grade separations, has been approved by the U. S. Bureau of Public Roads; the Ohio State Department of Highways; the county boards of Cuyahoga, Geauga, Lake, Lorain, Medina, Portage and Summit Counties; the City of Cleveland; and other cooperating agencies.

Summary of Traffic Facts

Local traffic predominant.—Local traffic, particularly between Cleveland and its suburbs and between the larger centers of population within the regional area, constitutes the bulk of the highway traffic. On 15 main routes in Cuyahoga County it was found that only 2.4 per cent of the traffic was moving between points outside of the county.

Sunday and weekday traffic.—Sunday is the day of maximum traffic except in the business section of Cleveland. Compared with the weekday traffic the Sunday movement is proportionately greater on roads of low traffic density.

The improvement of major and medium traffic routes, the widening of major routes, and the creation of new routes will satisfactorily solve the problem of Sunday traffic distribution and provide relief for the congestion which prevails on that day from 2 p. m. to 7 p. m. at the traffic "bottle necks."

Volume of traffic on the highways of the area in 1927.—The greatest traffic density on any section of a highway in the area was recorded on the Superior high-level bridge in Cleveland, where the average daily 24-hour traffic was 56,000 vehicles.

Within the City of Cleveland daily traffic on the main arterial routes ranged from 14,000 on Detroit Avenue at West 25th Street to 38,000 on Carnegie Avenue at East 55th Street.

Beyond the area included in Cleveland, Lakewood, East Cleveland, and Cleveland Heights only a small mileage of roads had a traffic density of over 10,000 vehicles.

Practically all of the principal radial routes out of Cleveland carried 4,000 or more vehicles

a day for varying distances. Within the heavy-traffic area of Cuyahoga County, bounded approximately by Richmond Road (State Route 175), and Pleasant Valley, and Clague Roads, traffic on highways of this class will increase during the next fifteen years to a daily volume which will require a surface width sufficient to carry four lanes of traffic.

Among the radial roads whose daily traffic was over 4,000 vehicles are: Lake Shore Boulevard (State Route 175); Euclid Avenue (U. S. Route 20); Mayfield Road (U. S. Route 322); Cedar Road; Kinsman Road (U. S. Route 422); Miles Avenue (State Route 43); Broadway (State Route 14); Brecksville Road (U. S. Route 21); Wooster Pike (U. S. Route 42); Center Ridge Road (U. S. Route 20); Detroit Road (State Route 254); and West Lake Road (State Route 2).

Outside of Cuyahoga County the only roads in the regional area on which daily traffic was over 4,000 vehicles were U. S. Route 20 in Lake and Lorain Counties, a short section of State Route 175 in Lake County, and sections of three routes out of Akron, these being State Route 8 north to the Bath-Stowe Road, State Route 36 east to Kent, and State Route 18 west to its junction with State Route 92.

Of the total mileage of roads in Cuyahoga County included in the survey, exclusive of the Cities of Cleveland and Lakewood, 3.1 per cent or 20 miles had a daily traffic density of 10,000 or more vehicles, and 13.8 per cent or 90 miles carried 4,000 or more vehicles daily. Over one-third of the road mileage in Cuyahoga County is of minor traffic importance, having a daily traffic of less than 400 vehicles. These are mainly lateral routes which serve as feeder roads to the radial routes connecting Cleveland and the larger centers of population.

Those roads which are not a part of through routes or which serve sections of low population density show a rapid decrease in traffic volume with increasing distance from Cleveland. Through routes connecting Cleveland with the larger centers of population in the regional area, such as Akron, Lorain, Elyria, Painesville and Medina, carry comparatively greater volumes of traffic over their entire length.

Convergence of routes causes traffic congestion.—Out of any center of population important traffic routes radiate from the business center. In the Cleveland area topographic obstacles, shown in Figure 1, have limited the number of such radial routes connecting the city and its suburban territory; and the convergence of the existing routes as they approach the city, as well as within the city proper, has created "bottle-necks" in which there is serious traffic congestion.

The most serious of these congested sections in the order of their importance are found on the following routes:

1. The Superior high-level bridge, the west end of which is the junction point of Bulkley Boulevard, Detroit Avenue, and West 25th Street, the latter carrying a large part of the traffic of Franklin Avenue, Fulton Avenue, and a considerable part of the traffic from Lorain Avenue. The combining of all this traffic results in a daily volume of over 56,000 vehicles on the Superior bridge. The principal routes from the east, which join before crossing the bridge, pass through the badly congested Public Square section.

2. Cedar Glen Road, at the Cleveland city limits, carries 36,000 vehicles a day produced by the junction of Cedar Road, Fairmount Boulevard, Euclid Heights Boulevard, the Kenilworth-Surry connection from Mayfield Road, and Murray Hill Road. A large part of the traffic from the east suburban territory enters Cleveland via Carnegie Avenue to the downtown business district.

3. Euclid Avenue (U. S. Route 20) at the junction with Superior Avenue, where the average daily traffic is 32,000 vehicles. Euclid Avenue from this point east is the main traffic artery for the entire northeastern section of the regional area.

4. West 25th Street, at the Brooklyn-Brighton bridge, carries the traffic of Wooster Pike (U. S. Route 42), Brook Park, York, Ridge (State Route 3), State (State Route 94), Broadview (State Route 176), and Schaaf Roads, a daily volume of 25,000 vehicles. West 25th Street at this point is the only usable connection between the center of Cleveland and the territory south of the city and west of the Cuyahoga River.

5. Woodland Avenue which, west of East 55th Street, carries the traffic of Woodland Avenue, Shaker Boulevard, Buckeye Road, and Kinsman Road, a total of 22,000 vehicles a day.

6. Broadway, southeast of its junction with East 55th Street, where the average daily traffic is 21,000 vehicles, the combined traffic of Broadway, Turney, Warner, Miles Avenue, East 71st Street, and Union Avenue. The traffic problem on Broadway is aggravated by its narrow roadway, street car lines, parked vehicles, and the movement of local business traffic.

7. The Rocky River bridge, where West Lake, Detroit, and Wooster Roads on the west, and Sloane, Detroit and Riverside Drive on the east, combine to produce an average daily traffic of 20,000 vehicles and a Sunday traffic of 28,000 vehicles. During peak hours of traffic the capacity of this bridge is greatly exceeded and vehicle speed is reduced to a minimum principally because of the series of turns in the routes approaching and leaving the bridge and congestion at both the east and west approaches.

8. In the outlying section of the county the most congested highway section due to the junction of main routes is in the village of Bedford on Broadway between Columbus Street and Northfield Road. Daily traffic at this point varied between 8,000 and 10,000 vehicles. Northwest of Bedford, traffic on Broadway is augmented by that from Warrensville Center, Lee, and other north-south routes. The Northfield route from Akron converges with Broadway within the village of Bedford a short distance southeast of the business center of the village. Motor vehicle parking, the street car traffic, and the movement of local vehicles in Bedford are contributing factors to the resulting traffic congestion.

A satisfactory method of providing relief on over-crowded routes is to distribute traffic over parallel routes and prevent the concentration of great volumes of traffic on the comparatively small number of main arterial routes. A second method is to widen the present main arteries, but as these frequently pass through highly developed business sections the cost of this method in many cases is prohibitive. In addition the concentration of large volumes of traffic on main arterial

routes passing through highly developed business sections usually results in unsatisfactory traffic service, decreased opportunity to transact business and greater accident hazard.

The proposed plan makes full use of available right of way on these routes, but wherever practicable the relief sought is to develop parallel distributing routes either by the establishment of new highways or the development of proper connection between, and the completion of gaps in, existing routes.

Motor truck traffic.—On the principal trucking routes within the City of Cleveland, average weekly truck traffic ranged from 2,841 on Euclid Avenue at Superior to 4,527 on the Superior high-level bridge.

Outside of the cities of Cleveland and Lakewood the roads carrying the greatest volume of truck traffic for a considerable distance are Euclid Avenue, Mayfield Road, Wooster Pike, Detroit, Lee, Center Ridge, and West Lake Roads, and Broadway.

Motor bus traffic is a very small part of total traffic. Within the heavy-traffic zone of Cuyahoga County, bounded approximately by Richmond, Pleasant Valley, and Clague Roads, it was only 0.6 per cent of the total traffic.

Traffic growth.—Studies of traffic increase over a period of years in several States have shown that traffic on the highways of an area increases in the same ratio as the motor vehicle registration in the area. An analysis of population growth and the relation of motor vehicle ownership to population, *i. e.*, persons per registered car, indicates that an increase in traffic of 73 per cent may be expected on the highways of Cuyahoga County during the next ten years, and that in the same period the increase in other parts of the region will be 17 per cent in Geauga County, 37 per cent in Lake County, 58 per cent in Lorain County, 13 per cent in Medina County, 38 per cent in Portage County, and 85 per cent in Summit County.

Distribution of traffic in the area.—To determine whether present roads in the regional area provide direct highway service between important residential, business and suburban areas and to determine the approximate location of new routes

FIGURE 1

RELIEF MAP OF CLEVELAND REGIONAL AREA



The origin of the light which illuminates this pictorial relief map is at the northwest corner of the sheet and is sufficiently elevated to light one side of all objects within the area of the map.

In all relief maps the vertical scale is exaggerated so as to show the configuration of the surface of the area.

The shadows represent the sides of the hills or valleys that are not illuminated.

Map accompanying "Report of Highway Traffic and Planning Survey Cleveland (Ohio) Regional Area"

Scale 0 3 6 Miles
 Polyconic projection, North American datum.

for the relief of traffic congestion, it was necessary to know the principal sources of traffic in the area. The planning survey was directed not only toward the adequate improvement of present routes but also toward the establishment of new routes and the coordination of all routes so that traffic will be enabled to flow from origin to destination over the most direct routes possible and with the least possible congestion and delay.

To accomplish this purpose, traffic was stopped at key locations on the principal roads and a record was made of the places of origin and destination of each trip.

In the analysis of these trips according to place of origin and destination it was found that traffic was predominantly local in character, that the principal movement of traffic in Cuyahoga County was between Cleveland and its suburbs, and that the movement between the suburbs themselves and the remainder of the regional area was small in volume when compared with the movement of local traffic into and out of the City of Cleveland.

In Cleveland the principal source and destination of traffic is the downtown business district, the area bounded by East 12th Street, Euclid Avenue, and the Cuyahoga River. One-fifth of the total traffic between the entire City of Cleveland and its suburbs is between this downtown business district and the suburbs of the city.

The eastern population centers of the suburban area of Cleveland, East Cleveland, Cleveland Heights, Shaker Heights and Lake County, produce a much greater volume of traffic than the southern and western sections. South of Cleveland the principal centers of traffic are the Villages of Parma and Garfield Heights and the City of Akron and vicinity.

Average speed of passenger car traffic.—Supplementing the analysis of density, concentration, and distribution of motor vehicle traffic on the main routes serving the area, studies of the speed of passenger car movement on various sections of these routes were made during peak and average traffic periods.

The low average speed of traffic on the main routes in the heavy-traffic zone of the City of Cleveland and its suburban area contrasts sharply with the high average rate of vehicle movement outside of these two areas.

Narrow streets, street car operation, street car loading platforms, parking at the curb, large volumes of motor truck traffic, intersecting traffic routes, and traffic control at intersections are in general the principal causes of the slow rate of movement within the city and its more densely populated suburbs.

The low average traffic speed during morning and evening congestion periods on the main routes traversing the City of Cleveland and its adjacent suburban territory, shows that the present routes are not satisfactory, and are causing motor vehicle operators inconvenience and an unnecessary loss of time.

The Plan of Highway Improvement

The essential highway facilities necessary in each section of the area as determined by the present volume of traffic, expected future traffic and the origin-destination distribution of traffic, compared with the condition, width, location, continuity and adequacy of present highways, the condition and width of bridges and the analysis of railroad crossings at grade, determined the plan of highway improvement.

The plan is designed to provide satisfactory highway facilities for each section of the area by the creation of a complete highway transportation system. The proposed plan makes use of the present highways to the fullest possible extent. New routes are proposed only where essential links of a complete transportation system are missing, or where adequate traffic capacity can not practicably be obtained on present routes.

The improvement of present routes involves an extensive program of widening and reconstruction of present surfaces and structures and the construction of unimproved gaps. The widening program contemplates increasing the width of present pavements to that required by the volume of present and expected future traffic or to the width possible on existing or obtainable right of way. Widening beyond four lanes for moving traffic is not contemplated. The concentration of more than four lanes of traffic on one route results in serious congestion at the focal and central discharge points, and the cost of acquiring additional right of way in the highly developed areas where such routes would be required is

usually excessive. Present and future traffic can be more efficiently served by the provision of a sufficient number of four-lane highways. The condition of the surface on a considerable mileage of the highways of the regional area necessitates reconstruction as well as widening. On a few routes, where present width is adequate, reconstruction without widening is necessary. The new construction program on established highways involves the improvement of routes or sections of routes that are now unimproved, or of sections on which present improvements are in such poor condition as to be worthless except possibly as salvaged material.

The improvement plan for Cuyahoga County includes 281 miles of roadway and 65 structures distributed as follows: New routes, exclusive of the City of Cleveland, 61.7 miles; new routes within the City of Cleveland, 24.5 miles; widening of present routes, 68.9 miles; reconstruction and widening, 89.0 miles; reconstruction, 4.7 miles; and new construction on present routes, 31.8 miles. The 65 structures included are as follows: In Cuyahoga County, exclusive of the City of Cleveland, 11 new bridges, 38 railway grade separations, and 4 highway grade separations; within the City of Cleveland, 8 new bridges, 2 railway grade separations, and 2 highway grade separations.

The program of improvement for the regional area, exclusive of Cuyahoga County, comprises 312 miles of highway improvement and 48 structures as follows: New routes 40 miles; new construction of present routes 39 miles; reconstruction and widening 233 miles; 28 railway grade separations; 2 new bridges; and replacement or widening of 18 bridges.

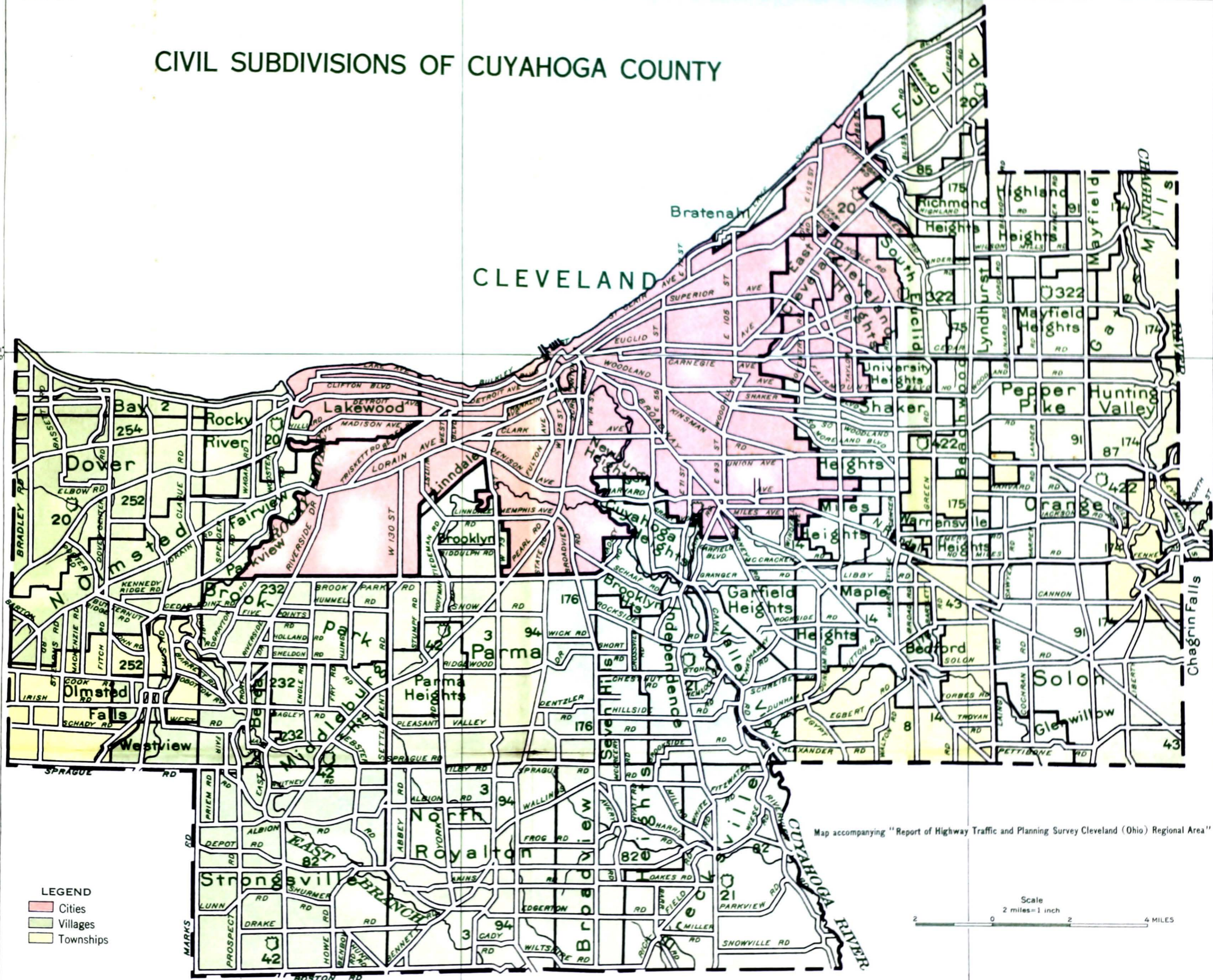
The Cost of the Plan of Improvement

The estimated cost of construction of the complete plan for the regional area, exclusive of the cost of right-of-way acquisition and property damages, is \$63,000,000, of which \$41,200,000 represents the cost of improvements within Cuyahoga County. Of this total of \$41,200,000, roadways and structures on the new routes are estimated to cost \$26,300,000, approximately two-thirds of the total Cuyahoga County program.

As previously stated, the plan is designed to provide a complete and connected system of highways for proper traffic distribution in the regional area. The extent to which this object will be accomplished will depend upon the fullness with which the plan is carried out and upon the provision that is made for future planning to prevent the recurrence of the present unsatisfactory situation.

FIGURE 2

CIVIL SUBDIVISIONS OF CUYAHOGA COUNTY



Map accompanying "Report of Highway Traffic and Planning Survey Cleveland (Ohio) Regional Area"

Scale
2 miles = 1 inch

0 2 4 MILES

ADMINISTRATIVE CONTROL OVER HIGHWAY IMPROVEMENT

THE improvement of highways and streets in Cuyahoga County is controlled by 63 administrative jurisdictions. The construction of Federal-aid routes involves the cooperation of the U. S. Bureau of Public Roads, the Ohio State Department of Highways, the Commissioners of Cuyahoga County, the Cuyahoga County Surveyor, and the villages through which the Federal-aid routes pass. With respect to State highways not included in the Federal-aid system, the same cooperating agencies, exclusive of the Bureau of Public Roads, are parties to the improvement. For county roads the county commissioners, the county surveyor and the villages and cities through which a county road passes are involved in the improvement. City streets are improved by the respective cities except where the county commissioners accept responsibility for improvements within city limits. During the ten-year period from 1918 to 1928 the county commissioners constructed approximately 33 miles of highway within city limits, of which 25.5 miles were constructed in Cleveland, 4 miles in East Cleveland, and 3.5 miles in Lakewood.

There are 4 cities, Cleveland, Lakewood, East Cleveland, and Cleveland Heights; 49 villages and 6 townships in Cuyahoga County, as shown in Figure 2, a total of 59 local jurisdictions.

Each of the U. S., State, and county main traveled routes, as shown in Figure 2, pass through several of these jurisdictions, and the number of highway improvement agencies, exclusive of property owners, which must agree to the plan of improvement prior to construction, inevitably causes uneconomic delays and, in some cases, the abandonment of essential highway improvements. This situation is partially responsible for the inability of the Cuyahoga County Commissioners to complete satisfactorily essential highway improvements.

Pearl Road (U. S. Route 42) traverses four villages; Kinsman Road (U. S. Route 422) passes through five villages; and Broadway (State Route 14) crosses three villages between the Cuyahoga County line and the city limits of Cleveland. The

S. O. M. Center Road (State Route 91) passes through seven villages between the north and south limits of the county. Warrensville Center Road, an important county highway, is located entirely within seven villages in a distance of approximately nine miles from Broadway to the city limits of Cleveland Heights. Except for a small mileage on the Broadway and Kinsman routes where they pass through townships, each of these routes is entirely within incorporated village limits. A similar condition exists on all the highways within Cuyahoga County except for a small mileage within the remaining unincorporated township areas of Bedford, Chagrin Falls, Olmsted, Orange, Riveredge, and Warrensville.

Practically the entire county consists of incorporated villages and cities, and within a comparatively short period of time there will probably be no unincorporated township areas.

The control over highway improvements should be more centralized, but to accomplish this purpose the present statutes, which delegate to the villages authority over county highways, would have to be revised.

Procedure Required to Initiate Highway Improvement

Highway improvements can be initiated by a unanimous vote of the three members of the board of county commissioners approving a resolution declaring that public welfare and convenience require the improvement, or by a petition to the commissioners from 51 per cent or more of the property owners whose land will be assessed to pay part of the cost of the improvement. If the latter method is used, a majority of the board of commissioners can approve the project.

The resolution of necessity, or the petition of property owners, must state the termini of the proposed improvement, and must describe the grading, drainage, paving, relocation, widening, and the construction or reconstruction of bridges or culverts involved. The apportionment of the improvement cost must also be specified.



A CONSISTENT DEVELOPMENT OF THE MAIN HIGHWAYS OF THE REGIONAL AREA HAS BEEN DIFFICULT BECAUSE OF THE NUMEROUS COUNTY AND MUNICIPAL JURISDICTIONS INVOLVED

Above—Chardon Road (State Route 85) at the village limits of Richmond Heights and Euclid Villages. Note the change in width. The narrow section is being widened this year (1928)

Below—Wooster Pike (U. S. Route 42) at the Cuyahoga-Medina county line. Note the change in type and the abrupt ending of the center line

When the proceedings are initiated by petition, the board of commissioners sets the dates for a view of the improvement by the board and a final hearing for approval or disapproval of the petition.

The approval of an improvement by either method results in an order from the board of county commissioners to the county surveyor to prepare surveys, plans, profiles, cross sections, specifications and estimates of cost of the proposed improvement, and an estimated assessment on the benefited property.

The detailed improvement plan prepared by the county surveyor, after approval by the commissioners, is filed for inspection by the public. The date of the hearing by the commissioners of claims for compensation and damage and objections to the improvement must be advertised for two weeks. The decision of the commissioners as to objections to the improvement may be appealed to the probate court, which has authority to reverse the commissioners' decision and modify assessments when inequalities exist. Appeals to the court involving awards of compensation and damages are determined by a jury.

When private property is required for a proposed improvement, notice must be served on the owner of each parcel of land affected, showing the ownership, location, and dimensions of the land required, and must fix a time and place for presentation of claims for compensation and damage. On the date named the commissioners consider the claims and awards are made. The board of commissioners may adopt a resolution to settle claims for damage to property resulting from the improvement after the improvement is completed. After all claims for damages have been determined by the commissioners, or by the probate court, when awards of the commissioners are appealed to the court, and these claims are filed, the board of commissioners can adopt a resolution to proceed with the improvement.

After approval of the project by the commissioners, the proposed work is advertised and the contract is let to the lowest and best bidder. When different types of improvement are submitted, a board consisting of the county commissioners and the county surveyor determines by a majority vote the type of improvement. Con-

tracts are usually made on a unit-price basis, the aggregate not to exceed the total estimated cost.

Municipal Control of County and State Highways

The laws of Ohio establish the exclusive right and duty of a municipality to control the improvement of streets and roads within its corporate limits, even when such roads are State or county highways. Prior to the improvement of a State or county road within a municipality, the council of the city or village must approve the proposed project by resolution or ordinance.

This requirement is responsible for considerable delay in the improvement of important State and county highways, and in some instances has prevented the improvement of roads which are inadequate in their width, class of improvement and state of repair. In Cuyahoga County, where practically the whole county is incorporated into a large number of municipalities of limited area and limited resources for highway improvement, political zeal has prompted such municipalities to insist upon limiting the improvement assessments upon abutting or contiguous property to a minimum amount, considerably less than the benefits accruing to property, and to insist further that the State or county or both shall finance practically the entire cost of the construction.

The result of this authority delegated to the villages is that a small village having, perhaps, less than a mile of highway frontage can indefinitely delay necessary improvements on the main highways of the county. This power of the municipalities should be modified to facilitate the procedure of improving highways in Cuyahoga County. In a large majority of the counties of Ohio this situation is not so serious a problem as in Cuyahoga County, since in these other counties a large part of the county area is unincorporated, and the township authorities have no control over State or county highways within their limits.

Financing Highway Improvements in Cuyahoga County

Ohio legislation provides that municipalities traversed by State or county highways may finance a part, but are not compelled to share any of the road improvement cost. When a muni-

pality authorizes participation in the cost of the improvement, the council, by resolution or by legislation, authorizes an agreement with the county commissioners as to the cost assumed by the municipality. Any proportion so assumed is credited to that part of the cost of the improvement otherwise assessed upon benefited property within the municipality.

The first stage of financing a highway improvement by the board of county commissioners is the apportionment of the improvement cost between the county and abutting property owners. All or any part of the cost of the project may be assessed by the commissioners against real property abutting on the highway or within a half mile, one mile or two miles on each side of the improvement, based on the estimated benefit to property resulting from the construction.

There is no legal limit placed on the amount that may be assessed against property for county roads, but in the development of State highways, when the pavement width is less than 18 feet, the assessment can not exceed 10 per cent of the cost, or 20 per cent of the current tax value of the assessed property.

The usual procedure in Cuyahoga County has been to assess one-half the cost against benefited property and finance the remainder from the county highway funds, or from county highway bonds resting on property and real property levies.

This method of financing is inequitable, particularly when the improvement provides a surface width greater than that required for two lanes of traffic. Local property receives no material additional increment of value when a four-lane highway rather than a two-lane highway is constructed. The traffic which requires width in excess of that of a two-lane surface is not local, but rather county and regional traffic. Also the amount of the increase in the value of property resulting from a highway improvement decreases along a route with increase of distance from the center of population.

It would seem logical for the county commissioners of Cuyahoga County to modify the present method of financing highway improvements based upon the width of surface to be constructed and a determination of the influence of the improvements on the value of land at various distances from the City of Cleveland.

THE CLEVELAND REGIONAL AREA

THE territory selected for the highway planning survey and designated as the Cleveland Regional Area, as shown in Figure 1, includes Cuyahoga County and the parts of Lake, Geauga, Portage, Summit, Medina and Lorain Counties enclosing Cuyahoga County and the City of Cleveland, the center of traffic distribution of the area. The outer limits of the regional area are approximately 30 miles from the business center of Cleveland. The area is bounded by three Ohio States Routes, viz., Route 44 to the east, Route 18 to the south, and Route 57 to the west. On these routes are located the outlying centers of population contributing to the traffic of the area. At the eastern limits these centers are Painesville, Chardon, Mantua and Ravenna; at the southern limits, Kent, Akron, and Medina; and at the western limits, Elyria and Lorain.

This area includes the principal sources of Cuyahoga County traffic and its borders approximately define the limits of local service between Cleveland and its tributary area. An index map of Cuyahoga County showing the location of the principal streets, highways and municipalities is shown in Appendix Figure 9.

Population Density and Distribution

The distribution of population in the regional area, based on the population sections of the 1920 census, is shown in Figure 3. Population per square mile and rates of increase vary widely in the various sections. Population density in sections of the City of Cleveland exceeds 38,000 persons per square mile and in a considerable number of the townships of the area is less than 30 persons per square mile.

Recent estimates of population trends, supplementing the decennial censuses, furnish a reliable basis for estimates of future population. The estimated rates of growth from 1920 to 1930 in the wards of the City of Cleveland vary from a decrease of about 15 per cent to an increase of 85 per cent; for the remaining sections of Cuyahoga County, from 37 to 560 per cent increase; for the remaining sections of the regional area, from a

decrease of 5 per cent to an increase of 72 per cent. In general, the population is increasing most rapidly in the suburban areas of Cuyahoga County adjacent to the Cleveland city limits, and these are the most important areas of the suburban territory from the standpoint of traffic.

Cuyahoga County's population is distributed in a series of five zones surrounding the business center of Cleveland. In the business center, population is decreasing, and its density per square mile is lower than that of the area immediately surrounding it. In the second zone within the city, which surrounds the business center and is colored green in Figure 3, population in 18 of the wards was more than 15,000 and, in one ward, over 38,000 persons per square mile. One section is decreasing at a rate which for the 1920-1930 period will approximate 15 per cent. In each of the remaining sections the population is increasing, the maximum rate of estimated growth for the 1920-1930 period being 40 per cent.

Surrounding the second population area, is a third zone extending approximately to the city limits and including the cities of East Cleveland and Lakewood, with a population density between 5,000 and 15,000 persons per square mile. Rates of growth within this area range from 20 to 85 per cent for the 1920-1930 period, the latter being the rate of increase for the southeastern part of the city. Cleveland Heights, University Heights and the section of Cleveland known as West Park each have from 1,000 to 5,000 persons per square mile, and their population is increasing at a rate of approximately 200 per cent for the 1920-1930 period. In the suburban areas adjacent to the city limits, population, and rates of increase, are more variable than in Cleveland.

The fourth zone includes areas that have a population density of 300 to 1,000 persons per square mile, comprising Rocky River, Fairview, Parkview, Euclid, Richmond Heights, South Euclid, Lyndhurst, Beechwood, Shaker Heights, Miles Heights, North Randall, Warrensville Heights, Bedford, Maple Heights, Garfield Heights, Valley View, Cuyahoga Heights, Newburgh Heights, Brooklyn Heights and Chagrin

Falls. The rate of growth within this zone ranges from 148 to 264 per cent for the 1920-1930 period.

The fifth population zone includes the villages of Highland Heights, Mayfield, Mayfield Heights, Gates Mills, Independence, Seven Hills, Parma, Parma Heights, Brooklyn, Brook Park, Berea, Middleburg Heights, Olmsted Falls, Westview, North Olmsted, Dover and Bay and the townships of Olmsted and Riveredge. This area has a population ranging from 101 to 300 persons per square mile, and rates of increase during the 1920-1930 period varying between 37 and 560 per cent. Parts of this zone, most of which is south and west of the city, are nearer to the center of the city than other sections of greater population density and its relatively slower growth has been influenced by a lack of adequate transportation facilities.

The sixth zone is the most sparsely populated section of Cuyahoga County, and includes the villages of Pepper Pike, Hunting Valley, Orange, Solon, Glenwillow, Brecksville, Broadview Heights, North Royalton and Strongsville. Population in these villages is less than 100 persons per square mile, and their rates of population growth between 1920 and 1930 are from 50 to 60 per cent.

A clear picture of the distribution and growth of population in Cuyahoga County may be obtained by comparing the population, area, and rate of population increase in the three principal traffic zones of the county; viz., (1) the City of Cleveland, (2) the area between the Cleveland city limits and Clague, Pleasant Valley, and Richmond Roads, and (3) the remainder of the county.

Table 1 shows sharp differences in population density and rates of increase in these areas.

The rate of population increase from 1910 to 1920 in section 2 was three times that of section 1, and the estimated increase in section 2 from 1920 to 1930 is four and one-half times that of section 1.

Assuming no change in the city limits of Cleveland the distribution of population in 1930 will be approximately 84 per cent in the city, 14 per cent in section 2 and 2 per cent in section 3.

The rapid change in the distribution of population between sections 1 and 2, is one of the reasons necessitating improved transportation facilities between section 2, the principal suburban zone, and the business section of Cleveland.

For the purposes of convenience and clarity in the study of traffic and the plan of improvement, Cuyahoga County has been divided into seven sections.

The population in 1910 and 1920, the percentage of increase from 1910 to 1920 and the estimated increase from 1920 to 1930 in these seven sections, exclusive of the City of Cleveland, Lakewood and Bratenahl Village, are shown in Table 2.

These sections are nearly equal in area except for the western section which is approximately two-thirds the area of each of the others. Their order of importance in respect to population density, therefore, corresponds closely with their order in respect to total population.

Table 1—Comparison of population, area, and rate of population increase in the three traffic zones of Cuyahoga County

Section	Per cent of total population of Cuyahoga County in 1920	Per cent of area of Cuyahoga County 1927	Percentage rate of population increase 1910-1920	Estimated rate of population increase 1920-1930
(1) City of Cleveland ¹	90	16	44	32
(2) Area between the city limits of Cleveland and Clague, Pleasant Valley and Richmond Roads..	8	36	131	146
(3) Remainder of the county.....	2	48	18	139

¹ Includes village of West Park annexed to the City of Cleveland subsequent to 1920.

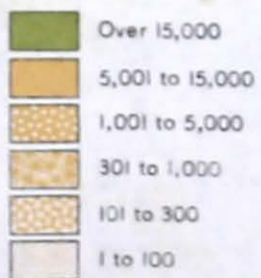
FIGURE 3

POPULATION DENSITY
1925

CLEVELAND

Density of population per square mile by cities, villages, and township units, 1925

LEGEND



Map accompanying "Report of Highway Traffic and Planning Survey Cleveland (Ohio) Regional Area"

Scale 250000

Polyconic projection, North American datum



The northeastern and east-central sections are most thickly populated and during the period from 1910 to 1920 increased at the most rapid rate. The southeastern and east-south-central sections had approximately the same total population in 1920 but their rates of increase from 1910 to 1920 were approximately half the increases of the northeastern and east-central sections.

Total population in the remaining three sections was low and increased slowly from 1910 to 1920.

Estimated rates of growth from 1920 to 1930 are greater than in the prior decade for all sections except the northeastern. The rate of growth in the west-south-central section exceeds those of all other sections, but this fact loses some of its significance when the low population density of the section in 1920 is noted. Considering population and the present and probable future demand for traffic facilities, the seven sections classified in the order of their importance are: Northeastern; east central; southeastern; east-south-central; west-south-central; western; and southwestern. The provision of new transportation facilities will undoubtedly be an important factor in influencing population changes in the several sections, particularly the low population sections adjacent to the business center of Cleveland.

The section of the regional area outside of Cuyahoga County comprises the seventh population zone. It is sparsely populated except for the cities of Akron, Lorain, Elyria, Painesville, Kent, Ravenna, Medina and Chardon.

Physical Obstacles to Highway Improvement

The location and improvement of highways and bridges in the regional area has been influenced to a considerable extent by topography, especially by the Cuyahoga, Rocky, Chagrin and Black River valleys, industrial development, golf courses, cemeteries, and park areas as shown in Figures 1 and 4. The influence of topography upon the location of highways is particularly marked in Cuyahoga County, as shown in Figure 1.

The four principal river valleys run generally north and south and divide the northern part of the area into four sections. East-west routes cross these valleys and the structure costs involved have materially delayed the establishment of new routes, since large bridge construction projects involve a considerable expenditure of public funds. The main highways from the southeast, in general, parallel but do not cross the Cuyahoga River valley. There is no satisfactory east-west crossing of this valley in the suburban zone south of the

Table 2—Population rate of increase in the seven sections of Cuyahoga County

Section ¹	Population		Percentage increase 1910 to 1920	Estimated percentage increase 1920 to 1930
	1920	1910		
Northeastern.....	36,841	13,956	164	130
East-central.....	21,007	7,773	170	209
Southeastern.....	9,951	5,928	68	146
Southwestern.....	8,581	7,866	9	52
East-south-central.....	7,387	3,934	88	122
Western.....	6,745	4,895	38	121
West-south-central.....	4,829	3,975	22	211

¹Northeastern section, north of Cedar Road; east-central section, between Cedar and North Miles Roads; southeastern section, south of North Miles Road and east of the west limits of Garfield Heights Village and Bedford Township; southwestern section, west of Settlement Road and south of the southern limits of Parkview and North Olmsted Villages; east-south-central section, between Garfield Heights Village and Bedford Township, and Broadview Road; western section, west of the cities of Cleveland and Lakewood and north of the southern limits of Parkview and North Olmsted Villages; west-south-central section, between Broadview and Settlement Roads, as shown in Figure 29.

Harvard-Denison route; and south of Lorain Avenue there are no important traffic routes which cross the Rocky River valley.

Within the City of Cleveland the traffic congestion in the central business section is partially caused by an absence of proper high-level and low-level crossings over the lower Cuyahoga valley to relieve the heavy traffic utilization of the Superior high-level structure.

Industrial development hampers the location of new routes near the City of Cleveland. As shown in Figure 4, there is a series of industrial belts through which must pass both present routes and new arterial routes. It is a difficult problem to develop new routes through a large industrial section, so difficult that the usual result is a location of the highways to avoid such sections and a sacrifice of the principle of maximum traffic service.

Railroad lines, and freight unloading and classification yards are serious obstacles to the location of new routes. The solution usually resorted to, and the only solution for aggravated cases is viaduct construction, which on account of its cost usually results in a failure to develop the improvement. This type of solution enters into the present plan in only one instance.

Golf courses, cemeteries and park areas are distributed throughout Cuyahoga County, as shown

in Figure 4. These, also, are barriers to the opening of new routes.

The steady increase, during the past few years, in the land areas occupied by industrial plants, railroads, golf courses, park areas and cemeteries, emphasizes the urgent need of establishing rights of way for future highway development to protect the public in the future development of essential routes.

Highway Systems, Width of Surfaces, and Their Condition

There are 1,784.1 miles of State and county highways in the Cleveland regional area, bounded, as previously described, by Ohio State Routes 44, 18, and 57. Of the 604.5 miles of State highways in this area, 339.5 miles are part of the Federal-aid highway system, the cost of improvement of which may be shared by the Federal Government. The mileage of Federal-aid, State and county roads in the several counties of the regional area is shown in Table 3.

The traffic survey, concerned only with the principal roads of the regional area outside of Cuyahoga County, covered 1,263.8 miles of the total mileage of the Federal-aid, State, and county highways. An analysis of the present type and condition of surfaces of these highways showed

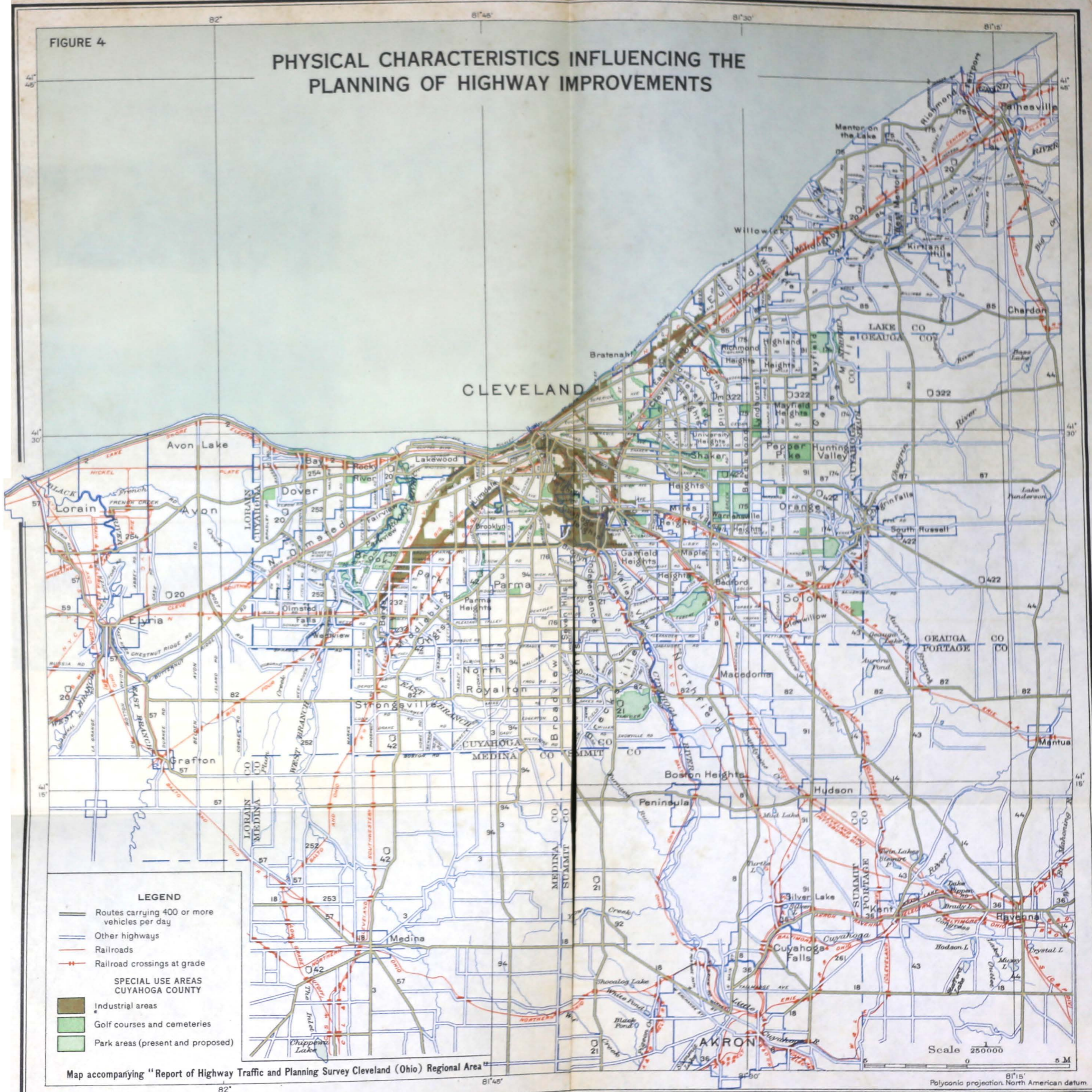
Table 3—Mileage of Federal-aid, State, and county highways in the regional area

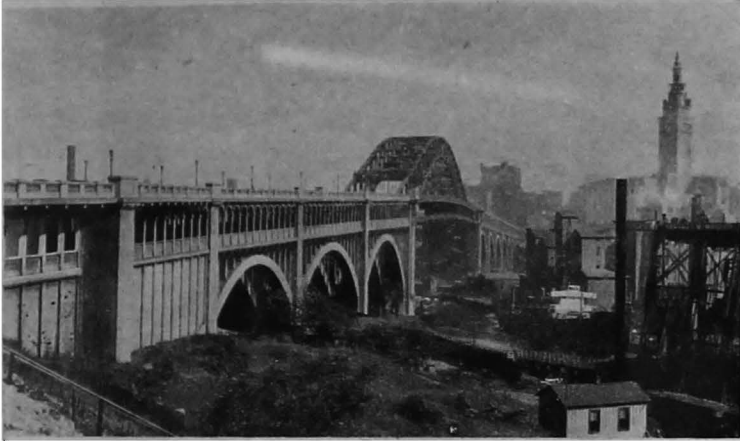
County	State highways			County highways ¹	Total
	Federal-aid	Other than Federal-aid	Total		
	Miles	Miles	Miles	Miles	Miles
Cuyahoga.....	122.7	91.3	214.0	597.5	811.5
Geauga.....	39.5	13.4	52.9	116.9	169.8
Lake.....	25.9	47.5	73.4	115.5	188.9
Lorain.....	29.4	29.9	59.3	75.9	135.2
Medina.....	21.2	39.1	60.3	105.6	165.9
Portage.....	39.6	23.4	63.0	84.8	147.8
Summit.....	61.2	20.4	81.6	83.4	165.0
Total.....	339.5	265.0	604.5	1,179.6	1,784.1

¹ Includes township roads in Cuyahoga County, but not in the remainder of the regional area.

FIGURE 4

PHYSICAL CHARACTERISTICS INFLUENCING THE PLANNING OF HIGHWAY IMPROVEMENTS

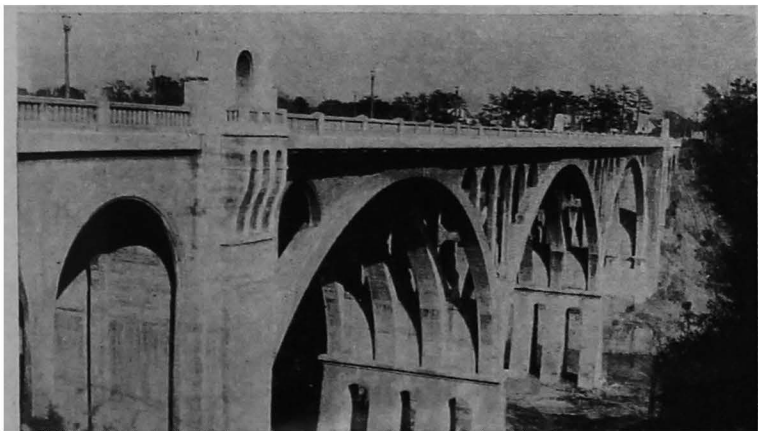




THE SUPERIOR HIGH-LEVEL BRIDGE OVER THE CUYAHOGA RIVER

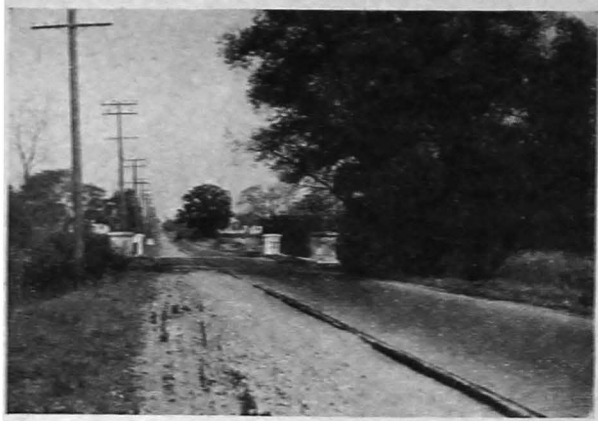


ABBEY AVENUE VIADUCT OVER THE BIG FOUR AND NICKEL PLATE RAILROADS AND SCRANTON ROAD



THE HILLIARD BRIDGE OVER THE ROCKY RIVER

THE COST OF CONSTRUCTING LARGE BRIDGES OVER THE FOUR PRINCIPAL RIVERS HAS DELAYED THE ESTABLISHMENT OF NEW ROUTES BADLY NEEDED FOR THE RELIEF OF CONGESTION ON THE EXISTING ROUTES



Pavement of inadequate width on Brook Park Road west of Hoffman Road

that 52.4 per cent of the total mileage is paved with brick or concrete, 31.4 per cent with bituminous surfaces, and the remaining 16.2 per cent is either surfaced with waterbound macadam, slag, or gravel, or is unimproved.

The surfaces of 70.6 per cent of the 1,263 miles surveyed are classified as satisfactory for 10 years or more,¹ 23.1 per cent are classified as suitable for subbase, and 6.3 per cent as salvable for material only. The mileage of major and medium

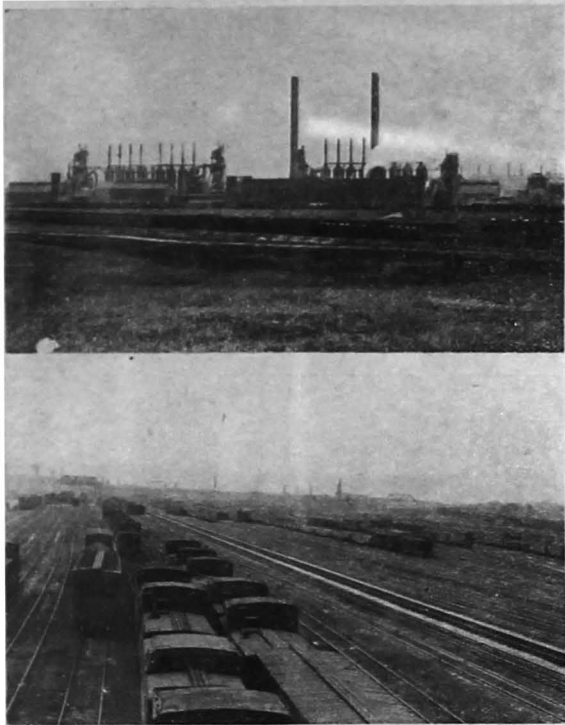
¹ The classification of surfaces as satisfactory does not mean that the surfaces so classified are adequate as to width.

Table 4—Classification of major and medium traffic routes according to type and condition of surface

Type and condition	Cuyahoga County		Lake County		Geauga County		Portage County		Summit County		Medina County		Lorain County	
	Major	Medium	Major	Medium	Major	Medium	Major	Medium	Major	Medium	Major	Medium	Major	Medium
	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
Brick and concrete:														
Satisfactory for 10 years or more.....	58.3	69.7	75.3	78.5	70.0	21.3	41.9	65.9	32.5	48.2	100.0	26.1	31.2	
Satisfactory for subbase.....	18.5	17.0	12.0	21.5		26.7	9.2	30.4	13.9					
Salvable as material only.....	3.6						14.6		7.6					
Bituminous top:														
Satisfactory for 10 years or more.....	17.8	9.4	4.7		39.0	38.3	18.8	40.4	12.6	62.4		43.3	39.4	
Satisfactory for subbase.....	1.7		8.0			13.7	15.5	18.6		51.8		30.6	23.2	
Salvable as material only.....														
Minor types:														
Satisfactory for 10 years or more.....		2.2												
Satisfactory for subbase.....		0.7					10.6		5.1				4.3	
Salvable as material only.....	0.1	1.0											1.9	
Total.....	100.0	109.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
Total—miles.....	291.1	132.9	47.0	35.0	14.4	29.7	38.3	37.4	74.8	24.7	30.0	11.4	35.7	44.4

Table 5—Classification of major and medium traffic routes according to surface width

Surface width	Cuyahoga County	Geauga County	Lake County	Lorain County	Medina County	Portage County	Summit County	Total
Feet	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
Less than 18.....	38.3	90.5	50.4	64.1	55.9	76.7	52.6	61.2
18-20.....	19.2	9.5	41.8	35.9	44.1	23.3	44.1	31.1
21-29.....	13.2						3.3	2.4
30-39.....	16.7		3.7					2.9
40 and over.....	12.6		4.1					2.4
Total.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total—miles.....	424.0	44.1	82.0	80.1	41.4	75.7	99.5	846.8

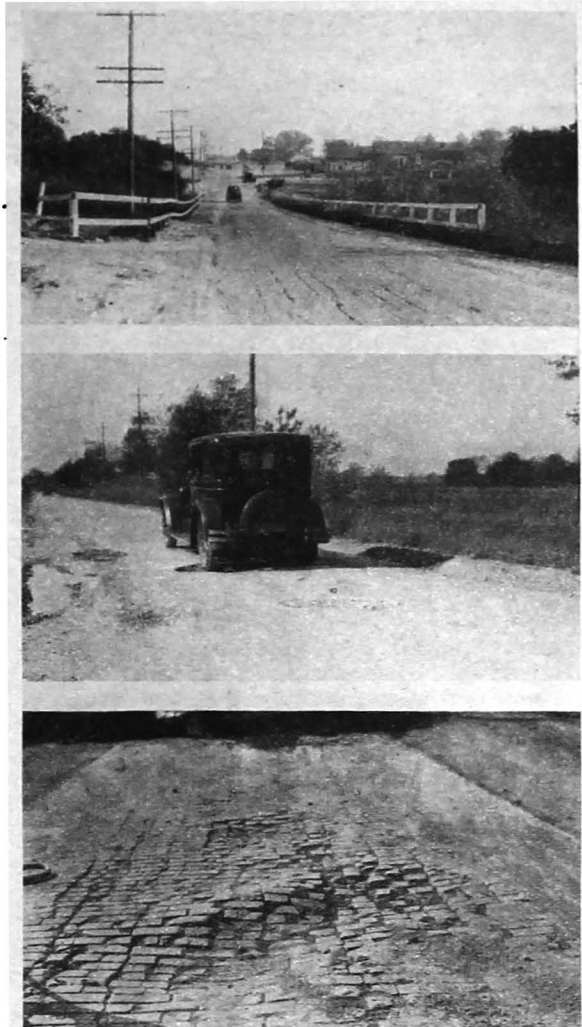


Large industrial plants and railroad freight yards stand in the way of much needed highway connections. Before the situation becomes more difficult steps should be taken to acquire the rights of way that will be needed for future highways

traffic roads,² in the several counties of the regional area, according to type and condition of surfaces is shown in Table 4.

The surface width of approximately 61 per cent of the total mileage of major and medium traffic routes is less than 18 feet while that of approximately 31 per cent is 18 and 20 feet. Only 7.7 per cent of the total mileage is paved with surfaces of width greater than 20 feet. The mileage of major and medium traffic routes by width of surface is shown in Table 5.

² These roads carry most of the traffic of the area. Major roads are those which now carry or by 1937 will carry 1,800 or more vehicles a day; medium traffic roads now carry or by 1937 will carry between 700 and 1,800 vehicles.



THREE VIEWS TYPICAL OF ROADS IN NEED OF RECONSTRUCTION

Above—Brecksville Road

Middle—Anderson Road

Bottom—Brook Park Road

Brecksville Road and Anderson Road are now being reconstructed (1928) and Brook Park Road is scheduled for early reconditioning

THE DENSITY OF TRAFFIC IN 1927

THE greatest traffic density on any section of a highway in the regional area was recorded on the Superior high-level bridge in Cleveland, where the average daily 24-hour traffic was 56,000 vehicles.*

Within the City of Cleveland, daily traffic on the main arterial routes was 38,000 on Carnegie Avenue at East 55th Street; 33,000 on Superior Avenue at East 55th Street; 32,000 on Bulkley Boulevard at Main Avenue; 28,000 on Euclid Avenue at East 55th Street, and 32,000 east of its junction with Superior Avenue; 25,000 on West 25th Street at the junction of Broadview Road; 22,000 on Woodland Avenue at East 55th Street; 21,000 on Broadway at East 55th Street; 16,000 on Lorain Avenue at Denison Avenue; and 14,000 on Detroit Avenue at West 25th Street.

The comparative traffic density on various routes in Cuyahoga County and the remainder of the regional area is shown in Figure 5. Seven classes of traffic are shown by colors while traffic of over 1,000 vehicles outside the congested city area, in addition to being shown by colors, is indicated by a tan band, along the road, the width of which represents, according to the scale shown, the daily traffic density. In Appendix I traffic density figures are tabulated for all roads covered by the traffic survey.

Beyond the area included in Cleveland, Lakewood, East Cleveland, and Cleveland Heights only a small mileage of roads had a traffic density of over 10,000 vehicles, the highest traffic class shown in Figure 5. Lake Shore Boulevard, Euclid Avenue, Lee Road, and Detroit Road are the only sections on which the volume of traffic exceeded 10,000 vehicles beyond the above area.

Practically all of the principal radial routes out of Cleveland carried over 4,000 vehicles a day for varying distances. Within the heavy traffic area, bounded approximately by Richmond, Pleasant Valley, and Clague Roads in Cuyahoga County, traffic on these radial routes and others now carrying 4,000 or more vehicles daily will increase dur-

ing the next fifteen years to the point where a surface width sufficient to provide for four lanes of traffic will be required. Outside of this congested area, highway traffic capacity researches have indicated that only those roads which carried over 5,000 vehicles a day in 1927 will require widening to four traffic lanes during the next fifteen years. In general, however, the roads shown in Figure 5 as carrying 4,000 or more vehicles in 1927 include those sections which can be considered as requiring widening beyond the normal two-lane width.

Among the radial roads whose traffic was over 4,000 vehicles are: Lake Shore Boulevard (State Route 175) as far as Vine Street in Willowick; Euclid Avenue (U. S. Route 20) to Painesville; Mayfield Road (U. S. Route 322) to Ford Road; Cedar Road to Green Road; Kinsman Road (U. S. Route 422) to Norwood Road; Miles Avenue (State Route 43) to Lee Road; Broadway (State Route 14) to its junction with Northfield Road in Bedford; Northfield Road (State Route 8) from Bedford to the Cuyahoga County line; Brecksville Road (U. S. Route 21) to Schaaf Road; Wooster Pike (U. S. Route 42) to Bagley Road; Center Ridge Road (U. S. Route 20) to Elyria; Detroit Road (State Route 254) to Hall Road; and West Lake Road (State Route 2) to Cahoon Park just west of Dover Center Road.

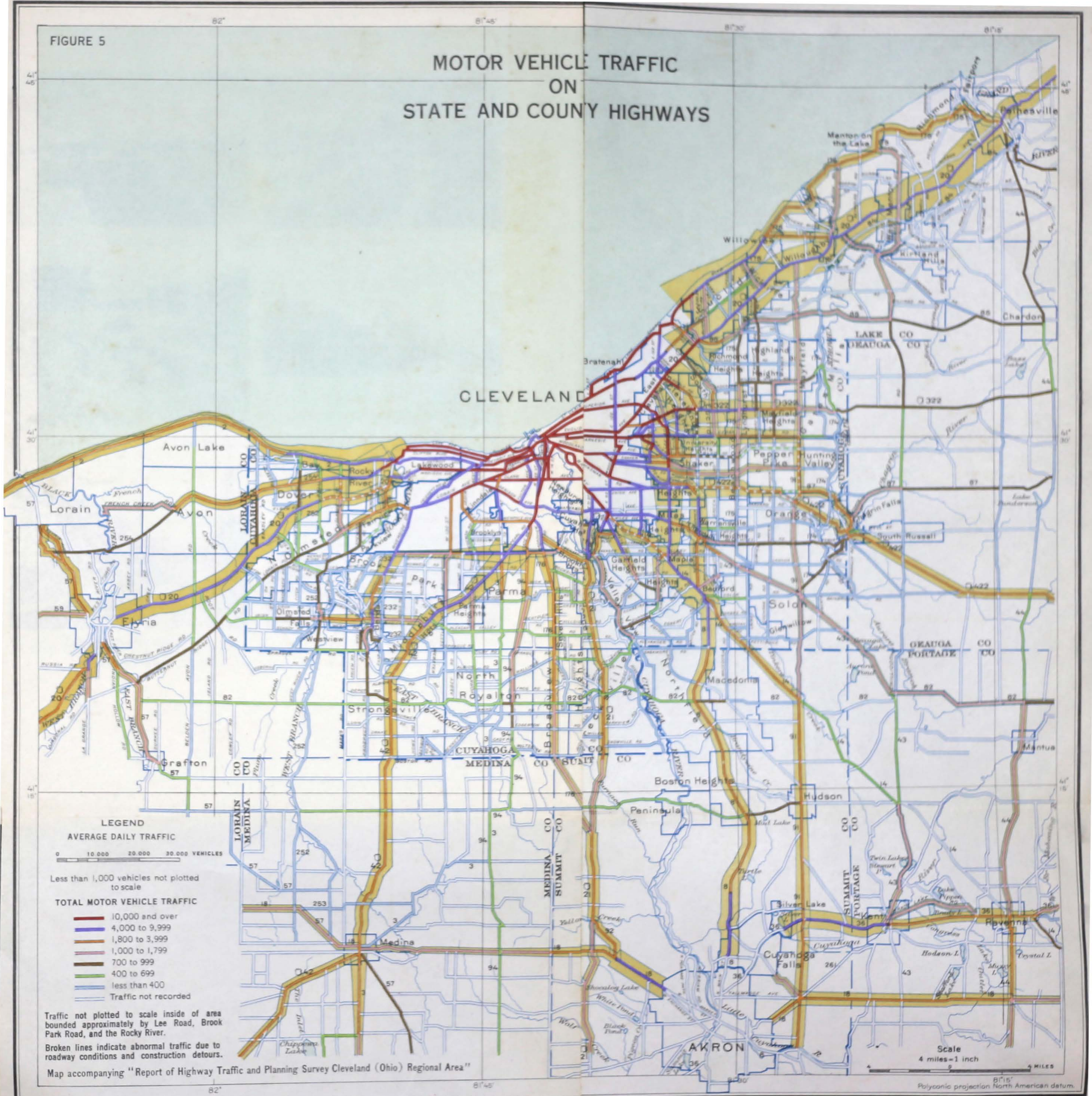
Several sections of the local roads outside of Cleveland, Lakewood, East Cleveland, and Cleveland Heights carried over 4,000 vehicles a day. These include portions of Lee, Taylor, Warrensville Center, Turney, Warner, and Brook Park Roads, and Windfall Avenue.

The mileage of roads in Cuyahoga County, exclusive of Cleveland and Lakewood, classified according to traffic density, is shown in Figure 6. Of this mileage 3.1 per cent or 20 miles had a density of 10,000 or more vehicles and 13.8 per cent or 90 miles carried 4,000 or more vehicles. Over one-third of the road mileage in Cuyahoga County (235 miles) carried a daily traffic of less than 400 vehicles, and is classified as of minor traffic importance. This mileage is made up mainly of short sections of routes which serve as

* Traffic was counted at 973 points on the roads of the regional area, of which 722 were located in Cuyahoga County.

FIGURE 5

MOTOR VEHICLE TRAFFIC ON STATE AND COUNTY HIGHWAYS



LEGEND

AVERAGE DAILY TRAFFIC

0 10,000 20,000 30,000 VEHICLES

Less than 1,000 vehicles not plotted to scale

TOTAL MOTOR VEHICLE TRAFFIC

- 10,000 and over
- 4,000 to 9,999
- 1,800 to 3,999
- 1,000 to 1,799
- 700 to 999
- 400 to 699
- less than 400
- Traffic not recorded

Traffic not plotted to scale inside of area bounded approximately by Lee Road, Brook Park Road, and the Rocky River.

Broken lines indicate abnormal traffic due to roadway conditions and construction detours.

Map accompanying "Report of Highway Traffic and Planning Survey Cleveland (Ohio) Regional Area"

Scale
4 miles = 1 inch

Polycaric projection North American datum.



The Superior high-level bridge



Carnegie Avenue



Lorain Avenue

Public Square

TRAFFIC ON MAIN ARTERIAL ROUTES IN THE CITY OF CLEVELAND

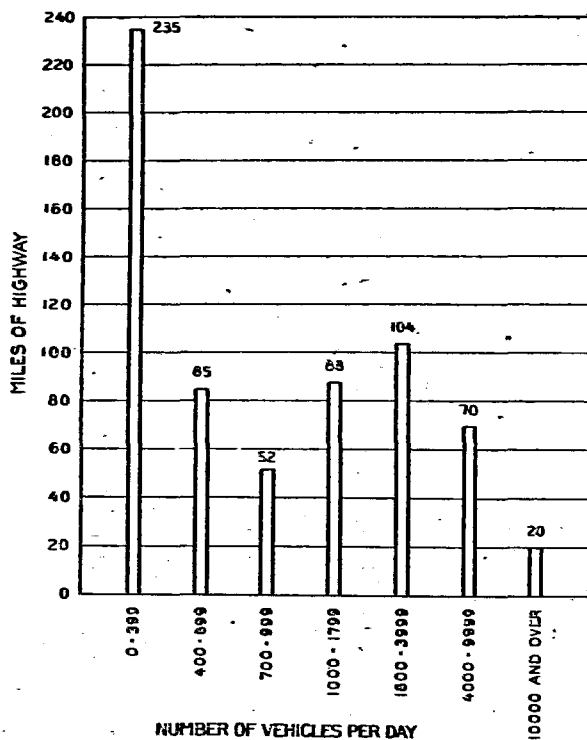


FIG. 6.—Mileage of roads in Cuyahoga County classified according to traffic density

feeder roads to the radial routes connecting Cleveland and the larger centers of population.

Outside of Cuyahoga County there were no roads on which the traffic exceeded 10,000 vehicles a day; and the only roads on which daily traffic was over 4,000 vehicles were U. S. Route 20 in Lake and Lorain Counties, a short section of State

Route 175 in Lake County, and sections of three routes out of Akron; these being State Route 8 north to the Bath-Stowe Road; State Route 36 east to Kent; and State Route 18 west to its junction with State Route 92. The total mileage of these sections is 34 miles, as shown in Table 6.

The volume of traffic on the principal radial routes from Cleveland is further indicated by Table 7, which shows traffic density on these roads at 7, 10, and 13 miles from the Cleveland Public Square. The 7, 10, and 13-mile intervals can be approximately located by their intersection with Euclid Avenue, Cedar Road, Broadway, Wooster Pike and Detroit Road. The 7-mile interval intersects these roads respectively at about Noble, Taylor, Windfall, Snow, and Sloane; the 10-mile interval at Chardon, Richmond, Rockside, Pleasant Valley, and Clague; and the 13-mile interval at Lloyd, S. O. M. Center, Forbes, Whitney, and Bassett.

The relative importance of the roads given in Table 7 changes to some extent as distance from the Public Square of Cleveland increases. Wooster Pike (U. S. Route 42), for instance, ranks seventh in density of traffic at 7 miles, sixth at 10 miles, and third at 13 miles. Euclid Avenue stands out as the most important of all routes in the regional area, with a density of 22,826 vehicles at 7 miles, 10,176 at 10 miles, and 8,614 at 13 miles. Lake Shore Boulevard is the next most heavily traveled route at and beyond seven miles. Lorain Road and St. Clair Avenue, which

Table 6—Mileage of roads by traffic classes

Traffic class	Cuyahoga County ¹		Regional area outside Cuyahoga County		Total regional area	
	Miles	Per cent	Miles	Per cent	Miles	Per cent
Vehicles per day						
0- 399.....	235	35.9	152	24.9	387	30.6
400- 699.....	85	13.0	97	15.9	182	14.4
700- 999.....	52	7.9	76	12.4	128	10.1
1,000-1,799.....	88	13.5	114	18.7	202	16.0
1,800-3,999.....	104	15.9	137	22.5	241	19.1
4,000-9,999.....	70	10.7	34	5.6	104	8.2
10,000 and over.....	20	3.1			20	1.6
Total.....	654	100.0	610	100.0	1,264	100.0

¹ Does not include cities of Cleveland and Lakewood.

carry 5,470 and 4,453 vehicles a day, respectively, at 7 miles, carry 931 and 447, respectively, at 13 miles.

Those roads which are not a part of through routes or which serve sections of low population density show a much more rapid decrease in traffic volume with increasing distance from Cleveland. St. Clair Avenue, Lorain Avenue, and North Woodland Road are in this class. Through routes connecting with the larger centers of population in the regional area, such as Akron, Lorain, Elyria, and Painesville, carry comparatively greater volumes of traffic over their entire length than the local suburban roads and the less important through roads, such as Mayfield, which do not connect with large, nearby centers of population.

On U. S. Route 20, between Elyria and Painesville, as shown in Figure 7, traffic ranged between 4,600 vehicles a day west of the Belden-Avon

Road in Lorain County and 56,200 on the Superior high-level bridge. Daily traffic on this route was over 20,000 vehicles between the Rocky River bridge and East 105th Street. The section of Euclid Avenue just east of Superior Avenue also carried over 20,000 vehicles a day. The effect of the narrow roadway on Superior Avenue between East 55th Street and Euclid Avenue is apparent. Daily traffic decreased from 33,100 west of East 55th Street to 16,000 west of Euclid Avenue. On Euclid Avenue just east of Superior daily traffic was 32,300 vehicles. Sunday traffic on the same route ranged between 6,800 vehicles west of the Belden-Avon Road and 47,800 on the Superior high-level bridge. Sunday traffic is smaller in volume than average daily traffic on Bulkley Boulevard, the Superior high-level bridge, and Superior Avenue.

A profile of the traffic on Carnegie Avenue and Cedar Road is shown in Figure 8. On this route

Table 7—Daily 24-hour traffic density on the principal radial routes at intervals of 7, 10, and 13 miles from the Cleveland Public Square

Road ¹	Traffic at 7 miles	Traffic at 10 miles		Traffic at 13 miles	
		Density	Per cent of 7-mile traffic	Density	Per cent of 7-mile traffic
	Vehicles per day	Vehicles per day		Vehicles per day	
Euclid Avenue.....	22,826	10,176	45	8,614	38
Lake Shore Boulevard.....	17,700	12,522	71	8,213	46
Mayfield Road.....	11,403	5,177	45	2,447	22
Detroit Road.....	10,616	7,091	67	2,590	24
West Lake Road.....	9,301	5,444	58	3,371	36
Cedar Road.....	6,324	3,832	61	2,802	44
Wooster Pike.....	5,802	4,114	71	3,535	61
Lorain Avenue.....	5,470	1,955	36	931	17
Kinsman Road.....	5,166			1,469	28
St. Clair Avenue ²	4,453	1,909	43	447	10
South Woodland Road.....	4,237	1,511	36	1,065	25
Miles Avenue.....	4,073	2,039	50	1,775	44
State Road.....	3,975	1,128	28	1,030	26
North Woodland Road.....	3,886	778	20	505	13
Brecksville Road.....	2,880	1,952	68	1,879	65
Broadview Road.....	2,590	2,122	82	1,642	63
Ridge Road.....	880	434	49	483	55

¹ Center Ridge Road and Broadway are not included because of the poor condition of the highway in the 7-mile zone.

² St. Clair Avenue terminates at Lloyd Road.

HIGHWAY PLANNING REPORT

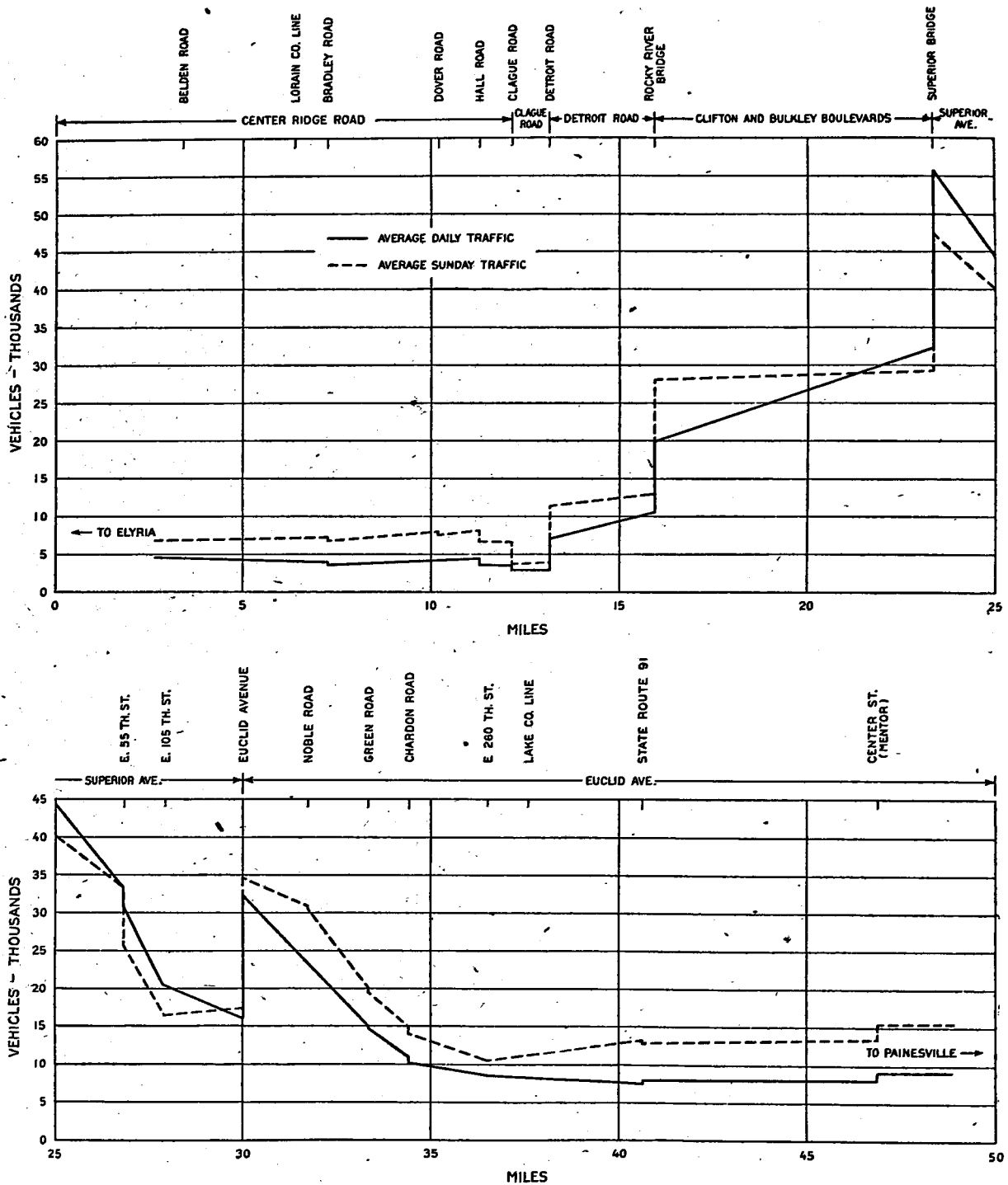


FIG. 7.—Average density of daily and Sunday traffic on U. S. Route 20 between Elyria and Painesville

the highest density of average daily traffic was found on Carnegie Avenue east of East 55th Street, where it was 38,200 vehicles. Between this point and Murray Hill Road the density of daily traffic was approximately 36,000 vehicles. West of East 55th Street on Carnegie Avenue it was reduced to 31,300. This decrease is due to the fact that Carnegie Avenue ends at East 22nd Street and, as far out as East 55th Street, traffic has begun to distribute itself over parallel and lateral routes.

Cedar Road traffic is considerably augmented by traffic from Fairmount Boulevard. East of Fairmount Boulevard the daily traffic density was 11,800; west of the same street it was 23,400 vehicles. From Fairmount Boulevard east, traffic gradually decreased until it was only 300 vehicles a day just east of Woodstock Road.

Sunday traffic on this route is considerably less than average daily traffic on Carnegie Avenue at East 55th Street. It increases in volume, however, until it reaches a density greater than daily traffic at Lee Road.

Traffic reaches its greatest density on U. S. Route 42 between Cleveland and Medina on West 25th Street at Broadview Road, as shown in Figure 9. This is the point of traffic convergence of Wooster Pike and York, Ridge, Brook Park, State, and Broadview Roads. The rise in traffic density can be seen as each one of these roads joins U. S. Route 42. North of Denison Avenue a considerable amount of the traffic uses Scranton Road instead of West 25th Street, which accounts for the decrease beyond Denison Avenue. Sunday traffic is greater than average daily traffic on this route with the exception of the section of West 25th Street between Lorain Avenue and the Superior high-level bridge.

Motor Truck and Bus Traffic

Motor truck traffic constituted 9.8 per cent of average daily total traffic on the roads of the regional area. The percentage varied considerably on different routes due principally to the type of area served and also, within the city, to restrictions on truck use of sections of the main arterial routes, such as Carnegie Avenue, Franklin Ave-

nue from Franklin Circle to W. 85th Street, Bulkley Boulevard, and Shaker Boulevard from Woodhill Road to the city line. The highest motor truck densities were recorded in Cleveland on the Superior high-level bridge and on Woodland Avenue west of East 55th Street, where the average



Motor trucks at a freight warehouse—an important source of motor truck traffic in the city

week-day truck traffic was 4,527 and 3,947, respectively. On the Superior bridge, trucks comprised 8.2 per cent of total week-day traffic, while on Woodland Avenue they constituted 18.4 per cent.

The average week-day density of truck traffic on the roads in the regional area is shown in Figure 10 (map insert) and tabulated in Appendix I.

On the principal trucking routes within the City of Cleveland, average week-day truck traffic was: 4,527 on the Superior high-level bridge, 3,947 on Woodland Avenue at East 55th Street, 3,679 on East 55th Street between Euclid and Prospect Avenues, 3,468 on Broadway at East 55th Street, 3,425 on St. Clair Avenue at East 55th Street, 3,086 on Lorain Avenue at West 25th Street, 2,944 on Superior Avenue at East 55th Street, 2,929 on West 25th Street at Broadview Road, 2,841 on Euclid Avenue east of Superior Avenue, 2,811 on Detroit at West 25th Street. In the City of Lakewood the principal trucking routes are Detroit and Madison Avenues, both of which carry around 2,000 trucks on an average week-day.

Outside of the cities of Cleveland and Lakewood, truck traffic is also an important part of total traffic at the principal congestion points. On Euclid Avenue, east of its junction with Superior Road in East Cleveland, average week-day truck traffic was 2,841. Although Euclid Avenue will always be one of the principal trucking routes in the county, the development of an additional trucking route through the northeastern territory must ultimately take place.

On Cedar Glen Road in Cleveland Heights, one of the principal points of traffic congestion, there was an average week-day density of 1,830 trucks.

This comparatively large volume of truck traffic is one of the important factors creating congestion on Cedar Glen Road.

On the Rocky River bridge, at the congested junction of West Lake, Detroit, and Wooster Roads, week-day truck traffic was 2,082.

The principal outlying point of traffic congestion is on Broadway between Columbus Street and Northfield Road, in Bedford. Week-day truck traffic averaging between 700 and 1,050 trucks accentuates congestion caused by local traffic, motor vehicle parking, and the street car line.

Outside of the cities of Cleveland and Lakewood the roads carrying the greatest volume of truck traffic for a considerable distance are:

1. Euclid Avenue, on which week-day truck density is over 1,000 as far as Chardon Road and over 500 from there to Painesville.
2. Mayfield Road, which carries over 1,000 between Coventry and Noble Roads, over 500 from Noble Road to Richmond, and over 250 to S. O. M. Center Road.
3. Wooster Pike, carrying over 1,000 trucks as far as Ridge Road, over 500 to Fowles Road, and over 250 to Medina.

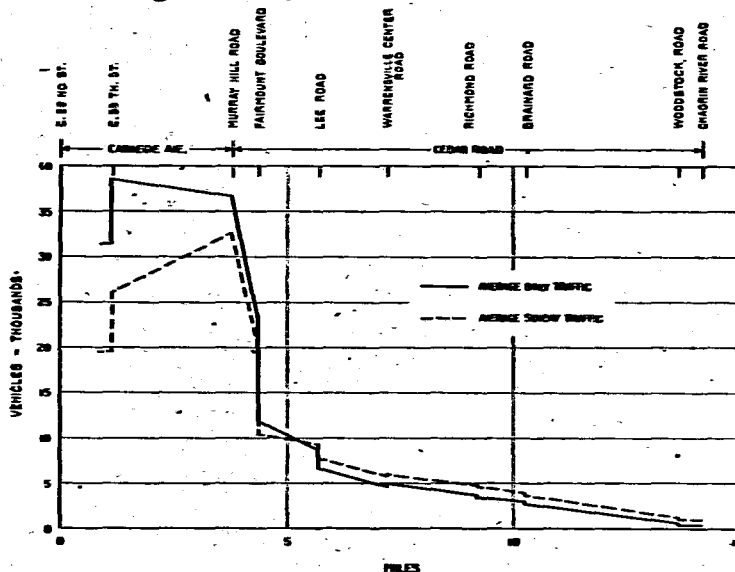


FIG. 8.—Average density of daily and Sunday traffic on Carnegie Avenue and Cedar Road from East 22nd Street to the Chagrin River Road

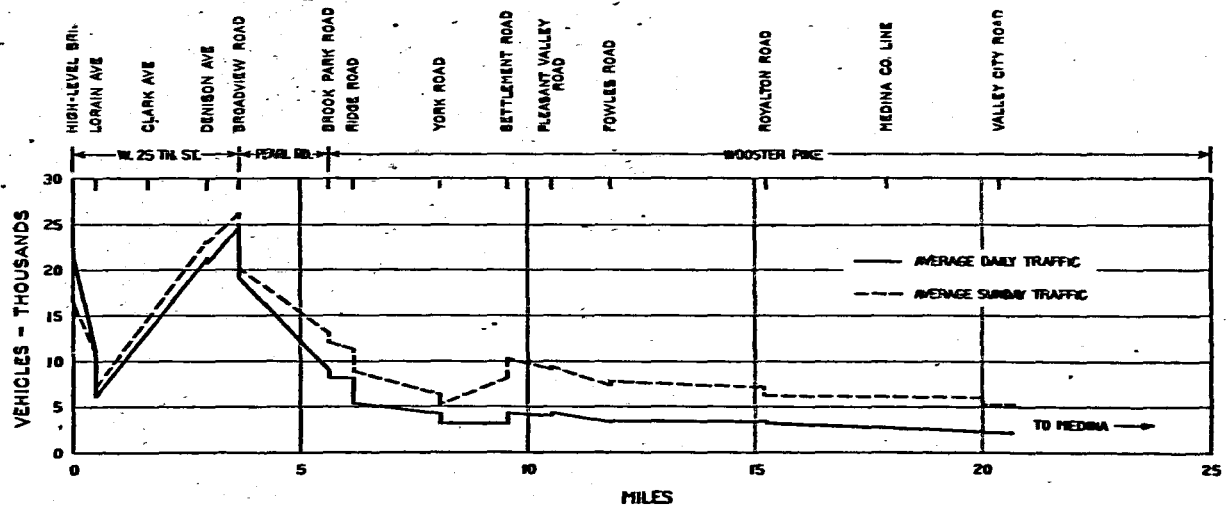
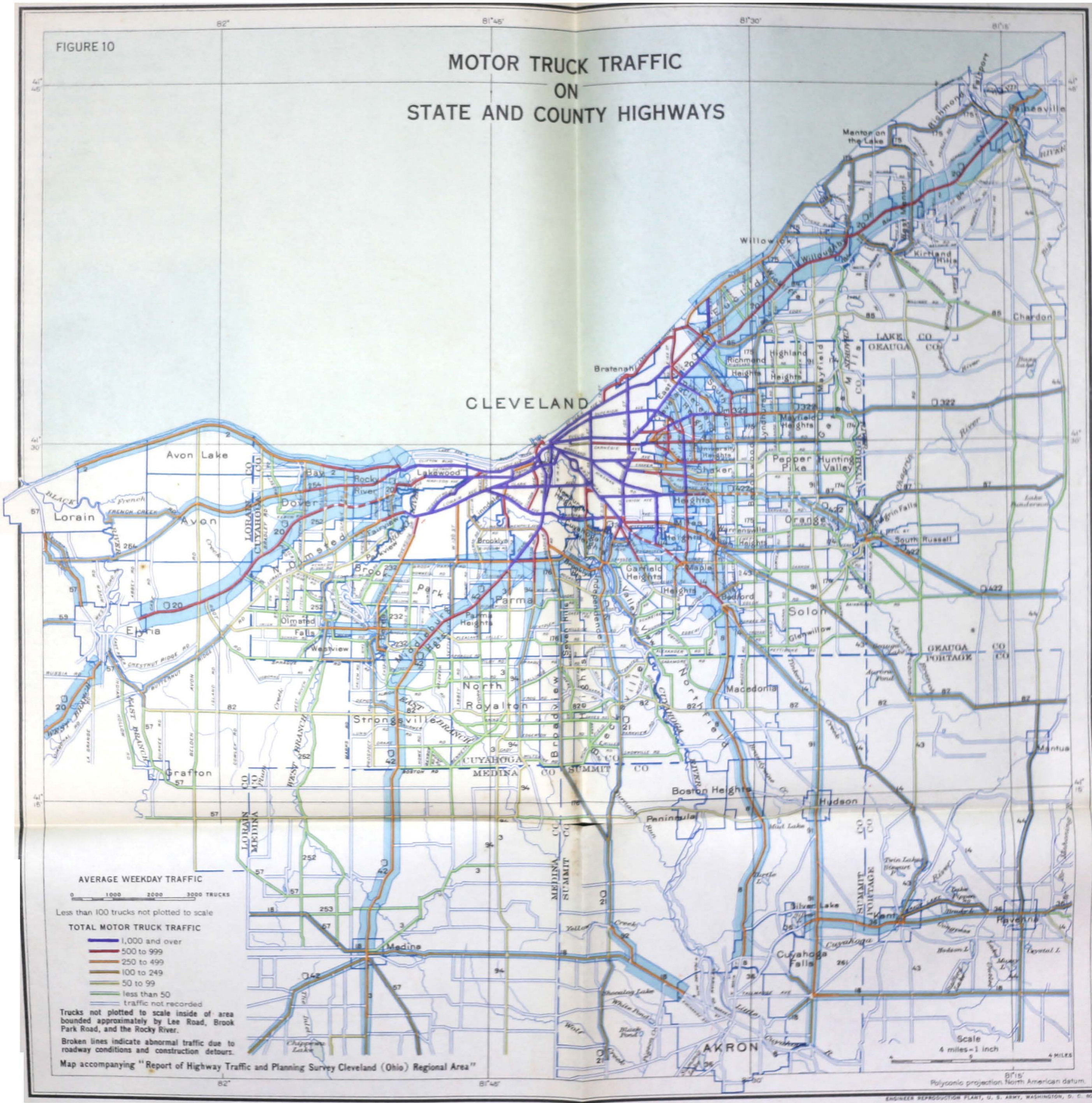


FIG. 9.—Average density of daily and Sunday traffic on Wooster Pike (U. S. Route 42) from the Superior high-level bridge to the Valley City Road

FIGURE 10

MOTOR TRUCK TRAFFIC ON STATE AND COUNTY HIGHWAYS



4. Detroit Road, with a density of over 1,000 trucks to Lakeview Avenue, over 500 to Dover Road, and over 250 from there to French Creek Road in Lorain County.
5. Lee Road, on which truck traffic is over 1,000 between Superior and Kinsman Roads, and over 500 between Kinsman and McCracken Roads.
6. Center Ridge Road, having a truck traffic density of over 500, under normal conditions, as far as Elyria.
7. West Lake Road, the truck traffic of which averages over 500 to Hall Road and over 250 from there to the city of Lorain.



Motor truck and bus traffic on West Lake Road (State Route 2)

8. Broadway, which carries truck traffic of over 500 between the Cleveland city line and Northfield Road and over 250 between Northfield and Forbes Roads. The volume of truck traffic on Broadway has been influenced by the condition of the roadway south of the city line. This volume will be considerably increased as soon as the roadway is improved.

Of the 654 miles of road in Cuyahoga County (excluding the cities of Cleveland and Lakewood) on which traffic was counted, 38.2 per cent or 250 miles had a density of less than 50 trucks a day as shown in Figure 11. These are the roads of minor traffic importance on which truck traffic is composed almost entirely of trucks of small capacity and for which road surfaces of the traffic-bound type are adequate.

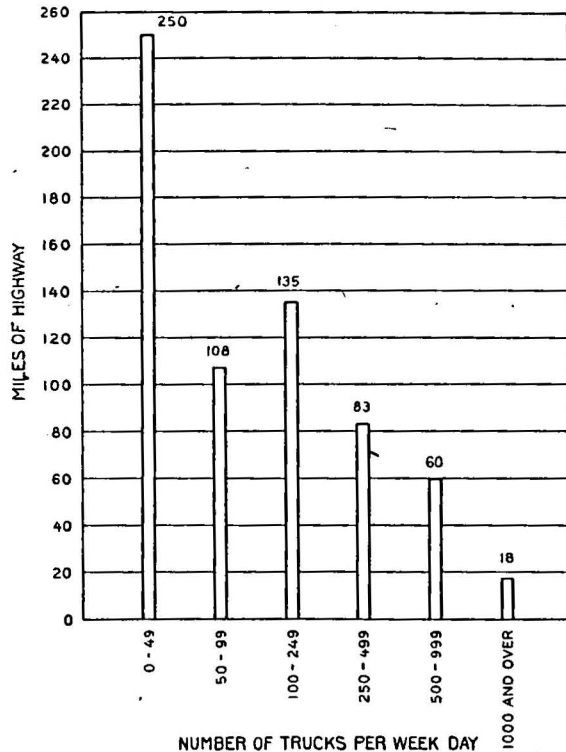


FIG. 11.—Mileage of roads in Cuyahoga County classified according to density of motor truck traffic on week days

There were 78 miles on which truck traffic exceeded 500 a day; and 18 miles carried over 1,000 trucks a day. Truck traffic alone on at least 78 miles of road in the county was greater than total traffic on over one-third of the total road mileage in the county. On 18 miles the truck traffic alone was of greater volume than total traffic per mile on 372 miles of road in the county.

Traffic of large-capacity trucks (3 to 7½ tons capacity) on roads outside of the cities of Cleveland and Lakewood is tabulated in Appendix I. Approximately 80 per cent of the truck traffic on these roads was composed of trucks of less than 3 tons capacity and 20 per cent of trucks of 3 to 7½ tons capacity. Table 8 shows the percentage distribution of trucks by capacity classes. Traffic of trucks of over 5½ tons capacity was negligible in volume; only 0.1 per cent of the total truck traffic was in this class.

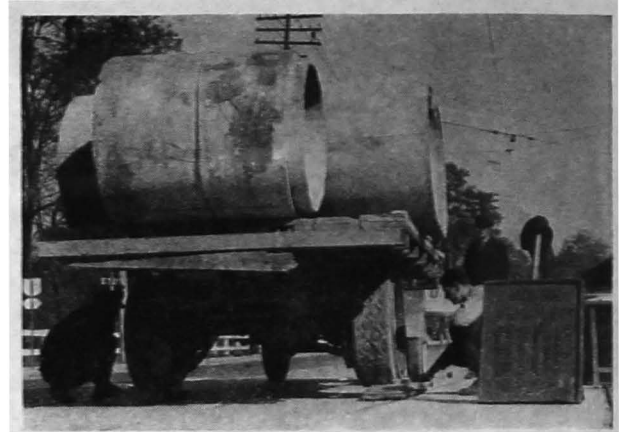
Table 8—Distribution of motor trucks by type of rear tire and capacity classes¹

Capacity class	Pneumatic rear tires	Cushion or solid rear tires	Total trucks
Tons	Per cent	Per cent	Per cent
1½-1¾.....	77.4	8.9	58.1
2-2½.....	18.5	32.2	22.3
3-4.....	3.8	25.2	9.8
5-5½.....	0.3	33.5	9.7
6-7½.....	0.0	0.2	0.1
Total.....	100.0	100.0	100.0

¹ Based on 46,149 trucks.

Trucks equipped with pneumatic tires on the rear wheels constituted 72 per cent of all trucks and those equipped with cushion or solid rear tires 28 per cent.

At 30 key locations on the principal roads loaded motor trucks equipped with cushion or solid rear tires were stopped and their weights recorded. It was found that 36 per cent of these



Weighing a motor truck at the weight station at Euclid Avenue and Chardon Road

trucks were hauling building and road construction materials.⁴ The average gross weight of trucks of various capacities is given in Table 9. Trucks of all capacities hauling construction materials carried, on the average, considerably heavier loads than other trucks. In any attempt to

⁴ Including brick, cement, gravel, sand, stone, asphalt, pitch, tar, slag, and cinders.

Table 9—Average gross weight of loaded motor trucks of various capacities equipped with solid or cushion rear tires

Capacity	Total trucks		Trucks hauling construction material		Other trucks	
	Loaded trucks weighed	Average gross weight	Loaded trucks weighed	Average gross weight	Loaded trucks weighed	Average gross weight
Tons	Number	Pounds	Number	Pounds	Number	Pounds
1½.....	2	4,150			2	4,150
¾.....	10	7,360			10	7,360
1.....	201	5,630	23	7,260	178	5,420
1¼.....	7	7,490	3	8,600	4	6,650
1½.....	76	8,550	4	8,700	72	8,540
2.....	652	10,850	65	13,880	587	10,510
2½.....	738	15,220	172	18,940	566	14,090
3.....	361	16,530	98	20,270	263	15,130
3½.....	398	18,250	151	20,170	247	17,080
4.....	136	19,870	78	21,590	58	17,560
5.....	1,380	21,270	820	22,780	560	19,050
5½.....	1	22,600			1	22,600
6.....	5	21,960			5	21,960
6½.....						
7.....						
Total.....	3,967	16,550	1,414	21,070	2,553	14,040



A trenching machine being moved over the highway—an unusual type of load

regulate the maximum gross load per truck, attention should be directed first toward these construction-material trucks. That these trucks are the principal transporters of heavy loads is further evidenced by the fact that they constituted 72 per cent of the trucks having gross weights of over 20,000 pounds.

Motor Busses

Motor busses accounted for a very small part of the total traffic on the roads of the area. Within the heavy-traffic zone, bounded approxi-

mately by Richmond, Pleasant Valley, and Clague Roads, motor bus traffic constituted only 0.6 per cent of the total. In the regional area outside of this zone it was 0.9 per cent.

The greatest density of motor bus traffic was found on the Superior high-level bridge, where this form of traffic exceeded 500 a day. On the main arterial routes within the city, motor bus traffic was: 345 on West 25th Street south of Detroit Avenue; 299 on Carnegie Avenue at East 55th Street; 183 on Euclid Avenue at East 55th Street; 177 on Detroit Avenue at West 25th Street; 13 on Broadway at East 55th Street; 6 on Superior at East 55th Street; 6 on Bulkley Boulevard at Main Avenue; 3 on Lorain Avenue at Denison Avenue, and 2 on Woodland Avenue at East 55th Street. On none of these arterial routes, with the exception of Detroit Avenue, did motor bus traffic exceed one per cent of total traffic.

Motor bus traffic of any appreciable amount is restricted to comparatively few routes both inside and outside of the City of Cleveland. Outside of the city, Mayfield Road carries over 230 busses a day as far as Green Road, South Woodland Road 180 as far as Lee Road, Superior Road over 170 between Euclid Avenue and Lee Road,



The large size of the modern motor bus makes it a factor to be considered in the design of highways

Lee Road over 170 between Superior and South Woodland Roads, and Euclid Avenue 130 as far as the county line.

From the standpoint of number only, motor busses are a negligible part of the total motor vehicle traffic. However, the size of busses, particularly their width, is a factor which must be considered in the design of highways on which there is an appreciable volume of motor truck and bus traffic. Information as to the size of the busses using the roads, as indicated by their passenger capacity, is summarized in Table 10. This information was recorded at 60 of the traffic survey stations.

It will be noted that over 50 per cent of the busses recorded have a passenger capacity between 25 and 29; and over 75 per cent ranged between 20 and 29 in passenger capacity.

Table 10—Motor busses classified according to passenger capacity

Passenger capacity	Busses	
	Number	Per cent
10-14.....	34	1.1
15-19.....	198	6.5
20-24.....	683	22.5
25-29.....	1,618	53.2
30-34.....	461	15.2
35 and over.....	45	1.5
Total.....	3,039	100.0

Daily and Hourly Variation of Traffic Density

Very little variation was found in the density of traffic on week days from Monday to Friday, inclusive. Sunday is the day of maximum traffic in all parts of the regional area except the City of Cleveland, and the total traffic on Saturday is exceeded only by the Sunday movement. The greater total traffic on these two days, however, is the result of increase in the passenger car movement. On both days the truck traffic is less than the week-day average.

The total traffic on Sunday is 134 per cent of the week-day average, the net result of a combination of a passenger car traffic increased to 145 per cent and a truck traffic decreased to 13 per cent of the respective averages on week days.

On Saturday, the total traffic is 122 per cent of the week-day average; but truck traffic is reduced to .88 per cent of the average week-day density.

On the medium and minor traffic routes, the Sunday increase of traffic is proportionately greater than on the main highways of the area. This is indicated by Figure 12 which shows the comparison of Sunday and week-day traffic by traffic-density classes. On those roads which, on an average week day, carry less than 2,500 vehicles, Sunday traffic is over 200 per cent of that of an average week day; on routes carrying between 5,000 and 10,000 vehicles the corresponding ratio is 130 per cent; and on routes carrying 15,000 or more vehicles, it is only 90 per cent.

The principal difference between Sunday and

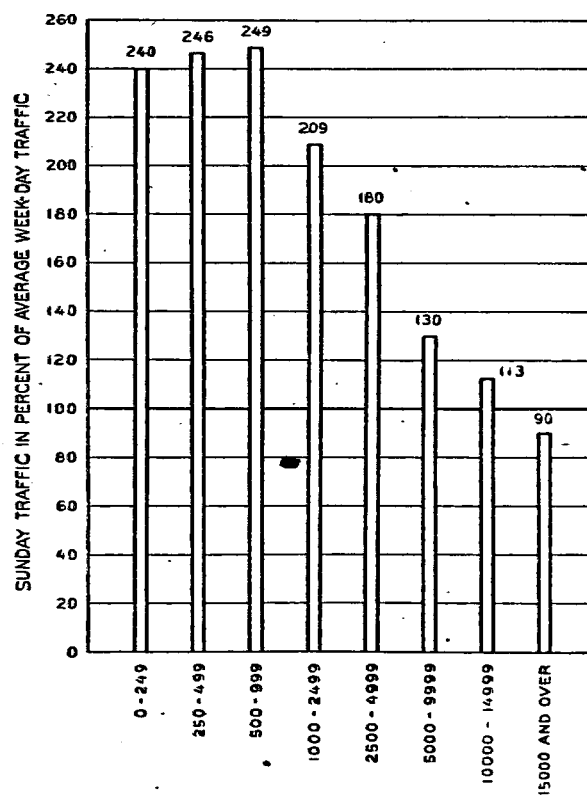


FIG. 12.—Relation of Sunday to week-day traffic for various densities of week-day traffic

week-day traffic lies in the fact that during a few hours on Sunday there is a considerably greater concentration of traffic than occurs at any time on other days. In Figure 13 is shown a comparison of the hourly variation of Sunday and week-day (Monday to Friday, inclusive) traffic. To obtain this comparison hourly traffic on Sunday and the average week day are expressed as the percentage of traffic during the average hour. It will be noted that from 3 a. m. to 10 a. m. the Sunday traffic is less than that of the average week day. During the remaining hours the traffic is greater in volume on Sunday than on the average week day. The peak hour of Sunday traffic occurs between 4 p. m. and 5 p. m.; during this hour the density is 350 per cent of the average hourly density on week days. On week days traffic during the same hour is 198 per cent of that of the average hour.

During the five hours from 2 p. m. to 7 p. m., traffic is greater in density than during any other equal period of time. On Saturday, 35 per cent of the day's total traffic occurs during these hours; on an average week day 36 per cent; and on Sunday 48 per cent occurs during these hours; i. e., almost one-half of the Sunday 24-hour traffic occurs during these five hours.

The improvement of major and medium traffic routes, the widening of major routes and the creation of new routes will solve the problem of the distribution of Sunday traffic and provide relief for the congestion which has existed during peak hours at the traffic "bottle necks."

The Distribution of Traffic in the Area

To determine whether the present roads of the regional area provide direct highway service between important residential, business and suburban areas and to determine the location of new routes for the relief of traffic congestion, it was necessary to know the principal sources of traffic in the area. The planning survey was directed not only toward the adequate improvement of present routes but also toward the establishment of new routes and the coordination of all routes so that traffic between important residential and business districts would travel over the most direct route possible and with the least possible congestion, delay, and loss of time.

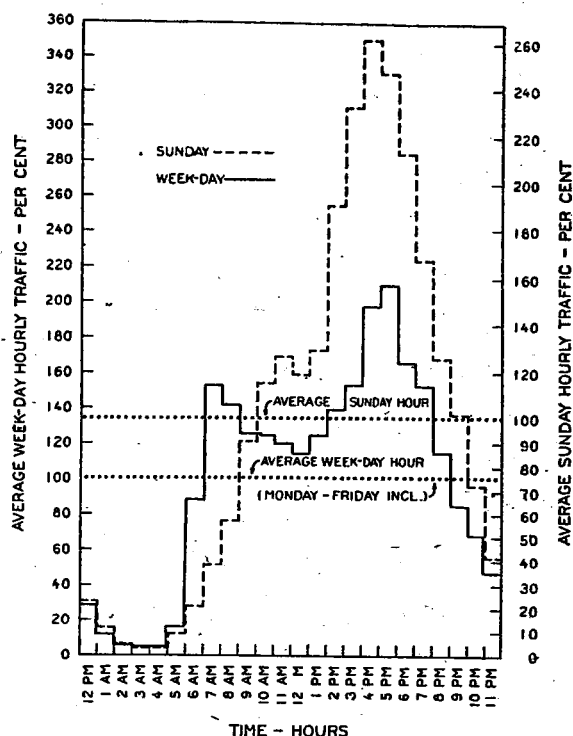


FIG. 13.—Hourly variation of Sunday and week-day traffic expressed as percentage of the traffic during the average hour

To accomplish this purpose passenger car traffic was stopped at key locations on the principal roads and a record was made of the places of origin and destination of each trip. Additional information was also noted concerning the route followed; a description of the route traveled, if indirect, and the reason for choosing it; whether the trip was made regularly a certain number of times per day or week; and, in the case of vehicles traveling through the City of Cleveland, whether the driver would, if proper highway facilities were provided, prefer to avoid driving through the downtown business section of the city.

Motor trucks were omitted from this analysis because they constitute less than 10 per cent of the total traffic and, in general, follow the same tendencies in distribution as passenger car traffic.

The places of origin and destination were recorded by street address within the City of Cleveland and these were subsequently grouped into 24 sections within the city as shown in Appendix Figure 1. In Cuyahoga County outside the city

Euclid Avenue, and the Cuyahoga River. One-fifth of the total traffic between the entire City of Cleveland its suburbs is between this downtown busines district and the suburbs of the city.

The distribution of suburban traffic to and from the downtown business district is shown in Figure 15. Over 21,000 cars a day travel on the principal routes between the downtown section and points beyond the city. This is a minimum

of the suburban area, produce a much greater volume of traffic than the southern and western sections. The principal traffic centers to the east are the two sections of Cleveland Heights, Shaker Heights Village, and Lake County. South of the city the principal centers of traffic are the villages of Parma and Garfield Heights and the City of Akron and vicinity. Traffic is fairly evenly distributed among the sections west of the suburban



Cars parked in the downtown business district of Cleveland—a few of the large number that are driven daily to this section from homes all over the regional area

figure, however, since it includes neither the traffic over the less important roads nor the traffic from sections close to the city in congested areas where, because of the great volume of traffic, it was not possible to stop vehicles. For instance, traffic was not stopped on Cedar Hill and consequently not all the traffic is included between the downtown section and section 26, Cleveland Heights.⁵ The inner boundary of the suburban area used in this analysis is marked by a heavy black band.

Figure 15 shows that the sections east of the city area, the present principal population centers

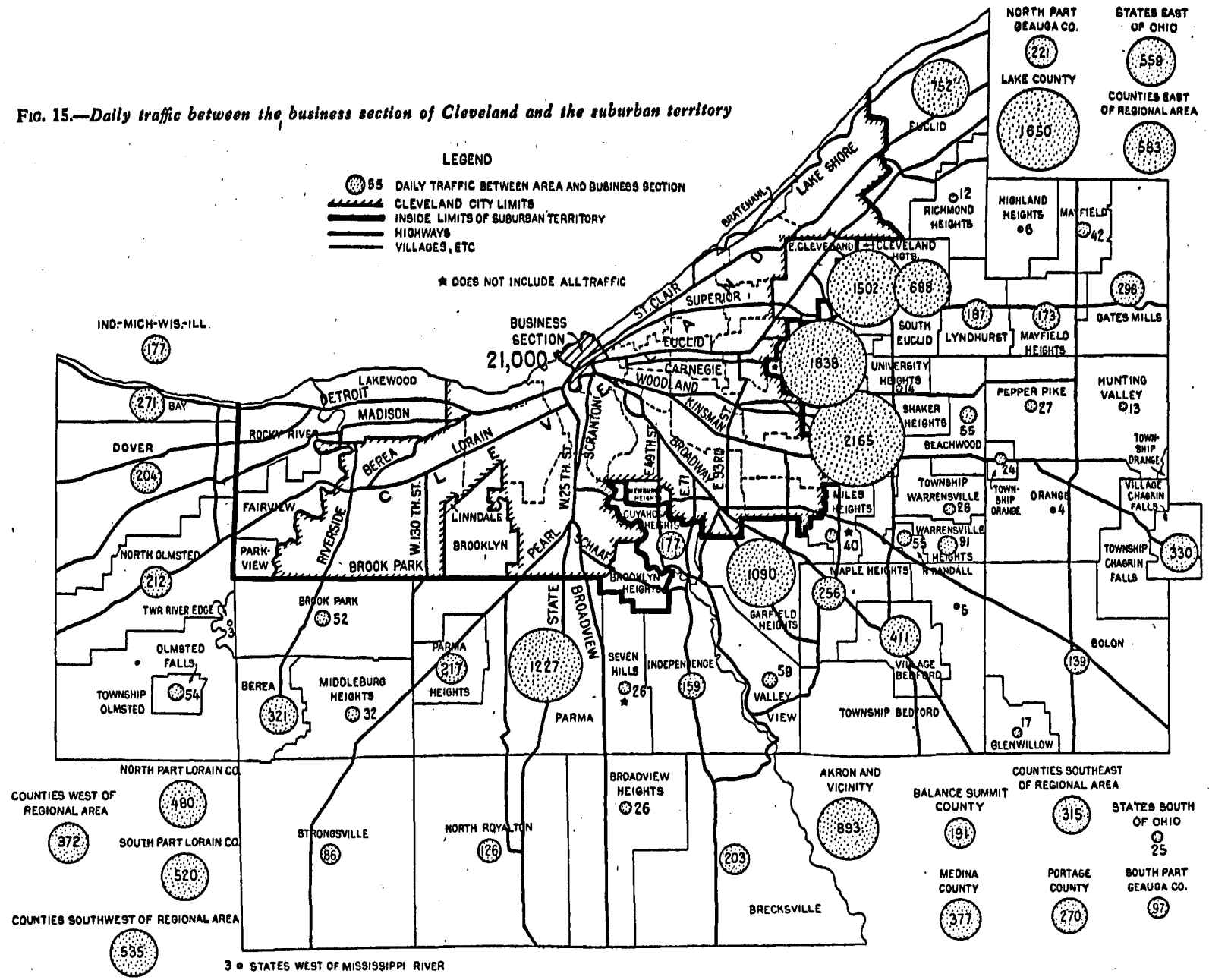
limits. Had it been possible to stop traffic between Lakewood and Cleveland and between Rocky River Village and Cleveland these two sections would have balanced, to some extent, the heavy traffic volume east of the city.

It was found that the same comparative traffic importance of the suburban sections was maintained by the expansion of the downtown section to 55th Street on the East and 45th Street on the west. Even in the consideration of the movement of traffic between the entire City of Cleveland and the suburban territory very little change was noted in the relative traffic importance of the suburban sections to this larger area of the city from that indicated by Figure 15.

The volume of long-distance traffic to the downtown sections is small in comparison with

⁵ A star in Figure 15 indicates the suburban sections whose entire traffic it was impossible to record by place of origin and destination.

FIG. 15.—Daily traffic between the business section of Cleveland and the suburban territory



3 • STATES WEST OF MISSISSIPPI RIVER

local suburban traffic. Daily traffic between the downtown section and Ohio counties east of the regional area is 583 cars, Ohio counties southeast of the regional area produce 315 cars of the daily downtown traffic. Counties of the State southwest of the regional area produce 535 cars and counties west, 372 cars. Between the downtown sections and States east, south and west of Ohio there are respectively 559, 25 and 180 cars.

A considerable amount of the traffic operating between points outside the city and the downtown business section as well as traffic to other central sections of the city could advantageously be rerouted over new routes to avoid congested sections of roads outside the city and streets within the city proper. There are, for example, 2,100 cars a day on Lake Shore Boulevard and Euclid Avenue traveling between the downtown section and Lake County and points east. Between the business district and points south of Brook Park Road there are 3,000 cars a day which use West 25th Street. Between points west of the Rocky River and the downtown section there are 1,200 cars a day traveling over the Rocky River bridge. This volume of traffic to the comparatively limited area of the downtown section is indicative of the amount of traffic between points outside the city and the central sections of the city.

After an analysis of the volume and movement of traffic between the various sections of the regional area it was possible to estimate the amount of traffic which would use the several proposed new routes. One of the most important of these routes is the extension of Brook Park Road over the Cuyahoga Valley. It is estimated, on the basis of the origin-destination data, that a minimum of 6,600 cars a day would have used this extension had it been completed in 1927. Half of this estimated volume of traffic would have used a northerly connection via the East Boulevard route within the city. The distribution of this traffic according to source and destination on the east and west sides of the valley is shown in Figure 16.

On the west side of the Cuyahoga Valley, Parma Village is the chief source and destination of traffic which would use the proposed Brook Park Cuyahoga River crossing; 1,670 cars a day of the total 6,600 would have operated between Parma

Village and points on the east side of the valley tributary to the new route. Lakewood and section 24 of Cleveland would have accounted for 810 and 720 cars, respectively, of the estimated total traffic. The north and south portions of Lorain County would also supply a large part of the total traffic. The north portion, which includes the City of Lorain, will be directly connected with this new route after the proposed extension of Brook Park Road over the Rocky



Employees' cars parked at an industrial plant

River is completed. The City of Lorain and the surrounding territory would have produced 450 cars a day, and southern Lorain County, including the city of Elyria, would have furnished 590 cars a day. Other important sections on the west side are the villages of Berea, Brooklyn Heights and Parma Heights.

On the east side of the valley the principal traffic sections involved in the use of the Brook Park Road extension are the villages of Garfield Heights and Shaker Heights, which would have produced 700 and 600 cars a day, respectively, in 1927. Lake County and sections 16 and 17 of Cleveland are next in importance, being the source or destination of over 400 cars each. Other important sections are East Cleveland, section 26 of Cleveland Heights, section 14 of Cleveland, and the village of Bedford, each of which would have produced between 300 and 400 cars per day over the Brook Park extension.

The traffic shown in Figure 16 represents only those passenger cars now using other routes which would have used the Brook Park Road extension as the most direct route had it been completed in 1927. The part of this traffic pro-

After classifying the routes traversed by cars whose trips were recorded, it was found that 27.1 per cent of the trips between the downtown business section of Cleveland and the suburban territory were made over indirect routes. The reasons given by the operators for the use of these indirect routes are shown in Table 11.

Table 11—Cars using indirect routes between the downtown business section of Cleveland and the suburban territory, classified according to the reason for using these routes

Reason	Percentage of cars ¹
Traffic congestion.....	48.2
Direct route in bad condition.....	21.9
Direct route closed.....	10.7
Unfamiliar with direct route.....	6.6
Personal choice.....	4.9
Shorter.....	3.7
Shopping or business.....	3.0
Miscellaneous.....	1.0
Total.....	100.0

Almost one-half of the trips over indirect routes were due to traffic congestion on the direct route. "Bad condition of the roadway on the direct route" was the reason given for 21.9 per cent of the indirect trips and "direct route closed" for 10.7 per cent. The following cases illustrate the use of, and reasons for the choice of, indirect routes between the suburban territory and the downtown business section of Cleveland.

On Mayfield Road west of Taylor Road approximately 45 per cent of the traffic to the downtown business section, instead of proceeding over Mayfield Road and Euclid Avenue which is the most direct route, turned south at Kenilworth and then west over Euclid Heights Boulevard, Cedar Road, and Carnegie Avenue. Traffic

¹ Based on 2,624 passenger-car trips.

congestion on Euclid Avenue primarily between Mayfield and 105th Street was the reason given for using this indirect route.

On Lee Road, south of Kinsman Road, 42 per cent of the traffic to the business section used indirect routes because of traffic congestion on Kinsman Road. Approximately one-half of these cars, instead of traveling over the direct route via Kinsman Road and Woodland Avenue, used Lee Road, South Moreland Boulevard, Buckeye Road and Woodland Avenue. The other half used Lee Road, Fairmount Boulevard, Cedar Road, and Carnegie Avenue.

About 13 per cent of the traffic on South Moreland Boulevard northwest of Buckeye Road did not proceed over the direct route to the downtown section via Shaker Boulevard, Buckeye Road, and Woodland Avenue, but over North Moreland Boulevard, Coventry Road, Fairmount Boulevard, Cedar Road, and Carnegie Avenue.

On Warrensville Center Road south of Norwood Road about 48 per cent of the traffic used indirect routes rather than the direct route: Norwood Road, Kinsman Road, and Woodland Avenue. One of these indirect routes was over Norwood Road, South Moreland Boulevard, Buckeye Road, and Woodland Avenue. The other was Warrensville Center Road, Kinsman Road, Lee Road, Fairmount Boulevard, Cedar Road, and Carnegie Avenue. These indirect routes were used because of traffic congestion on Kinsman Road.

From these cases and analysis of similar data for other principal routes it is apparent that a considerable volume of traffic approaching the city is diverted from the direct routes to other routes which, in addition to their normal traffic, are overburdened by this additional improperly routed traffic. The greater part of the traffic which avoids the congestion on Euclid Avenue, Woodland Avenue, and Kinsman Road finds its way to Cedar Road and turns west over Cedar Hill and Carnegie Avenue to downtown Cleveland. Cedar Road at Murray Hill has reached its full capacity. On an average day it carries over 36,000 vehicles and during the maximum

hour of traffic almost 3,600 vehicles. Under normal conditions this part of Cedar Road is the focal point for traffic feeding into it from Euclid Heights Boulevard, Cedar Road, and Fairmount Boulevard. The additional volume of traffic which pours into it from routes having their own entrances to the city has aggravated the traffic conditions on Cedar Hill and Carnegie Avenue.

When traffic assumes proportions so great that it is forced to avoid traffic congestion on direct routes and to seek indirect routes which are themselves congested, the time has come for the opening of new routes. These routes, if advantageously located, will not only relieve traffic congestion on present routes but provide a better distribution of traffic within the city.

In the southeastern part of the county, Broadway and Miles Avenue were avoided by traffic, which ordinarily would use them, because of the poor condition of the roadway. Broadway, it was found, was also avoided because of traffic congestion inside the city.

South of the city, the most commonly avoided route was State Road, because part of the road was closed and also because of the poor condition of the roadway.

To the west, Lorain Avenue and Detroit Avenue are both avoided as direct routes because of traffic congestion. Traffic to downtown Cleveland is diverted from these routes to Clifton Boulevard and Lake Avenue.

In cases where poor condition of the roadway is responsible for the diversion of traffic the solution is not so difficult. Reconstruction and widening of present surfaces will in most instances bring traffic back to normal channels. These improvements have been too long deferred on some of the principal arterial routes into the city.

In analyzing the regularity of traffic movement it was found that 47 per cent of the traffic was composed of cars making the same trip (as that recorded) every day with the exception of Sunday. The proportion of regular traffic is greatest on the routes serving industrial and business territory and on those interior county roads not

servicing "through" traffic; it is lowest on the outlying county roads and on routes serving "through" traffic.

In answer to the question as to whether or not they would prefer to avoid driving through the downtown business section of Cleveland, 29 per cent of the operators now doing so reported that they would prefer to avoid the downtown business section if proper highway facilities were provided elsewhere.

The Predominance of Local Traffic

The improvement of highways in the regional area is primarily for the benefit of, and necessitated by the volume of local traffic. Local traffic, particularly between Cleveland and its suburbs and between the larger centers of population within the regional area, constitutes the bulk of the highway traffic. On 15 main routes in Cuyahoga County it was found that only 2.4 per cent of the passenger car traffic was crossing the county between points outside of Cuyahoga County and that only 1.5 per cent was crossing the regional area between outside points. On the same roads it was found that 3.7 per cent of the passenger car traffic was composed of cars owned in counties of Ohio outside of the regional area and 4.7 per cent of cars owned in States other than Ohio. Traffic on each of these routes is shown in Table 12.

The greatest volume of cross-over traffic between points outside of Cuyahoga County and between points outside of the regional area was found on Euclid Avenue (U. S. Route 20) and Lake Shore Boulevard (State Route 175) east of Cleveland and on Center Ridge Road (U. S. Route 20), Detroit Road (State Route 254) and West Lake Road (State Route 2) west of Cleveland. Euclid Avenue and Lake Shore Boulevard carried a combined total of 671 cars crossing Cuyahoga County between outside points of which 420 cars were moving between points, outside of the regional area. The three routes west of the city carried a combined total of 603 cars crossing Cuyahoga County of which 411 were moving between points outside of the regional area.

Table 12—Week-day cross-over passenger car traffic and traffic of cars owned outside of the regional area

Road	Route No.	Location of survey station	Average week-day passenger car traffic	Cross-over traffic				Traffic of cars owned outside of regional area			
				Between points outside of Cuyahoga County		Between points outside of regional area		Ohio cars outside of regional area		Cars from outside of Ohio	
				Cars	Per cent	Cars	Per cent	Cars	Per cent	Cars	Per cent
Lake Shore Blvd....	175	Bliss Road.....	6,831	131	1.9	46	0.7	96	1.4	198	2.9
Euclid Avenue.....	U. S. 20	Chardon Road.....	8,747	340	6.2	374	4.3	262	3.0	840	9.6
Mayfield Road.....	U. S. 322	Taylor Road.....	10,800	16	0.1	16	0.1	32	0.3	184	1.7
Cedar Road.....		Warrensville Center Road.....	3,768	23	0.6	14	0.4	132	3.5	132	3.5
Kinsman Road.....	U. S. 422	Lee Road.....	6,404	92	1.4	80	1.2	154	2.4	269	4.2
Miles Avenue.....	43	North Miles Road...	2,075	10	0.5	3	0.1	66	3.2	68	3.3
Broadway.....	14	County line.....	1,361	15	1.1	5	0.4	257	18.9	42	3.1
Northfield Road.....	8	County line.....	2,854	34	1.2	2	0.1	200	7.0	66	2.3
Brecksville Road....	U. S. 21	Grant Avenue.....	3,053	11	0.4	6	0.2	49	1.6	116	3.8
Broadview Road.....	176	Brook Park Road....	3,153	8	0.3	2	0.1	114	3.6	35	1.1
Wooster Pike.....	U. S. 42	Ridge Road.....	4,225	65	1.5	31	0.7	338	8.0	199	4.7
Lorain Avenue.....		Mastic Road.....	2,396	2	0.1			19	0.8	19	0.8
Center Ridge Road...	U. S. 20	Clague Road.....	2,293	237	10.3	185	8.1	273	11.9	326	14.2
Detroit Road.....	254	Clague Road.....	3,104	188	6.1	130	4.2	165	5.3	227	7.3
West Lake Road....	2	Clague Road.....	3,588	178	5.0	96	2.7	215	6.0	301	8.4
Total.....			64,652	1,550	2.4	990	1.5	2,372	3.7	3,022	4.7

These figures east and west of Cleveland involve the same cars to a large extent since these routes are the principal east-west cross-over routes for through traffic in the county.

The greatest traffic of cars owned in Ohio counties outside of the regional area was found on the Wooster Pike (U. S. Route 42) at Ridge Road; this traffic amounted to 338 cars on an average week day. Five of the 15 roads carried between 200 and 300 such cars and four carried between 100 and 200 on an average week day.

Euclid Avenue and Center Ridge Road which are part of U. S. Route 20 had the greatest volume of "foreign" traffic, *i. e.*, traffic of cars owned in States other than Ohio. On Euclid Avenue at Chardon Road the week-day density of foreign cars was 840 and on Center Ridge Road at Clague Road it was 326. Foreign traffic on other main routes was: 301 on West Lake Road (State Route 2) at Clague Road; 269 on Kinsman Road (U. S. Route 422) at Lee Road; 227 on Detroit Road (State Route 254) at Clague Road; 199 on Wooster Pike (U. S. Route 42) at Ridge Road; 198 on Lake Shore Boulevard (State Route 175) at Bliss Road; and 184 on Mayfield Road (U. S. Route 322) at Taylor Road.

Although foreign traffic was probably not at its peak during the period of the traffic survey, the traffic on Labor Day, September 5, indicates the volume of maximum foreign traffic. The greatest amount of foreign traffic recorded on Labor Day, between 10 a. m. and 8 p. m. was on the Rocky River bridge where 12 per cent (2,839 cars) of the total traffic was composed of cars from States other than Ohio. On Euclid Avenue at Green Road, 12 per cent (1,732 cars) of the total traffic was composed of foreign cars. During the same period foreign traffic of over 500 cars was recorded on the following routes: Cedar Glen Road at Murray Hill Road, 1,085; Superior Road at Coventry Road, 835; and Lake Shore Boulevard at East 185th Street, 582 foreign cars. On the day of maximum foreign traffic, this traffic did not exceed 12 per cent of total traffic on any road and, with the exception of a few routes, was considerably less than 12 per cent. At 27 principal gateways to the City of Cleveland, foreign traffic on Labor Day constituted 5.4 per cent of the total passenger car traffic.

The roads which carry an appreciable amount of foreign traffic and traffic of cars owned in

counties of Ohio outside of the regional area are the principal routes of the area, and are also the roads which carry the greatest volume of local traffic. On these roads, whatever improvements are required are necessitated principally by the volume of local traffic within the regional area.



Traffic on congested Cedar Glen Road

Congested Sections Caused by Convergence of Routes

Out of any center of population the principal traffic routes develop and fan out as the spokes of a wheel, from the business center as the hub. In the regional area this development has resulted in the convergence of these routes as they approach Cleveland as well as within the city, as shown in Figure 3. Traffic congestion at these points of convergence has been further intensified by a lack of sufficient connected radial routes between the center of Cleveland and its suburban territory, a condition for which the topography of the area (Figure 1) has been responsible to a considerable extent.

The most serious of these congestion points, in the order of their traffic density, are found on the following roads:

1. The Superior high-level bridge, the west end of which is at the convergence of Bulkley Boulevard, Detroit Avenue, and West 25th Street into which has poured the traffic from Franklin Avenue, Fulton Avenue, and a considerable part of the traffic from Lorain Avenue. The com-

bing of all this traffic results in a daily utilization of the Superior bridge by over 56,000 vehicles. The fact that Bulkley Boulevard produces almost 60 per cent of the traffic over the bridge indicates the need for a new structure north of the present high-level bridge. It is significant that 7,000 vehicles daily use the present low-level Main Street route across the Cuyahoga Valley, with its excessive grades, railroad grade crossings, train switching, and delays caused by the narrow swing bridge.

The principal routes from the east, which join before crossing the Superior bridge, pass through the badly congested public square "bottle neck."

2. Cedar Glen Road, at the Cleveland city line carries a daily traffic of over 36,000 vehicles produced by the convergence of Cedar Road, Fairmount Boulevard, Euclid Heights Boulevard, the Kenilworth-Surry connection from Mayfield Road, and Murray Hill Road. A large part of the traffic from the eastern suburban territory uses this entrance to the city, proceeding over Carnegie Avenue to the downtown business district. Traffic which, if it followed direct channels, would normally use Mayfield Road and Euclid Avenue, Woodland Avenue, Buckeye Road, or Kinsman Road into the city, because of unsatisfactory conditions on other routes and the satisfactory width and condition of Carnegie Avenue, prefers to use Cedar Glen Road and Carnegie Avenue. The solution of the traffic congestion problem at this entrance to the city does not lie solely in improvements in the immediate vicinity of Cedar Glen but in the rerouting of traffic over new and more direct routes, such as the extension of Chester Avenue to Euclid via Crawford and Hough Avenue and the overpassing of 105th Street, the extension of Mayfield Road to Superior Avenue and the extension of Shaker Boulevard to Broadway. The relocation of street car lines and underpassing the "bottle neck" at the intersection of Euclid Heights Boulevard, and Cedar, and Cedar Glen Roads would relieve congestion materially. The im-

provement of traffic conditions on any of the principal radial routes from the east by the establishment of new routes outside, and improvement of streets within the city will attract traffic back to normal channels and eventually relieve congestion on Cedar Glen Road.

3. Euclid Avenue (U. S. Route 20) east of its junction with Superior Avenue, carries an average daily traffic of 32,300 vehicles. Euclid Avenue east of this point is the main traffic artery for the entire northeastern section of the

center of Cleveland and the entire territory lying south of the city and west of the Cuyahoga River. Any new connection between this territory and the center of Cleveland would materially reduce congestion on West 25th Street and improve traffic service for this area. The proposed Valley Route which taps Wooster Pike north of its junction with York and Ridge Roads, State Road, and Broadview Road north of its junction with Schaaf Road, will carry a considerable volume of traffic from this territory south



Traffic on the Rocky River Bridge at 3 p. m., Sunday, October 23, 1927. Between 5 and 6 p. m. traffic on this bridge reaches an hourly maximum of more than 2,500 vehicles

regional area. Traffic conditions on Euclid Avenue will be relieved considerably by the diversion of a large part of the traffic from Lake County and Euclid Village to the proposed St. Clair Avenue extension and Lake Front Boulevard.

4. West 25th Street, at the Brooklyn-Brighton bridge, carries the combined traffic of Wooster Pike, Brook Park, York, Ridge, State, Broadview, and Schaaf Roads, a total daily volume of 25,000 vehicles. This section of West 25th Street is the only usable connection between the

of the city to the downtown sections. The eastern extension of Brook Park Road and the improvement of Independence Road will also relieve conditions on West 25th as well as provide a through east and west route south of the city.

5. Woodland Avenue, west of East 55th Street carries the combined traffic of Woodland Avenue, Shaker Boulevard, Buckeye Road, and Kinsman Road, a total of 22,000 vehicles a day. A parallel route is undoubtedly needed to reduce the present volume of traffic on Woodland Ave-

nue and to take care of the future increase in traffic in this area. Both Kinsman Road and Woodland Avenue are now avoided by a large amount of traffic because of congestion. The extension of Shaker Boulevard to Broadway is a logical solution which will reduce the traffic volume on these routes and provide a more direct route for vehicles which normally would use Woodland Avenue and Kinsman Road but which, because of traffic congestion, are using less direct routes to the center of Cleveland.

6. Broadway southeast of its junction with East 55th Street carries a traffic which on an average day is 21,000 vehicles, the total traffic of Broadway, Turney, Warner, Miles Avenue, East 71st Street, and Union Avenue. Traffic conditions are here aggravated by the narrow roadway, street car line, parked vehicles, and the regular movement of local business traffic. A considerable part of the through traffic, particularly that from East 71st Street will be diverted to the Brook Park-Independence route after its improvement.

7. Rocky River bridge, where West Lake, Detroit, and Wooster Roads converge at its western end and Sloane, Detroit and Riverside Drive on the east, producing an average daily traffic of 20,000 vehicles and a Sunday traffic of 28,000 vehicles. Sunday traffic between 5 p. m. and 6 p. m. reached an hourly maximum of over 2,500 vehicles on this bridge. During peak hours of traffic the capacity of the bridge is greatly exceeded and vehicle speed is reduced to a minimum, principally because of the series of turns necessary in approaching and leaving the bridge and congestion at the eastern and western approaches. A new lake-front bridge crossing north of Rocky River bridge, and connecting Lake Avenue and West Lake Road will take practically all of the West Lake Road through traffic off the present bridge and the connection of Detroit Road and Hilliard bridge will provide additional relief.

8. In the outlying section of the county the most congested highway section due to the convergence of main line routes is in the village of Bedford on Broadway between Columbus Street and Northfield Road. Daily traffic on this sec-

tion ranged between 8,000 and 10,000 vehicles. On Broadway northwest of this section, traffic is augmented by that from Warrensville Center, Lee, and other north-and-south roads. To the southeast, Northfield Road and Broadway converge. Motor vehicle parking, the street car line, and the regular movement of local traffic in Bedford Village are also factors contributing to the resulting congestion.

A large part of the traffic passing through Bedford, most of which is between Akron and Cleveland, will be able to avoid this congested section after the completion of the proposed connection between Northfield and Warrensville Center Roads.

A satisfactory method of providing relief on over-crowded routes is to distribute and diffuse traffic over a series of parallel routes and prevent the concentration of great volumes of traffic on a comparatively small number of routes. The alternative method of widening existing main arteries, frequently through highly developed areas, would involve a cost which in most cases would be prohibitive.

Full use should be made of available right of way on these routes, but wherever practicable the remedy sought is to develop parallel distributing routes either by the establishment of new highways or the development of proper connections between, and completion of gaps in, existing routes. This method is the basis of the new routes and connections formulated both from the standpoint of effective distribution of traffic and cost of the improvement.

Speed of Traffic

In addition to the analysis of the volume, congestion, and distribution of motor vehicle traffic on routes in the regional area, a study of the time required for passenger car traffic to traverse the principal routes was made during average and peak-hour traffic periods.

These studies were made by means of a car equipped with a recording device which showed the actual speed at which the car was moving at all times, the mileage traveled in hundredths of miles, and the time required to cover the distance. Observers also recorded the causes of changes in

speed during the test runs on each route. The car was operated so as to "float" with traffic and the data obtained therefore represent average traffic conditions during the period of each test run. Typical results of these time study runs are shown in Figures 17, 18, 19, and 20.

The Public Square at Ontario Street was made a common point for the beginning of each time-study run, with Clague Road in the west, Royalton Road in the south and Green Road and the county line in the east as ending points for most of the test runs.

The lower average speed and the greater time required for a passenger car to travel during congested periods over routes within the city and suburban zones as compared with the average speed and time required to traverse sections of highways beyond these districts are indicated in Table 13, and Figures 17, 18, 19, and 20. For example, the average speed of passenger car traffic on Euclid Avenue during congestion hours from the Public Square to Lakeview Road was 9 miles per hour, from Lakeview Road to Green Road 18 miles per hour, and from Green Road to the county line 31 miles per hour. On Detroit Avenue during the morning and late afternoon rush hours, the average speed from the Public Square to West 117th Street was 13 miles per hour, from West 117th Street to Wooster Road 10 miles per hour, and from Wooster Road to Clague Road 34 miles per hour. On U. S. Route 42 via West 25th Street from the Public Square to Broadview Road the speed averaged 14 miles per hour, while the average speed from Brook Park Road on the same route to the Royalton Road increased to 34 miles per hour.

Narrow streets, poor surface improvements, street cars, street car loading platforms, traffic control at street intersections, parking at the curbs, and heavy volumes of motor truck and bus traffic are the principal causes of the low average speed on sections of routes within the city and suburban zones.

A comparison of alternate routes extending west to Clague Road from the Public Square, as shown in Table 14, indicates the travel time lost by each passenger car operator because of these causes of delay on the Detroit Avenue route.

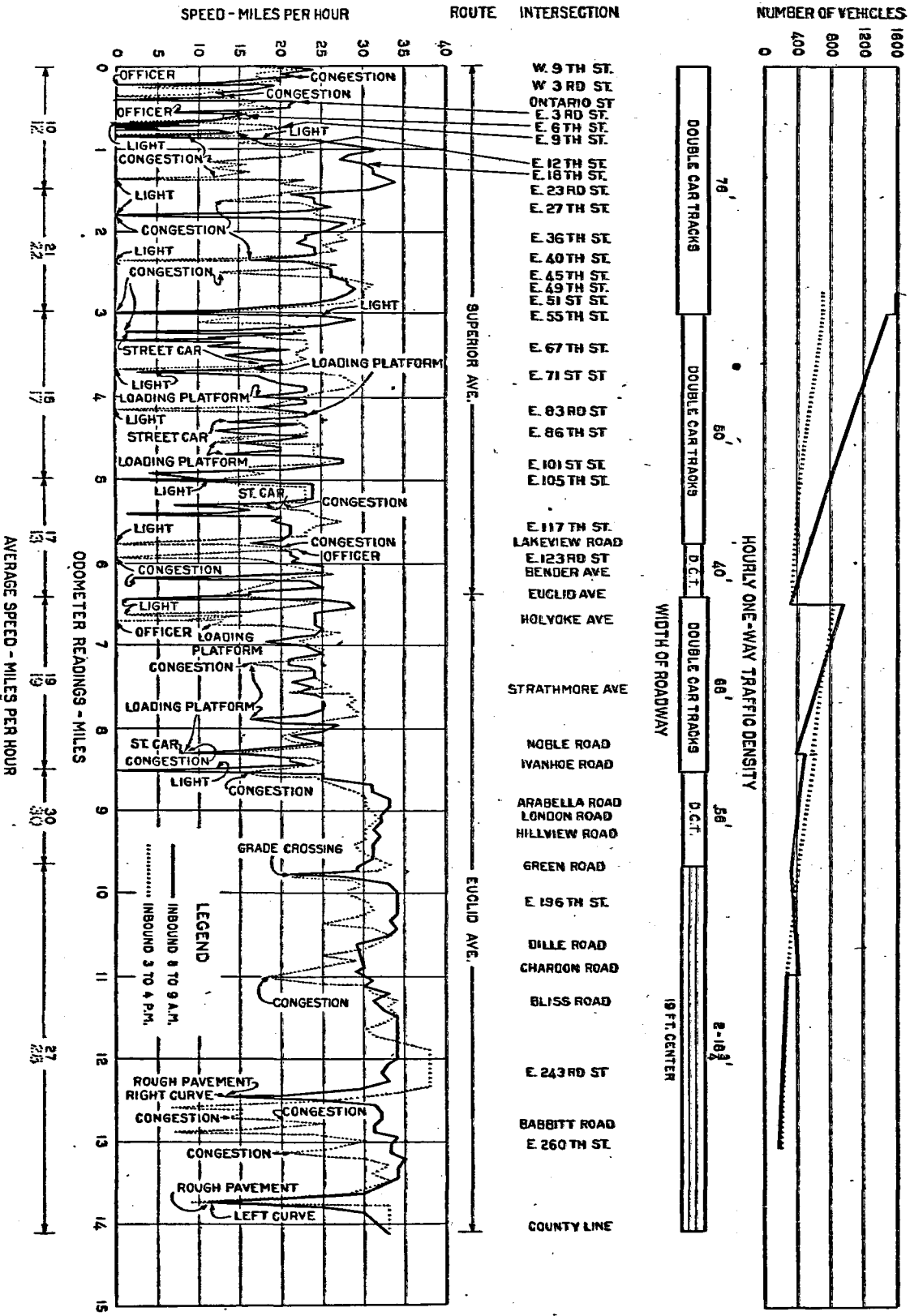
Although the distance is approximately the same for the two routes, there was a saving of 22 minutes in the eleven-mile trip for each car operator who traveled from the Public Square via Bulkley Boulevard, Lake Avenue, and West Lake Road to Clague Road as compared with the Detroit Avenue route.

The junction of U. S. Route 20 and State Route 91 (the S. O. M. Center Road) east of Cleveland, and the junction of U. S. Route 20 and State Route 57 in Elyria, west of Cleveland, were used as the starting and ending points for the time-study runs of passenger car traffic which by-passed or passed through the City of Cleveland.

The average time required to make the trip, and the average speed of passenger car traffic which by-passed or passed through the City of Cleveland is shown in Table 15. Although the distance on the by-pass route from the junction of U. S. Route 20 and S. O. M. Center Road (State Route 91) to the junction of U. S. Route 20 and State Route 57 via Kinsman, Warrensville Center, Libby, Dunham, Brookside, Pleasant Valley, Wooster, Bagley, Irish, Lorain and Root Roads is greater than the through-city route via Euclid, Superior, Bulkley, Lake, West Lake, Clague and U. S. Route 20, and while the former is indirect, the time involved in traveling the two routes was approximately the same, there being less than three minutes difference.

A comparison of the total time required to travel sections of present routes and the time that it will take to traverse the newly proposed arterial routes in the Cleveland area is shown in Table 16. With the completion of the Lake Front Boulevard there will be an estimated saving of at least 30 minutes for each passenger car operator who travels from the junction of U. S. Route 20 and S. O. M. Center Road to the junction of U. S. Route 20 and State Route 57 in Elyria via the new route as compared with the present route, over a distance of approximately 44 miles. When the Valley-Independence route is completed it will take each car operator approximately 10 minutes less time to travel from Wooster Pike at Brook Park Road via the Valley-Independence Road to the Public Square, a

Fig. 17—Hourly passenger car traffic, traffic speed, and roadway width on Superior and Euclid Avenues (U. S. Route 20) from West 9th Street to the Lake County line



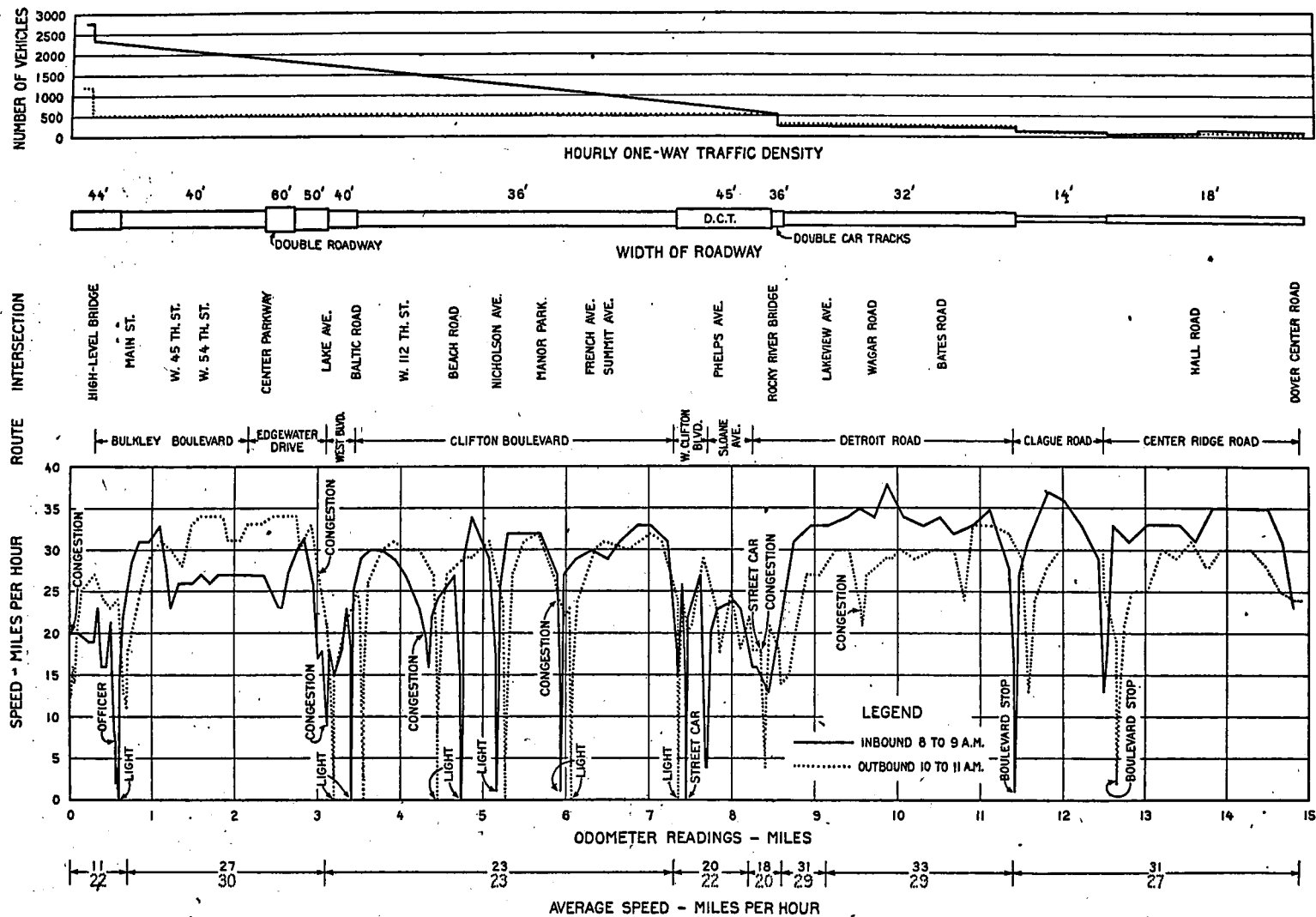
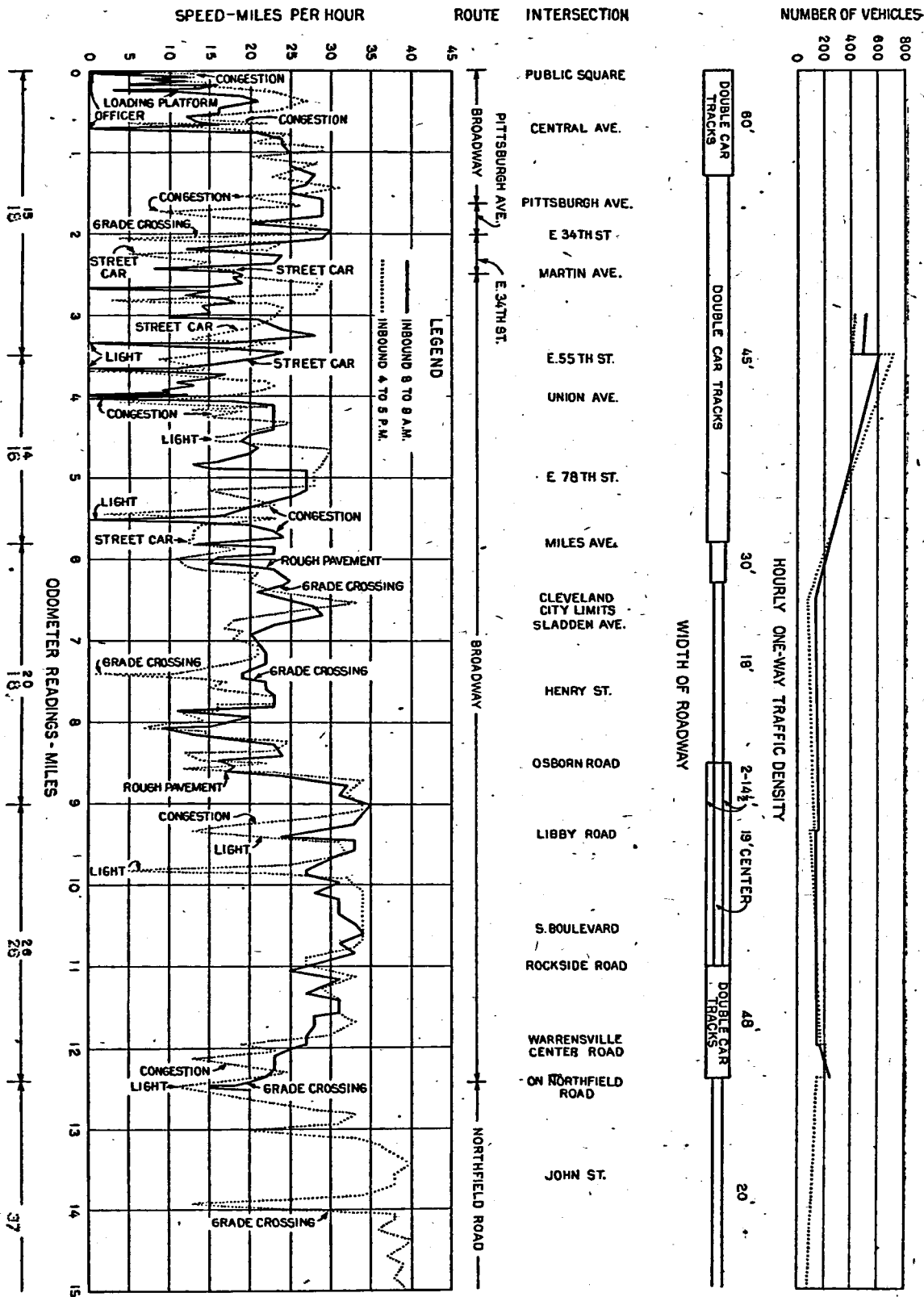


FIG. 18.—Hourly passenger car traffic, traffic speed, and roadway width on Bulkley Boulevard, Clifton Boulevard, Detroit, Clague, and Center Ridge Roads (U. S. Route 20) from the Public Square to Dover Center Road

FIG. 19A.—Hourly passenger-car traffic, traffic speed, and roadway width on Broadway and Northfield Road from the Public Square to Akron (see next page)



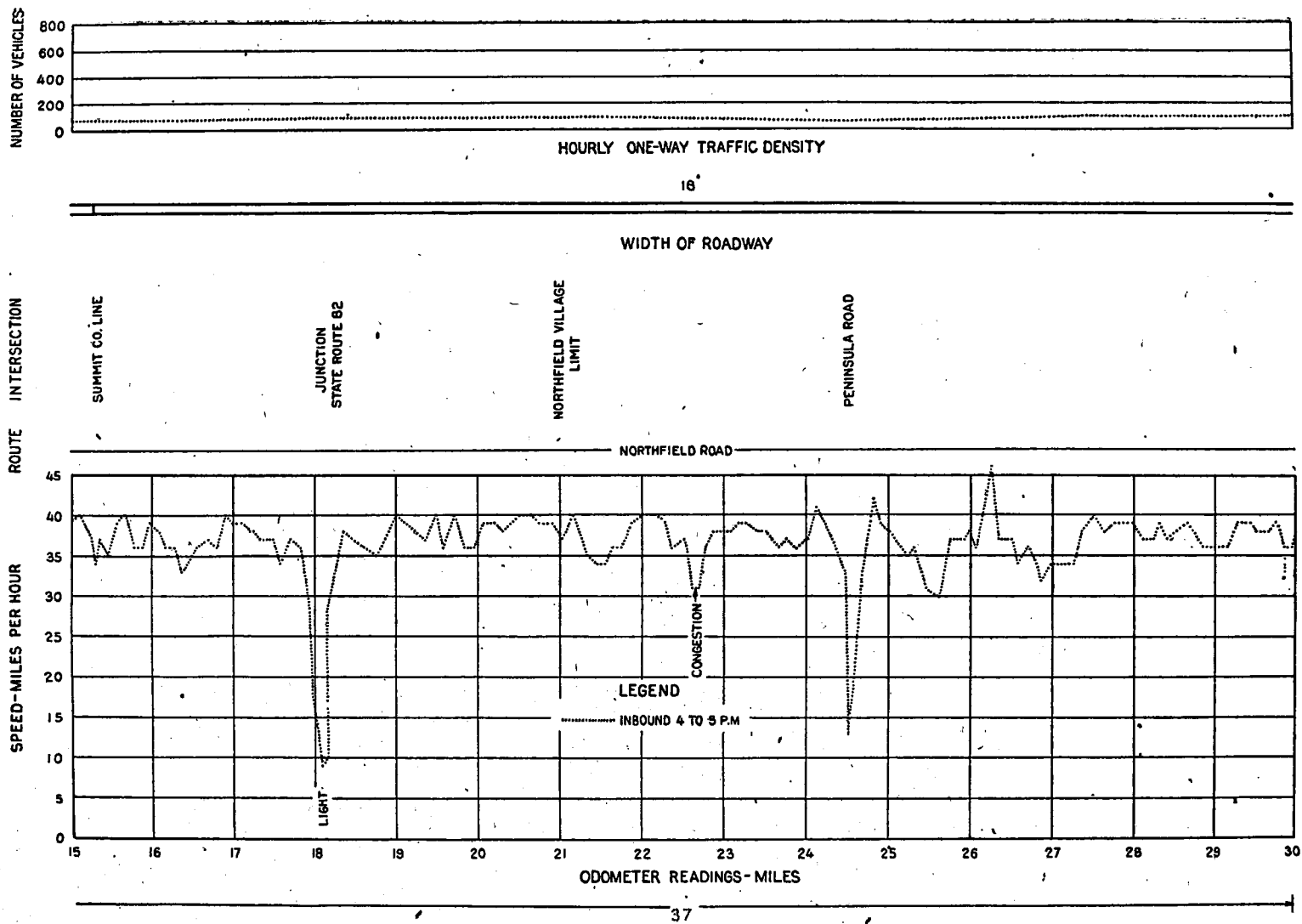


FIG. 19B.—Hourly passenger-car traffic, traffic speed, and roadway width on Broadway and Northfield Road from the Public Square to Akron (see next page)

THE DENSITY OF HIGHWAY TRAFFIC

HIGHWAY PLANNING REPORT

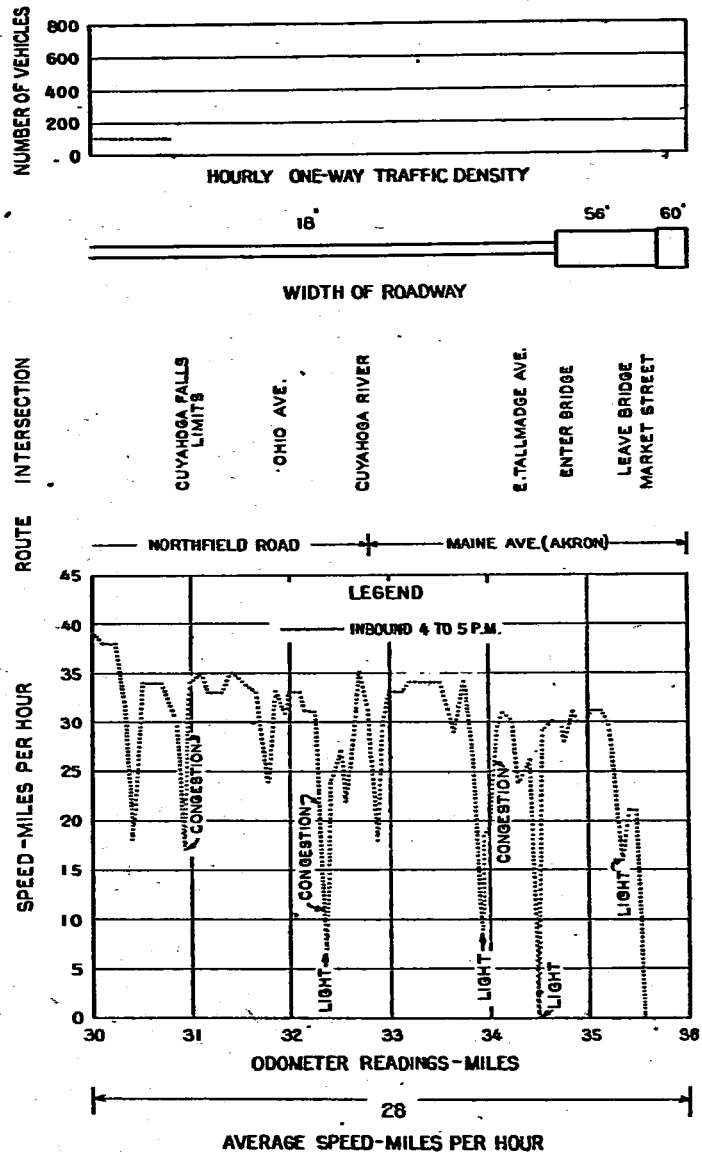


FIG. 19C.—Hourly passenger-car traffic, traffic speed, and roadway width on Broadway and Northfield Road from the Public Square to Akron (see preceding pages)

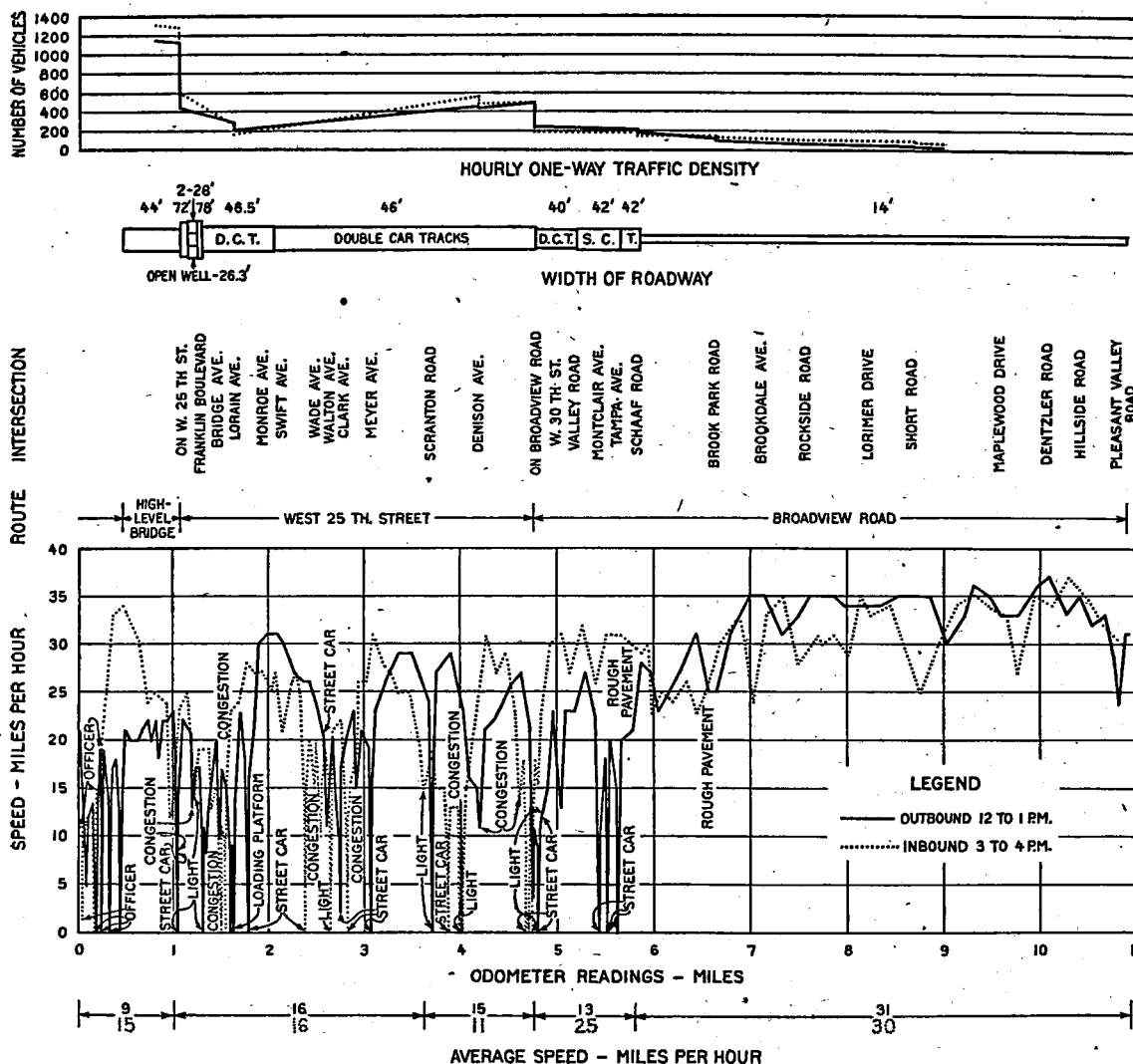


FIG. 20.—Hourly passenger car traffic, traffic speed, and roadway width on Superior high-level bridge, West 25th Street, and Broadview Road from the Public Square to Pleasant Valley Road

Table 13—Observed speed of passenger car traffic on routes and sections of principal routes ¹

Route	From	To	Distance	Time	Speed
			Miles	Min. Sec.	Mi. per hr.
Detroit Avenue, Detroit Road	Ontario St.....	W. 117th St.....	4.63	21 5	13
	W. 117th St.....	Wooster Road.....	3.66	21 48	10
	Wooster Road.....	Clague Road.....	2.95	5 12	34
	Total.....		11.24	48 5	14
Bulkeley Blvd., Clifton Blvd., Detroit Road	Ontario St.....	Wooster Road.....	8.93	26 12	20
	Wooster Road.....	Clague Road.....	2.96	5 37	32
	Total.....		11.89	31 49	22
Bulkeley Blvd., Lake Ave., West Lake Road	Ontario St.....	Bulkeley Blvd. and Main St.	1.06	4 14	15
	Bulkeley Blvd. and Main St.	Lake Ave. and Webb Road.	6.49	13 1	30
	Lake Ave. and Webb Road.	Wagar Road.....	2.47	6 00	25
	Wagar Road.....	Clague Road.....	1.66	2 30	40
	Total.....		11.68	25 45	27
Lorain Ave. via Ontario St., Central Viaduct, Abbey Ave.	Ontario St. and Euclid Ave.	Clark Ave. and Lorain Ave.	4.41	17 32	15
	Clark Ave. and Lorain Ave.	East end of Rocky River Bridge	4.53	13 48	20
	Total.....		8.94	31 20	17
U. S. Route 42 via Ontario St., Rockwell Ave., W. 3rd St., Superior Ave., W. 25th St.	Ontario St. and St. Clair Ave.	Broadview Road and W. 25th St.	4.83	21 5	14
	Broadview Road and W. 25th St.	Brook Park Road and U. S. Route 42	2.11	4 47	26
	Brook Park Road and U. S. Route 42	Royalton Road.....	10.20	18 6	34
	Total.....		17.14	43 58	23
Broadview Road via Ontario St., Rockwell Ave., W. 3rd St., Superior Ave., W. 25th St.	Ontario St. and St. Clair Ave.	Broadview Road and W. 25th St.	4.83	21 5	14
	W. 25th St. and Broadview Road	Broadview Road and Brook Park Road	1.82	5 34	20
	Broadview Road and Brook Park Road	Royalton Road.....	7.72	14 16	32
	Total.....		14.37	40 55	21
Carnegie Ave. and Cedar Road via Euclid Ave., E. 22nd St.	Ontario St. and Euclid Ave.	E. 22nd St. and Euclid Ave.	1.08	6 00	11
	E. 22nd St. and Euclid Ave.	Cedar Road and Euclid Heights Blvd.	4.38	14 15	18
	Cedar Road and Euclid Heights Blvd.	Cedar Road and Green Road	4.21	11 4	23
	Total.....		9.67	31 19	19

¹Time required for passenger car traffic to traverse the principal traffic routes during peak-hour periods.

Table 13—Observed speed of passenger car traffic, etc.—Continued

Route	From	To	Distance	Time	Speed
			Miles	Min. Sec.	Mi. per hr.
Euclid Ave.....	Ontario St.....	Lakeview Road.....	5.75	36 53	9
	Lakeview Road.....	Green Road.....	3.87	12 42	18
	Green Road.....	County line.....	5.63	10 46	31
Total.....			15.25	60 21	15
Superior Ave., Euclid Ave..	Ontario St. and Superior Ave.	Superior Ave. and Lakeview Road.	5.38	27 1	12
	Superior Ave. and Lakeview Road.	Euclid Ave. and Green Road.	3.89	13 18	18
	Euclid Ave. and Green Road.	County line.....	5.63	10 46	31
Total.....			14.90	51 5	18
Euclid Ave., Mayfield Road.	Ontario St. and Euclid Ave.	Mayfield Road and Euclid Ave.	4.97	34 0	9
	Mayfield Road and Euclid Ave.	Mayfield Road and Green Road.	4.91	13 36	22
Total.....			9.88	47 36	12
Lake Shore Blvd. via St. Clair Ave., E. 72nd St.	Ontario St. and St. Clair Ave.	E. 72nd St. and St. Clair Ave.	3.62	12 38	17
	E. 72nd St. and St. Clair Ave.	E. 72nd St. and Lake Shore Blvd.	.49	1 23	21
	E. 72nd St. and Lake Shore Blvd.	E. 185th St.....	7.23	19 14	23
	E. 185th St.....	Lloyd Road.....	3.76	8 18	27
Total.....			15.10	41 33	22
St. Clair Ave. ¹	Ontario St.....	E. 105th St.....	5.13	17 53	17
	E. 105th St.....	Ivanhoe Road.....	2.17	14 44	9
Total.....			7.30	32 37	13
North Woodland Road via Woodland Ave.	Ontario St. and Woodland Ave.	Coventry Road.....	6.18	20 21	18
	Coventry Road.....	Green Road.....	3.88	8 12	28
Total.....			10.06	28 33	21
South Woodland Road via Woodland Ave., Buckeye Road	Ontario St. and Woodland Ave.	Buckeye Road and Woodland Ave.	3.82	14 38	16
	Buckeye Road and Woodland Ave.	Woodhill Road and S. Woodland Road.	.72	2 14	19
	Woodhill Road and S. Woodland Road.	Green Road.....	5.54	11 21	29
Total.....			10.08	28 13	21

¹ Repairing street car tracks.

Table 13—Observed speed of passenger car traffic, etc.—Continued

Route	From	To	Distance	Time	Speed
			Miles	Min. Sec.	Mi. per hr.
Kinsman Road via Woodland Ave.	Ontario St.....	E. 154th St.....	7.24	26 58	16
	E. 154th St.....	Green Road.....	3.00	6 7	29
Total.....			10.24	33 5	19
Broadway and Miles Ave. via Ontario St., Pittsburgh Ave., E. 34th St.	Ontario St. and Euclid Ave.	Pittsburgh Ave. and Broadway.	1.29	5 25	14
	Pittsburgh Ave. and Broadway	E. 34th St. and Broadway	.99	2 33	23
	E. 34th St. and Broadway	Miles Ave. and Broadway	3.40	13 45	15
	Miles Ave. and Broadway	Warrensville Ctr. Road and Miles Ave.	5.04	10 50	28
Total.....			10.72	32 33	20
Brecksville Rd. via Ontario St., Broadway, Pittsburgh Ave., E. 34th St., E. 71st St.	Ontario St. and Euclid Ave.	E. 71st St. and Broadway	4.41	17 13	15
	E. 71st St. and Broadway	Grant Ave.....	1.39	5 17	16
	Grant Ave.....	Royalton Road.....	10.39	26 20	24
Total.....			16.19	48 50	20

Table 14—Travel speed on Detroit Avenue compared with that on the Bulkley Boulevard, Lake Avenue, and West Lake Road route

Detroit Avenue ¹					Bulkley Boulevard, Lake Avenue, West Lake Road				
Street cars, loading platforms, parking at curbs, motor truck traffic					No street cars or loading platforms and little parking or motor truck traffic				
From	To	Distance	Time	Speed	From	To	Distance	Time	Speed
		Miles	Min. Sec.	Mi. per hr.			Miles	Min. Sec.	Mi. per hr.
Ontario St.....	West 117th St...	4.63	21 5	13	Ontario St.....	Bulkley Blvd. & Main St.	1.06	4 14	15
West 117th St...	Wooster Road...	3.66	21 48	10	Bulkley Blvd. & Main St.	Lake Ave. & Webb Road.	6.49	13 1	30
Wooster Road...	Clague Road...	2.95	5 12	34	Lake Ave. & Webb Road	Wagar Road....	2.47	6 00	25
					Wagar Road....	Clague Road....	1.66	2 30	40
Total.....		11.24	48 5	14	Total.....		11.68	25 45	27

¹ The Detroit Ave. route compares favorably as to surface width with the Bulkley Blvd., Lake Ave., and West Lake Road route.

Table 15—Time required for passenger car traffic to by-pass the City of Cleveland and pass through the City from the Junction of S. O. M. Center Road and U. S. Route 20 to the Junction of State Route 57 and U. S. Route 20 in Elyria

By-passing Cleveland

Route	From	To	Distance	Time	Speed
			Miles	Min. Sec.	Mi. per hr.
S. O. M. Center Road, Kinsman Rd., Warrensville Ctr. Rd., Libby Rd., Dunham Rd., Brookside Road, Pleasant Valley Rd., Wooster Pike, Bagley Road, Irish Road, Lorain Rd., Root Road, U. S. 20	U. S. Route 20 and S. O. M. Center Road	S. O. M. Center Road and Kinsman Road	11.80	22 17	32
	S. O. M. Center Road and Kinsman Road	Kinsman Road and Warrensville Center Road	5.37	10 59	29
	Kinsman Road and Warrensville Ctr. Road	Canal Road and Dunham Road	10.46	20 24	31
	Canal Road and Dunham Road	Brecksville Road and Pleasant Valley Road	2.00	3 48	32
	Brecksville Road and Pleasant Valley Road	U. S. Route 20 and Root Road	22.35	43 29	31
	U. S. Route 20 and Root Road	Jct. U. S. Route 20 and State Route 57 in Elyria	5.00	9 30	32
Total.....			56.98	110 27	31
S. O. M. Center Road, State Route 82, State Route 57.	U. S. Route 20 and S. O. M. Center Road	S. O. M. Center Road and Kinsman Road	11.80	22 17	32
	S. O. M. Center Road and Kinsman Road	S. O. M. Center Road and State Route 82	11.08	19 48	30
	S. O. M. Center Road and State Route 82	Jct. U. S. Route 20 and State Route 57 in Elyria	40.99	78 14	32
	Total.....			63.87	120 19	31

Through Cleveland

Route	From	To	Distance	Time	Speed
			Miles	Min. Sec.	Mi. per hr.
U. S. Route 20 via Clague Road, Detroit Road, Clifton Blvd., Bulkley Blvd., Superior Ave., Euclid Ave.	U. S. Route 20 and State Route 57 in Elyria	Clague Road and U. S. Route 20	14.24	25 7	34
	Clague Road and U. S. Route 20	Clague Road and Detroit Road	1.03	2 30	25
	Clague Road and Detroit Road	Ontario St. and Superior Ave.	11.89	31 49	22
	Ontario St. and Superior Ave.	U. S. Route 20 at County line	14.90	51 5	18
	U. S. Route 20 at County line	U. S. Route 20 and S. O. M. Center Road.	3.42	6 25	34
	Total.....			45.48	116 56	24
U. S. Route 20 via Clague Road, West Lake Road, Lake Ave., Bulkley Blvd., Superior Ave., Euclid Ave.	U. S. Route 20 and State Route 57 in Elyria	Clague Road and U. S. Route 20	14.24	25 7	34
	Clague Road and U. S. Route 20	Clague Road and West Lake Road	2.03	5 00	25
	Clague Road and West Lake Road	Ontario St. and Superior Ave.	11.68	25 45	27
	Ontario St. and Superior Ave.	U. S. Route 20 at County line	14.90	51 5	18
	U. S. Route 20 at County line	U. S. Route 20 and S. O. M. Center Road	3.42	6 25	34
	Total.....			46.27	113 22	25

Table 16—Travel time of passenger car traffic using the present routes and the estimated travel time of passenger cars using the proposed new arterial highways¹

Present				Proposed				Minimum time saved each passenger car
Route	From	To	Time	Route	From	To	Time	
U. S. Route 20 via Bulkeley Blvd., Clifton Blvd., Detroit Road	S. O. M. Center Road and U. S. Route 20	U. S. Route 20 and State Route 57 in Elyria	Min. Sec. 116 56	Lake Front Route via Bulkeley Blvd., Lake Ave., West Lake Road, Clague Road	S. O. M. Center Road and U. S. Route 20	U. S. Route 20 and State Route 57 in Elyria	Min. Sec. 65 50	Min. Sec. 31 6
Pleasant Valley Route via Kinsman Road, Warrensville Center Road, Liberty Road, Dunham Road, Brookside Road, Wooster Pike, Bugley Road, Irish Road, Lorain Road, Root Road, U. S. Route 20	S. O. M. Center Road and U. S. Route 20	U. S. Route 20 and State Route 57 in Elyria	110 27	Brook Park Extension via U. S. Route 20, Lee Road, Brook Park Road, U. S. Route 20	S. O. M. Center Road and U. S. Route 20	U. S. Route 20 and State Route 57 in Elyria	101 45	8 42
U. S. Route 42 via W. 25th St.	Brook Park Road	Ontario St.	25 52	Valley—Independence Route	Brook Park Road	Ontario St.	15 41	10 11
S. Woodland Road via Woodland Ave.	Green Road	Ontario St.	28 13	Shaker Blvd. Extension via Broadway	Green Road	Ontario St.	22 36	5 37
Mayfield Road via Euclid Ave.	Green Road	Ontario St.	47 36	Mayfield Extension via Superior Ave.	Green Road	Ontario St.	38 4	9 32
Broadway via Brecksville Road	Grant Ave.	Ontario St.	22 30	Independence Extension via Broadway	Grant Ave.	Ontario St.	12 25	10 5
Lorain Ave. via Central Viaduct, Abbey Ave.	East side of Rocky River Bridge	Ontario St.	31 20	Walworth Train Route via Lorain Ave., Clark Ave., Scranton Road	East side of Rocky River Bridge	Ontario St.	23 20	8 00

¹ Time required for passenger car traffic to traverse the principal traffic routes during peak-hour traffic.

distance of about 6 miles, than to travel the present route via West 25th Street and the Superior high-level bridge.

The low average speed and the total time required to traverse sections of the principal highway routes during average and peak-hour traffic periods indicate that present main arterial highway facilities are unsatisfactory and are costing motor vehicle operators considerable unnecessary loss of time.

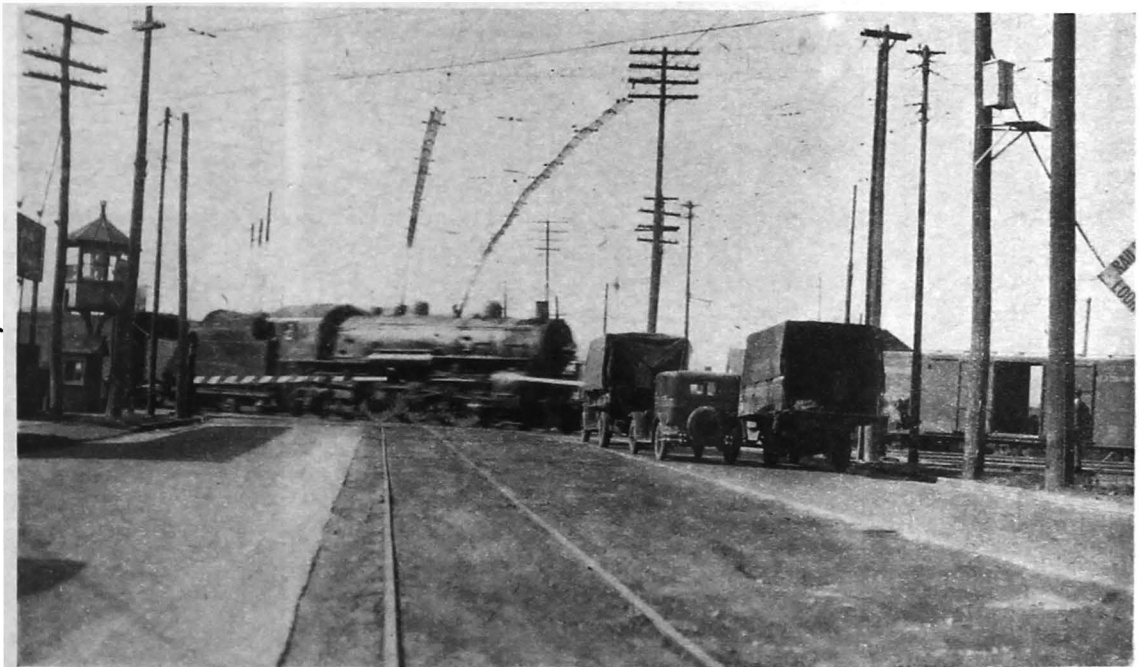
Time Loss at Grade Crossings

Railroad crossings at grade not only constitute an accident hazard, but also reduce the traffic capacity of a route. This reduction in traffic capacity is due (1) to the actual stopping of vehicles to permit passing of trains and (2) to the general decrease in speed of all traffic in order to determine the safety of crossing. To measure the influence of unseparated crossings on traffic capacity and to determine the resulting

vehicle time loss, a series of time studies was made at selected grade crossings in the area.

The location of these crossings, the highway traffic, the rail traffic, and resulting time loss at each crossing during the observation period are shown in Table 17.

The greatest vehicle time loss was found at the New York Central Railroad crossing of Lorain Avenue near West 143rd Street. At this point vehicle time loss during the 12-hour period was 46 hours, involving the stopping of 1,867 vehicles or 31.4 per cent of all vehicles passing during the 12-hour period from 7 a. m. to 7 p. m. In this case the railroad has four tracks. The crossing was closed for train traffic 2.48 hours during the 12-hour period. The distribution of trains and the period the crossing was blocked by each train, together with the number of vehicles stopped and the resulting time loss caused by each train, are shown in Figure 21. In Figure 22 is shown the relationship of total



DANGEROUS AND TIME-CONSUMING RAILROAD GRADE CROSSINGS

Above—A dangerous crossing of the Nickel Plate Railroad on Clague Road

Below—Lorain Avenue crossing of the New York Central Railroad near West 143rd Street. During 12 hours the vehicles stopped by the gates at this crossing lost a total of 46 vehicle-hours

Table 17—Summary of railroad grade crossing time studies with traffic and vehicle time loss

Road	Railroad	Location	Highway traffic 7 a. m. to 7 p. m.	Rail traffic 7 a. m. to 7 p. m.			Time blocked 7 a. m. to 7 p. m., hours	Vehicles stopped	Per cent of time blocked	Per cent of vehicles stopped	Ratio of clearance time to time crossing is blocked	Total vehicle time loss, vehicle- hours
				Passenger trains	Freight trains	Switch trains						
East 72nd Street.....	New York Central.....	West end Gordon Park....	7,752	27	17	31	1.69	1,078	14.1	14.0	1.24	23.6
Lorain Avenue.....	New York Central.....	Near West 143rd Street....	5,955	44	4	36	2.48	1,867	20.6	31.4	1.22	46.0
Broadway.....	Wheeling and Lake Erie....	At Union Avenue.....	14,220	6	.....	27	1.67	600	5.2	4.2	1.38	12.1
East 93rd Street.....	Erie.....	Near Mesch Avenue ¹	4,372	13	7	22	1.20	709	10.0	16.2	1.31	30.6
East 93rd Street.....	Wheeling and Lake Erie....	Near Mesch Avenue ¹	4,372	6	11	18	1.18	650	9.8	14.9	1.24	23.7
Broadway.....	Pennsylvania and the Wheeling and Lake Erie.....	White House Crossing.....	1,968	20 ²	9	2	.87	191	7.3	9.7	1.40	2.9
Main Street.....	Baltimore and Ohio.....	Near Cuyahoga River.....	6,470	.....	.....	19	.57	210	4.7	3.2	1.14	7.9
Front Street.....	New York Central.....	In Berea ³	1,826	43	18	1	1.31	249	10.9	14.2	1.17	4.7
U. S. Route 20.....	Nickel Plate.....	West of Palmsville.....	4,799	2	12	4	.89	319	7.4	6.6	1.18	16.4
East 131st Street.....	Erie.....	At Miles Avenue.....	4,002	11	7	1	.46	170	3.8	4.2	1.33	4.4
Front Street.....	Rig 4.....	In Berea ³	1,826	1	10	25	.75	258	6.2	14.1	1.18	4.2
Vine Street.....	New York Central.....	West of Willoughby ⁴	1,109	26	22	11	1.64	399	13.7	36.0	1.18	9.7
Lee Road.....	Erie.....	South of Miles Avenue.....	4,352	12	1	.....	.19	74	1.5	1.7	1.25	0.7
Broadway.....	Wheeling and Lake Erie....	In Bedford.....	4,616	6	4	2	.16	88	1.3	1.9	1.25	1.1
Northfield Road.....	Pennsylvania.....	South of Bedford.....	2,223	16	6	2	.28	66	2.3	3.0	1.16	0.7
Settlement Road.....	Rig 4.....	South of Brook Park Rd....	1,104	1	30	16	1.62	253	13.5	22.9	1.11	9.4
Warrenville Center Road.....	Erie.....	At Randall.....	2,222	12	7	.....	.43	41	3.6	1.8	1.06	0.6
Chardon Road.....	Nickel Plate.....	North of Euclid Avenue....	1,436	2	12	9	1.00	30	8.4	2.1	1.04	0.8
Brecksville Road.....	Baltimore and Ohio.....	At Willow.....	2,347	8	2	4	.14	17	1.1	0.7	1.05	0.2
State Route 36.....	Baltimore and Ohio.....	West of Ravens.....	1,373	5	15	3	.44	37	3.7	2.7	1.06	0.7
Vine Street.....	Nickel Plate.....	West of Willoughby ⁴	1,109	2	13	1	.57	133	4.8	12.0	1.22	4.0
Brook Park Road.....	Rig 4.....	At West 150th Street.....	822	.....	10	10	.60	82	5.0	10.0	1.07	1.6
Aurora Road.....	Erie.....	East of Solon.....	951	12	3	.....	.17	14	1.6	1.5	1.08	0.1
Aurora Road.....	Erie.....	West of Solon.....	921	12	3	.....	.26	23	2.2	2.5	1.00	0.4
Brook Park Road.....	Baltimore and Ohio.....	East of Settlement Road....	1,156	3	3	6	.20	18	1.7	1.6	1.06	0.3
S. O. M. Center Road.....	Erie.....	South of Solon.....	642	12	3	.....	.19	9	1.6	1.4	1.08	0.1
Aurora Road.....	Wheeling and Lake Erie....	West of Solon.....	921	6	.....	.....	.09	3	0.7	0.3	1.02	0.02

¹ Crossings approximately 300 feet apart; blocking of one crossing impedes traffic at other.
² Also 32 electric trains on Northern Ohio Traction Lines.
³ Crossings approximately 650 feet apart; blocking of one crossing impedes traffic at other.
⁴ Crossings approximately 100 feet apart; blocking of one crossing impedes traffic at other.

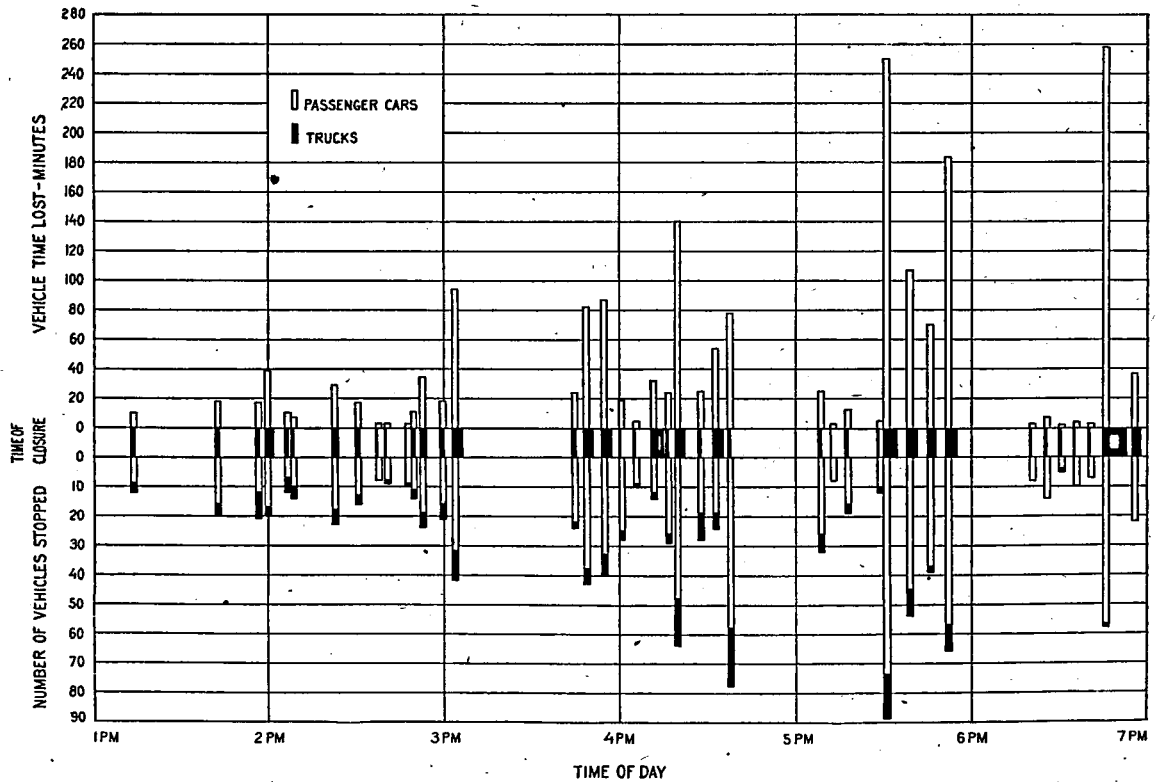
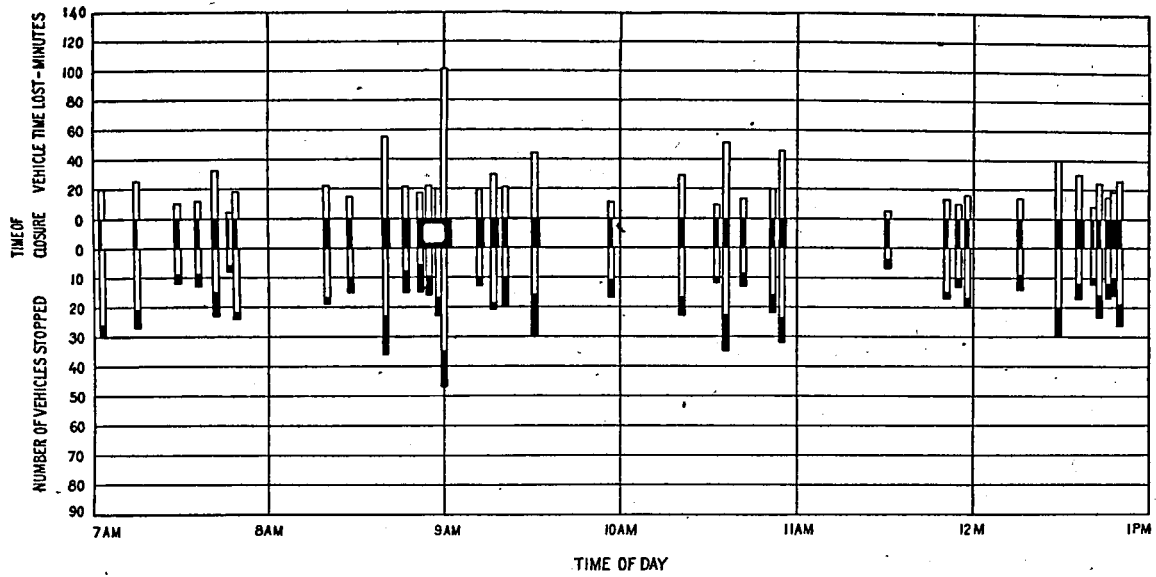


FIG. 21.—Chart showing the periods during which the gates were closed at the Lorain Avenue crossing of the New York Central Railroad, and the number of vehicles stopped and time lost by vehicles, from 7 a. m. to 7 p. m., November 11, 1927

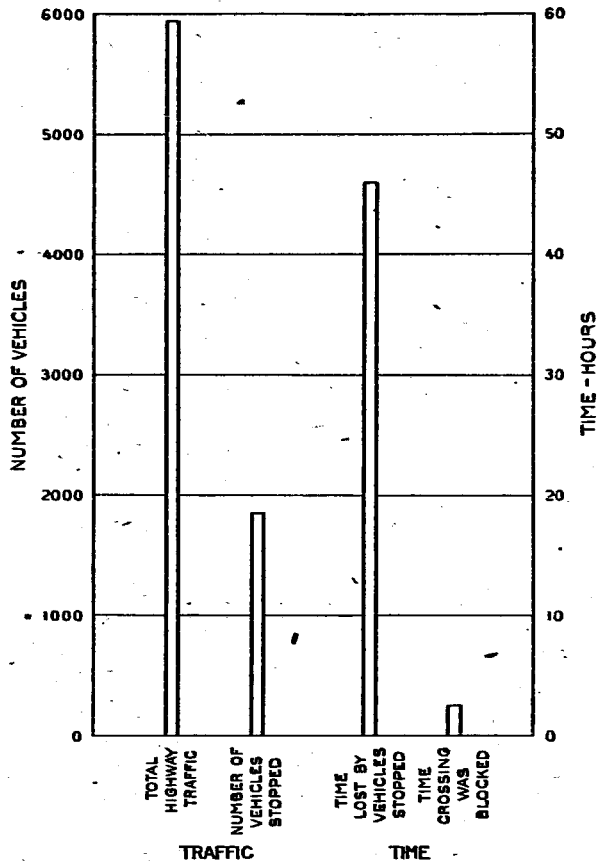


FIG. 22.—Highway traffic and time lost by highway vehicles at the New York Central Railroad crossing of Lorain Avenue, Cleveland, 7 a. m. to 7 p. m., November 11, 1927

traffic to vehicles stopped and the time the crossing was closed, compared with vehicle time loss. These data are typical of unseparated intersections of important highways and main lines of railway.

Similar data for a typical crossing of an important highway with a single-track rail line are shown in Figures 23 and 24, which present the data recorded at the Nickel Plate crossing of U. S. Route 20 near the west city limits of Painesville. The vehicle time loss during the 12-hour period at this crossing was 16.4 hours and the crossing was blocked .89 hour.

With decreases in highway traffic and decreases in rail traffic the vehicle time loss decreases rapidly, becoming negligible at crossings of unimportant highways with rail lines carrying a small number of trains.

Vehicle time loss is affected by the type of train traffic as well as its volume. The average time the crossings were blocked by passenger trains was approximately 1 minute, by freight trains approximately 2 minutes. The time of closure for switch trains varied greatly, depending upon the type of switching. At the crossings where a considerable switching movement was recorded the average time blocked per switch train was between one and one and one-half minutes.

The time required for clearing of the crossing by highway traffic which has been stopped varied with the number of vehicles stopped, which is in turn dependent upon the volume of highway traffic, and the length of time the crossing has been blocked. The ratio of clearance time (*i. e.*, the total from the time the crossing is closed until the last car stopped has cleared the crossing) to the time the crossing is actually blocked varies from 1.40 to 1.02. The higher ratios are found at the crossings having the largest highway and rail traffic.

Transverse Distribution of Traffic

Studies of the transverse distribution of traffic on surfaces of various widths were made to determine the surface width unused by traffic.

The observed transverse distribution of passenger car, truck, and bus traffic was recorded on pavements, the width of which ranged from 18 to 40 feet. The total pavement width, where observations were recorded, was divided into one-foot lanes with painted identification markings. The right rear wheel passage of each motor vehicle crossing within each marked one-foot lane of the pavement was recorded. These data form the basis of the studies of transverse distribution of motor vehicle traffic on straight and level highway pavements in the various width classes made during the month of November, 1927.

The distribution of right rear wheel passages of passenger cars on the various parts of the surface is shown in Table 18. There is a marked difference between the transverse distribution of the right rear wheel passages of passenger cars on pavements 18 and 20 feet in width and similar data on pavements in excess of 20 feet

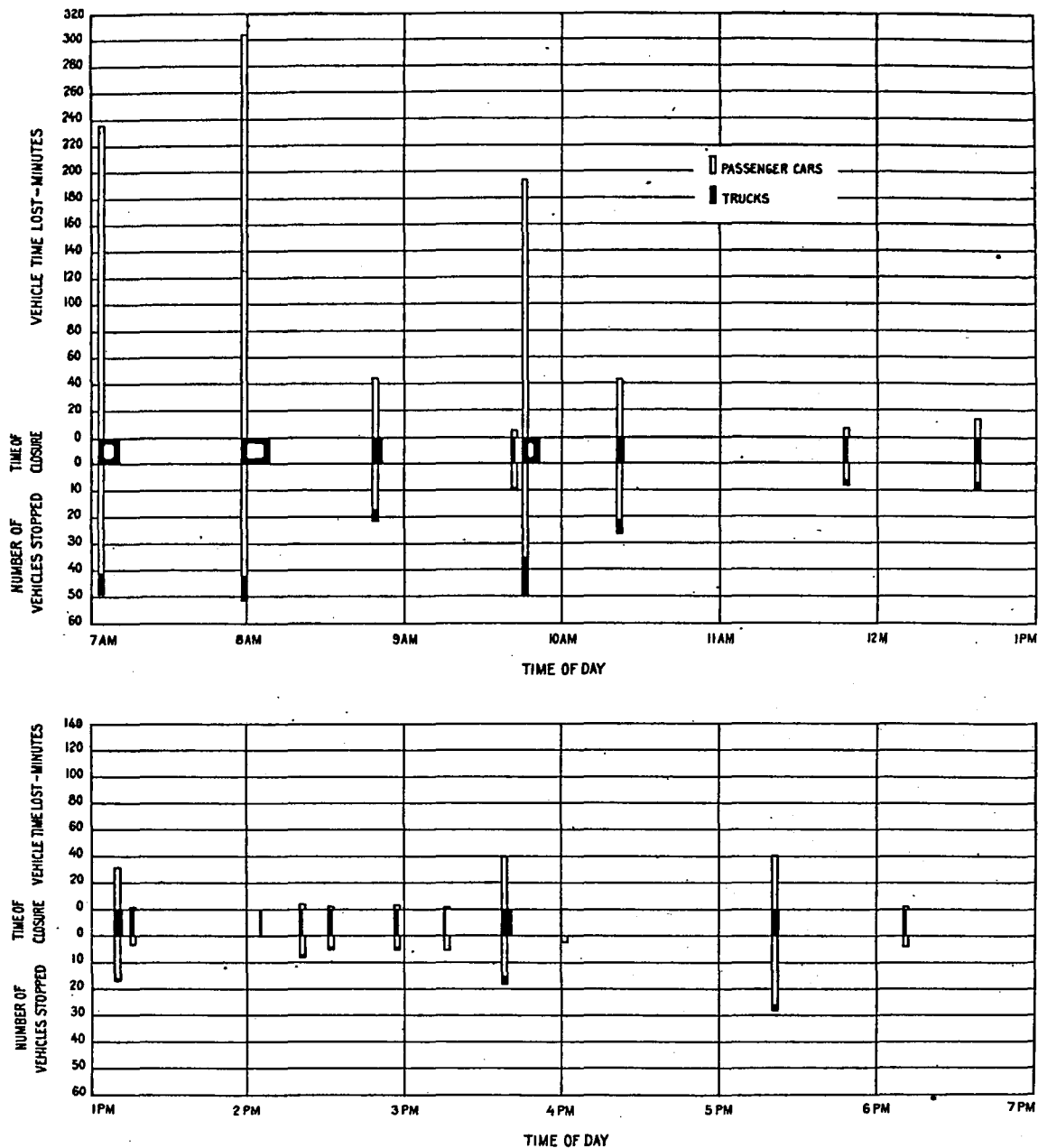


FIG. 23.—Chart showing the periods during which the gates were closed at the U. S. Route 20 crossing of the Nickel Plate Railroad west of Painesville, and the number of vehicles stopped and time lost by vehicles, from 7 a. m. to 7 p. m., November 14, 1927

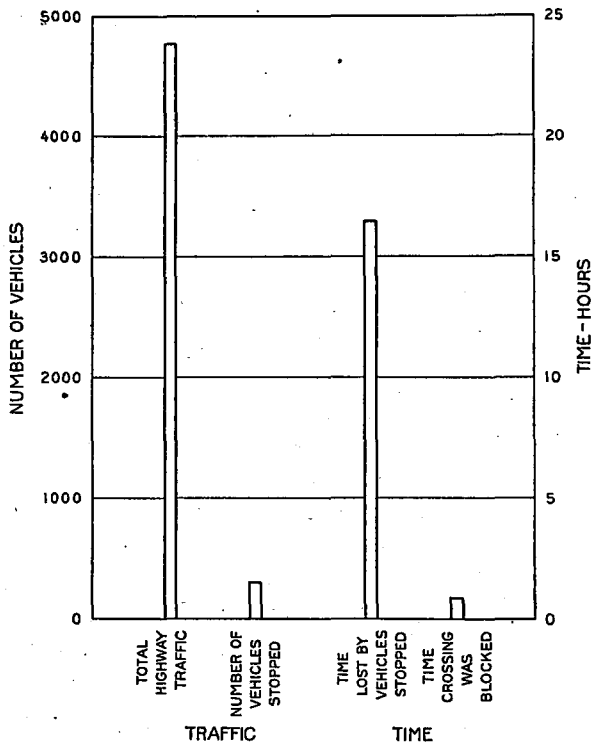


FIG. 24.—Highway traffic and time lost by highway vehicles at the Nickel Plate Railroad crossing of U. S. Route 20, west of Painesville, 7 a. m. to 7 p. m., November 14, 1927

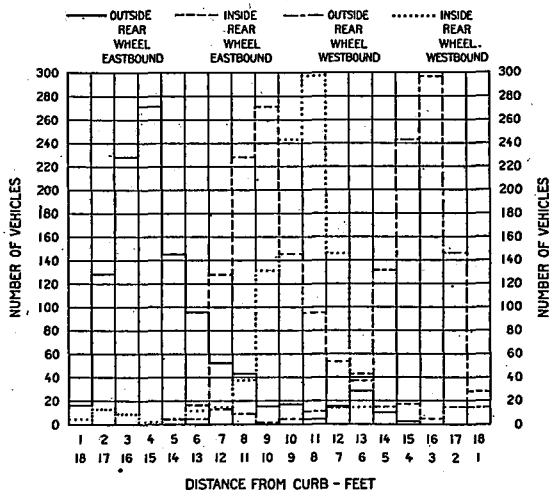


FIG. 25.—Transverse distribution of passenger car traffic on an 18-foot pavement (Cedar Road), based on total passenger car traffic November 23, 1927, from 7:15 a. m. to 12 m. and 1:00 p. m. to 5:00 p. m.

in width but not wide enough for four lanes of traffic. On the 18 and 20-foot surfaces, over 80

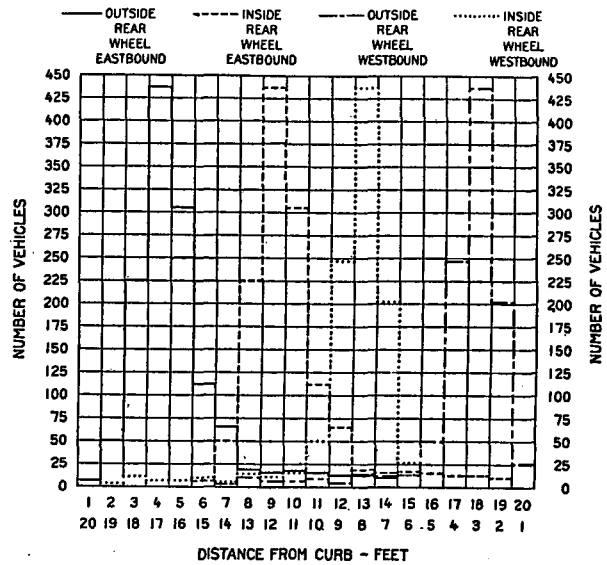


FIG. 26.—Transverse distribution of passenger car traffic on a 20-foot pavement (West Lake Road), based on total passenger car traffic November 26, 1927, from 7:15 a. m. to 12 m. and 1:00 p. m. to 5:00 p. m.

per cent of the passenger-car traffic traveled 6 feet or less from the edge of the pavement. For surfaces in excess of 20 feet the highest percentage of utilization of the section within 6 feet of the edge of the pavement was 46.2.

The two one-way traffic pavements, each 18.7 feet in width, on Euclid Avenue, are separated by a center gravel strip 18.5 feet wide. The center gravel strip is used essentially for parking purposes. On these one-way pavements it is significant that over 65 per cent of the passenger cars were seven feet or more from the outer edge of the pavement and that the 3 feet of pavement nearest the edge of the surface was used very little by passenger car traffic.

The Lake Shore Boulevard, 38 feet in width, and U. S. Route 20, 40 feet in width, are used as two-lane traffic routes. On each of these routes few passenger cars traveled less than three feet from the edge of the pavement in each direction of traffic.

The 32-foot pavement on Franklin Avenue is used as a two-lane traffic route except at peak traffic hours and then it is used as a three-lane route. Bulkley Boulevard is lane-marked to accommodate four lanes of traffic. During peak

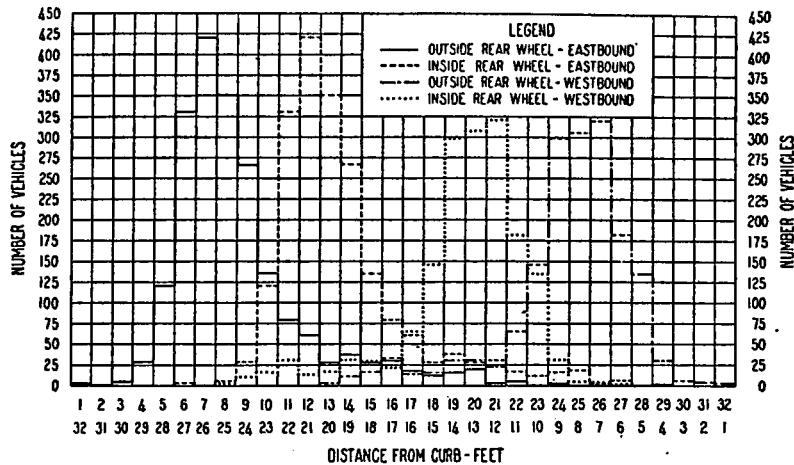


FIG. 27.—Transverse distribution of passenger-car traffic on a 32-foot pavement (Detroit Road), based on total passenger car traffic November 25, 1927, from 7:15 a. m. to 12 m. and 1:00 p. m. to 5:00 p. m.

Table 18—Transverse distribution of passenger-car traffic on highway pavements

Highway	Surface width	Direction of traffic	Total passenger cars observed	Distance from edge of surface, feet						Total
				1	2	3	4	5	6	
				Right rear wheel passages—per cent of total number						
Cedar Road, east of Warrensville Center Road	18	E	1,069	1.5	12.0	21.3	25.3	13.6	8.9	82.6
		W	931	1.5	15.7	31.9	26.1	14.1	4.0	93.3
West Lake Road, west of Wagar Road	20	E	1,304	0.5	3.8 ¹	17.2	33.5	23.4	8.6	87.0
		W	1,042	2.5	19.5	41.9	23.6	4.8	1.3	93.6
Northfield Road, south of Forbes Road	20	N	620	1.9	13.9	32.7	27.7	13.9	3.4	93.5
		S	806	.....	2.1 ²	13.9	27.2	21.6	16.1	80.9
Euclid Ave., ³ east of Chardon Road	18.7	E	1,403	.....	0.8	2.1	3.7	6.5	8.3	21.4
		W	1,376	.....	0.6	3.5	6.7	9.7	13.5	34.0
Euclid Ave., ³ west of Chardon Road	18.7	E	2,328	.....	0.6	0.7	4.3	11.0	9.0	25.6
		W	2,354	.....	0.7	4.8	10.7	10.7	9.1	36.0
Detroit Ave., east of Clague Road	32	E	2,000	0.1	.....	0.3	1.4	6.0	16.6	24.4
		W	1,668	0.1	0.2	0.3	1.9	8.1	11.0	21.6
Franklin Ave., ⁴ east of West 65th St.	32	E	2,948	0.1	0.3	2.1	6.0	12.1	16.3	36.9
		W	2,095	.....	0.3	1.7	4.6	10.6	16.5	33.7
Lake Shore Blvd. east of Harland Ave.	38	E	1,334	0.0	0.7	2.4	8.0	9.6	11.0	31.7
		W	1,803	0.1	0.1	0.9	3.1	4.3	6.6	15.1
U. S. Route 20, east of Wickliffe...	40	E	1,081	0.0	0.0	0.0	0.5	0.7	4.0	5.2
		W	1,094	0.0	0.0	0.8	0.6	4.1	7.4	12.9
Bulkley Blvd., ⁵ east of Center Parkway Section	40	E	8,183	0.2	1.1	7.3	18.2	13.0	6.5	46.3
		W	4,702	0.0	0.1	1.4	5.5	12.7	15.7	35.4

¹ A letter box located close to the edge of pavement accounts for the low percentage in the second foot lane, east direction of traffic.

² A 6-inch raised curb accounts for the low percentage in the second foot lane, south direction of traffic.

³ Each direction is used for one-way traffic and is separated by a gravel strip 18.5 feet in width.

⁴ Used as a three-lane road during peak-hour traffic; the in, or outbound peak traffic, uses two lanes during peak hours. Lanes are not separated by markings.

⁵ Roadway width separated into four marked lanes, each 10 feet in width. Inbound or outbound peak traffic uses three lanes during peak hours.

hours three lanes are used by passenger cars in the direction of heavy traffic. Large-capacity trucks are not allowed on Franklin Avenue or Bulkley Boulevard. On both roads little use is being made of six feet of pavement, three feet on each side of the route being largely unused. Figures 25, 26 and 27 indicate clearly the difference in utilization by passenger cars on 18, 20, and 32-foot pavements. The greatest concentration of right rear-wheel passages occur 3, 4 and 5 feet from the edge of the pavement for 18 and 20-foot highways in each direction of traffic. On West Lake Road, a letter box located close to the edge of the pavement accounts for the low percentage of right, rear-wheel passages eastbound in the second-foot lane. On Detroit Road, a 32-foot, two-lane traffic route, the greatest concentration of right, rear-wheel passages of passenger cars occurs between 6 and 9 feet from the edge of the pavement.

The transverse distribution of motor trucks

of over 2½-ton capacity, and the transverse distribution of busses are indicated in Tables 19 and 20 respectively. On 18 and 20-foot pavements the greatest concentration of right, rear-wheel passages of motor trucks and busses occurs between two and four feet from the curb in each direction of traffic, indicating that the heavier motor truck and bus traffic keeps approximately one foot closer to the edge of the pavement than passenger cars. It was observed on Cedar Road that slow-moving, heavily loaded trucks, which were hauling material to a construction job east of the point at which the transverse distribution of motor vehicles was recorded, accounted for the high percentage indicated in the lane nearest to the edge of the pavement in the east direction of traffic.

On pavements over 20 feet in width it is evident that truck and bus traffic fail to utilize to any extent the three feet nearest the edge on each side of the pavement. With an increase in

Table 19—Transverse distribution of 2½-ton or larger motor trucks on highway pavements

Highway	Surface width	Direction of traffic	Total trucks observed	Distance from edge of surface, feet						Total
				1	2	3	4	5	6	
				Right rear wheel passages— percentage of total number						
Cedar Road, east of Warrensville Center Road	18	E	66	28.8 ¹	59.1	10.6	1.5	.....	.....	100.0
		W	44	6.8	50.0	31.8	9.1	.....	2.3	100.0
West Lake Road, west of Wagar Road	20	E	12	8.3	50.0	16.7	25.0	.....	.....	100.0
		W	33	3.0	30.3	48.5	15.2	3.0	.....	100.0
Northfield Road, south of Forbes Road	20	N	40	.....	45.0	35.0	15.0	5.0	.....	100.0
		S	35	.....	5.7	45.7	31.5	5.7	11.4	100.0
Euclid Ave., ² east of Chardon Road	18.7	E	58	1.7	17.3	48.3	15.5	6.9	1.7	91.4
		W	75	.....	4.0	29.3	32.1	22.6	5.3	93.3
Euclid Ave., ² west of Chardon Road	18.7	E	18	.....	.....	27.8	38.9	33.3	.....	100.0
		W	5	.....	.....	100.0	.....	.....	.....	100.0
Detroit Ave., east of Clague Road	32	E	79	.....	.....	2.5	11.4	29.1	31.6	74.6
		W	81	.....	.....	2.5	13.6	23.5	21.0	60.6
Lake Shore Blvd., east of Harland Ave.	38	E	25	.....	4.0	8.0	16.0	24.0	16.0	68.0
		W	13	.....	.....	.....	23.1	15.3	.....	38.4
U. S. Route 20, east of Wickliffe...	40	E	62	.....	.....	.....	.....	14.5	9.7	24.2
		W	68	.....	1.5	8.8	20.6	19.1	26.5	76.5

¹ Slowly moving trucks account for the high percentage in the first one-foot lane for eastbound traffic.

² Each direction is used as a one-way traffic route, separated by an 18.5 foot gravel center strip.

Table 20—Transverse distribution of motor busses on highway pavements

Highway	Surface width	Direction of traffic	Total busses observed	Distance from edge of surface, feet						Total
				1	2	3	4	5	6	
				Right rear wheel passages, percentage of total number						
Cedar Road, east of Warrensville Center Road	18	E	26	23.0	15.4	30.8	15.4	7.7	.....	92.3
		W	20	.....	45.0	30.0	5.0	20.0	.....	100.0
West Lake Road, west of Wagar Road	20	E	8	.....	.....	12.5	50.0	12.5	.....	75.0
		W	7	.....	28.6	71.4	.....	.....	.....	100.0
Northfield Road, south of Forbes Road	20	N	17	5.9	47.1	17.6	23.5	.....	5.9	100.0
		S	16	12.5	6.2	18.8	37.5	.....	.....	75.0
Euclid Ave., ¹ east of Chardon Road	18.7	E	36	2.8	.....	16.7	13.9	16.6	8.3	58.3
		W	39	.....	2.6	7.7	5.1	17.9	5.1	38.4
Euclid Ave., ¹ west of Chardon Road	18.7	E	36	.....	.....	.....	11.1	19.4	5.6	36.1
		W	42	.....	.....	16.7	21.4	11.9	16.7	66.7
Detroit Ave., east of Clague Road	32	E	29	.....	.....	.....	3.5	13.8	31.0	48.3
		W	26	.....	.....	.....	3.8	19.2	11.5	34.5
Franklin Ave., east of West 65th St.	32	E	144	.....	0.7	3.5	16.7	29.8	24.3	75.0
		W	127	.....	.....	0.8	12.6	24.4	22.3	60.1
Lake Shore Blvd., east of Harland Ave.	38	E	33	.....	.....	9.1	36.4	18.2	18.2	81.9
		W	38	.....	5.3	18.4	5.3	10.5	18.4	57.9
U. S. Route 20, east of Wickliffe...	40	E	28	.....	.....	.....	.....	.....	.....	0.0
		W	30	.....	.....	.....	3.3	3.3	6.7	13.3

¹ Each direction is used as a one-way traffic route, separated by an 18.5 foot gravel center strip.

Table 21—Average position on pavement of passenger cars during period of maximum traffic and average clearance between cars passing in opposite directions

Highway	Surface width	Direction of traffic	Average distance of right rear wheel from edge of surface				Average clearance between passenger cars passing in opposite directions during maximum traffic period
			In direction of maximum passenger car traffic	Passenger car traffic in opposite direction from maximum	Passenger cars passing in opposite directions during maximum traffic period		
			Feet	Feet	Feet	Feet	Feet
Cedar Road, east of Warrensville Center Road	18	E	...	4.3	.....	3.2	1.1
		W	4.1	.....	3.3	.....	.....
West Lake Road, west of Wagar Road	20	E	4.7	.....	4.1	.....	2.4
		W	.....	3.7	.....	3.1	.....
Northfield Road, south of Forbes Road	20	N	.....	4.1	.....	3.2	1.9
		S	5.3	.....	4.5	.....	.....
Detroit Ave., east of Clague Road	32	E	8.4	.....	7.3	.....	6.7
		W	.....	8.2	.....	7.5	.....
Lake Shore Blvd., east of Harland Avenue	38	E	.....	7.9	.....	7.8	11.2
		W	9.7	.....	8.6	.....	.....
U. S. Route 20, east of Wickliffe	40	E	.....	10.3	.....	9.3	11.7
		W	9.7	.....	8.6	.....	.....

width there is an increasing tendency for motor vehicle traffic to operate more towards the center of the pavement.

The average position on the pavement of the right, rear wheel of passenger cars during the hour of maximum traffic, separated into cars moving freely in one direction and cars passing vehicles moving in the opposite direction, together with the average clearance* of cars in the latter class for highways of various pavement widths are shown in Table 21.

Passenger cars on an 18-foot highway when passing vehicles moving in the opposite direction travel approximately one foot nearer the edge of the pavement than when they are not passing other vehicles.

The average clearance between passing passenger cars on an 18-foot pavement is approximately one foot, while on a 20-foot pavement the average clearance ranges from 1.9 to 2.4 feet. On both 18 and 20-foot pavements, drivers of passenger cars apparently prefer to sacrifice clear-

*It is assumed that the total width of passenger cars is 5.7 feet and the gauge 4.7 feet.

ance rather than drive close to the edge of the pavement.

The average distance of rear-wheel passages of passenger cars from the edge of the pavement on 32, 38, and 40-foot highways is over 8.0 feet. The average clearance of passenger cars passing in opposite directions ranges from 6.7 feet on the 32-foot pavement to 11.7 feet on the 40-foot road.

To encourage safety and to develop maximum utilization of total pavement width on two-lane traffic routes, shoulders should be properly maintained, obstacles should be sufficiently removed from the edge of the pavement, raised curbs should be eliminated where possible, and parking on the two-lane surface prohibited.

A three-lane pavement such as the 32-foot width on Detroit Road seems to be justified only when there is a heavy peak hour traffic and two lanes are used for traffic moving in one direction.

With the expected increase in traffic on Lake Shore Boulevard, and U. S. Route 20, maximum efficiency in utilization can be obtained by lane-marking the pavement.

FORECAST OF HIGHWAY TRAFFIC

SINCE no historical series of highway traffic records is available for the Cleveland regional area it is impossible to estimate future traffic on the various highways of the area directly from past highway traffic trends.

In the States of Maine, Maryland, Massachusetts, Michigan and Wisconsin, where historical series of traffic growth are available, highway traffic and motor vehicle registration have increased at approximately equal rates. The similarity of increase of traffic on the various highways of these States and the increase of motor vehicle registration has occurred despite variations in location, population density, rates of population growth, and industrial and agricultural development.⁷

A forecast of future traffic for a period of ten years for each county of the regional area, based on the increase in registration in each county, and the resulting factors of traffic growth applied to the 1927 traffic using the highways of the several counties represents estimated future traffic with reasonable accuracy within the practical limits of highway planning for various densities of traffic.

The increase of registration, and its related factor of growth of highway traffic, is a function of two variables: (1) the increase in population, and (2) the increase in ownership and use of motor vehicles in proportion to population, measured by the number of persons per motor vehicle.

The county is the smallest practical unit for analysis of population and motor vehicle registration trends in the Cleveland regional area.

Motor vehicle registration, population, and persons per car from 1920 to 1927 and estimates to 1937 for each of the counties of the area are shown in Appendix III.

⁷ For detailed presentation of highway traffic and motor vehicle registration data in these States see "The Maine Highway Transportation Survey," *Public Roads*, Vol. 6, No. 3, May, 1925; "Report of a Study of Highway Traffic and the Highway System of Cook County, Illinois," 1925; "Report of a Survey of Transportation on the State Highway System of Connecticut," 1926; and "Report of a Survey of Transportation on the State Highway System of Ohio," 1927.

Registration figures for the regional area are available for the years 1920 to 1927 only. Although this is a relatively short period for the determination of the future trend in motor vehicle registration in the area its accuracy as the basis of the future trend is indicated by Appendix Figure 2, in which a trend for the entire State of Ohio based upon registration from 1920 to 1927 is compared with a trend based upon a longer period from 1913 to 1924. Only a slight variation is found between the 1920-1927 trend and that based upon the years 1913 to 1924.

The 1913-1924 trend was prepared for the "Report of a Survey of Transportation on the State Highway System of Ohio." At that time no registration data were available beyond the year 1924. The black circles, representing the actual registration in Appendix Figure 2, show that the amount of error in estimates based upon the 1913-24 trend is very small.

The fact that the trend of registration in the State based upon the 1920-27 data never varies more than three per cent from the 1913-24 trend indicates that a reasonably accurate trend of registration in the regional area is obtained when registration figures for the years 1920-27 are used as the basis.

Motor vehicle traffic data for years subsequent to those published in prior traffic survey reports⁸ have recently become available for the States of Maryland and Wisconsin. Traffic and registration data for Maryland include the additional years of 1925 and 1926; the corresponding data for Wisconsin include the additional years 1925, 1926 and 1927. In both States the close agreement of the rates of increase of traffic and of registration during the whole period is shown in Appendix Figure 3, thus emphasizing on the basis of more recent data, that a projection of the trend of motor vehicle registration for comparatively short periods of years is a reasonably accurate measure of traffic growth on a highway system.

⁸ See footnote 7.

The trend of motor vehicle registration for each of the counties indicates an increase in registration and a corresponding increase of highway traffic on the highways from 1927 to 1937 as shown in Table 22.

Table 22—Estimated increase in motor vehicle registration and highway traffic¹

County	Increase 1927-1932	Increase 1927-1937
	Per cent	Per cent
Cuyahoga.....	45	73
Geauga.....	12	17
Lake.....	19	37
Lorain.....	39	58
Medina.....	10	13
Portage.....	24	38
Summit.....	48	85

¹ Based on actual registration trends 1920 to 1927, and estimated registrations for 1932 and 1937.

The estimated increase of traffic on the highways of Cuyahoga County is 45 per cent during the first five-year period, 1927 to 1932, and 73 per cent from 1927 to 1937. It is estimated that during the 15-year period from 1927 to 1942 traffic on the highways of Cuyahoga County will increase approximately 100 per cent. Although the Summit County increase of 85 per cent for the 10-year period exceeds that of Cuyahoga County, the density of traffic in 1927 on the highways of Cuyahoga County is far greater than on the highways of Summit County and the increase of 73 per cent means a considerably greater volume increase on the highways of Cuyahoga County than for any other county in the area.

The expected increase of traffic on the highways of Lorain, Lake and Portage Counties ranks second in importance to Cuyahoga and

Summit Counties, while the estimated increase for Geauga and Medina Counties is comparatively small.

The estimated increases in traffic correspond with population density, the rate of population growth and the motor vehicle ownership in each of the counties. Cuyahoga County in 1927 had 259,000 registered motor vehicles and produced most of the traffic on the highways of the Cleveland suburban area. Lorain with 25,500 and Lake with 12,900 registered motor vehicles produced a comparatively small part of the total traffic of the area. Motor vehicle ownership in Cuyahoga and Summit Counties is less intense than in the remainder of the area, there is therefore a greater potential opportunity for increase in motor vehicle ownership and traffic use in these counties.

The rates of increase as shown in Table 22 may be expected to measure the increase on the routes of the seven counties.

These rates of increase in registration have been applied to the 1927 density of traffic on the routes of each of the counties. In the case of routes carrying considerable volumes of through traffic, the estimate of increase is very conservative.

The estimated traffic for each route is shown in Appendix I.

Recreational, suburban, and industrial developments and changes affecting the present highway system as to location of new routes and improvement of present routes will influence the increase of traffic on short sections of highway. It is not expected that the 1932 and 1937 estimates of traffic will reflect in all cases the actual traffic in these years, but that the estimates will measure with reasonable accuracy highway traffic on the U. S., State, and county highways in the area.

CLASSIFICATION OF HIGHWAYS

THE determination of the type of surface with which the highways in the regional area should be improved depends principally upon the volume of present and probable future traffic. A high-type surface or a width of pavement in excess of a two-lane roadway cannot be economically justified for a highway carrying a small amount of traffic, nor can a low-type surface be justified in the case of a heavy traffic route. A scientific highway improvement program should be directed toward providing at the lowest possible cost the best possible highway system which will satisfactorily meet the demands of present and expected future traffic.

As one of the principal bases for the determination of the most serviceable type of surface, the highways in the regional area have been classified as major, medium, and minor traffic routes. Major traffic roads are those on which traffic now is or by 1937 will be over 1,800 vehicles a day; medium roads are those which now carry or by 1937 will carry between 700 and 1,800 vehicles a day; and minor roads those on which traffic will not exceed 700 vehicles a day in 1937. The traffic classes in 1927, 1932, and 1937, and the type of surface recommended for major, medium, and minor roads are shown below.

The approximate limits of the traffic classes of the major, medium, and minor traffic roads are based on experience in many States. In Ohio it has been found that traffic-bound sur-

faces carrying more than a daily average of 600 vehicles throughout the year can not be economically maintained. It has also been found that bituminous macadam surfaces carrying more than a daily average of 1,500 vehicles for the entire year can not be economically maintained.*

Because the traffic counts in the Cleveland regional area were taken during the months of September and October, when daily traffic is approximately 18 per cent greater in volume than average daily traffic throughout the year, the class limits of 600 and 1,500 vehicles a day were increased to 700 and 1,800 vehicles. These latter class limits were then used as the basis for the traffic classification of roads in the regional area.

The roads of the regional area classified as major, medium, and minor are shown in Figure 28. In Cuyahoga County, exclusive of the cities of Cleveland and Lakewood, 653.5 miles were so classified, and of this mileage there are 291.1 miles of major, 132.9 miles of medium, and 229.5 miles of minor roads (Table 23). Practically 45 per cent of the road mileage of Cuyahoga County is of the major class for which a type A surface is recommended; 20 per cent is of the medium class which requires a type B surface; and 35 per cent is classed as minor which means that it requires nothing better than a type C surface.

* See "Report of a Survey of Transportation on the State Highway System of Ohio," 1927.

Classification	Average daily traffic			Type of highway surface
	1927	1932	1937	
Major 1.....	1,800 or more	1,800 or more	1,800 or more	A. Rigid (concrete or brick, or equivalent)
2.....	700-1,800	1,800 or more	1,800 or more	
3.....	700-1,800	700-1,800	1,800 or more	
Medium 1.....	700-1,800	700-1,800	700-1,800	B. Flexible (bituminous macadam or equivalent)
2.....	less than 700	700-1,800	700-1,800	
3.....	less than 700	less than 700	700-1,800	
Minor.....	less than 700	less than 700	less than 700	C. Traffic bound

Outside of Cuyahoga County, on the highways covered by the survey in the regional area there are 240.2 miles of major, 182.6 miles of medium, and 187.5 miles of minor roads. The planning survey was concerned only with the principal roads outside of Cuyahoga County and consequently a considerable mileage of less important minor roads have not been included in the highway classification.

To clarify the discussion of the program of highway improvement, Cuyahoga County has been divided into seven sections as shown in Figure 29.

The governing factors in the selection of these sections were: (1) Traffic distribution, population density and topography; (2) conformity of section boundaries with city, village and township limits; (3) equality of section area as nearly as possible; and (4) inclusion in each section of the highways which primarily serve that section.

A comparison of the mileage of major, medium and minor roads in these sections and the percentage of total area in each are given in Table 24. The east-central section contains the greatest mileage of major traffic roads. Although it includes only 15.4 per cent of the total area and

Table 23—Mileage of major, medium and minor traffic roads in the regional area

County	Major		Medium		Minor		Total	
	Miles	Per cent	Miles	Per cent	Miles	Per cent	Miles	Per cent
Cuyahoga.....	291.1	44.6	132.9	20.3	229.5	35.1	653.5	100.0
Geauga.....	14.4	15.1	29.7	31.1	51.3	53.8	95.4	100.0
Lake.....	47.0	51.2	35.0	38.1	9.8	10.7	91.8	100.0
Lorain.....	35.7	30.8	44.4	38.2	36.0	31.0	116.1	100.0
Medina.....	30.0	26.2	11.4	9.9	73.3	63.9	114.7	100.0
Portage.....	38.3	47.0	37.4	45.9	5.8	7.1	81.5	100.0
Summit.....	74.8	67.5	24.7	22.3	11.3	10.2	110.8	100.0
Total.....	531.3	42.0	315.5	25.0	417.0	33.0	1,263.8	100.0

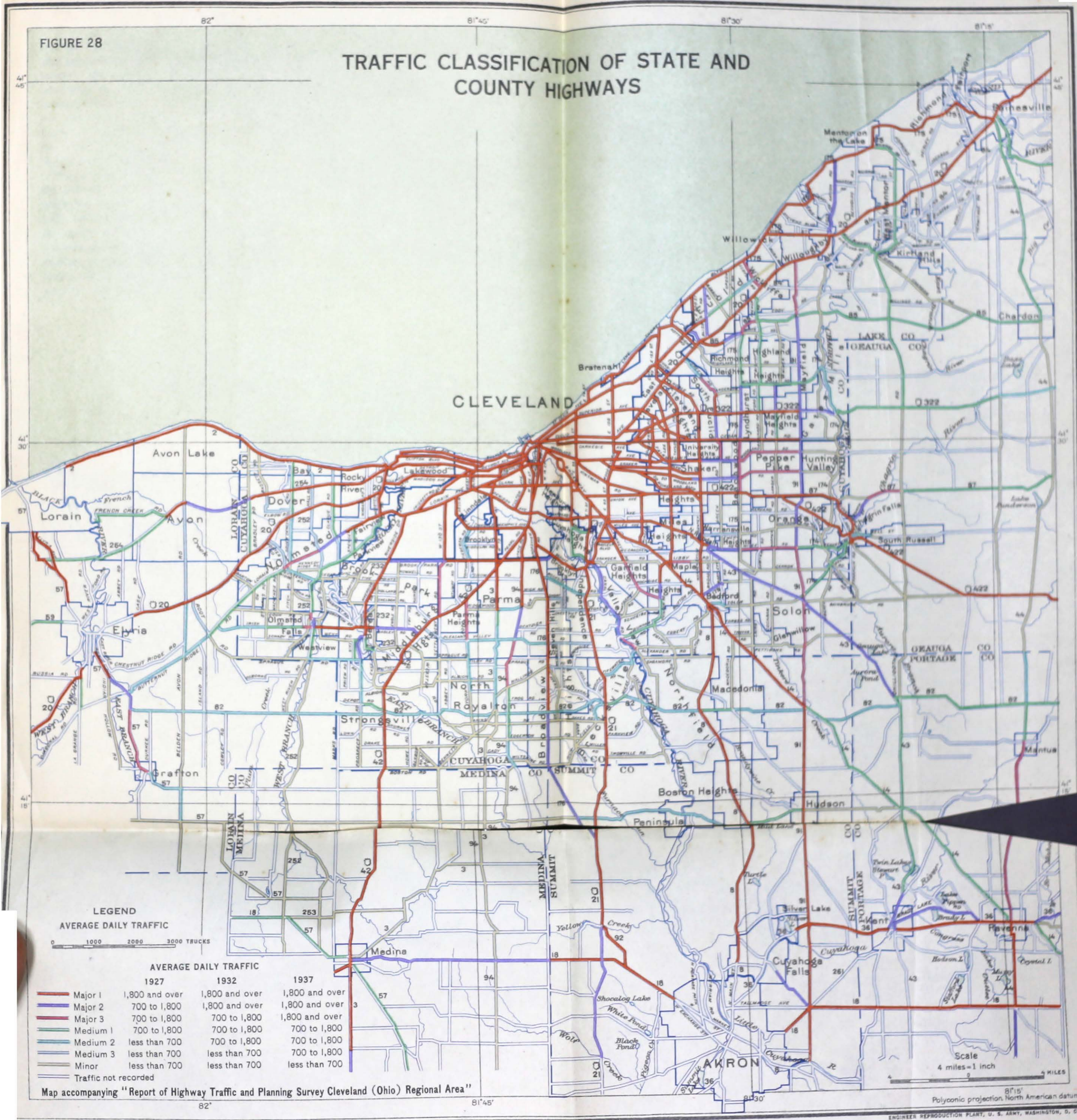
Table 24—Mileage of major, medium and minor roads in the seven sections of Cuyahoga County¹

Section	Major		Medium		Minor		Total		Per cent of total area
	Miles	Per cent	Miles	Per cent	Miles	Per cent	Miles	Per cent	
East-central.....	82.8	28.4	9.0	6.8	33.4	14.5	125.2	19.2	15.4
Northeast.....	53.8	18.5	17.8	13.4	20.6	9.0	92.2	14.1	14.3
Southeast.....	39.4	13.5	3.8	2.9	48.6	21.2	91.8	14.0	14.6
West-south-central.....	37.5	12.9	25.4	19.1	33.2	14.5	96.1	14.7	14.4
West.....	32.0	11.0	32.2	24.2	12.0	5.2	76.2	11.7	11.0
East-south-central.....	23.5	8.1	24.2	18.2	27.4	11.9	75.1	11.5	14.1
Southwest.....	22.1	7.6	20.5	15.4	54.3	23.7	96.9	14.8	16.2
Total.....	291.1	100.0	132.9	100.0	229.5	100.0	653.5	100.0	100.0

¹ Exclusive of the cities of Cleveland and Lakewood.

FIGURE 28

TRAFFIC CLASSIFICATION OF STATE AND COUNTY HIGHWAYS



LEGEND
 AVERAGE DAILY TRAFFIC
 0 1000 2000 3000 TRUCKS

	1927	1932	1937
Major 1	1,800 and over	1,800 and over	1,800 and over
Major 2	700 to 1,800	1,800 and over	1,800 and over
Major 3	700 to 1,800	700 to 1,800	1,800 and over
Medium 1	700 to 1,800	700 to 1,800	700 to 1,800
Medium 2	less than 700	700 to 1,800	700 to 1,800
Medium 3	less than 700	less than 700	700 to 1,800
Minor	less than 700	less than 700	less than 700
Traffic not recorded			

Map accompanying "Report of Highway Traffic and Planning Survey Cleveland (Ohio) Regional Area"

Scale
 4 miles = 1 inch
 0 4 MILES

Polyconic projection, North American datum.

ENGINEER REPRODUCTION PLANT, U. S. ARMY, WASHINGTON, D. C.

19.2 per cent of the total road mileage, it has 28.4 per cent of the major road mileage of the county. The northeast section also includes a percentage of major roads greater than its percentage of total area or road mileage. Over 60 per cent of the mileage of major roads in the county is located east of the Cuyahoga River in the area including the northeastern, east-central, and southeastern sections.

The mileage of medium roads is greatest in the southern and western parts of the county, where population density and the density of local traffic are comparatively low. This is the condition in the east-south-central, west-south-central, southwestern and western sections. These four sections, which include only 39.6 per cent of the major road mileage of the county, include 76.9 per cent of the medium road mileage.

The mileage of minor roads is greatest in the southeast and southwest sections. These two sections, which include approximately 29 per cent of the total road mileage of the county, contain about 45 per cent of the total mileage of minor roads.

It should be noted that, in addition to the classification of highways as major, medium and minor, other factors were considered in the final selection of surfaces in developing the plan of highway improvement. The volume of truck traffic, particularly of large-capacity trucks, soil, drainage, and climatic conditions, and the usability of existing pavements as sub-base for the new surface were features which, where it was deemed necessary, have modified the theoretical surface type determined on the basis of highway classification.

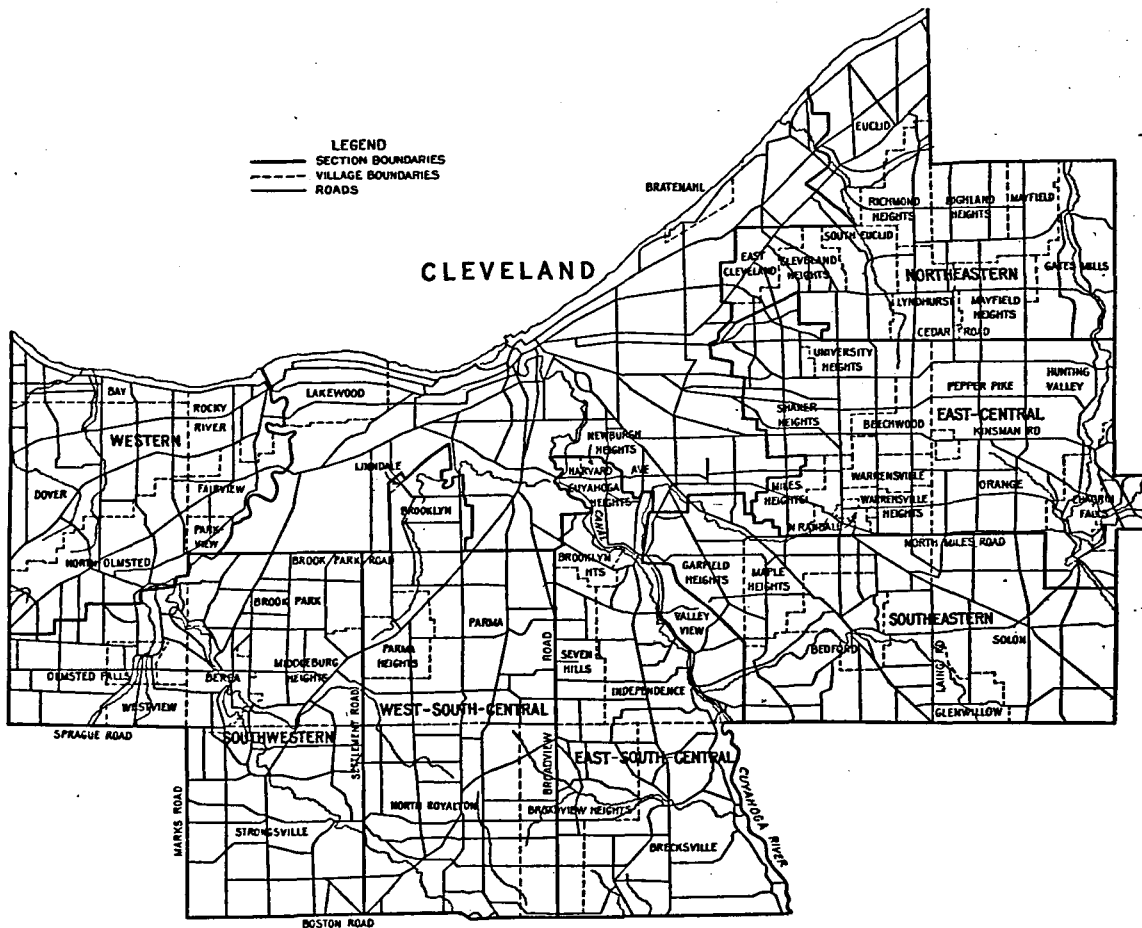


FIG. 29.—Traffic sections of Cuyahoga County

BASIS OF THE PLAN OF HIGHWAY IMPROVEMENT

IT IS the purpose of a highway system to provide direct, expeditious, and safe service to the motor vehicle traffic of the area. The adequacy of any system is measured by the degree to which it meets the demand for service of this character. The fundamental basis of highway planning is, therefore, present and expected future motor vehicle traffic, its volume, composition and distribution.

The first stage of the planning survey was, therefore, a detailed study of the motor vehicle traffic in the area, involving determination and analyses of the volume of traffic on each route, the composition of the traffic, its sources and destinations, and the expected growth in each section of the area. These data determine the present and expected future demands for traffic service.

The second stage was the determination of the highway facilities required to meet adequately the present and future traffic demands. The determination of the proper highway facilities for a given volume of traffic involves: (a) the selection of the most advantageous location for routes to be improved, (b) the adoption of the appropriate class of improvement, (c) the choice of the correct width of right of way and of roadway surface, and (d) the decision upon the treatment of obstructions most likely to promote the free and rapid movement of traffic.

In the selection of the most advantageous location for routes to be improved, principles of economy, which must always govern the expenditure of public funds, require the fullest possible utilization of the established rights of way and present improvements. Where no right of way exists or where the established right of way is inadequate, reconnaissance location surveys were made to determine the possibility and practicality of obtaining satisfactory locations.

The appropriate class of improvement is determined by the traffic classification, whether major, medium, or minor, into which the particular highway falls by reason of the density of its traffic.

From studies of the relative construction and maintenance costs of different types of highway improvement when subjected to varying volumes of traffic, in this area and in other sections of the country, it has been concluded that a certain general class of improvement is best adapted to highways of each of the three traffic classes. Application of these conclusions to the highways of the regional area results, it is believed, in a choice of a class of improvement for each route which will be most economical under the existing physical and climatic conditions.

The determination of the proper width of roadway surface was based upon detailed studies of the traffic capacity of roadways of various widths and of the transverse distribution of traffic upon the highways of the regional area. From these studies the following conclusions were drawn.

1. The roadway surface for all two-lane roadways should be 20 feet exclusive of space for parked vehicles. Roadways of 18-foot width in good condition are classed as satisfactory but these should be widened to a minimum of 20 feet when reconstruction is necessary. Surfaces less than 18 feet in width should be widened to a minimum of 20 feet as rapidly as conditions permit except in the case of extremely light traffic routes where the widening is less urgent.
2. Normal distribution of traffic requires an even number of traffic lanes. When the volume of traffic exceeds the capacity of a two-lane roadway a four-lane roadway (approximately 40 feet), exclusive of space for parked vehicles, is recommended. The three-lane roadway is found satisfactory in a few cases where there are very pronounced peak periods of traffic in alternate directions at different periods of the day and particularly when the acquisition of right of way for a four-lane roadway is extremely difficult or prohibitive in cost. The three-lane roadway, when used, requires lane marking and careful traffic control.

3. All roadways designed for more than two lanes of traffic should have complete lane marking and provision should be made for regulation of traffic in conformity with the lane marking.
4. Assuming that the roadway is designed for the accommodation of moving traffic, the choice of any width between 20 and approximately 40 feet, except in the relatively few cases where the three-lane roadway is satisfactory, is normally uneconomical, as the excess of width above 20 feet adds but little to the traffic capacity of the roadway. If the additional width is intended to provide space for parking, such widths as 22, 24 and 27 do not permit parking without obstruction of the normal traffic lanes.
5. Under open road conditions, *i. e.*, through areas outside of suburban development, with little local traffic and relatively infrequent cross routes, the normal traffic capacity of a two-lane roadway, at a traffic speed of 25 miles per hour, is approximately 10,000 vehicles per day. In suburban sections, with parking adjacent to the roadway surface, and a larger volume of cross traffic and local traffic, the capacity of a two-lane roadway is reduced to approximately 8,000 vehicles per day. An abnormally high proportion of large-capacity trucks, busses or other slow-moving vehicles will decrease these limits.

Roads now carrying or expected within the next fifteen years to carry 8,000 or more vehicles per day within the zone bounded approximately by Clague Road, Pleasant Valley Road, and Richmond Road (State Route 175) are therefore planned as 40-foot roadways to carry four lanes of traffic. Routes outside of this zone now carrying or expected to carry 10,000 or more vehicles per day are similarly planned. Routes expected to carry less than these amounts in the respective zones are planned as 20-foot, two-lane roadways.

In all cases the roadway widths as planned are designed for moving vehicles only. Space for parking of vehicles, where required, must be provided off the two or four-lane surface.

The normal traffic capacity of a roadway is frequently lowered by obstacles to the free movement of traffic, such as railroad crossings at grade, intersections with heavy traffic routes, sharp curves, steep grades, the use of the roadway by other utilities, especially traction lines, and developments adjacent to the roadway which produce heavy local traffic.

In addition to decreasing the traffic capacity of the route, railroad grade crossings also constitute accident hazards. To measure the influence of unseparated crossings on traffic capacity a series of time studies was made at selected grade crossings in the area. The time lost by traffic was found to vary with the volume of highway traffic, the number of trains, and with the type of railroad traffic. The program of grade crossing elimination was established on the basis of these studies and the accident hazard at each crossing as determined by reconnaissance surveys.

The proper treatment of intersections of heavy traffic routes is determined principally by the volume of traffic on each route and the number of vehicles making right and left turns at the intersections. Possible solutions of the problem at such intersections are: (1) To give traffic on one route the right of way; (2) to construct circular intersections; (3) to provide facilities for circulatory movement by opening connected by-passes around the intersection; and (4) to separate the grades and provide ramp connections.

Curves and grades over 5 per cent which reduce traffic capacity can frequently be eliminated by minor relocations of the roadway.

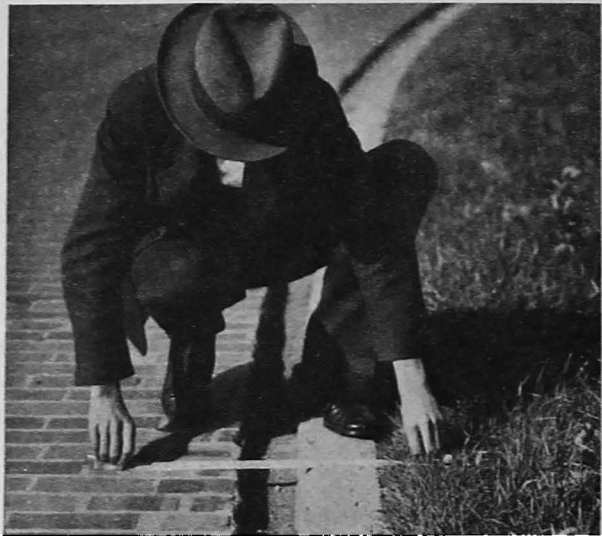
The use of the roadway by other utilities, particularly street car and local motor bus lines, usually causes a marked decrease in the traffic capacity. On routes which carry a large number of mass transportation vehicles the most satisfactory solution is the development of parallel routes which do not carry this type of traffic.

As a result of these series of studies the required highway facilities for each section of the area were determined.

The third stage of the planning survey involved a detailed engineering study of the present highway system including surfaces and structures.

The purpose of this study was to obtain complete information regarding the present condition of each section of highway in the area.

The type, design, specifications, width and date of construction of the existing surfaces on each section of highway were tabulated from construction records. These data were supplemented by careful condition inspections of each route, including the determination of surface roughness



A member of a condition survey party at work

by the use of a roughometer, check measurements of surface thickness, observations of surface cracking, scaling, and shattering, areas patched or repaired, shoulder condition, drainage conditions, and other factors influencing the serviceability of the routes.

On the basis of these inspections routes were classified as to condition into the following classes:

- A1. Pavements in good condition and supporting traffic. Surfaces of this class are reasonably smooth, show no evidence of failure, and are in such condition that they can be used as integral parts of future improvement.
- A2. Pavements supporting present traffic but rough and irregular. Such pavements show no evidence of foundation failure, but require resurfacing to transform them into class A1 improvements.
- B1. Pavements showing signs of disintegration or failure, but having reasonably smooth surfaces. These are suitable for use as subbases for new surfaces.
- B2. Pavements disintegrating or disintegrated and having rough irregular surfaces. These show evidence of foundation failure, but are suitable as subbases for new surfaces of adequate thickness.
- C1. Surfaces worn out or so thoroughly disintegrated as to be of no value in place. The material may have a salvage value after removal from the pavement and processing.
- C2. Surface completely disintegrated. The materials comprising these surfaces have no salvage value.

This condition classification, together with an estimate of the remaining life of the present surface, considered in conjunction with the traffic classification, determined the plan of improvement for present surfaces, except as to surface width. The present width of the surfaces compared with the required roadway capacity as determined by present and expected future traffic and the traffic capacity studies, determined the plan of improvement as to width.

The results of the detailed study of the major and medium traffic routes in the regional area in respect to type and condition are shown in Table 4, and in respect to surface width in Table 5. Both types of information are shown on the map, Figure 30.

Of the major and medium traffic roads in Cuyahoga County, 77 per cent are improved with brick, concrete, or bituminous pavements or equivalent surfaces adequate in surface condition for 10 years' further service. The corresponding proportions in the other counties are: Lake, 79 per cent; Geauga, 71 per cent; Portage, 51 per cent; Summit, 83 per cent; Medina, 61 per cent; and Lorain, 70 per cent. The remaining mileage of major and medium traffic routes in each county will require rebuilding within the 10-year period.

A considerable mileage in each of the counties, which is adequate in surface condition, has surfaces too narrow for traffic requirements. Of

the mileage of major and medium traffic routes in Cuyahoga County, 38.3 per cent is surfaced less than 18 feet in width—the minimum for a satisfactory two-lane roadway. The corresponding percentages in other counties are: 50.4 per cent in Lake County; 90.5 per cent in Geauga County; 76.7 per cent in Portage County; 52.6 per cent in Summit County; 55.9 per cent in Medina County; and 64.1 per cent in Lorain County. These routes require widening in order to provide adequate traffic service.

To facilitate the analysis of the mass of evidence considered in planning the improvement of the existing routes, all data available for each route in the area were assembled on log sheets, of which a typical sample is shown in Figure 31. This form summarizes all the facts as to the present roadway, the traffic which it carries, and the condition and estimated life of the present roadway. Similar data and forms were compiled for each route in the area.

Figure 31 presents these data for Broadway (State Route 14) from the Cleveland city line to Twinsburg in Summit County. Applying the planning principles developed, this route should be a four-lane major-type roadway from the Cleveland line to its junction with Northfield Road (State Route 8) and a two-lane, 20-foot, major-type of construction from this junction to Twinsburg. Comparison of these requirements with the present improvements and their condition establishes the required plan as follows: New construction of major type, 48 feet wide from the Cleveland city limits to McCracken Road, and reconstruction and widening to 20 feet of major type between the Cuyahoga County line and Twinsburg. The remaining sections are classed as satisfactory since the sections from McCracken Road to Harrison Avenue, and from Tinker's Creek to the Summit County line are under contract for adequate improvement. The section between the Cleveland city limits and McCracken Road is planned for 48-foot rather than 40-foot width in order to form a roadway uniform in width with the section between McCracken Road and Harrison Avenue where the center strip is being paved to provide a 48-foot roadway. Through the business section of Bed-

ford traffic is impeded by parking and electric railway tracks. Widening of this section to provide four free traffic lanes would be prohibitive in cost and a relief route is therefore provided by the Northfield Road extension.

Similar procedure was followed in planning all routes.

Reconnaissance Surveys

In order to develop adequate and practicable remedies for the correction of the traffic difficulties which were found to exist, an extensive reconnaissance of the entire area of the regional survey was necessary. Reference to Figures 1 and 4 will disclose that a study of the highway and street maps of the region was not sufficient to determine whether complete relief could be secured for the unsatisfactory condition found.

In each case the plan recommendations made in this report and shown in Figure 32, for the extension of, or completion of gaps in, present routes; the opening of new routes; the location and construction of bridges; the location and construction of railroad grade crossing eliminations; and the elimination of highway grade intersections are based upon careful reconnaissance surveys and studies of the proposed improvements. By means of enlarged sections of topographic maps of the U. S. Geological Survey, paper locations and profiles of alternative solutions of each problem were made and then compared with conditions on the ground. Consideration was given to all engineering features, and in addition special attention was paid to the development in the vicinity of each proposed improvement, which might affect right-of-way matters. It is believed that the locations that have been suggested offer a satisfactory and economical solution of traffic distribution problems. Estimates of the probable cost of the suggested features were based on quantities computed from the paper locations. Examples of the locations selected are shown in Appendix Figures 4, 5, and 6.

In all, 127 miles of extensions and new roads were thus handled, 69 grade crossings, 45 bridges, and 6 highway grade crossing separations. For such work as that involved in the lakefront routes east of the Cuyahoga River and at the mouth of

ROAD NAME *Broadway*

CONTROL POINTS	1	2	3	4	5	6
	<i>Madison City, Tenn.</i>	<i>McMinnon</i>	<i>Leitch Creek</i>		<i>Harrisonville</i>	<i>Frankfield, Tenn.</i>
PRESENT RIGHT OF WAY WIDTH						
PRESENT ROADWAY WIDTH		18'	2-15' Drivks 18' <i>centerline</i> (Under <i>control</i>)		2-15' Drivks 18' <i>centerline</i>	
PRESENT TYPE		<i>Arisek</i>	<i>Arisek</i>		<i>Arisek</i>	
YEAR BUILT		1907	1924-26		1924-26	
TOTAL TRAFFIC - AVERAGE DAY	3078		3885	3141	7800	10160 ³⁰⁴⁴
TOTAL TRAFFIC - SUNDAY	3649		4818	4002	15217	14504 ⁵⁶¹¹
TOTAL TRAFFIC - AVERAGE WEEK DAY	2701		3552	2852	6363	8358 ⁶⁵⁷⁸
TOTAL TRAFFIC - 1932	4460		5630	4552	11310	14730 ¹¹⁶⁶⁰
TOTAL TRAFFIC - 1937	5300		6700	5400	13500	17600 ³⁹⁰⁰
PERCENT OF AVERAGE WEEK DAY 7-9 AM	12.8		11.6	11.2	13.5	12.0 12.0 13.4
PERCENT OF AVERAGE WEEK DAY 4-6 PM	16.2		15.7	15.7	12.5	14.4 16.5 16.9
PERCENT OF AVERAGE WEEK DAY 6-8 PM	11.0		14.0	14.2	12.0	12.2 12.7 13.4
MAXIMUM HOUR - AMOUNT	525		574	480	1826	2340 1873 724
MAXIMUM HOUR - HOUR	4		4	4	4	4 4 4 4
TRUCK TRAFFIC						
MAXIMUM HOUR - AMOUNT	65		76	48	93	118 77 38
MAXIMUM HOUR - HOUR	11.0		3	3	1	12 11.0 11.0
AVERAGE WEEK DAY	649		608	418	676	1052 701 275
AVERAGE DAILY - 3 TO 5 TON TRUCKS	70		76	49	59	70 81 24
AVERAGE DAILY - 5 TO 7 TON TRUCKS	163		52	30	31	38 32 13
TRAFFIC CLASSIFICATION		<i>Major</i>	<i>Major</i>		<i>Major</i>	
CONDITION CLASSIFICATION		<i>B - Salvable for material only</i>	<i>A - Satisfactory for 10 years or more</i>		<i>A - Satisfactory for 10 years or more</i>	
ESTIMATED LIFE OF PAVEMENT			10 Years		10 Years	
LENGTH		2.02 Miles	2.56 Miles		1.60 Miles	
DESIGN		<i>48' New Construction</i>	<i>Satisfactory</i>		<i>Satisfactory</i>	
CONSTRUCTION PLAN		<i>New Construction - 48' High Type Surface</i>	<i>Satisfactory</i>		<i>Satisfactory</i>	

Note: Estimated cost of improvement determined for each section of road

FIG. 31.—Typical highway log sheet

Rocky River and for the major bridges, designs were made in sufficient detail to establish a satisfactory preliminary estimate.

Several of the recommendations, such as the Valley Road-Independence development, the Brook Park extension across the Cuyahoga Valley, and the relocation of the northern end of Brecksville Road, involve crossing the Cuyahoga River at a low elevation. The designs for these crossings of the main channel of the Cuyahoga River and its flood plain presented a hydrographic problem which was given special investigation in order to insure that the proposals made will not aggravate flood conditions by retarding stream discharge, and at the same time establish a satis-

factory minimum height for causeway and bridge construction on these routes.

The Design of New Pavements and Reconstruction of Existing Pavements

Estimates for new pavement construction are based on designs of tested serviceability conforming to the best current practice. The large amount of reconstruction and widening required necessitated the development of an unusual variety of special cross-sections designed to utilize to the greatest possible degree the existing pavements, bases in place, or to employ material salvable from the present surfaces. In all, 26 different designs were developed which, with changes

7		8		9		10		11		12		13			
Mainline Road		Shoulder Road		Shoulder Road		Shoulder Road		Shoulder Road		Shoulder Road		Shoulder Road			
30'								14'							
Aluminous Concrete								Gravel							
Under Contract 1928								1915							
2370		2175		1850		1847						2279			
4223		3876		3298		3292						4005			
1958		1794		1528		1522						1898			
3440		3150		2680		2680						3370			
4100		3800		3200		3200						4200			
13.7		13.3		13.2		13.0						12.9			
17.0		16.8		17.2		16.9						16.5			
14.4		13.9		13.2		13.1						12.5			
507		465		398		395						444			
4		4		4		4						6			
24		21		8		14						30			
10a		10a		3		10a						10a			
183		187		142		148						223			
18		15		11		11						19			
7		8		7		8						6			
Major								Major							
A - Satisfactory for 10 years or more								B - Good for sub-base							
10 Years +															
3.01 Miles								3.60 Miles							
Satisfactory								20' Deck Construction Reconstruction and Widening - 20' High Type Surface							

Fig. 31.—Typical highway log sheet—Continued

in width possible in most of the designs, provide for approximately 50 different cross-sections. Examples of these cross-sections are shown in Appendix Figure 7.

These designs are to be considered as typical and are for general application. They are not intended to apply specifically to any particular section of road.

It is expected that the engineer using them will adapt them to meet existing conditions. The reconstruction designs are symmetrical with reference to the center line of the roadway, and provide for different amounts of widening. There will be cases in which the widening will be greater on one side than on the other, for some of the present pavements are not centered on

the right of way; and there are extreme cases in which all the widening will be on one side. For these cases the typical designs will require modification.

The designs for reconstruction and widening show a subbase of stone or gravel under one side and not under the other. This indicates the use and place of subbase when needed. In general, such subbases should be introduced under all flat curbs used for widening up to 3 feet in width and they may be required under wider curbs. Such base support may be omitted only where the natural soil is of a sandy or gravelly nature. It should not be omitted on clay or heavy loam soils.

The designs are grouped in series as follows:

1. New pavements.
2. Widening and retopping with bituminous concrete.
3. Widening and retopping with cement concrete.
4. Miscellaneous widening and resurfacing.

In series 1 there are five designs, representing modern practice for concrete, bituminous concrete, brick, and bituminous macadam construction. Two concrete pavement designs are included—one with the usual type of thickened edges, and the other with lip curbs. The design with lip curbs will be found useful on grades where the soil easily erodes. Its use requires especial care in providing properly located outlets

at sags in the grade, and at points where this design is discontinued. The weight of designs is shown for average good conditions. In locations where unusually heavy construction is needed the engineer must select and adjust his designs accordingly.

Series 2 shows a variety of methods for widening and retopping different types of old pavements in cases where the use of bituminous concrete is suggested for the new surface.

Series 3 shows a similar variety of cases where the retopping is to be of cement concrete.

Series 4 shows a group of miscellaneous cases which will arise where bituminous macadam, brick, and concrete pavements are to be widened and used with or without new surface courses as may be required.

THE PLAN OF HIGHWAY IMPROVEMENT

THE plan of highway improvement is designed to provide highway facilities adequate for the accommodation of traffic during the next 10 years, and to furnish a complete and balanced highway transportation system for the entire area, making use of the present highways and improvements to the fullest possible extent. New routes are proposed only where essential links of a complete transportation system are missing or where adequate traffic capacity can not practicably be obtained on present routes.

It involves an extensive program of widening and reconstruction of present surfaces and structures and the construction of adequate improvements where there are now gaps in the system. The widening program will increase the width of the present pavements to that required by the volume of present and expected future traffic or to that possible on existing or obtainable right of way. Widening beyond four free lanes for moving traffic is not contemplated. The concentration of more than four lanes of traffic on one route results in serious congestion at focal and central discharge points, and the cost of acquiring additional right of way for a roadway of more than four-lane width with necessary provision for parked vehicles is usually prohibitive. Traffic can be more economically served by the provision of a larger number of four-lane roads. Furthermore the traffic capacity of routes providing more than four lanes for moving traffic and their capacity relation to two-lane and four-lane routes has not been finally determined.

The condition of the surface on a considerable mileage of these routes necessitates reconstruction as well as widening. On a few routes where present width is adequate, reconstruction without widening is required. The new construction program on established highways involves the improvement of routes or sections of routes that are now unimproved, or of sections on which present improvements are in such poor condition as to be worthless except possibly by salvaging the material.

In each of the counties of the regional area highway reconstruction and widening has been in progress during the past few years. In Cuyahoga County a large number of vitally necessary reconstruction and widening improvements have been completed during the past year or will be completed during the 1928 construction season. Among the more important of these projects are the following:

Wooster Road from Rocky River Bridge to Lorain Avenue

Center Ridge Road from Wooster Road to the east limits of Dover Village

Lorain Avenue from Rocky River to the Lorain County line

Wooster Pike from York Road to the Medina County line

State Road from near Ridgewood Drive to the Medina County line

Brecksville Road from Rockside Road to the Summit County line

South Miles Road from Warrensville to the Geauga County line

North Miles Road from Green Road to Chargin Falls

South Woodland Road from Warrensville Center Road to S. O. M. Center Road

North Woodland Road from Belvoir Boulevard to S. O. M. Center Road

Mayfield Road from Warrensville Center Road to the Geauga County line

Lee Road from Miles Avenue to the south limits of Shaker Heights Village and Monmouth Road to Superior Road

Warrensville Center Road from Mayfield Road to the south limits of Shaker Heights Village

These improvements, initiated prior to or during the period of the cooperative survey, are generally in agreement with the findings of the survey and reduce materially the Cuyahoga County reconstruction and widening program necessary during the 10-year period of the plan.

The current highway improvement program in those sections of Geauga, Lake, Lorain, Medina, Portage, and Summit Counties which were included in the regional area also conforms generally with the findings of the survey and serves to reduce the required 10-year program in these counties.



RECONSTRUCTION AND WIDENING IN PROGRESS DURING THE 1928 SEASON

*Above—Preparing for the reconstruction of Wooster Road
Below—Curve widening on the Brecksville Road at Wallings Road*

Table 25—Summary of 10-year plan of improvement in the regional area

A. Roadways				B. Structures			
Proposed construction	Width		Total	Proposed construction	On existing routes	On new routes	Total
	40 feet	20 feet					
New routes, miles.....	45.6	57.3	102.9	Bridges, new, number.....	4	16	20
Widening, miles.....	51.3	106.1	157.4	Bridges, replacement or widening, number.....	17	..	17
Reconstruction and widening, miles.....	27.8	199.8	227.6	Railway grade separations, number.....	55	12	67
Reconstruction, miles.....	1.6	4.7	6.3	Highway grade separations, number.....	..	4	4
New construction, miles....	5.4	70.8	76.2	Total, number.....	76	32	108
Total, miles.....	131.7	438.7	570.4	Structures in City of Cleveland			
New routes in City of Cleveland, miles.....	22.2	2.3	24.5	Bridges, new, number.....	..	8	8
Grand total, miles....	153.9	441.0	594.9	Railway grade separations, number.....	..	2	2
				Highway grade separations, number.....	..	2	2
				Total, number.....	..	12	12
				Grand total, number...	76	44	120

The plan of highway improvement for the regional area is shown in Figure 32. This map shows the approximate location of each improvement project and the class of improvement required. The approximate location of new routes is shown by the solid red lines. Improvements on present routes are classified as widening, reconstruction and widening, reconstruction without widening, and new construction and the several classes of improvement are indicated by distinctive colors within the roadway lines. Solid colors represent improvements required during the first five years of the plan period and broken lines those required during the second five years of the period. The required highway structures, such as bridges and railroad grade crossing eliminations, are also shown in their approximate lo-

cation. The location of new routes and structures in the Cuyahoga River Valley between Lake Erie and Rockside Road, and their relation to existing city streets and county highways are shown in detail in Appendix Figure 8.

A summary of the mileage of roadway improvements and the number of highway structures is shown in Table 25. A detailed description of the plan with respect to roadways, detailing their width, type, class, and period of construction is shown in Appendix IV; and a similar description of the required highway structures is given in Appendix V.

The plan for the entire regional area involves 595 miles of highway improvement, and 120 structures, as shown in Table 25.

THE PLAN OF HIGHWAY IMPROVEMENT IN CUYAHOGA COUNTY

THE plan for Cuyahoga County and for the new arterial routes within the City of Cleveland involves 281 miles of surface and 65 structures, as shown in Table 26.

The Northeastern Section of Cuyahoga County

The northeastern section of Cuyahoga County, which includes the densely populated area north of Cedar Road, produces a large volume of traffic which moves daily between this section and the City of Cleveland. In addition to this locally originated traffic the highways of the section must carry the large volume of traffic which originates in Lake County and the area to the northeast. This combined local and through traffic results

in loading to capacity the main highways of the section. The principal direction of the traffic movement is into and out of the City of Cleveland; and traffic demands can be met by providing adequate arterial routes to the city with proper connections between these routes.

The principal routes in this section are Euclid Avenue, Lake Shore Boulevard, Mayfield Road and St. Clair Avenue.

Euclid Avenue (U. S. Route 20) carries a daily traffic of 32,300 vehicles east of the junction with Superior Avenue, 22,800 at Noble Road, and 8,600 at the Cuyahoga County line. The roadway width from the City of Cleveland to the county line is approximately 56 feet, consisting of two approximately 18-foot brick pave-



EUCLID AVENUE AT CHARDON ROAD

The two 18-foot brick pavements are in good condition; but the center strip should be paved to increase the traffic capacity of the roadway

Table 26—Summary of 10-year plan of improvement in Cuyahoga County

A. Roadways

Proposed construction	Width		Total
	40 feet	20 feet	
New routes, miles.....	29.8	31.9	61.7
Widening, miles.....	32.1	36.8	68.9
Reconstruction and widening, miles.....	21.4	67.6	89.0
Reconstruction, miles.....		4.7	4.7
New construction, miles.....	5.4	26.4	31.8
Total, miles.....	88.7	167.4	256.1
New routes in City of Cleveland, miles.....	22.2	2.3	24.5
Grand total, miles.....	110.9	169.7	280.6

B. Structures

Proposed construction	On existing routes	On new routes	Total
Bridges, replacement or widening, number.....			
Railway grade separations, number.....	27	11	38
Highway grade separations, number.....		4	4
Total, number.....	28	25	53
Structures in City of Cleveland			
Bridges, new, number.....		8	8
Railway grade separations, number.....		2	2
Highway grade separations, number.....		2	2
Total, number.....		12	12
Grand total, number...	28	37	65

ments with an unpaved center strip. The brick pavements are in good condition. Because of the large present volume of traffic and its rapid growth, as well as the large volume of truck and bus traffic, the center strips should be improved to permit its free use as part of the surfaced roadway.

Lake Shore Boulevard carries a daily traffic of 12,400 vehicles at the city line, 8,850 at Bliss Road and 5,100 at Vine Street in Lake County. It is improved with two 18-foot strips of brick in good condition and with a macadam center strip of approximately 18 feet. This improvement is considered as satisfactory for a 10-year period.

Mayfield Road (U. S. Route 322) carries a daily traffic of 3,900 vehicles west of the junction with Kenilworth Road, 10,000 east of this junction, 11,400 west of Taylor Road, 5,200 west of Richmond Road and 1,200 in Gates Mills. This route is well improved with pavements in good condition and of various widths, including sections with 24 and 32-foot pavements, and others with two 19½-foot strips, and two 18-foot strips. This route is considered satisfactory for 10 years.

St. Clair Avenue outside the city carried very little traffic largely because of its condition east of Bliss Road and the construction of a railroad grade separation at Bliss Road where St. Clair Avenue crosses the New York Central Railroad. Daily traffic at the city line was 1,950 vehicles and at the county line 450 vehicles. This roadway is satisfactory for a 10-year period west of Bliss Road. East of this point it is made a part of a new arterial route from the center of Cleveland to Painesville, and is recommended for 40-foot width.

Chardon Road (State Route 85) carries a daily traffic of 2,200 vehicles at its junction with Euclid Avenue, 1,500 vehicles at Richmond Road and 1,050 vehicles at the county line. Through Euclid village this route is now improved with a 30-foot pavement in good condition, and through Richmond Heights village widening of the present surface to 20 feet is in progress. Upon the completion of this project this route will be satisfactory for the 10-year period.

On Coventry Road a short section just north of Mayfield Road requires reconstruction and widening. This route carries a daily traffic of 5,100 vehicles at Superior Road and 10,400 vehicles north of Euclid Heights Boulevard.

Lee Road, which is the first continuous north-south route east of the city and which traverses a densely populated section, requires improvement north of Mayfield Road in order to provide

sections are too narrow to accommodate two lanes of traffic on each strip and paving of the center strip is therefore recommended. The utilization of this section will also be increased by the proposed northerly connection from this route to Euclid Avenue via parts of Bluestone Road and Belvoir Boulevard.

Green Road from Cedar Road to Euclid Avenue requires rebuilding. It is at present a 14-



LAKE SHORE BOULEVARD AT EAST 115TH STREET

Beyond the intersection the pavement consists of two 18-foot strips of brick and macadam center strip. This improvement is considered satisfactory for a 10-year period

a connected route through to Euclid Avenue. Reconstruction and widening is also required on a short section just south of Euclid Avenue. This important belt-line route, because of its condition, carries only 1,800 vehicles north of Mayfield Road. Upon completion of the necessary improvements this traffic will be greatly increased and it is therefore recommended as a 40-foot roadway.

Noble Road from its connection with Warrensville Center Road at Mayfield Road to the south limits of East Cleveland is a 50-foot roadway, improved with two 16-foot strips. These

foot roadway in such condition as to require the construction of a new pavement. At the northern end a relocation connecting with Belvoir Boulevard and Euclid Avenue is planned to eliminate the heavy grade just south of Euclid Avenue.

Richmond Road (State Route 175) is one of the outer belt routes. It carries a daily traffic varying between 800 and 1,600 vehicles at different points and requires reconstruction and widening to 20 feet from Cedar Road to Chardon Road. An extension of this route from Chardon Road to Euclid Avenue approximately at Upson Road is also planned, to provide a direct connec-

tion with Euclid Avenue. Upson Road will then provide a connection to the St. Clair and Lake Shore Boulevard routes east to the Willoughby territory north of the New York Central Railroad.

Highland Road requires the improvement of its connection with Euclid Avenue.

On S. O. M. Center Road (State Route 91) reconstruction and widening of the present 16-

just east of Painesville and runs parallel to and north of the New York Central Railroad, connecting with the present terminus of St. Clair Avenue just east of the Lake County line. St. Clair Avenue is then utilized to Bliss Road. From this point a partial new right of way is necessary north of the railroad using parts of Waterloo Road and Westropp Street to Grant Boulevard in Bratenahl, thence, following Grant



MAYFIELD ROAD NEAR LEE ROAD

This improvement is satisfactory for 10 years' use

foot pavement is required from the Lake County line to Mayfield Road. The 16-foot section south of Mayfield Road is now under construction. Traffic at different points on this route varies between 1,500 and 1,900 vehicles per day.

Other existing routes in the northeastern section of the county which form parts of a connected traffic distribution system are considered satisfactory for the traffic which they will be required to serve during the 10-year period.

The most important of the proposed new routes in this section is the new arterial route from Painesville to the center of Cleveland. This route begins at a junction of U. S. Route 20

Boulevard to Gordon Park and through Gordon Park just north of the railroad, to East 72nd Street. At this point a connection will be made to 72nd Street but the main line of the proposed route will involve an overhead crossing of 72nd Street leading to the lake front and a connection to the proposed underpass of the New York Central Railroad at 72nd Street. From this point a roadway on the lake front will be developed to East 9th Street with connections to East 55th and East 40th Streets. East 9th Street will form the principal approach to the business center for traffic from the east. The route will be continued with a diagonal cross-



THE ENDS OF THE PROPOSED LAKE-FRONT BOULEVARD

Above—East end near East 72nd Street

Below—West end looking toward East 9th Street from West 3rd Street

ing of the Pennsylvania Railroad from the north end of the 9th Street viaduct to the approximate location of Summit Avenue and thence along the line of this avenue with connections at West 3rd and West 6th Streets to a new high-level crossing of the Cuyahoga River in the vicinity of the present Main Street bridge and to a connection with Bulkley Boulevard west of West 25th Street.

during rush hours on Euclid Avenue between East 105th Street and the Public Square is only 9 miles per hour.

On the basis of present traffic it is estimated that a minimum of 6,700 passenger vehicles daily would have used the St. Clair Avenue section of the new route east of the city had it been available in 1927, and a minimum of 12,000 passenger



THE INTERSECTION OF RICHMOND ROAD AND CHARDON ROAD

This junction will be improved as part of one of the recommendations of the plan

The entire route is planned as a 40-foot roadway and will provide a fast arterial route with no obstructions to the center of the city from the entire northeastern section. It will relieve traffic congestion on Euclid Avenue, Superior Avenue and Lake Shore Boulevard each of which carries large volumes of traffic outside the city and is now loaded beyond capacity within the city.

Daily traffic at East 55th Street on Euclid Avenue is 28,000 vehicles, on Superior Avenue 33,000 and on St. Clair Avenue, which carries the Lake Shore Boulevard traffic west of East 72nd Street, it is 25,000 vehicles. Traffic speed

vehicles would have used the lake-front section from East 72nd to East 9th Streets.

The development of this route will result in the shifting of the principal lines of traffic flow northward to a more direct line to the center of the city and will permit the greater utilization of Euclid Avenue by the local traffic originating in its immediate vicinity.

It will also enable traffic originating east of the city and now using Lake Shore Boulevard to avoid the many curves and turns of this route and permit its freer utilization by local traffic. Connections between the new route and existing

arterial routes are provided by the many improved lateral north-south routes in the area, such as Coit Road, East 152nd Street, Dille-Nottingham Road, Chardon Road and East 200th Street, East 185th Street, Bliss Road and Lloyd Road.

Another new route which will permit traffic to move more directly is the proposed connection from Mayfield Road at Taylor Road to Superior Avenue at Euclid Avenue. This connection results in forming a direct line from Mayfield Road to the Public Square via Superior Avenue. The relief provided to Superior Avenue by the St. Clair-Lake Front development will permit it to absorb part of the Mayfield Road traffic that wishes to reach territory adjacent to Superior Avenue in the city, the traffic destined to the downtown business section, and that destined to the west side of the Cuyahoga River. The major part of this traffic is now diverted into the badly congested Cedar Glen section and enters the city via Carnegie Avenue, and the rest of it is compelled to use the equally overcrowded Euclid Avenue entrance to the city. This connection is planned as a 40-foot roadway.

A third route involves the completion of a direct, belt-line route on the eastern side of the city. Because of the development of lateral streets perpendicular to Euclid Avenue and the topography of the area to the south of Euclid Avenue, nearly all lateral routes take a northwest-southeast direction. As a result the north-and-south connections between the Euclid Avenue territory and Cleveland Heights, Shaker Heights and the south are indirect. To provide a direct route the line of Warrensville Center Road has been projected northward to Euclid Avenue and a new route laid out as closely as practicable to this line. This route uses Noble Road to Bluestone Road, thence to the proposed Belvoir Boulevard, thence along Belvoir Boulevard and its eastern branch to Euclid Avenue a short distance west of the present location of Green Road. This connection is planned as a 40-foot roadway. A connection is provided from the Belvoir Boulevard-Euclid route to Green Road. This route with the new southern and western belt routes provides a complete direct belt line around Cleveland.

Table 27—Summary of 10-year plan of improvement in the northeastern section of Cuyahoga County

A. Roadways

Proposed construction	Width		Total
	40 feet	20 feet	
New routes, miles.....	4.0	2.8	6.8
Widening, miles.....	5.7	.....	5.7
Reconstruction and widening, miles.....	0.4	11.4	11.8
Reconstruction, miles.....	.....	.....	.....
New construction, miles....	3.1	1.9	5.0
Total, miles.....	13.2	16.1	29.3
New routes serving this section in City of Cleveland, miles.....	10.7	.....	10.7
Grand total, miles....	23.9	16.1	40.0

B. Structures

Proposed construction	On existing routes	On new routes	Total
Bridges, new, number.....	.....	.....	.....
Bridges, replacement or widening, number.....	.....	.....	.....
Railway grade separations, number.....	3	.....	3
Highway grade separations, number.....	.....	.....	.....
Total, number.....	3	.....	3
Structures serving this section in City of Cleveland.			
Bridges, new, number.....	.....	1	1
Railway grade separations, number.....	.....	1	1
Highway grade separations, number.....	.....	1	1
Total, number.....	.....	3	3
Grand total, number...	3	3	6

A similar connection is planned from the present terminus of Richmond Road at Chardon Road to Euclid Avenue near Upson Road. This route, which is planned as a 20-foot roadway, involves a relocation of the junction of Chardon and Richmond Roads to improve alignment.

These improvements, when correlated with the improvements planned in the contiguous sections, will provide a complete and adequate traffic distribution system for the northeastern section of the county.

Traffic conditions on the main routes in the northeastern part of Cleveland will be further improved by the extension of Chester Avenue to a connection with Euclid Avenue, via Crawford Road and Hough Avenue, and by development of a new crossing through Wade Park by an overpass over East 105th Street and the parkway to Wade Park and a practically straight connection with Mayfield Road via Ford Drive. This development will provide a direct route from the western terminus of Mayfield Road at Euclid Avenue and will permit Euclid Avenue traffic to avoid the badly congested section in the vicinity of University Circle and East 105th Street.

The improvement plan for the northeastern section also includes the construction of railroad grade separations on Dille Road, Chardon Road and Bliss Road at the Nickel Plate Railroad.

The summary of improvements planned in the northeastern section of the county is shown in Table 27.

The East-central Section of Cuyahoga County

The east-central section of Cuyahoga County comprises the territory east of the City of Cleveland, and located approximately between Cedar Road on the north and North Miles Road on the south. This section includes the densely populated and highly developed residential area immediately east of Cleveland and the rapidly developing area further eastward. It produces a large volume of traffic which moves daily between this section and Cleveland. A considerable volume of traffic moving between the city and the area east and southeast of Cuyahoga County also uses routes through this section, par-

ticularly Kinsman Road, U. S. Route 422, and State Route 87. In this section there are a number of important north-south routes which form sections of the principal north-south belt lines and provide the necessary connections between arterial routes as well as furnish the required facilities for interchange of local traffic between the communities in the section.



CEDAR ROAD WEST OF BRAINARD ROAD
On this section of the road the existing 18-foot pavement will be satisfactory for the next ten years.

The existing highways in this section of the county are more nearly adequate for present and expected future traffic than in any other section. All of the principal east-west arterial routes with the exception of Kinsman Road, South Kinsman Road and a section of Cedar Road are now improved or in process of improvement with surfaces adequate for expected traffic during the 10-year period.

Kinsman and South Kinsman Roads, forming U. S. Route 422, are urgently in need of improvement. This route from Lee Road to the east limits of Shaker Heights village consists of a 30-foot roadway in good condition. Daily traffic on this section, which was considerably below normal because of the poor condition and narrow width of the surface east of the east limits of Shaker Heights, was 5,200 vehicles. This section is scheduled for widening to 40 feet.

From the east limits of Shaker Heights to the west limits of Chagrin Falls village the present improvement consists of 14 and 16-foot pavements in such condition as to be salvable as sub-

base. Reconstruction and widening is planned for this section. From the east line of Shaker Heights to a point east of Richmond Road, where a new route begins, a 40-foot roadway is planned and the balance of the route is planned as a 20-foot roadway. This new route (from the point mentioned to a junction with U. S. Route 422 in Geauga County) provides a relocation of U. S.

Chagrin Falls and North Street back to Route 87 because of the unimproved condition of the direct connection. This direct connection located partly in Cuyahoga and partly in Geauga Counties is planned for 20-foot construction.

Cedar Road from Lee Road to Warrensville Center Road consists of a 50-foot roadway with two 16-foot paved strips and an unpaved center



THE TRAFFIC AT LEE ROAD AND MILES AVENUE

Lee Road is planned as a 40-foot thoroughfare because of its importance as the first north-south belt route east of Cleveland

Route 422 which greatly improves the alignment and grades and by-passes the village of Chagrin Falls, and will carry the through traffic from beyond Chagrin Falls now using South Kinsman Road. It is planned as a 40-foot roadway to the junction with Kinsman Road and as a 20-foot roadway beyond that point. Kinsman Road east of the junction with South Kinsman Road for a distance of approximately two miles is at present a 15-foot pavement in unsatisfactory condition for the daily traffic of 2,300 vehicles. It is planned to reconstruct and widen this section to 20 feet. Through traffic on State Route 87 is now compelled to use Cleveland Street into

strip. This section carries a daily traffic of 6,300 vehicles at Lee Road and 4,600 vehicles at Warrensville Center Road. The 16-foot strips are too narrow to accommodate safely two lanes of traffic on each strip and, for this reason the paving of the center strip is planned.

From Warrensville Center Road to Chagrin River Road, Cedar Road is improved with an 18-foot pavement in good condition. The section from Warrensville Center Road to Richmond Road is planned for widening to 40 feet in the second five years of the plan period, and the section east of Richmond Road is considered satisfactory for traffic during the next ten years.

The section of North Woodland Road between S. O. M. Center Road and Chagrin River Road is planned for reconstruction and widening to 20 feet in the second five years of the plan period. The remainder of the important east-west arterial routes in this section are in satisfactory condition or are under construction at the present time.

Lee Road traverses the principal centers of population east of the city, and carries a daily traffic ranging from 5,700 vehicles north of Miles Avenue to 13,400 south of Cedar Road. Because of its importance as the first north-south belt route east of Cleveland, it is planned as a 40-foot roadway throughout. The sections between Superior Road and Monmouth Road, and between the south limits of the village of Shaker Heights and Miles Avenue are now under construction, involving widening to approximately the required width. The remaining sections, Mayfield Road to Superior Road, Monmouth Road to the south limits of Shaker Heights and Miles Avenue to Broadway are planned for widening to 40 feet.

A second north-south belt line of primary importance is Warrensville Center Road. This route, because of its condition, carried very little traffic north of Norwood Road. Between this point and Miles Avenue daily traffic varied between 3,900 and 4,600 vehicles. The section between Mayfield Road and Norwood Road is now being improved with surfaces of adequate width. Between Norwood Road and Miles Avenue the present 18-foot pavement, which is in good condition, is planned for widening to 40 feet.

On Green Road the present 14-foot pavement between Cedar Road and North Woodland Road is planned for reconstruction and widening to 20 feet.

On Richmond Road the section between Cedar Road and North Woodland Road is also planned for reconstruction and widening to 20 feet.

Other existing routes in the east-central section which form parts of a connected traffic distribution system are now in satisfactory condition for the traffic which they will be required to serve during the 10-year period or are under contract for adequate improvement.

The only new route located entirely in this section is the proposed new location for U. S. Route 422, mentioned above, known as the South Moreland Boulevard extension. This route begins at Kinsman Road a short distance east of Richmond Road, crosses the present location of Kinsman Road a short distance west of Harper Road and extends in a generally southeastern direction to a junction with Bainbridge Road at Chillicothe Road in Geauga County. The new location avoids the curves and heavy grades on South Kinsman Road and by-passes the village of Chagrin Falls. It is designed as an alternative to widening in excess of 20 feet on the present location of U. S. Route 422 which is the principal traffic artery between Cleveland and the Youngstown-Warren territory. The new route is planned as a 40-foot roadway west of its junction with State Route 87 and as a 20-foot roadway east of that point. A 40-foot connection is also planned from this new route at a point between Brainard Road and Lander Road to Shaker Boulevard at Brainard Road, thus providing a direct connection from Shaker Boulevard to Kinsman Road, South Kinsman Road, and the South Moreland Boulevard extension.

A series of relocations and new route developments is also planned in the vicinity of North Randall to facilitate traffic movement in that area. The major parts of these improvements are located in the southeastern section of the county and will be discussed in detail later. The improvements affecting routes in the east-central section are: (1) A new route from Warrensville Center Road at Emery Road to Bedford via Broad Road. This route will cross the Erie Railroad by an overpass at the approximate location of the present South Miles Road overpass and will thus permit Warrensville Center Road traffic to avoid the grade crossing on the present route; (2) the projection of Emery Road west from Warrensville Center Road to a junction with Miles Avenue; and (3) a new location of North Miles Road north of the present location from Green Road to the new route east of Warrensville Center Road. These improvements will by-pass North Miles Road traffic around the congestion center formed by the present intersection

of Miles Avenue and Warrensville Center Road in close proximity to the Erie Railroad.

The principal problem resulting from the large volume of traffic produced in the east-central section is that of providing proper arteries from this section to the business center of Cleveland, not the development of adequate highway facilities in the suburban area. Approximately at the Cleveland city line there are ten important routes carrying traffic into the city—Murray Hill Road and Euclid Heights Boulevard, which serve the major part of the Mayfield Road traffic, Cedar Road, Fairmount Boulevard, Larchmere Avenue, Shaker Boulevard, South Moreland Boulevard, South Woodland Road, Kinsman Road and Miles Avenue. Average daily traffic on these routes near the city line is as follows:

Murray Hill Road	2,400
Euclid Heights Boulevard	6,300
Cedar Road	11,800
Fairmount Boulevard	13,900
Larchmere Boulevard	5,400
Shaker Boulevard	3,000
South Moreland Boulevard	4,800
South Woodland Road	4,300
Kinsman Road	8,600
Miles Avenue	4,100
Total	64,600

With the exception of Miles Avenue these routes, before reaching the downtown business section, which is the most important terminal point, converge into two routes. Murray Hill Road, Euclid Heights Boulevard, Cedar Road and Fairmount Boulevard converge into Carnegie Avenue, and Larchmere Boulevard, Shaker Boulevard, South Moreland Boulevard, South Woodland Road and Kinsman Road all join Woodland Avenue between the city line and East 55th Street. Miles Avenue traffic is poured into badly congested Broadway and is compelled to follow this route for approximately five miles. Relief to the northern part of the section is provided by the improvements discussed in the northeastern section, which will provide a direct route for Mayfield Road traffic via Hough Avenue, Crawford Road and the extension of Chester Avenue, and will relieve Carnegie Avenue of this traffic.

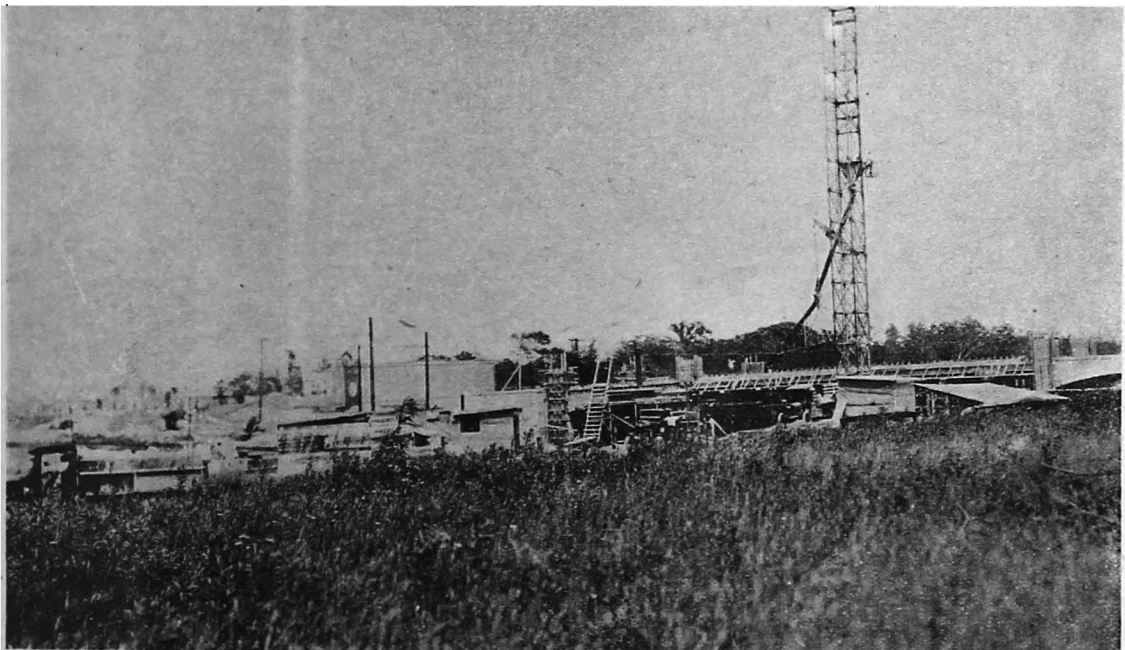
Table 28—Summary of 10-year plan of improvement in the east-central section of Cuyahoga County

A. Roadways

Proposed construction	Width		Total
	40 feet	20 feet	
New routes, miles.....	6.0	8.5	14.5
Widening, miles.....	12.0	.....	12.0
Reconstruction and widening, miles.....	2.1	11.9	14.0
Reconstruction, miles.....	.....	.....	.....
New construction, miles.....	.....	0.7	0.7
Total, miles.....	20.1	21.1	41.2
New routes serving this section in City of Cleveland, miles.....	2.8	.....	2.8
Grand total, miles.....	22.9	21.1	44.0

B. Structures

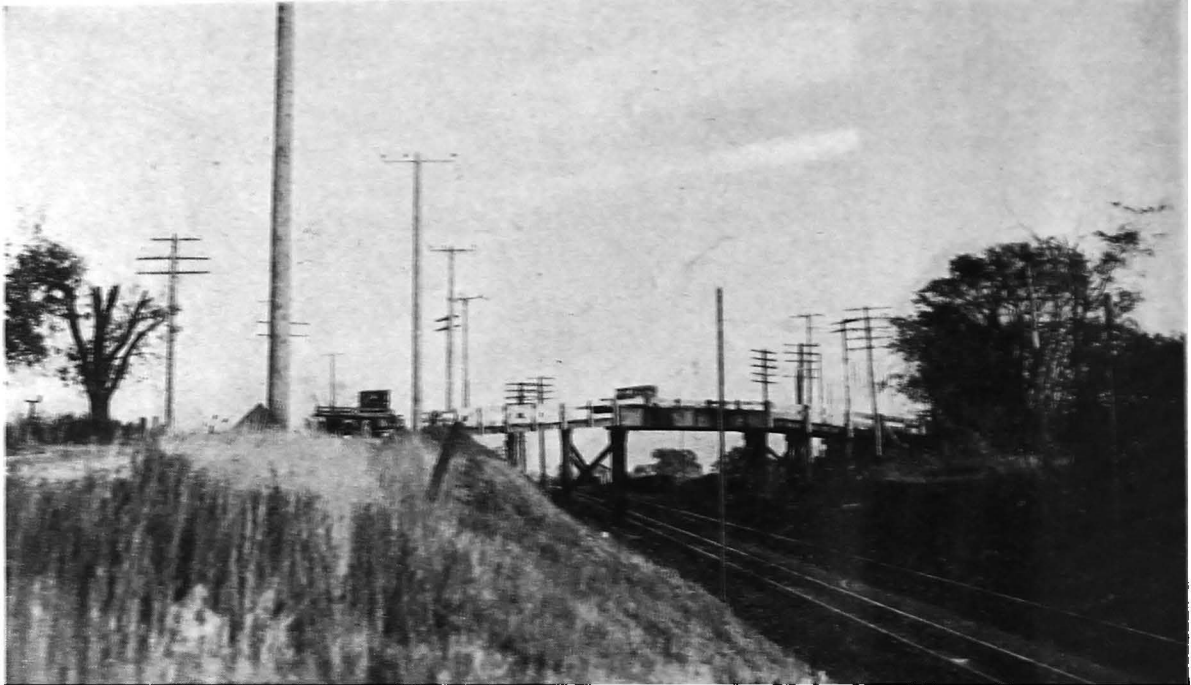
Proposed construction	On existing routes	On new routes	Total
Bridges, new, number.....	.....	1	1
Bridges, replacement or widening, number.....	.....	.....	.....
Railway grade separations, number.....	1	1	2
Highway grade separations, number.....	.....	.....	.....
Total, number.....	1	2	3
Structures serving this section in City of Cleveland.	.....	.....	.....
Bridges, new, number.....	.....	.....	.....
Railway grade separations, number.....	.....	.....	.....
Highway grade separations, number.....	.....	1	1
Total, number.....	.....	1	1
Grand total, number...	1	3	4



WARRENSVILLE CENTER ROAD IS THE SECOND NORTH-SOUTH BELT LINE EAST OF CLEVELAND

Above—Because of its bad condition north of Norwood Road it carried little traffic on that section in 1927

Below—Construction of grade separation at Shaker Boulevard in 1928



The new route to Bedford from Warrensville Center Road at Emery Road will cross the Erie Railroad at the approximate location of the present unsatisfactory South Miles Road overpass (above); and will avoid the present Warrensville Center Road grade crossing (below)

To relieve congestion caused by the convergence of routes into Woodland Avenue and facilitate traffic movement between the central part of the section and Cleveland an extension of Shaker Boulevard from its present terminus at Woodhill Road to approximately Pittsburgh Avenue at East 34th Street is planned. This route which is planned as a 40-foot roadway will be depressed with reference to present streets and will form a high-speed route without cross traffic interference between these points. This route if completed in 1927 would have carried, on the basis of the origin-destination analysis, an estimated minimum of 7,500 daily vehicles between points east of the City of Cleveland and the territory west of its terminus at Broadway.

The improvement plan for the east-central section also includes the construction of a railroad grade separation on Lee Road at the Erie Railroad. The replacement of the present railroad overpass on South Miles Road at the Erie Railroad is involved in the development of the new route east of Warrensville Center Road. This new route will also serve a large proportion of the traffic now using the grade crossing of the Erie Railroad on the Warrensville Center Road.

The summary of improvements planned in the east-central section of Cuyahoga County is shown in Table 28.

The Southeastern Section of Cuyahoga County

The southeastern section of Cuyahoga County includes the territory southeast of Cleveland, located south of North Miles Road and east of the west limits of Garfield Heights and Bedford township. The part between Cleveland and Bedford is a well developed and rapidly growing suburban area; the rest of the section is more rural in character, although parts of it are in process of suburban development.

The area between Bedford and Cleveland produces a large volume of traffic which moves principally between this area and the city. The remainder of the area produces only a moderate amount of traffic. In addition to the local traffic originating in the area, the main highways passing through the southeastern section serve a con-

siderable volume of traffic from the south and southeast. Northfield Road (State Route 8) is the principal route between Akron and Cleveland, carrying a daily traffic of 3,900 vehicles at the Summit County line and 5,300 vehicles at the junction with Broadway in the village of Bedford. Broadway (State Route 14) forms an alternative, although longer, route to Akron and is the direct route to Ravenna and the southeast. It carries a daily traffic of 1,850 vehicles at the Summit County line and 3,100 vehicles at the junction with Northfield Road in Bedford.

South Miles-Aurora Road (State Route 43) is another through route to the southeast, and carries a daily traffic of 1,600 vehicles at the Geauga County line and 2,000 vehicles at its junction with North Miles Road in Warrensville.

Through Bedford, and between Bedford and Cleveland, Broadway carries the combined traffic of Broadway and Northfield Road. Through the business section of Bedford, its daily traffic is 10,200 vehicles. This volume of traffic on a 48-foot roadway, with two electric railway tracks and parking at both curbs, produces a serious local congestion center. Northwest of Bedford the daily traffic on the road is 7,800 vehicles. At Lee Road approximately one-half of the Broadway traffic turns north because of the unsatisfactory surface condition of Broadway between McCracken Road and the Cleveland city limits.

With few exceptions the principal routes of this section are in good condition or in process of construction. South Miles-Aurora Road is being reconstructed and widened to 20 feet. At Solon, a by-pass for through traffic is being constructed south of the Erie Railroad. This eliminates two dangerous railroad crossings.

On Broadway, reconstruction and widening is in progress between Tinkers Creek and the Summit County line. Between Harrison Avenue and McCracken Road, the center strip is being paved, making a 48-foot roadway. Between McCracken Road and the Cleveland City line the construction of a 48-foot roadway is planned. This section is designed 48 feet in width to conform with the section now under construction. The construction of the White House crossing of Broad-

way over the tracks of the Pennsylvania, Wheeling and Lake Erie railroads and the Northern Ohio Traction line is now in progress.

Northfield Road from the junction of Broadway in Bedford to the Summit County line is a 20-foot pavement in good condition. The section in the village of Bedford from the junction with Broadway south to Forbes Road is planned for widening to 40 feet.

Turney Road forms an important route for local traffic between Garfield Heights and Cleveland, carrying a daily traffic of 4,600 vehicles south of its intersection with Garfield Boulevard. This route is satisfactory for traffic north of Rockside Road, but from Rockside Road to Dunham Road reconstruction and widening to 20 feet is planned.

Durham Road carries a daily traffic of 2,400 vehicles at its intersection with Broadway, 1,100 vehicles south of its junction with Turney Road and 700 vehicles at its junction with Egypt Road. The section of this road from the end of the viaduct over the Pennsylvania Railroad west of Broadway to its intersection with Schreiber Road is planned for reconstruction and widening. The section from Schreiber Road to Canal Road, which is partly in the east-south-central section, is planned for widening to 20 feet during the second five years of the plan period.

Lee Road, one of the important north-south routes, east of Cleveland, is planned for a 40-foot surface. This route was discussed in the east-central section which includes the major part of the route.

Warrensville Center Road between Miles Avenue and Broadway is at present a 20 to 26-foot pavement in good condition. Traffic ranges from 3,300 vehicles per day at Broadway to 4,100 at Miles Avenue. In view of the new parallel route planned east of this highway, which will serve a considerable part of the present Warrensville Center Road traffic, the present improvement is considered adequate.

The section of S. O. M. Center Road between South Miles-Aurora Road and the Summit County line, which is at present a 16-foot roadway in good condition, is planned for widening to 20 feet. Daily traffic on this section is only 1,100 vehicles and its widening can be safely

deferred until the second five years of the plan period.

Solon Road is planned for improvement as a 20-foot road during the second five years of the plan period, from Bedford to its intersection with South Miles Road in Solon. In addition to these improvements, all of which are planned as major or medium-type construction, a number of minor-type improvements are recommended. These include the following routes: Egypt Road, Dunham Road to the Summit County line; Walton Road, Egbert Road to the Summit County line; Troyan Road, Broadway to Laing Road; Bainbridge Road, Aurora Road to the Geauga County line; Pettibone Road, S. O. M. Center Road to Aurora Road; and Liberty Road from the south limits of Chagrin Falls township to the Summit County line.

The most important of the new routes located principally in this section is the new Warrensville-Bedford route which provides a direct connection from Northfield Road south of Bedford to Warrensville Center Road and Miles Avenue north of Warrensville. This route forms a direct northerly projection of Northfield Road from the top of the hill south of Bedford involving a new bridge over Tinkers Creek, a minor relocation of the stream, and overpasses of Broadway and Solon Roads and the Wheeling and Lake Erie Railroad. Access to the new route from Broadway will be provided by the improvement of Union Street between Broadway and Northfield Road. The proposed route continues north on the general location of Broad Road, and then west to an overhead crossing of the Erie Railroad on the approximate location of the present South Miles Road overpass and a connection with Warrensville Center Road at Emery Road. A connection westward along the line of Emery Road extended to Miles Avenue completes the project. By using this route, traffic will avoid two railroad grade crossings, the congestion of Bedford and Warrensville and the curves and grades on Northfield Road at the entrance to Bedford. The route is planned as a 40-foot roadway.

The southeastern section also includes a part of the proposed east-west belt route which con-

nects Brook Park Road with Lee Road, Warrensville Center Road and other north-south belt routes east of the city. This route from a circular intersection at East 71st Street near its intersection with Independence Road, takes a northeasterly direction to a connection with Garfield Boulevard, approximately midway between Warner Road and Turney Road from which point a new route skirting the northern boundary

a point east of the present overpass over the Lake Erie and Pittsburgh Railroad to a connection with the belt-line route east of the railroad. This section is planned as a 40-foot roadway, and the same width has been adopted for the section of Warner Road from the point east of the overpass to the city line, but south of the intersection with the belt-line route to Canal Road the plan is for 20-foot construction. The condi-



The row of crosses, each representing a fatal accident, strongly suggests the separation of grades at this intersection of S. O. M. Center Road and the Erie Railroad. The separation is recommended in the plan

of Garfield Park and the southern boundary of Calvary Cemetery is projected to a connection with an extension of East Boulevard into the City of Cleveland. From this point the route extends east, crossing Windfall Avenue with a separation of grades, to a connection with Lee Road south of the Erie Railroad, and thence southeast to Warrensville Center Road at McCracken Road. This route is planned as a 40-foot roadway west of Lee Road and as a 20-foot roadway between Lee Road and Warrensville Center Road. It involves an underpass of the Lake Erie and Pittsburgh Railroad, a bridge over Broadway, the Pennsylvania, and Wheeling and Lake Erie Railroads, and a separation of grades at its intersection with Windfall Avenue.

A relocation of Warner Road is planned from

tion of the present surface on Warner Road is such as to be of little value except possibly as salvable material.

From the terminus of the belt-line route at Warrensville Center Road a relocation of South Miles Road is planned to Laing Road. This route is planned as a 20-foot roadway and is designed to afford adequate right of way and permit better utilization of property adjacent to the Erie Railroad.

The remaining new route involves the development of a direct connection of Richmond Road over the Erie Railroad and the construction of a grade separation at this point. This connection is planned as a 20-foot roadway. With the completion of these improvements, traffic within the area will have adequate facilities for free and

direct movement. As in the other sections, however, the most important problem lies in the provision of adequate facilities between this section and the City of Cleveland. The arterial routes of the entire southeastern section converge into Broadway, a short distance within the city limits of Cleveland. Outside the city, Northfield Road and Dunham Road join Broadway and within the city limits, Miles Avenue, Turney Road and Warner Road feed into Broadway. Due to the congested conditions on this route within the city and the condition of Broadway in Garfield Heights, a large volume of traffic enters the city via Lee Road or Warrensville Center Road and the eastern approaches. Windfall Avenue connecting with East 131st Street provides an alternative route to the southeastern part of the city but provides no additional route to the central sections. The development of the southern belt-line route will provide a connection from the southeastern section to the proposed new entrance to the city through the Cuyahoga River valley and will thus relieve Broadway to some extent. Within the city, Harvard Avenue provides an additional connection between Broadway and the new Cuyahoga River valley arterial route. The East Boulevard connection from the Brook Park belt line and the proposed development of East Boulevard in the city will also provide a direct route to the eastern part of the city. An additional connection, which is not included in present planning but which will provide future relief, involves a new crossing of the Mill Creek valley from the present terminus of Garfield Boulevard at Warner Road to Grant Avenue at East 71st Street, and the use of Grant Avenue to East 49th Street and the new arterial route to the center of the city.

The plan of improvement for the southeastern section also includes the construction of grade separations on Northfield Road at the Pennsylvania Railroad south of Bedford; on Broadway at the Wheeling and Lake Erie Railroad in Bedford and on S. O. M. Center Road at the Erie Railroad in Solon.

The summary of improvements planned in the southeastern section of Cuyahoga County is shown in Table 29.

Table 29—Summary of 10-year plan of improvement in the southeastern section of Cuyahoga County

A. Roadways

Proposed construction	Width		Total
	40 feet	20 feet	
New routes, miles.....	5.2	3.7	8.9
Widening, miles.....	2.0	4.1	6.1
Reconstruction and widening, miles.....		3.0	3.0
Reconstruction, miles.....			
New construction, miles.....	2.3	10.0	12.3
Total, miles.....	9.5	20.8	30.3
New routes serving this section in City of Cleveland, miles.....	0.5		0.5
Grand total, miles.....	10.0	20.8	30.8

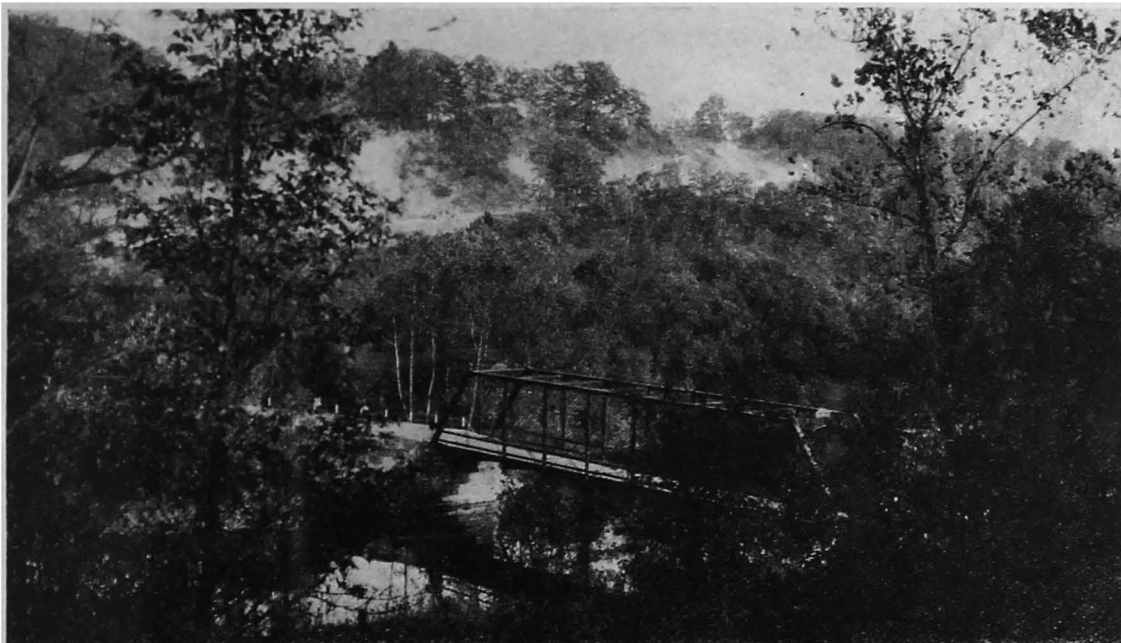
B. Structures

Proposed construction	On existing routes	On new routes	Total
Bridges, new, number.....		1	1
Bridges, replacement or widening, number.....			
Railway grade separations, number.....	3	4	7
Highway grade separations, number.....		2	2
Total, number.....	3	7	10
Structures serving this section in City of Cleveland			
Bridges, new, number.....			
Railway grade separations, number.....			
Highway grade separations, number.....			
Total, number.....			
Grand total, number...	3	7	10

The East-south-central Section of Cuyahoga County

The east-south-central section of Cuyahoga County comprises the territory located south of the city of Cleveland, extending from the village of Garfield Heights and Bedford township on the east to and including Broadview Road on the west. This section, which includes the Cuyahoga River Valley and the heights on either side of

(U. S. Route 21), which forms one of the important routes between Akron and Cleveland; Broadview Road (State Route 176), which forms an alternative, although longer route between Cleveland and Akron, entering the west side of Cleveland; and Canal Road, a valley route on the east side of the Cuyahoga River. This route, paralleling the canal, also forms a route to Akron but is at present unimproved in Summit County and therefore carries no through traffic.



The sharp, curving descent to the present bridge over the Cuyahoga River on Royalton Road (State Route 82)

the valley, is sparsely populated and, except for the territory immediately adjacent to Cleveland and several small communities, there is a comparatively small suburban development. This lack of development, even in areas relatively close to the center of Cleveland, is due partially to the topography of the area and the industrial character of the development of the valley in the city and partially to the lack of direct highway connections with the city. Highway traffic from this area is forced into the congested Broadway route to the east or into the equally congested West 25th Street route to the west.

There are three important north-south routes through this section. These are Brecksville Road

Right of way on this route should be protected for future improvement.

Brecksville Road carries a daily traffic of 4,500 vehicles at the city line and 1,900 vehicles south of its intersection with Royalton Road. A considerable amount of Cleveland-Akron traffic detoured this route because of its unsatisfactory condition.

Broadview Road carries a daily traffic of 3,800 vehicles at the city line and 1,600 vehicles at Royalton Road. Canal Road carries 3,000 vehicles per day between Brecksville Road and Warner Road, 1,750 vehicles south of Warner Road and 1,100 vehicles north of its junction with Fitzwater Road.

The east-south-central section has very few connected east-west routes due to the difficulty of developing satisfactory crossings of the Cuyahoga River valley. There is no continuous, improved east-west route between Harvard Avenue, which is largely within the city, and Royalton Road, (State Route 82) approximately nine miles further south. The present river crossing at this point involves sharp descents to the floor of the valley over a curved roadway with heavy grades. Schaaf Road, Rockside Road, Pleasant Valley Road and Wallings Road terminate as improved

This route involves the opening of a direct line from Brecksville Road at Rockside Road to East 71st Street near Independence Road where a circular intersection will be established. From this point Independence Road is relocated to improve alignment and grades to East 49th Street, approximately one-half mile north of the canal, thence via East 49th Street, and Washington Boulevard, after reconstruction and widening, to the southern boundary of Forest City Park. From this point a new route is established through the park and thence along the general lo-



View of Cuyahoga River Valley, at Willow, looking north, showing present location of Brecksville Road and bridge. The relocation of Brecksville Road will pass through the point from which the picture is taken on a direct line to the foot of East 71st Street (upper left). At this point a circular intersection is to be established, serving Brecksville Road and East 71st Street, Brook Park Road (a new East-West Route north of the Cuyahoga River) and the relocation of Independence Road

roads at Brecksville Road. The only improved route across the valley between Harvard Avenue and Royalton Road is via Fitzwater Road to Canal Road, thence to Dunham Road and by the latter to the east side of the valley.

The provision of adequate highway facilities for this section requires, in addition to reconditioning of present routes, the opening of new routes into the central section of the city and the development of additional valley crossings. Brecksville Road is now under contract for reconstruction and widening from Rockside Road to Summit County. From Rockside Road to the central section of the city a new route is planned.

of Independence Road to Broadway. This route is planned as a 40-foot roadway. Between Broadway and a location south of Campbell Street, it is designed as an elevated highway built on a trestle, which will leave the ground clear for industrial storage and railroad sidings. The southern approach of this route to the circular intersection at Willow involves a new bridge over the Cuyahoga River, the canal, and the Baltimore and Ohio Railroad. The circular intersection is placed on the north bank of the river at a sufficient height to be well above the high-water line. In addition to the new location of Brecksville Road and the new location of Independence



CONTROLLING POINTS ON THE INDEPENDENCE ROAD RELOCATION

A. Site of the circular intersection

B. The junction with Washington Boulevard

C. Site of the south end of the viaduct at Campbell Road

D. Location of the north end of the viaduct—present Independence Road at the left

Road, this circular intersection will also include the new belt route to the east, described in the southeastern section; the western connection of this belt route with Brook Park Road; East 71st Street; Canal Road and Granger Road.

The present location of Brecksville Road between Rockside and Canal Roads is planned for reconstruction and widening to 20 feet to serve local traffic.

Broadview Road is planned for reconstruction and widening to 40 feet between Schaaf Road and Short Road, and for 20-foot reconstruction and widening between Short Road and Avery Road. Between Avery Road and the Summit County line the present 18-foot surface is satisfactory.

To provide direct transportation facilities to the center of the city from Broadview Road, as well as from other routes from the southwest, which join to form West 25th Street, a new diagonal route is planned across the Cuyahoga River Valley from a location south of the junction of Broadview and Pearl Roads to the southern end of the viaduct section of the Independence Road. This route follows a relocation of Valley Road providing an easy grade to the floor of the valley and thence takes substantially a direct line to the proposed Independence Road. It is planned as a low-level route with new structures at the crossing of the Cuyahoga River, the canal, the Newburg and South Shore Railroad and the Baltimore and Ohio Railroad. On the basis of the origin-destination analysis this route, if completed in 1927, would have carried a minimum daily traffic of 9,000 vehicles. Independence Road between its junction with Valley Road and Willow, would have carried 5,000 vehicles, and the elevated section between Broadway and the junction of the two branches a minimum of 14,000 vehicles. This entire route is planned as a 40-foot roadway. It will furnish relief to Broadway on the east and West 25th Street on the west, as well as provide greatly improved highway facilities between the southern sections of the county and the central part of the city.

Another route, planned primarily to improve highway connections between the city and the Brooklyn Heights section, involves the develop-

ment of Jennings Road between West 14th Street and Bradley Road, and the development and relocation of Bradley Road between Jennings Road and Schaaf Road. Connections developed at the intersection of this route and the western branch of the valley route provide access to both the east and west sides of the valley from either route. This route is planned as a 20-foot roadway.

The remaining north-south route, in this section—Canal Road—is planned for reconstruction and widening to 20 feet from the proposed circle at Willow to Fitzwater Road.

The most important east-west route in this area and one of the major developments of the entire region is the southern belt route which provides connections between the eastern terminus of the present Brook Park Road and the north-south belt lines east of the city as well as East Boulevard in the city. The section from the circle at Willow to the eastern belt lines was described in the southeastern section. West from the circle the route crosses the canal, the Cuyahoga River and the Baltimore and Ohio Railroad and proceeds in a westerly direction passing under Schaaf Road near Marengo Drive and joining Brook Park Road in the vicinity of West 18th Street.

This route is planned as a 40-foot roadway and Brook Park Road between Schaaf and Broadview Roads is planned for widening to 40 feet. This southern belt route across the Cuyahoga Valley would have carried in 1927 a minimum of 6,600 vehicles per day. Approximately one-half of this traffic would have used East Boulevard to the eastern sections of Cleveland and the other half, Lee Road or parallel routes to the sections east of the city.

This route with its western and eastern connections forms a complete belt line around the City of Cleveland, connecting with each important arterial route into the city from every direction. It therefore forms an ideal distribution and traffic sorting route as well as a belt line, and although very advantageous for through traffic is designed primarily for, and will be used principally by, local traffic.

Schaaf Road is planned for reconstruction and widening to 40 feet between Broadview Road and

Table 30—Summary of 10-year plan of improvement in the east-south-central section of Cuyahoga County

A. Roadways

Proposed construction	Width		Total
	40 feet	20 feet	
New routes, miles.....	5.9	1.0	6.9
Widening, miles.....	0.4	3.9	4.3
Reconstruction and widening, miles.....	3.0	11.2	14.2
Reconstruction, miles.....			
New construction, miles.....		0.6	0.6
Total, miles.....	9.3	16.7	26.0
New routes serving this section in City of Cleveland, miles.....	4.4	2.3	6.7
Grand total, miles.....	13.7	19.0	32.7

B. Structures

Proposed construction	On existing routes	On new routes	Total
Bridges, new, number.....	1	5	6
Bridges, replacement or widening, number.....			
Railway grade separations, number.....	1	4	5
Highway grade separations, number.....		1	1
Total number.....	2	10	12
Structures serving this section in City of Cleveland			
Bridges, new, number.....		6	6
Railway grade separations, number.....		1	1
Highway grade separations, number.....			
Total, number.....		7	7
Grand total, number...	2	17	19

the proposed Brook Park belt route. Between the Brook Park route and the present Brecksville Road, which will serve only local traffic after completion of the belt route, reconstruction and widening to 20 feet is planned.

Pleasant Valley Road now has a 16-foot surface in good condition and a daily traffic of 500 vehicles. Widening of this route to 20 feet is deferred to the second five years of the plan period. The widening of the part of Dunham Road located in this section is also deferred to the second five years; its daily traffic is between 700 and 900 vehicles. Station Road (State Route 82) between Brecksville Road and the Cuyahoga River, now a 14-foot pavement, is planned for reconstruction and widening to 20 feet. A high-level bridge over the Cuyahoga River and the Baltimore and Ohio Railroad to eliminate the necessity of descending to the floor of the valley is also planned on this route which forms the outer suburban belt line. This new bridge is located partially in Cuyahoga and partially in Summit County.

The above projects are all planned as major or medium-type improvements. In addition, minor-type improvements are planned for Snowville Road, between Brecksville Road and Riverview Road; for Avery Road between Broadview Road and Oakes Road; and for Oakes Road between Richfield Road and Brecksville Road.

In addition to the roadway improvements planned in this section a railroad grade separation is proposed at the Baltimore and Ohio Railroad crossing of Fitzwater Road.

The summary of improvements planned in the east-south-central section of Cuyahoga County is shown in Table 30.

The West-south-central Section of Cuyahoga County

The west-south-central section of Cuyahoga County includes the area located south of Cleveland between Broadview Road on the east and the eastern limits of the villages of Brook Park, Middleburg Heights, and Strongsville on the west. Immediately adjacent to the City of Cleveland are located the rapidly growing villages of Parma and Parma Heights, but except for these two villages the area has very little suburban develop-

ment. The section is well served with highways, although some reconditioning is necessary. Large volumes of traffic are found on the routes north of the line of Pleasant Valley Road.

State Road (State Route 94) carried a daily traffic of 4,000 vehicles at the city line, 1,200 at Pleasant Valley Road and 600 at the Medina County line. Ridge Road and West 73rd Street (State Route 3) carried 5,600 vehicles south of the junction with Denison Avenue, 2,900 south of Wooster Pike and 500 at Pleasant Valley Road. Construction detours on this route north of Wooster Pike and south of Royalton Road influenced the volume of traffic on this route during the traffic survey. York Road carried a daily traffic of 1,200 at Wooster Pike and 300 at Royalton Road. Settlement Road, which forms the western boundary of this section, carried 1,400 vehicles at the city line and 1,000 vehicles north of its intersection with Wooster Pike. This route was used as a detour for U. S. Route 42, which was under construction in the city during the survey, and the observed traffic is therefore above normal.

Wooster Pike (U. S. Route 42), which forms the principal traffic artery between Cleveland, Medina and the southwest, carried 9,500 vehicles at the city line, 4,500 vehicles north of York Road and 3,700 vehicles east of Settlement Road.

State Road is being improved with an adequate surface to the Medina County line. Ridge Road is under construction as a 40-foot roadway between Brook Park Road and Ridgewood Drive, and the section between Ridgewood Drive and Pleasant Valley Road, at present a 14-foot surface, is planned for reconstruction and widening to 20-feet. On the section between Pleasant Valley Road and Royalton Road, at present a 16-foot surface, reconstruction and widening is deferred until the second five years of the plan period. The section from Royalton Road to the Medina County line is new pavement. West 73rd Street, between Brook Park Road and the city line, is now under construction as a 24-foot roadway and is planned for widening to 40 feet.

York Road, at present a 14-foot surface, is under contract for widening between Wooster Pike and Ridgewood Drive, and is planned for reconstruction and widening to 20 feet between

Ridgewood Drive and Royalton Road. The section between Pleasant Valley Road and Royalton Road is deferred to the second five years of the plan period.

Settlement Road, between the city line and Wooster Pike, at present a 14-foot surface, is planned for reconstruction and widening to 20 feet. South of Wooster Pike, Settlement Road is at present unimproved, the section between Wooster Pike and Pleasant Valley Road is planned for construction in the first five years of the plan period and the section from Pleasant Valley Road to the Medina County line during the second five years.

Wooster Pike (U. S. Route 42) is planned for widening to 40 feet between Ridge Road and York Road. The section between the city line and Ridge Road is at present a 56-foot roadway with two 18-foot pavements and a slag center strip. The section from York Road to the Medina County line is being rebuilt with 40 and 30-foot pavements.

Teideman Road between Brook Park and Linndale Roads is planned for 20-foot construction during the second five-year period.

The most important east-west road in this section is Brook Park Road which becomes a part of the southern belt route described in the previous sections. This route from Broadview Road to Settlement Road is planned for reconstruction and widening to 40 feet. Present traffic ranges from 1,800 vehicles per day at Settlement Road to 4,400 vehicles at Wooster Pike. The traffic on the entire route will be greatly increased by the filling of gaps in the route. Linndale and Park Streets from the city line to West 73rd Street are planned for widening to 20 feet.

Pleasant Valley, a 16-foot pavement carrying between 400 and 600 vehicles per day, is planned for widening to 20 feet during the second five years. The remaining roadways in this area are in satisfactory condition for the traffic which they will carry during the 10-year period.

All projects listed above are planned for major or medium-type improvement except Settlement Road between Royalton Road and the Medina County line, which is planned for minor-type construction.

Table 31—Summary of 10-year plan of improvement in the west-south-central section of Cuyahoga County

A. Roadways

Proposed construction	Width		Total
	40 feet	20 feet	
New routes, miles.....			
Widening, miles.....	4.5	6.9	11.4
Reconstruction and widening, miles.....	7.3	15.8	23.1
Reconstruction, miles.....			
New construction, miles.....		8.9	8.9
Total, miles.....	11.8	31.6	43.4
New routes serving this section in the City of Cleveland, miles.....	2.4		2.4
Grand total, miles.....	14.2	31.6	45.8

B. Structures

Proposed construction	On existing routes	On new routes	Total
Bridges, new, number.....			
Bridges, replacement or widening, number.....			
Railway grade separations, number.....	2		2
Highway grade separations, number.....			
Total, number.....	2		2
Structures serving this section in the City of Cleveland			
Bridges, new, number.....			
Railway grade separations, number.....			
Highway grade separations, number.....			
Total, number.....			
Grand total, number...	2		2

The improvement plan for this section also includes the construction of grade crossing separations at the Baltimore and Ohio Railroad on Brook Park and Settlement Roads.

As in other sections of the county, the principal traffic problem lies in the provision of direct and rapid service facilities between this section and the central part of the City of Cleveland. The traffic of the entire section, together with that of a part of the east-south-central section, and a part of the southwestern section, converges into one route—West 25th Street—on entering the city, producing a daily traffic of 25,000 vehicles. Additional entrances to the city are provided by West 73rd Street and Settlement Road—West 130th Street. These routes, however, feed into equally congested routes within the city, are less direct, and are not satisfactory for the relief of the West 25th Street congestion.

Relief for this area is planned principally through the proposed Valley-Independence route described in the previous section. This route taps Wooster Pike, State Road and Broadview Road south of the convergence of these routes and forms a fast traffic artery to the center of the city with very few intersections. A second relief route for traffic destined to points west of West 25th Street will be provided by the City of Cleveland by the development of a crossing of the Big Creek Valley through Brookside Park and a connection with West 44th or 45th Street, to form a direct route from Wooster Pike to Bulkley Boulevard west of the most seriously congested area.

Another new route, located wholly within the city and designed principally for traffic originating within the city, is the development of a depressed 40-foot highway without cross-street connections in the Walworth Run Valley from Scranton Road to a connection with Clark Avenue. This route will relieve West 25th Street of a considerable volume of local traffic and therefore increase its capacity for traffic from outside the city. It will also provide a direct, fast route for West 73rd Street traffic to the center of the city. When required, this route can be extended via West 63rd or 65th Street and projected to a junction with West 73rd Street at Clinton Road

to avoid the congested conditions at the West 73rd Street and Denison Avenue intersection. It can be further extended via Clinton Road, Jasper Avenue and Bellaire Road to West 130th Street, and provide a direct connection from Settlement Road to the business section of the city.

The summary of improvements planned for the west-south-central section of Cuyahoga County is shown in Table 31.

The most important highway in the area is Wooster Pike (U. S. Route 42), which forms the arterial route to Medina and the southwest and carries a daily traffic of 4,400 vehicles at Settlement Road and 3,100 vehicles south of Royalton Road. This route is now being rebuilt with pavements of 40 and 30-foot width, which will adequately serve the traffic it will be required to carry.



THE GRADE CROSSINGS ON FRONT STREET IN BEREA

In the foreground is the Big Four crossing; in the middle distance the crossing of the New York Central Railroad. Both of these grade crossings would be eliminated by a structure which it is proposed to build a short distance west of the present crossings

The Southwestern Section of Cuyahoga County

The southwestern section of Cuyahoga County includes the area located southwest of the City of Cleveland west of Settlement Road and south of the south limits of the villages of Parkview and North Olmsted. With the exception of Berea and Olmsted Falls this section has at present only a small amount of suburban development. It is also adjacent to the least densely populated section of Cleveland.

Other important north-south routes are Berea Road or Riverside Drive carrying a daily traffic of 4,400 vehicles at the Cleveland city line and 3,400 vehicles at Sheldon Road. Front Street, which is a continuation of the route, carries 4,800 vehicles per day at its intersection with Bagley Road in Berea. This route consists of 24 and 36-foot pavements except for one short section 18 feet in width, all in good condition and adequate for the volume of traffic to be carried. In the village of Berea a grade separation of the

New York Central and the Big 4 Railroads is planned a short distance west of the present grade crossings. This grade separation with the proper connections will materially reduce the traffic over the present grade crossings on Front Street. The continuation of this route southward to the Medina County line via Prospect Road is of less traffic significance. The average daily

reconstruction and widening to 20 feet, but the reconditioning of the section south of Irish Road is deferred to the second five years of the plan period. Plans for this route also include the construction of grade crossing separations at the New York Central and the Big 4 Railroads.

The most important east-west route in this section will be Brook Park Road which forms a part



Extensive repairs on Brook Park Road which is planned for reconstruction and widening to 40 feet

traffic on Prospect Road at Royalton Road is 400 vehicles. The section between Fair Road and Depot Road consists of a 14-foot brick pavement, which is planned for widening to 20 feet in the second five years of the plan period.

The remaining section consisting of a 16-foot surface is adequate for present and expected traffic. East Road from Riverside Drive to Fowles Road is planned for 20-foot construction. Separation of the New York Central Railroad grade crossing on East Road is also planned.

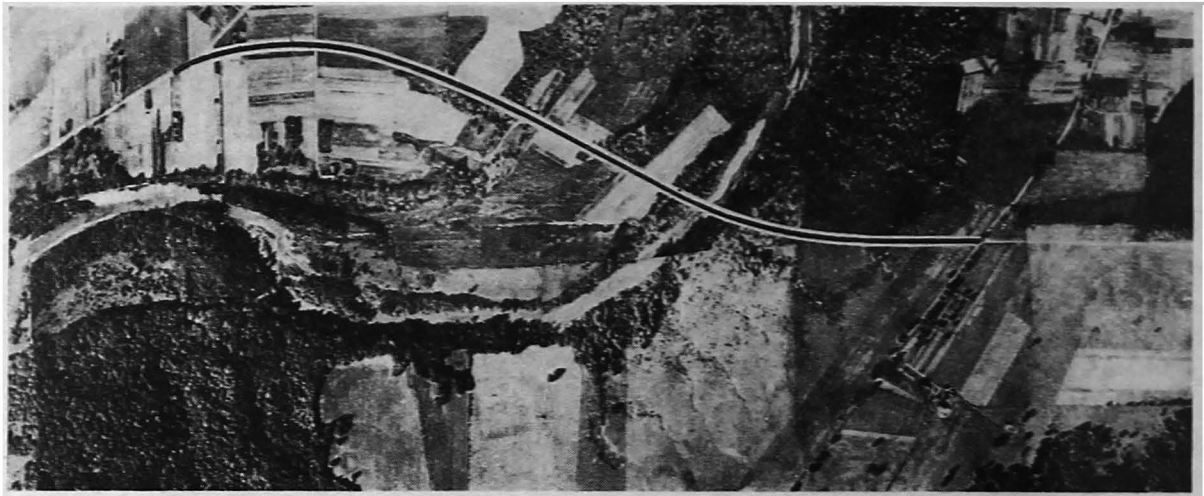
Columbia Road (State Route 252) through this section consists of a 14-foot pavement. It carries a daily traffic of 900 vehicles north of Cook Road, 1,600 through Olmsted Falls, and 700 at the Medina County line. It is planned for

of the southern belt route discussed in the previous sections. The route between Riverside Drive and Settlement Road is now a 14-foot pavement. This section is planned for reconstruction and widening to 40 feet. The route is also projected westward to a crossing of the Rocky River and a connection with Mastic Road near Spencer Road. This new section and the proposed bridge are planned for 40-foot roadways. The plans for Brook Park Road also include the elimination, by separation, of the grade crossings at the Big 4 and Cleveland Short Line Railroads. The most heavily traveled, east-west route in the section at present is composed of Irish Road and Bagley Road, which form a direct connection from the Lorain County line to Woos-

ter Pike, passing through Olmsted Falls and Berea.

This route consists of 14 and 16-foot pavements except for a short section 24 feet in width in Berea. Daily traffic is 700 vehicles at Stearns Road, 2,200 through Olmsted Falls, 2,800 through Berea and 1,600 at Engle Road. This

from Bagley Road, a short distance west of Wooster Pike, to Pleasant Valley Road, a short distance east of Wooster Pike. This connection is planned as a 20-foot roadway. As described in the previous section, Pleasant Valley Road is planned for widening to 20 feet in the second five years of the plan period.



Aerial photograph showing the Rocky River Valley and the proposed location of the Brook Park Road crossing from Brook Park Road at Grayton Road to Spencer Road and Mastic Road (see Appendix, Figure 6)

route is planned for widening to 20 feet except through the villages of Berea and Olmsted Falls where widening to 40 feet is suggested. The proper development of this route requires the elimination of three grade crossings, the Big 4 Railroad west of Berea, and the Cleveland Southwestern Electric Railway and the Baltimore and Ohio Railroad between Berea and Wooster Pike.

Except for an offset at Wooster Pike this same route continues eastward via Pleasant Valley Road to Brecksville Road forming a well located intermediate belt route in the western half of the county. The lack of a direct connection at Wooster Pike produces congestion on the latter route between its junctions with Bagley Road and Pleasant Valley Road. To eliminate this congestion and to provide a direct connection between the two roads a new connection is planned

Other improvements planned in this section include the widening of Depot Road between Wooster Pike and Prospect Road to 20 feet during the second five years of the plan period; the construction of medium-type 20-foot surfaces on West Road between Prospect Road and Fair Road and on Fair Road between West Road and Sprague Road; the improvement with minor-type surfaces of John Road between Columbia Road and Fitch Road, of Albion Road between Wooster Pike and East Road, and of Jacque Road between Albion Road and Settlement Road; and the elimination of the grade crossing on Royalton Road at the Baltimore and Ohio Railroad.

The summary of improvements planned in the southwestern section of Cuyahoga County is shown in Table 32.

Table 32—Summary of 10-year plan of improvement in the southwestern section of Cuyahoga County

A. Roadways

Proposed construction	Width		Total
	40 feet	20 feet	
New routes, miles.....	1.3	1.0	2.3
Widening, miles.....	1.2	10.6	11.8
Reconstruction and widening, miles.....	2.5	3.6	6.1
Reconstruction, miles.....			
New construction, miles.....		4.3	4.3
Total, miles.....	5.0	19.5	24.5
New routes serving this section in City of Cleveland, miles.....			
Grand total, miles.....	5.0	19.5	24.5

B. Structures

Proposed construction	On existing routes	On new routes	Total
Bridges, new, number.....			
Bridges, replacement or widening, number.....			
Railway grade separations, number.....	10		10
Highway grade separations, number.....			
Total, number.....	10		10
Structures serving this section in City of Cleveland			
Bridges, new, number.....			
Railway grade separations, number.....			
Highway grade separations, number.....			
Total, number.....			
Grand total, number...	10		10

The Western Section of Cuyahoga County

The western section of Cuyahoga County includes the area located west of Cleveland and Lakewood, comprising the villages of Bay, Dover, Fairview, North Olmsted, Parkview and Rocky River.

This section, particularly adjacent to the cities of Cleveland and Lakewood and in the northern part near the lake shore, is a rapidly growing suburban area producing a considerable daily traffic between this section and the cities.

All of the important arterial routes between Cleveland and the west pass through this section and its highways must therefore accommodate in addition to local traffic the traffic between Cleveland and Lorain, Elyria and other population centers to the west. Traffic movement is predominantly in the east-west direction. North-south movement is limited to local traffic within the section and to the interchange of traffic between the east-west routes. The most important routes are Center Ridge Road (U. S. Route 20) and West Lake Road (State Route 2). Normal utilization of Center Ridge Road during the period of the survey was influenced by the fact that the route was closed for construction east of Clague Road. The recorded daily traffic west of Clague Road was 3,600 vehicles; at Dover Center Road it was 4,300 vehicles; and at the Lorain County line 3,800 vehicles. This highway forms the direct route to Elyria and the west and, with the exception of U. S. Route 20 east of Cleveland, carries a larger volume of long-distance traffic than any other route in the area. The connection of this route to the Rocky River bridge and to Hilliard bridge via Wooster Road has recently been improved with a 40-foot roadway. Between Wooster Road and the east limits of the village of Dover, construction of a 40-foot roadway is in progress. The section from the east limits of Dover to the Lorain County line is planned for reconstruction and widening to 40 feet.

West Lake Road (State Route 2) forms the principal route between Cleveland and Lorain and other cities on the lake shore, and also serves the suburban developments along the lake. It carries a daily traffic of 9,300 vehicles at its junction with

Detroit Road west of the Rocky River bridge, 5,400 vehicles at Clague Road, and 3,300 vehicles at the Lorain County line. From Blount Street to the east limits of the village of Bay the present improvement is 20 feet in width and is planned for widening to 40 feet. From the east limits of Bay to the Lorain County line the present improvement consists of a good pavement, 24 feet in width.

The section between the east limits of Bay Village and Dover Center Road is planned for widening to 40 feet in the second five years of the plan period. The 24-foot surface between Dover Center Road and the Lorain County line is adequate for traffic during the next ten years.

Detroit Road (State Route 254), which is located between West Lake Road and Center Ridge Road forms a direct route from Cleveland to the southern part of the City of Lorain. This route served as the detour for U. S. Route 20 during the survey and carried 10,600 vehicles at its junction with State Route 2 west of Rocky River bridge. West of Dover Center Road, where it was free of detour traffic, its average daily traffic density was 2,800 vehicles; and at the Lorain County line it carried 1,600 vehicles. East of Clague Road the present improvement consists of a 32-foot pavement which is adequate for normal traffic on this route. Between Clague Road and the Lorain County line the present improvement consists of a 20-foot surface which will not provide adequate service for ten years and is therefore planned for reconstruction to 20-foot width during the second five years of the plan period.

The fourth principal east-west route is Lorain Road located south of Center Ridge Road. This route is under construction as a four-lane pavement with car tracks in the center from Rocky River to the Lorain County line.

Part of an additional east-west route is now under construction as a 20-foot roadway between Canterbury Road and the Lorain County line. To complete this route, Hilliard Boulevard, requires the establishment of a new route from Canterbury Road to the present pavement west of Hilliard bridge. When completed in Cuyahoga County and extended to Elyria in Lorain County this route will form an excellent relief route for U. S. Route 20. This route is planned as a 20-foot roadway

with adequate right of way to permit widening to 40 feet if required.

The most important new east-west route in this section is designed to relieve congestion on Rocky River bridge by the development of a new crossing of the river at the lake front. This route will form a connection from Lake Avenue, near Webb Road in Lakewood, to Avalon Drive, near Wagar road in Rocky River village. Avalon Drive forms a direct connection to West Lake Road and to the proposed Spencer Road western belt route which connects with each of the important east-west arterial routes. This proposed crossing of Rocky River is planned as a 40-foot roadway. The connection, if it had been completed in 1927, would have carried a minimum of 5,000 vehicles daily.

An improvement in the City of Cleveland which will facilitate traffic movement between the western section of the county and the central business section of Cleveland is the proposed new high-level crossing of the Cuyahoga River in the vicinity of the present Main Street bridge. Traffic between the central business section of Cleveland and the western centers of traffic crosses either the present Superior high-level bridge, which carries 56,000 vehicles per day, or the present Main Street low-level bridge, which carries a daily traffic of 7,000 vehicles. The proposed bridge, if it had been built in 1927, would have carried a minimum of 18,000 vehicles per day. Connections of this bridge with the proposed lake front development east of the Cuyahoga River will also permit traffic destined to points east of the Public Square to by-pass this congestion center. Between the eastern terminus of the proposed Rocky River crossing and the western approach to the proposed Cuyahoga River crossing, present traffic is well served by Lake Avenue, Clifton Boulevard, Edgewater Drive and Bulkley Boulevard. When these arteries approach their capacity, relief can be provided by the development of a lake-front roadway between these points.

Further relief for the present Rocky River bridge is provided by a connection, 40 feet in width, from Detroit Road near Wagar Road to Hilliard Boulevard west of the Hillard bridge. This connection, together with the proposed improvements by the cities of Cleveland and Lake-



CENTER RIDGE ROAD (U. S. ROUTE 20) AT DOVER

This highway is the direct route to Elyria and the west and carries more long-distance traffic than any other highway in the area with the exception of the U. S. Route 20, east of Cleveland



WEST LAKE ROAD, THE PRINCIPAL ROUTE FROM CLEVELAND TO LORAIN

The 24-foot surface is in good condition and will be adequate for 10 years

wood of direct routes from Hilliard bridge to the central section of the city, will provide a direct route, particularly for commercial traffic and other traffic destined to points south of the Public Square section, from Detroit Road to the point of destination.

A further improvement, designed to relieve congestion at the intersection of Blount Street and Detroit Road, involves the development of a short

tion to Spencer Road, which is designed to form an inner, north-south belt route is also made. Ramps at both ends of the bridge over Rocky River will provide connections to the proposed Rocky River parkway drives. East of Mastic Road this route is planned as a 40-foot roadway. Westward Mastic Road is utilized to a point near the terminus of Clague Road. This section of Mastic Road is planned for widening to 40 feet

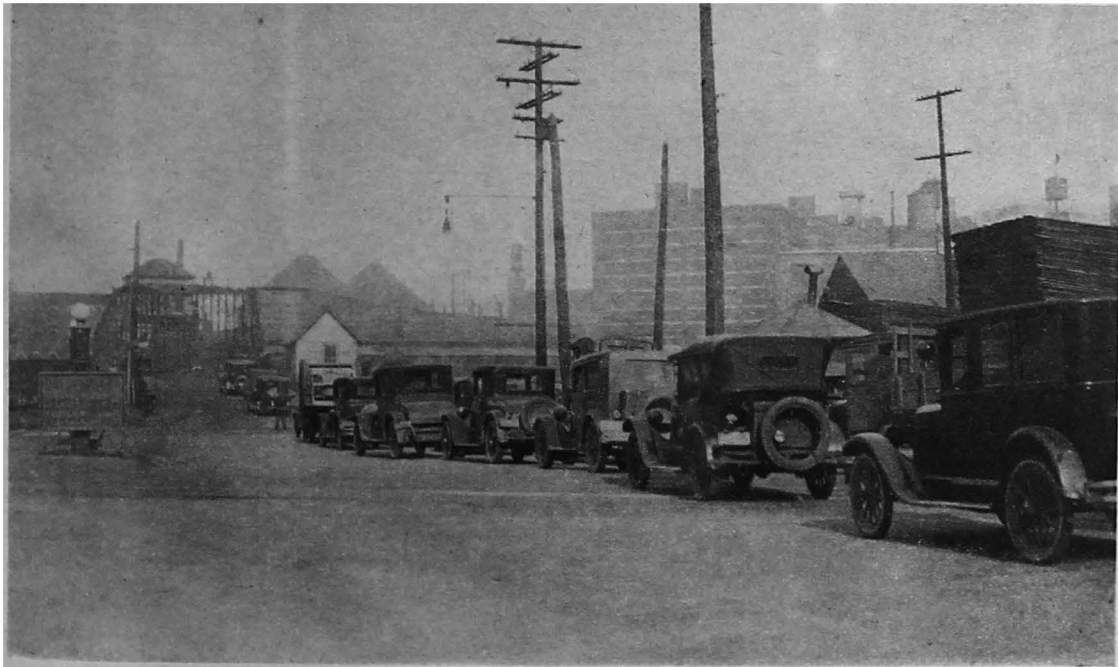
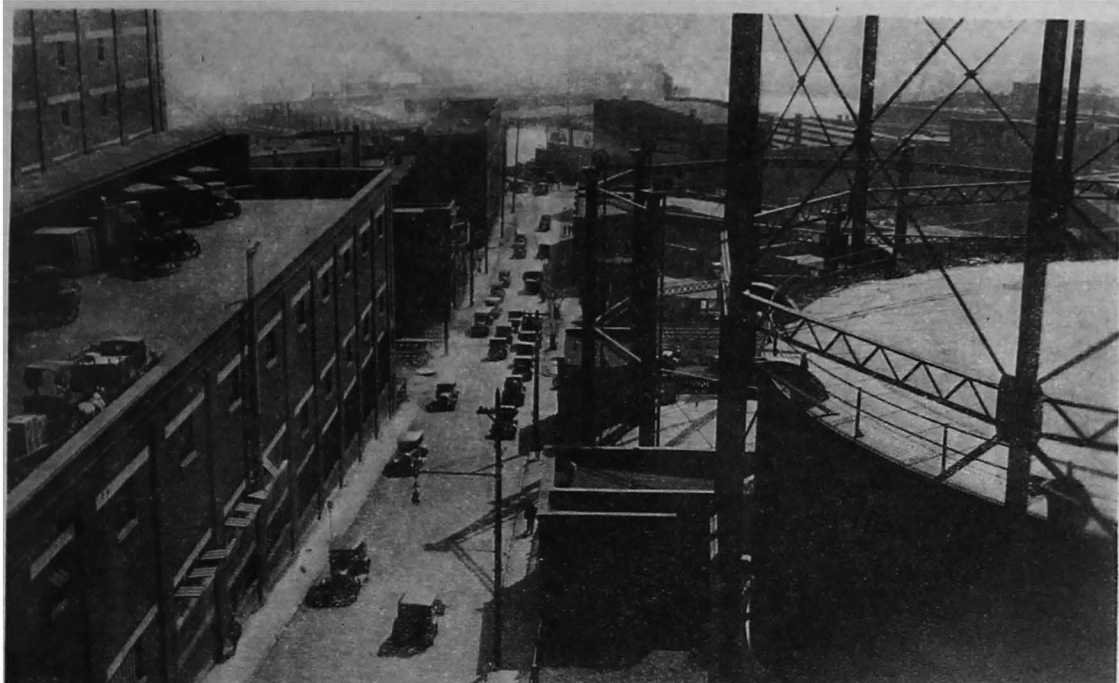


SITE OF THE LAKE-FRONT CROSSING OF ROCKY RIVER

section of 40-foot roadway from the west end of Rocky River bridge westward, following the south side of the Lake Shore Electric tracks to Detroit Road west of the present crossing.

Another important new east-west route planned for this section is the extension westward of the Brook Park belt route. From the present terminus of Brook Park Road in the southwestern section, a new route and bridge is planned over Rocky River to a connection with Mastic Road a short distance west of Spencer Road. A connec-

to accommodate the combined traffic of Mastic Road and the new route. From the above-mentioned point near the junction of Mastic and Clague Roads, a new route 20 feet in width is projected directly westward to the Lorain County line, intersecting U. S. Route 20 a short distance east of the county line and forming a direct connection from U. S. Route 20 to the Brook Park belt route for traffic desiring to enter the City of Cleveland from the south or desiring to by-pass the city.



THE PRESENT MAIN STREET LOW-LEVEL BRIDGE AND ITS APPROACHES

Steep grades and bad alignment of the approaches cause serious congestion with a daily traffic of 7,000 vehicles

Other new east-west routes in the section are Wolf Boulevard from the proposed Spencer Road extension immediately north of the Nickel Plate Railroad to the Lorain County line, which is planned as a 20-foot roadway; and a short section extending Avon Road from Bradley Road to Detroit Road. This section, also planned as a 20-foot roadway, forms the eastern connection of the proposed Powdermaker Road development in Lorain County. The plan also provides for the improvement of Avon Road from Bradley Road to the Lorain County line.

The most important north-south route in this section will be the Spencer Road belt route which will tap all the important east-west routes and connect with the Brook Park belt route. It will provide facilities for the easy interchange of traffic between routes, for the sorting of traffic between the city entrances, and for the by-passing of traffic around the city. The development of this route, which is planned as 40-foot roadway, requires the opening of a new connection from the present terminus of Spencer Road at Mastic Road to the proposed Brook Park extension; the widening of Spencer Road between Mastic Road and Lorain Road to 40 feet; and the projection of a new route northward to West Lake Road near the junction of Avalon Drive. The proposed new route underpasses Center Ridge Road with ramp connections. Grade separations are planned at the crossings of the Nickel Plate Railroad and the Lake Shore Electric Railroad. Clague Road is planned for reconstruction and widening to 20 feet between West Lake Road and Lorain Road.

On Hall Road between Detroit Road and Lorain Road, and on Dover Center Road between West Lake Road and Butternut Ridge Road, widening of the present surface to 20 feet is planned in the second five years of the plan period.

Columbia Road from Lorain Road to the south limits of the section is planned for reconstruction and widening to 20 feet during the first five years.

Bradley Road from West Lake Road to Center Ridge Road is planned for reconstruction and widening to 20 feet during the second five years of the plan period.

Table 33—Summary of 10-year plan of improvement in the western section of Cuyahoga County

A. Roadways

Proposed construction	Width		Total
	40 feet	20 feet	
New routes, miles.....	7.4	14.9	22.3
Widening, miles.....	6.3	11.3	17.6
Reconstruction and widening, miles.....	6.1	10.7	16.8
Reconstruction, miles.....		4.7	4.7
New construction, miles.....			
Total, miles.....	19.8	41.6	61.4
New routes serving this section in City of Cleveland, miles.....	1.4		1.4
Grand total, miles.....	21.2	41.6	62.8

B. Structures

Proposed construction	On existing routes	On new routes	Total
Bridges, new, number.....		3	3
Bridges, replacement or widening, number.....			
Railway grade separations, number.....	7	2	9
Highway grade separations, number.....		1	1
Total, number.....	7	6	13
Structures serving this section in City of Cleveland, number.....			
Bridges, new, number.....		1	1
Railway grade separations, number.....			
Highway grade separations, number.....			
Total, number.....		1	1
Grand total, number....	7	7	14

The proper development of these north-south roads also involves the separation of grades at the crossings of these roads with the Nickel Plate and the Lake Shore Electric Railroad. Of these grade crossing eliminations, the crossings on Dover Center Road, Hall Road, Clague Road and Bradley Road at the Nickel Plate Railroad are planned for the first five years, and the crossings on Hall Road, Dover Center Road and Clague Road at the Lake Shore Electric Railroad for the second five years of the plan period.

Other roadway improvements in this section include the widening to 20 feet in the second five years of the plan period of those sections of Mastic Road between Spencer Road and Columbia Road not made a part of the Brook Park belt route, and of Butternut Ridge Road between Lorain Road and Columbia Road. All of the above improvements are planned for major or medium type construction. The plan also provides for the improvement with minor-type construction of Kennedy Ridge Road between Butternut Ridge Road and Columbia Road.

The summary of improvements planned in the western section of Cuyahoga County is shown in Table 33.

The City of Cleveland

Improvements planned within the City of Cleveland are principally relief routes for the main arterial routes which provide facilities for the movement of traffic between the central section of the city and the suburban areas. These routes will also serve large volumes of traffic moving between points within the city but the present study does not include plans for improvements which are not of general importance to the regional area.

The principal improvements planned within the city have been discussed in the previous sections in their relation to the various sections of the county. These improvements are:

1. The lake-front development forming a new arterial route from the west limits of the village of Bratenahl to the down-town section, connecting with a new route extending to Painesville. In the city this route follows the north side of the New York Central Railroad to East 72nd Street

and from this point to East 9th Street it is to be constructed in the lake front. From East 9th Street, which forms the principal entrance to the business section, the route is projected westward over the Pennsylvania Railroad and along the approximate line of Summit Avenue to a new high-level crossing of the Cuyahoga River near the location of the present low-level Main Street bridge and to a connection with Bulkley Boulevard west of West 25th Street. In addition to facilitating the movement to the business section both from the east and from the west, this development also provides a by-pass route of the business section of the city.

2. The Cuyahoga Valley development forms, with its two branches, new arterial routes through the valley for the relief of Broadway at West 25th Street. This development includes an elevated 40-foot roadway through the industrial section of the valley from Broadway at Jefferson Avenue to a point south of Campbell Road and a relocation of Independence Road from this point to a connection with Washington Boulevard north of Harvard Street. The western branch crosses the Cuyahoga River valley from the south end of the viaduct section to connections with Broadview, State, and Pearl Roads south of their convergence. This development will provide relief for the badly congested routes on both sides of the valley and will also furnish greatly improved highway facilities for the upper Cuyahoga Valley both in the city and in the section immediately south of the city.

3. The Shaker Boulevard extension forms a depressed highway without intersections from the present terminus of Shaker Boulevard at Woodhill Road to Broadway at approximately Pittsburgh Avenue at East 34th Street. This route is designed primarily to provide adequate highway facilities between the business section of Cleveland and the east-central suburban section and the transfer of this traffic to the new route will permit the greater utilization of existing routes in this section of the city by local traffic.

4. The Walworth Run development forms a depressed highway without intersections from Scranton Road to Clark Avenue near West 61st Street. This route is designed to provide relief



APPROACHES TO THE NEW, HIGH-LEVEL MAIN STREET BRIDGE

Above—Front Street looking west from Union Depot

Below—Main Street looking east from Bulkley Boulevard at West 25th Street

for Lorain Avenue and to furnish increased highway facilities for the section of the city south of Lorain Avenue and west of Fulton Avenue.

5. The Jennings Road development provides an improved route from West 14th Street on the west side of the Cuyahoga Valley to the city limits. This route is designed to provide improved facilities for traffic originating in the territory adjacent to the route in the city and in the section immediately south of the city. These routes are included in the plan of improvement and in the cost estimate.

The traffic and planning studies of the area also indicated the demand for and the practicability of developing a number of additional projects which are of primary importance to the city rather than to the regional area, and which are therefore not included as a part of the improvement plan, but which would greatly improve traffic conditions on the city streets. These improvements are:

1. The development of a parallel relief route north of Euclid Avenue. The most satisfactory location of this route is Chester Avenue extended from East 55th Street to 82nd Street, and thence via Crawford Road to Hough Avenue, and via Hough Avenue to Wade Park, overpassing East 105th Street, and a crossing of Wade Park, to Ford Road, and an improved connection with Mayfield Road at Euclid Avenue.

2. The development of a north-south route west of West 25th Street from Pearl Road to Bulkley Boulevard to serve as a relief route for West 25th Street. The development of this route involves a crossing of Big Creek on the west side of Brookside Park, an adequate connection from this crossing to Pearl Road, and the further improvement of West 44th or 45th Street from Denison Avenue to Bulkley Boulevard. This route will provide direct connection to all important east-west routes on the west side of the city and will permit traffic to select the most direct route to its destination.

3. The elimination of grade crossings of the New York Central Railroad at Lorain Avenue and East 72nd Street. There are a number of other grade crossings also requiring elimination

but the two listed are on important highways and should be given immediate attention.

4. Lower Cuyahoga Valley highway improvements.

(a) The low-level Main Street bridge crossing, connecting Bulkley Boulevard and West 25th Street with West 9th Street. The development of the proposed high-level crossing near this point will relieve the low-level route of traffic moving between the east and west sides of the city, but the present bridge and its approaches from West 9th Street to a point some distance west of the present bridge are inadequate for the use of local valley traffic and require reconstruction.

(b) Columbus Road improvement. The development of Columbus Road from its connections with West 25th Street and Lorain Avenue to connections with Superior Avenue and to St. Clair Avenue at West 9th Street will provide an additional low-level Cuyahoga Valley crossing connecting the principal trucking routes from the southwest—West 25th Street and Lorain Avenue—with St. Clair Avenue, the principal trucking route to the northeast. It will also provide greatly improved highway distribution facilities for the lower valley. This route will pass under the eastern arch of the Superior high-level bridge, approximately through the present Erie Railroad passenger station, and will connect with the east-bound ramp to Superior Avenue and a proposed Superior Avenue west-bound ramp via West 10th Street to Columbus Road, and to St. Clair Avenue at West 9th Street. The general location of this route is shown in Appendix Figure 8.

The completion of these projects will provide for the lower valley three high-level crossings; viz., the Superior high-level bridge, the proposed Main Street-Summit Avenue high-level bridge connecting the lake front boulevard routes, and the Central Viaduct bridge, which should be reconstructed. They will also provide three important low-level crossings, viz., Scranton Road and Walworth Avenue via the Eagle Ramp to Ontario Street; Columbus Road with a new bridge connecting Lorain Avenue, West 25th Street and their tributary streets with Superior Avenue and St. Clair Avenue; and the Main

Street route connecting Bulkley Boulevard and West 9th Street. These crossings and the roadway changes in progress or planned for improvement are expected to meet satisfactorily the immediate requirements of traffic crossing the lower Cuyahoga River Valley.

The location of any additional crossings of the Cuyahoga Valley between the Clark Avenue crossing and Lake Erie should be planned in accordance with routes now constructed, the new high

and low-level crossings planned for improvement, the effect of additional crossings on the traffic usefulness of present and new routes, and traffic distribution requirements. The construction of a bridge on the approximate site of the proposed Lorain-Central bridge, according to present plans, will result in the creation of a traffic congestion area at the eastern approaches to such a bridge probably more serious than any existing congestion in the Cleveland regional area.

THE PLAN OF HIGHWAY IMPROVEMENT IN SURROUNDING COUNTIES

TO provide a complete highway traffic distribution system for the Cleveland regional area certain improvements are also required outside of Cuyahoga County in parts of the six surrounding counties of Lake, Lorain, Summit, Portage, Medina, and Geauga. In the parts of these six counties located within approximately thirty miles of the center of Cleveland the traffic needs with reference to the regional area were analyzed and a plan of improvement established on the same basis as the plan for Cuyahoga County. As distance from the center of population of the regional area increases the volume of traffic decreases and the number of routes of regional importance also decreases. Within these six counties no attempt has been made to establish a plan for roads of purely local or county importance; only those roads which form a part of the regional distribution system have been analyzed. These routes group themselves into two classes—first, and most important, the series of radial routes extending from the center of population of the area, and second the routes which connect the secondary centers of population. These routes generally include the State highways and the more important county highways.

The Lake County Plan

Lake County, which is located northeast of Cuyahoga County, includes the rapidly developing suburban territory adjacent to Lake Erie between Painesville and Cuyahoga County. This

section produces a large volume of traffic moving daily between it and the City of Cleveland. In addition, the principal through routes to the northeast pass through this area, and on these roads the heavy local traffic is augmented by a considerable volume of through traffic.

The most important highway in this section is U. S. Route 20 which carries a daily traffic of 8,600 vehicles at the Cuyahoga County line, 7,900 east of its junction with State Route 91 and 9,200 east of Center Street in the village of Mentor. This route is planned as a 40-foot roadway between the Cuyahoga County line and Painesville. A short section directly east of the Cuyahoga County line is at present a 36 to 40-foot pavement which will not provide adequate highway service for a 10-year period. This section is planned for reconstruction during the second five years of the plan period. Between this section and the west limits of Willoughby, widening to a 36 to 40-foot surface has recently been completed. From the west limits of Willoughby to the Chagrin River bridge in the village the present surface is 40 feet in width but requires reconstruction. The section between the Chagrin River bridge in Willoughby and Center Street in Mentor is being widened to 40 feet. Between Mentor and the Painesville city line widening to 40 feet is planned. The plan also includes the elimination of the grade crossing at the Nickel Plate Railroad near the west limits of Painesville.

This route passes through the business sections of Wickliffe, Willoughby and Mentor and its

traffic capacity is decreased by parking and local traffic in these villages. To provide a relief route for U. S. Route 20 and to provide improved highway facilities for the area lying north of the New York Central Railroad a new route is planned as an extension of St. Clair Avenue from its present terminus at Lloyd Road to a junction with U. S. Route 20 immediately east of Painesville. This new route is planned as a 40-foot roadway and the short section from the Cuyahoga County line to Lloyd Road is planned for widening to 40 feet. Its development involves the construction of bridges over the Chagrin River at Willoughby and over the Grand River at Painesville. This route connects with the proposed St. Clair-Lake Front route in Cuyahoga County and provides a direct route without serious traffic interruptions from Painesville and points east of the center of Cleveland. Adequate connections between this route and U. S. Route 20 are provided by Lloyd Road, Vine Street, and Center Street.

Lake Shore Boulevard, (State Route 175) forms another important route through the western half of Lake County. This highway is the direct route between Cleveland and the villages of Willowick, Mentor-on-the-Lake, and Richmond, and other developments along the lake, as well as a lake-front route from Cleveland to Painesville. It carries a daily traffic of 5,100 vehicles west of its junction with Vine Street, 3,000 vehicles east of this junction, 1,900 vehicles west of its junction with Lost Nation Road, and 2,500 east of this junction. The section from the Cuyahoga County line to Vine Street is planned as a 40-foot roadway, involving widening of the western half of this section and reconstruction and widening of the eastern half. Between Vine Street and Lost Nation Road the present 18-foot surface is satisfactory but the bridge over the Chagrin River and a smaller bridge a short distance west are planned for replacement. The replacement of the Chagrin River bridge also involves an improvement of the alignment between the bridge and roadway. The 16-foot surface between Lost Nation Road and Munson Road is planned for widening to 20 feet as is also the 16-

foot section between the south limits of Richmond and the west limits of Painesville. The proper development of the approach to Painesville on this route necessitates the elimination of the grade crossings of the Baltimore and Ohio and New York Central Railroads.

Vine Street forms an important connection between U. S. Route 20 and State Route 175 carrying a daily traffic of 2,400 vehicles. Following the development of the new St. Clair extension the east end of Vine Street will form an even more important connection between U. S. Route 20 and this new route.

The present 14-foot surface is planned for reconstruction and widening to 20 feet between Lake Shore Boulevard and the St. Clair extension, and for reconstruction and widening to 40 feet between U. S. Route 20 and the St. Clair extension. The plan also provides for the elimination of the grade crossings of the New York Central and the Nickel Plate Railroads on this latter section.

The development of an additional route south of U. S. Route 20 has been in progress. This route—State Route 84—extends from State Route 85 near the Cuyahoga County line via French Road, Willoughby Ridge Road, Warren Road, Baxter Road, Johnny Cake Ridge Road and a partial new right of way to a junction with South Ridge Road southeast of Painesville. The section from the Willoughby-Kirtland Road to State Route 44 south of Painesville is in process of improvement, and French Road is improved with a 20-foot surface. The section between French Road and the Willoughby-Kirtland Road is planned for 20-foot construction. The improvement of this section involves the construction of a bridge over the Chagrin River near the southern limits of Willoughby.

The proper development of this route also requires the opening of a by-pass route south of Painesville, as a part of which it will be necessary to construct a bridge over the Grand River. The by-pass branches from State Route 84 at its junction with State Route 44 and returns again to Route 84 at the point where the present route turns north to enter Painesville. In order to per-

mit traffic on the eastern part of this route to flow into U. S. Route 20 and thence to the St. Clair extension the construction of a 20-foot surface on Johnny Cake Ridge Road between State Route 84 and U. S. Route 20 is planned.

The planned improvements on north-south routes in Lake County include the reconstruction and widening to 20 feet of Lost Nation Road between U. S. Route 20 and State Route 175; of the Willoughby-Kirtland Road between U. S. Route 20 and Kirtland Flats; and of Chillicothe Road from Kirtland Flats to the Geauga County line; also the widening to 20 feet of Center Street (Mentor) from Walnut Street to Chillicothe Road and of Chillicothe Road from Center Street

to Kirtland Flats. Minor-type improvement is planned for the Chagrin Falls-Willoughby Road (State Route 174) from State Route 84 to the Cuyahoga County line.

Additional grade crossings planned for elimination are the New York Central Railroad and the Nickel Plate Railroad crossings on Lloyd Road; the crossings of the same two railroads on Center Street (Mentor); the Liberty Street and the State Street crossings of the Nickel Plate Railroad in the southern part of Painesville; and the Baltimore and Ohio Railroad crossing of State Route 44, approximately four miles south of Painesville.

The summary of improvements planned in Lake County is shown in Table 34.

Table 34—Summary of 10-year plan of improvement in Lake County

A. Roadways

Proposed construction	Width		Total
	40 feet	20 feet	
New routes, miles.....	15.8	1.1	16.9
Widening, miles.....	6.4	5.9	12.3
Reconstruction and widening, miles.....	0.8	13.2	14.0
Reconstruction, miles.....	1.6	.....	1.6
New construction, miles.....	.....	10.4	10.4
Total, miles.....	24.6	30.6	55.2

B. Structures

Proposed construction	On existing routes	On new routes	Total
Bridges, new, number.....	1	3	4
Bridges, replacement or widening, number.....	2	.....	2
Railway grade separations, number.....	12	.....	12
Highway grade separations, number.....	.....	.....	.....
Total, number.....	15	3	18

The Lorain County Plan

Lorain County is located west of Cuyahoga County and occupies the same relative position in the western part as Lake County in the eastern part of the regional area. It includes the important cities of Lorain and Elyria which form the western limits of the Cleveland regional area. Except along the lake shore the territory between these cities has little suburban development and is, therefore, not a large source of highway traffic. The principal direction of traffic movement is east and west and the largest part of the traffic on these east-west routes is the movement between Cleveland and Lorain and Elyria. This traffic is supplemented by through traffic from points west and southwest of Lorain and Elyria and by the local traffic originating east of these cities. The most important route in this section is U. S. Route 20 which carries a daily traffic of 4,600 vehicles at the intersection with Belden-Avon Road. The present improvement between the Cuyahoga County line and the Elyria city limits is a 19-foot surface in good condition. Normal increase in traffic and the further developments anticipated immediately adjacent to the road will require the widening of this route to 40 feet during the second five years of the plan period.

State Route 2 which parallels the lake shore carries a daily traffic of 3,300 vehicles at the Cuyahoga County line and 2,700 vehicles approxi-

mately one mile east of the Lorain city limits. This route between the Cuyahoga County line and the Lorain limits is improved with an unsatisfactory 18-foot surface and it is therefore planned for reconstruction and widening to 20 feet.

In place of additional widening of this route when the traffic capacity of a two-lane roadway is reached the development of a new route on a more direct line is planned. With further lake-shore developments along State Route 2 local traffic will also increase and make it progressively less desirable as an arterial route between Lorain and Cleveland. The alternative route is planned along the line of Colorado Avenue and Powdermaker Road, utilizing Colorado Avenue within the city of Lorain, establishing a new route in a direct line from Colorado Avenue at the Lorain city limits to the Lorain-Ridgeville Road at Harris Road, improving the Lorain-Ridgeville Road from Harris Road to Miller Road, establishing a new route in a direct line from Miller Road to Powdermaker Road at Moore Road and improving Powdermaker Road from Moore Road to the Cuyahoga County line where it connects with Avon Road. Plans in Cuyahoga County provide for a connection from the county line to Detroit Road. This route is planned as a 20-foot roadway. To provide connections between this route and the important State Route 2 entering Lorain from the west, as well as to provide facilities for local traffic in Lorain, an additional bridge over the Black River is essential.

The proposed bridge and approaches forming a connection from Colorado Avenue at Kansas Avenue to 14th Street at Reid Avenue and to Broadway at 16th Street would meet these traffic requirements.

Detroit Road (State Route 254) carries a daily traffic of 1,600 vehicles at the Cuyahoga County line, 1,900 vehicles east of its junction with the Sheffield-French Creek Road, and 1,000 vehicles west of this junction. This route forms a direct connection from Cleveland to the territory south of Lorain and via the Sheffield-French Creek route to the southern part of the City of Lorain. The present 14-foot surface on the section between the Cuyahoga County line and French Creek requires reconstruction and widening to 20 feet.

Between French Creek and the termination of State Route 254 at State Route 57, the 18-foot sections are satisfactory. The unimproved section between the west line of Avon village and West River Road requires a 20-foot pavement. The construction of a bridge over the Black River to replace the present structure is also required. This bridge is planned as an intermediate level bridge and arranged to serve both State Route 254 and the proposed route along the line of Mills Road, which joins State Route 254 just east of this point.

The Sheffield-French Creek Road is also planned for reconstruction and widening to 20 feet.

Butternut Ridge Road which forms a continuation of Lorain Road in Cuyahoga County is planned for reconstruction and widening between the Cuyahoga County line and Belden-Avon Road. The present 16-foot section from Belden-Avon Road to a short distance east of State Route 57 is planned for widening to 20 feet in the second five years of the plan period. The 10-foot macadam section between this point and State Route 57 is planned for reconstruction and widening to 20 feet and the concrete section between State Route 57 and La Grange Road for widening to 20 feet. Other improvements on this route include the opening of a new connection on a direct line between Dewhirst Road and State Route 57 and the construction of a bridge over the East Branch on this connection, and also a relocation of the route between La Grange Road and U. S. Route 20 and the construction of a bridge over the West Branch on this relocation. These improvements, providing a direct connection from U. S. Route 20 southwest of Elyria and by-passing this city, will materially increase the present traffic of 700 vehicles recorded on this road west of the intersection with Root Road.

A new east-west route in Lorain County is planned in the extension of the Brook Park belt route, described in the Cuyahoga County plan, from the Cuyahoga County line along the line of Mills Road to a junction with State Route 254 at the east end of the proposed Black River bridge on this route. This extension will provide a direct route from Lorain and South Lorain to the southern limits of the City of Cleveland

with connections to all routes entering the city from the south as well as a complete by-pass of the city for traffic destined to points east. This route is planned as a 20-foot roadway.

The extension of Hilliard Boulevard from the Cuyahoga County line to Elyria provides an alternative route to U. S. Route 20. This route is planned as a 20-foot roadway extending from the Cuyahoga County line to Mills Road near Nagle Road. Mills Road, which becomes the Brook Park belt route extension, is then utilized to a point between Belden-Avon Road and Jaycox Road, from which point a diagonal route extends to East River Road near the north limits of Elyria.

On State Route 82 an extension is planned from the present terminus of this route at State Route 57 to a connection with Butternut Ridge Road east of the crossing of the Baltimore and Ohio Railroad, involving a bridge over the East Branch. This development will provide a direct connection from U. S. Route 20 via State Route 82 to all routes south and southeast from Cleveland, thus forming an outer belt route.

Other improvements on east-west routes include the reconstruction and widening to 20 feet of the connection from Irish Road in Cuyahoga County to Butternut Ridge Road, and the widening in the second five years of the plan period of the short section of the Belden-Hudson Road from State Route 57 to the Medina County line.

The most important north-south route in Lorain County is State Route 57, carrying a daily traffic of 3,700 vehicles south of the junction with Elyria Avenue between Lorain and Elyria, and 1,700 vehicles south of its junction with Indian Hollow Road south of Elyria. The present 18-foot surface between Lorain and Elyria is satisfactory. Between Elyria and the junction with Belden-Avon Road east of Grafton reconstruction and widening to 20 feet is planned, but the improvement of the section east of Grafton is deferred until the second five years of the plan period.

The traffic on Belden-Avon Road is very light, not exceeding 550 vehicles at any point. Reconstruction and widening is planned for the present sections of 10-foot width. Between State

Route 57 and Butternut Ridge Road minor-type construction is recommended and between U. S. Route 20 and Mills Road medium-type construction will be required.

In addition to these roadway improvements, grade-crossing eliminations are planned on State Route 254 at the Baltimore and Ohio Railroad, on State Route 82 at the Big 4 Railroad, and on Root Road and Belden-Avon Road at the New York Central Railroad.

The plan also provides for the replacement of three small bridges, one on U. S. Route 20 to be replaced with a 40-foot structure when the route is widened, one on State Route 82 a short distance west of Eaton, and one on the Belden-Avon Road a short distance south of Eaton.

The summary of improvements planned in Lorain County is shown in Table 35.

Table 35—Summary of 10-year plan of improvement in Lorain County

A. Roadways			
Proposed construction	Width		Total
	40 feet	20 feet	
New routes, miles.....		19.1	19.1
Widening, miles.....	6.4	5.1	11.5
Reconstruction and widening, miles.....		36.6	36.6
Reconstruction, miles.....			
New construction, miles.....		7.7	7.7
Total miles.....	6.4	68.5	74.9

B. Structures			
Proposed construction	On existing routes	On new routes	Total
Bridges, replacement or widening, number.....	3		3
Railway grade separations, number.....	4		4
Highway grade separations, number.....			
Total number.....	8	3	11

The Summit County Plan

Summit County, which is located southeast of Cleveland, is an important center of traffic. The regional area extends as far south as the City of Akron, which is the second largest city in the area. The principal direction of traffic movement is north-south, between Cleveland and Akron. Important east-west routes are also found from Akron to the cities located to its east and west, but traffic on east-west routes crossing the county north of Akron is comparatively small in volume.

The most important Cleveland-Akron route is Northfield Road (State Route 8), which carries a daily traffic of 3,800 vehicles at the Cuyahoga County line, 3,500 north and 3,200 south of State Route 82, 3,400 south of Chittenden's Corners, and 4,700 at the north limits of Cuyahoga Falls. This route is at present an 18-foot roadway from the Cuyahoga County line to the Akron city limits. This surface is considered adequate between the Cuyahoga County line and the north limits of Cuyahoga Falls. Through Cuyahoga Falls, widening to 40 feet is required, and the section from the Akron city limits to Broad Street will require reconstruction as well as widening.

Other improvements on this route include the widening to 40 feet of the high-level bridge over the Cuyahoga River between Akron and Cuyahoga Falls and the elimination of the two right-angle turns at Chittenden's Corners by the relocation of the route and the construction of an overhead crossing over the Lake Erie and Pittsburgh Railroad.

A second important Cleveland-Akron route is formed by parts of U. S. Route 21 and State Routes 92 and 18. Average daily traffic on this route is 1,200 vehicles north of its junction with State Route 176, 2,600 south of this junction, 2,500 on State Route 92 north of its junction with State Route 18 and 4,900 on State Route 18 east of its junction with the State Route 92. Traffic on this entire route and particularly on the section of U. S. Route 21 north of its junction with State Route 176 was influenced by the condition of Brecksville Road (U. S. Route 21) in Cuyahoga County. The completion of planned improvements in Cuyahoga County will result in

the shifting of part of the traffic from Northfield Road (State Route 8) to this route and materially increase the traffic on U. S. Route 21. The section from the Cuyahoga County line to the south line of Richfield township requires reconstruction and widening of the present 16-foot surface to 20 feet. From the south line of Richfield township to State Route 92 the present surface is in good condition but should be widened to 20 feet. This section could be materially improved by correction of alignment at certain points and by the reduction of a few vertical curves, and it is therefore planned for reconstruction as well as widening so as to include these improvements. On State Route 92, widening of the present 17-foot pavement to 20 feet is planned. The relocation of the northern end of this section to eliminate the bad turn in Ghent is also planned. Route 18 from the junction of State Route 92 to the Akron city limits carries the combined traffic of State Route 18 west and of State Route 92. On this section widening of the present 24-foot surface to 40 feet is planned.

State Route 91 is a third north-south route which forms an indirect route to Cleveland and provides a direct connection to U. S. Route 20 and the lake-shore section east of Cuyahoga County. This route carries a daily traffic of 3,500 vehicles north of its junction with State Route 36, 2,500 vehicles south of its junction with State Route 14 and 1,000 vehicles north of this junction. From the junction of State Route 36 to the junction of State Route 14, Route 91 is being rebuilt and widened at the present time. The section from the junction of State Route 14 to the Cuyahoga County line is planned for widening to 20 feet in the second five years of the plan period. The elimination of the grade crossings on State Route 91 at the Wheeling and Lake Erie Railroad and at the Akron and Ravenna Electric line just north of State Route 36 are included in the plan of improvement.

State Route 14, which forms a diagonal route from Cleveland to Ravenna and the southeast, crosses the northeastern corner of Summit County. The section between the Cuyahoga County line and State Route 91, which carries a daily traffic of 2,300 vehicles, is planned for re-

construction and widening to 20 feet. The section from State Route 91 to the Portage County line is adequate for the traffic which it will carry.

On State Route 82 the high-level bridge over the Cuyahoga River, described in the Cuyahoga County plan, is a joint project between the two counties. The present 18-foot surface from the end of this bridge to State Route 91 is satisfactory, but the Lake Erie and Pittsburgh Railroad grade crossing west of Northfield is planned for elimination.

From the junction of State Route 14 east of Twinsburg to the Portage County line construction of a medium-type, 20-foot surface is planned. Plans for this section also include the elimination of the grade crossing at the Wheeling and Lake Erie Railroad and the replacement of the bridge over Pond Brook.

On the Akron-Medina Road (State Route 18) the widening between the Akron city limits and State Route 92 has been described. West of State Route 92 reconstruction and widening to 20 feet is planned on the 16-foot brick section and widening to 20 feet on the 16-foot concrete section. This route carries a daily traffic of 2,000 vehicles west of its junction with U. S. Route 21.

The most important route east of Akron is State Route 36, which connects Akron and Cuyahoga Falls with Kent and Ravenna. This route carries a daily traffic of 5,400 vehicles west of its junction with State Route 91 and 4,200 vehicles east of this junction and is planned as a 40-foot roadway.

At the Cuyahoga River between Akron and Cuyahoga Falls a high-level bridge to replace the present bridge and eliminate the badly curved descent into the valley is planned. Within Cuyahoga Falls widening to 40 feet is planned for the asphalt section and reconstruction and widening of the brick section. Between Cuyahoga Falls and State Route 91 widening to 40 feet is planned, and between State Route 91 and the Portage County line reconstruction and widening to 40 feet. On this latter section the widening of the present 32-foot bridge near the county line is also required.

On State Route 18 east of Akron reconstruc-

tion and widening to 20 feet is planned from the Akron city limits to the Portage County line. This route carries a daily traffic of 3,100 vehicles east of Tallmadge. Reconstruction and widening to 20 feet is also planned on Tallmadge Avenue between the Akron city limits and Tallmadge.

The Stow Corners-Springfield Road, which forms a continuation of State Route 91 from State Route 36 to State Route 8, carries a daily traffic of 2,700 vehicles south of State Route 36 and 3,200 vehicles south of Tallmadge. Reconstruction and widening to 20 feet is planned on the section between State Route 36 and Tallmadge, and widening to 20 feet on the section between Tallmadge and State Route 8.

Near Tallmadge the plan provides for the elimination of five railroad grade crossings—the crossings of the Erie Railroad on State Route 18 west of Tallmadge, State Route 18 east of Tallmadge, State Route 261, the Stow Corners-Springfield Road, and the Cuyahoga Falls-Mogador Road. These eliminations will be effected by the construction of a by-pass route south and east of the railroad from State Route 18 west to State Route 261 and by the construction of grade separations on State Route 18 east of Tallmadge and on the Stow Corners-Springfield Road south of Tallmadge.

Other improvements planned are the widening to 20 feet of the bridges over the Cuyahoga River and canal on the Belden-Hudson Road in Peninsula.

The two principal routes between Cleveland and Akron—State Route 8 and U. S. Route 21—will ultimately require 40-foot roadways, although it is not anticipated that such width will be required within ten years. Sound highway planning, however, demands the acquisition or protection of sufficient right of way to permit widening of these routes to 40 feet in the future. An additional route between Cleveland and Akron can be provided by the development of a highway in the Cuyahoga River valley. Reconnaissance surveys indicate that such a development is entirely practicable. This route is not required in the immediate future, but the right of way should be acquired or protected until traffic requirements make its construction necessary.

The summary of improvements planned in Summit County is shown in Table 36.

Table 36—Summary of 10-year plan of improvement in Summit County

A. Roadways

Proposed construction	Width		Total
	40 feet	20 feet	
New routes, miles.....		2.0	2.0
Widening, miles.....	6.2	10.3	16.5
Reconstruction and widening, miles.....	4.8	24.2	29.0
Reconstruction, miles.....			
New construction, miles.....		1.5	1.5
Total miles.....	11.0	38.0	49.0

B. Structures

Proposed construction	On existing routes	On new routes	Total
Bridges, new, number.....	1	.....	1
Bridges, replacement or widening, number.....	5	.....	5
Railway grade separations, number.....	6	1	7
Highway grade separations, number.....			
Total number.....	12	1	13

The Portage County Plan

Portage County is located southeast of Cuyahoga County and east of Summit County. Its northwestern corner is 19 miles from the center of Cleveland, and Ravenna, the county seat, is approximately 35 miles from the center of Cleveland. It is therefore in the outer zone of the Cleveland regional area and the influence of regional-area highway traffic is found only on the principal highways. Only that part of the county located west of State Route 44 and north of State Route 18 is included in the regional area. The diagonal routes which form direct routes into Cleveland are State Route 43 from the Geauga County line to Aurora, connecting

with South Miles-Aurora Road, in Cuyahoga County; and State Route 14, connecting with Broadway in Cuyahoga County, and forming a direct route from Cleveland to Ravenna. Both of these routes are in satisfactory condition for a 10-year period. State Route 43 between the Geauga County line and Aurora is an 18-foot roadway, in good condition, carrying a daily traffic of 1,500 vehicles. State Route 14 was under construction during the traffic survey and is being completed as an 18-foot roadway.

The most important east-west route in the county is State Route 36, which connects Ravenna and Kent with Akron. This route carries a daily traffic of 4,200 vehicles east of its junction with State Route 91 in Summit County and 2,400 vehicles midway between Kent and Ravenna. It is at present a 16-foot roadway and is planned for reconstruction and widening to 40 feet between the Summit County line and Kent and for reconstruction and widening to 20 feet between Kent and Ravenna. On the latter section the plans also include the elimination of the grade crossing at the Baltimore and Ohio Railroad by construction of an overpass.

State Route 18, which is at present a 16-foot roadway carrying a daily traffic of 2,900 vehicles at the Summit County line and 2,300 vehicles west of its junction with State Route 44, is planned for reconstruction and widening to 20 feet. Improvement plans for this route also include the separation of grades at the crossing of the Wheeling and Lake Erie Railroad at Brimfield Station.

State Route 82, which crosses the northern part of the county, is unimproved between the Summit County line and State Route 43. This is planned for medium-type construction 20 feet in width. Between State Routes 43 and 44 the present improvement is 14 feet in width, carrying a daily traffic of 1,000 vehicles. This section is planned for reconstruction and widening to 20 feet. The grade crossing on this route at the Erie Railroad at Aurora Station is also planned for elimination.

Minor-type improvement is planned for the county road connecting Hudson, in Summit County, with Streetsboro and Shalersville.

This section of the county has two important north-south roads, State Routes 43 and 44. State Route 43 carries a daily traffic of 1,500 vehicles south of its junction with the Kent-Mantua Road, 1,100 vehicles north of this junction, and 700 vehicles south of its junction with State Route 82. The section between its intersection with State Route 82 and with State Route 14, which is at present a 14-foot surface, is planned for reconstruction and widening to 20 feet. The section from State Route 14 to Kent, at present a 16-foot surface, is planned for reconstruction and widening to 20 feet during the second five years of the plan period. The section from Kent to State Route 18, which is at present a 12-foot surface, is planned for reconstruction and widening to 20 feet in the first five years. Extending north from the intersection of State Routes 43 and 82 at Aurora is a county road connecting with Chillicothe Road, an improved county road in Geauga County. This section is planned for minor-type construction.

State Route 44 forms a direct route from Painesville to Ravenna and Canton. It carries a daily traffic of 700 vehicles north and 1,300 vehicles south of State Route 82 and 2,000 vehicles north of State Route 18. Between State Route 82 and the Geauga County line the present surface, with proper maintenance, is considered adequate. Between State Route 82 and Mantua reconstruction and widening to 20 feet of the present 12-foot surface is planned.

Through the village of Mantua the present 14 and 16 foot surfaces will be widened to 20 feet and through the business section the present surface will be widened to 40 feet. Plans also provide for the elimination of the Erie Railroad grade crossing in Mantua by the construction of an overpass. Between Mantua and Ravenna the present 14-foot surface will be reconstructed and widened to 20 feet. From Ravenna to State Route 18 the present 18-foot surface is satisfactory.

In addition to these improvements the grade crossing on State Route 261 at the Wheeling and Lake Erie Railroad in Kent is also planned for elimination.

The summary of improvements planned in Portage County is shown in Table 37.

Table 37—Summary of 10-year plan of improvement in Portage County

A. Roadways

Proposed construction	Width		Total
	40 feet	20 feet	
New routes, miles.....			
Widening, miles.....	0.2	0.7	0.9
Reconstruction and widening, miles.....	0.8	41.8	42.6
Reconstruction, miles.....			
New construction, miles.....		12.9	12.9
Total miles.....	1.0	55.4	56.4

B. Structures

Proposed construction	On existing routes	On new routes	Total
Bridges, new, number.....			
Bridges, replacement or widening, number.....			
Railway grade separations, number.....	5		5
Highway grade separations, number.....			
Total number.....	5		5

The Medina County Plan

Medina County, which is located southwest of Cuyahoga County, is an area of low population density, having no large cities. The section included in the regional area is the territory north and east of State Routes 18 and 57.

The most important route in the section is U. S. Route 42, which connects Cleveland with Medina, the county seat, and with centers of population to the south and southwest. This route carries a daily traffic of 2,700 vehicles on a 16-foot surface in fair condition. Plans for this route provide for reconstruction and widening to 20 feet from the Cuyahoga County line to Medina and the widening of a 16-foot bridge

located approximately 2 miles north of the Medina corporation line.

State Route 3, which forms an alternative route between Cleveland and Medina, connecting with Ridge Road in Cuyahoga County, carries a daily traffic of between 300 and 400 vehicles. From Medina to a point 5.4 miles northeast the present 16-foot surface is satisfactory. From this point to the junction of State Route 94 the present 10-foot surface is planned for widening to 20 feet, as is also the 10-foot section between this junction and Hinkley. Plans for this route also include the widening to 20 feet of a bridge near the south end of the 10-foot section. From Hinkley to the Cuyahoga County line a 20-foot surface is being constructed.

State Route 94, which forms an artery from Cleveland to Wadsworth and points south connecting with State Road in Cuyahoga County, carries a daily traffic of 600 vehicles at the Cuyahoga County line, 500 vehicles east of Hinkley and 400 vehicles at its intersection with State Route 18. The section from the Cuyahoga County line to Hinkley consists of a 10-foot surface. Its reconstruction and widening to 20 feet is deferred until the second five years of the plan period as the new section of State Route 3 from Hinkley north provides an equally direct route. A bridge approximately one mile east of Hinkley is also planned for widening to 20 feet when the roadway is reconditioned. The section of State Route 94 from its junction with State Route 3 to its intersection with State Route 18 is under contract for widening.

The county road from Bennett Corners directly south to State Route 3 and connecting with the proposed extension of Settlement Road in Cuyahoga County will provide an additional route between Cleveland and Medina. The section from Bennett Corners to the Belden-Hudson Road is planned for reconstruction and widening to 20 feet, and the section from Belden-Hudson Road to State Route 3 for medium-type construction 20 feet in width.

State Route 18 west from Medina, which carries a daily traffic of 1,400 to 1,500 vehicles, is planned for widening to 20 feet from Medina to the Baltimore and Ohio Railroad. The grade

crossing at this point is also planned for elimination. On State Route 18 east of Medina the present 18-foot surface is adequate, but the widening to 20 feet of a bridge less than 16 feet in width located approximately 1.75 miles east of the Medina corporation line is planned.

On State Route 57 which forms the direct route between Medina, Elyria and Lorain, widening to 20 feet is planned on a 10-foot section approximately one mile in length immediately east of the Lorain County line.

Crossing the northern part of Medina County is the Belden-Hudson Road, a light-traffic route carrying between 250 and 600 vehicles per day, improved very largely with 10-foot, major-type surfaces. The present surfaces are too narrow for safety, but the volume of traffic does not

Table 38—Summary of 10-year plan of improvement in Medina County

A. Roadways

Proposed construction	Width		Total
	40 feet	20 feet	
New routes, miles.....			
Widening, miles.....		20.6	20.6
Reconstruction and widening, miles.....		15.5	15.5
Reconstruction, miles.....		4.9	4.9
New construction, miles.....			
Total miles.....		41.0	41.0

B. Structures

Proposed construction	On existing routes	On new routes	Total
Bridges, new, number.....			
Bridges, replacement or widening, number.....	4		4
Railway grade separations, number.....	1		1
Highway grade separations, number.....			
Total number.....	5		5

warrant widening with major type improvements and widening with minor types is therefore proposed.

From the Lorain County line to the Baltimore and Ohio Railroad, 3.8 miles, the widening to 20 feet is deferred until the second five years of the plan period. From this point to the east line of Liverpool township the present 16-foot surface is satisfactory. From this point to U. S. Route 42, which section carries the largest volume of traffic, widening to 20 feet is planned during the first five years.

From U. S. Route 42 to the end of the concrete pavement, a short distance west of Route 3, the widening to 20 feet is again deferred to the second half of the plan period. The short unimproved section in Hinkley is planned for 20-foot, medium-type construction. The unimproved section from the east junction of State Route 94 to the Summit County line is planned for 20-foot, minor-type construction to complete the improved route.

The summary of improvements planned in Medina County is shown in Table 38.

The Geauga County Plan

Gauga County, which is located east of Cuyahoga County, is also an area of low population density without important centers of population, and, therefore, not a large source of local traffic. The regional area includes that part of the county located west of State Route 44. This section has one east-west route of major significance, U. S. Route 422, which forms the direct route between Cleveland and Warren and Youngstown. This route carries a daily traffic of 3,400 vehicles at the Cuyahoga County line, and 2,500 vehicles at its intersection with State Route 44. The present pavement is 18 feet in width between the Cuyahoga County line and Chillicothe Road and 16 feet in width between Chillicothe Road and State Route 44. Both sections are planned for widening to 20 feet.

The remaining east-west routes do not connect with large population centers and are therefore only medium-traffic routes. U. S. Route 322, a continuation of Mayfield Road in Cuyahoga

County, carries a daily traffic of 1,000 vehicles at its intersection with Chillicothe Road and 600 vehicles at its intersection with State Route 44. The present 16-foot surface from the Cuyahoga County line to a point 1.7 miles east is planned for widening to 20 feet. From this point to Chillicothe Road the present 18-foot surface is satisfactory, and from Chillicothe Road to State Route 44 widening to 18 and 20 feet is in progress. On State Route 85, which carries a daily traffic of 800 vehicles, the present 16-foot surface is satisfactory.

State Route 87 carries a daily traffic of 1,300 vehicles at the Cuyahoga County line, 1,100 vehicles west of Chillicothe Road, 800 vehicles east of this road, and 700 vehicles at its intersection with State Route 44. The present surface is 14 feet in width from the Cuyahoga County line to its junction with the unimproved road 1.3 miles east, and 16 feet in width from this point to State Route 44.

The section from the Cuyahoga County line to Chillicothe Road is planned for widening to 20 feet in the first five years and the section from Chillicothe Road to State Route 44 for widening to 20 feet in the second five years of the plan period. The bridge on this route a short distance west of Chillicothe Road is also planned for replacement with a bridge 20 feet in width.

The unimproved road which forms a junction with this route 1.3 miles east of the Cuyahoga County line provides a cut-off, shortening the mileage of this route by approximately one mile. This unimproved road is planned for 20-foot, medium-type construction to meet the similar improvement planned in Cuyahoga County.

The proposed South Moreland Boulevard extension, described in the Cuyahoga County plan, which provides an alternative route to present U. S. Route 422 through Chagrin Falls, extends into Geauga County and connects with Bainbridge Road at Chillicothe Road. This new route is planned as a 20-foot roadway. To provide a direct connection from this point to U. S. Route 422, Bainbridge Road is planned for 20-foot construction between Chillicothe Road and U. S. Route 422.

Bainbridge Road from the Cuyahoga County line to Chillicothe Road is planned for minor-type construction.

State Route 43, which crosses the southwestern corner of Geauga County, carries a daily traffic of 1,600 vehicles. The present 16-foot surface is planned for reconstruction and widening to 20 feet.

The north-south routes in this county carry a comparatively small volume of traffic. State Route 44, which forms a direct route from Painesville through Chardon to Ravenna and Canton, carries a daily traffic of 500 vehicles north of U. S. Route 322 and south of U. S. Route 422. Between U. S. Routes 322 and 422 the route was partly under construction and partly unimproved during the survey.

The present 16-foot surface between the Lake County line and Chardon, between Chardon and State Route 87; and between U. S. Route 422 and the Portage County line is satisfactory for the traffic that this route will carry.

The section between State Route 87 and U. S. Route 422 is being improved with an 18-foot surface.

Chillicothe Road carries a daily traffic of 800 vehicles north of U. S. Route 322 and 500 vehicles between U. S. Route 322 and State Route 87. South of State Route 87 this route was unimproved at the time of the traffic survey and carried between 100 and 200 vehicles.

The present section of 10-foot width between the Lake County line and the north line of Russell Township is planned for widening to 20 feet in the first five years, and the 14-foot section between this point and State Route 87 for widening to 20 feet in the second five years. On the latter section there are also two bridges planned

for replacement with structures having a 20-foot roadway. The section from State Route 87 to the Portage County line is being improved with 16 and 18-foot surfaces.

The summary of improvements planned for Geauga County is shown in Table 39.

Table 39—Summary of 10-year plan of improvement in Geauga County

A. Roadways

Proposed construction	Width		Total
	40 feet	20 feet	
New routes, miles.....		3.2	3.2
Widening, miles.....		26.7	26.7
Reconstruction and widening, miles.....		0.9	0.9
Reconstruction, miles.....			
New construction, miles.....		7.0	7.0
Total miles.....		37.8	37.8

B. Structures

Proposed construction	On existing routes	On new routes	Total
Bridges, new, number.....			
Bridges, replacement or widening, number.....	3		3
Railway grade separations, number.....			
Highway grade separations, number.....			
Total number.....	3		3

ACQUISITION OF RIGHTS OF WAY

THE development of the plan of improvement in the regional area will require the acquisition of new right of way for the majority of the new routes planned. In certain cases, satisfactory right of way is already available, having been acquired or donated in anticipation of the required development of a new route. In highly developed areas the acquisition of the required right of way frequently involves comparatively large expenditures because of high real-estate values. Had this property been acquired prior to such intense development a large saving would have resulted.

The plan of improvement includes all the important routes which will be required during the next ten years; with continued growth and development of the area, however, additional new routes will be required. All existing highway rights of way should therefore be carefully preserved and guarded against encroachments. In addition, rights of way should be acquired in the near future where demands for additional routes can be foreseen or where the ultimate widening of present routes beyond the limits of existing rights of way is anticipated.

Among the new routes, which are not urgently needed during the next ten years but which will be required soon thereafter and for which right of way should be obtained, are: (1) A route parallel to the present canal between Cleveland and Akron forming an alternative route between these cities when the capacity of present routes is reached; (2) an additional direct route between Cleveland and Berea. A satisfactory location for such a route would be on a direct line from Berea to West 130th Street at the Cleveland city line, and from this point following Bellaire

Road, Jasper Avenue, and Clinton Road to a connection with the proposed Walworth Run route; (3) a diagonal northeast-southwest route from Chagrin Falls to Ashtabula. This route will provide relief for the present arterial routes between Ashtabula and Cleveland, particularly for traffic destined to the southern part of Cleveland and the area south and southwest of the city. Present right of way can be utilized for the major part of this route and the missing sections can probably be acquired at the present time without large expenditures.

Sufficient right of way for a four-lane roadway should also be acquired on all important arterial routes not included in the present four-lane roadway program.

Two methods may be employed in acquiring necessary right of way for future widening, (1) acquisition through dedication, purchase or condemnation, (2) provision for future acquisition through establishment of building set-back lines. This latter method is suggested in cases where immediate acquisition involves large expenditures and where the widening may be deferred for a period of years.

Particular attention should be given to the acquisition or preservation of sufficient right of way at the intersections of important highways. Such intersections require greater right of way than the remainder of the route and also develop first as business or residential locations.

Foresight in acquisition of required right of way prior to the intensive development of an area will result in an important saving of public funds and will also permit the establishment of routes in the most advantageous locations.

THE RELIEF OF TRAFFIC CONGESTION PROVIDED BY THE PLAN

THE plan of improvement when completed will provide an adequate and well-balanced traffic distribution system for the entire regional area. This system will furnish arterial traffic routes in all directions from the center of the city of Cleveland, each having a capacity equal to the present and expected future traffic demands for the 10-year period. Facilities for the required interchange of traffic between arterial routes, for the movement between secondary centers of population in the area and for by-passing congested areas are provided by the series of belt routes which intersect or connect with all arterial routes. The plan provides for the reconditioning of all arterial routes not now in satisfactory condition, for the widening of such routes to four-lane highways where required, and for the development of new arterial routes where present traffic and expected future traffic cannot be adequately served by the existing routes.

The present highway system, with the rapidly increasing volume of traffic, has resulted in the development of several major congestion areas. One of the most important problems in the establishment of the present plan of improvement was to provide relief for these areas.

Among the more serious of these is in the northeastern section where the large volumes of traffic on Euclid Avenue, Lake Shore Boulevard, Mayfield Road and their tributaries must enter and move toward the city over Euclid Avenue, Superior Avenue, or St. Clair Avenue. Each of these routes is made up largely of business streets on which there is a large amount of parking and they also carry important street car lines. Primary relief for this section is provided by the Lake Front-St. Clair route, a four-lane uninterrupted route from the center of Cleveland to Painesville. Additional relief for Euclid Avenue, particularly between Mayfield Road and East 97th Street, will result from the completion of the widening of Euclid Avenue west of 101st Street, and the extension of Chester Avenue from East 55th Street to East 82nd Street, and by increasing the traffic capacity of Crawford Road

and Hough Avenue with the development of a route through Wade Park to Euclid Avenue at Mayfield Road. Existing arterial routes in this section are in good condition.

A second serious condition of congestion occurs in the east-central section, due principally to the convergence of routes in the Cedar Glen section and the progressive convergence of routes into Woodland Avenue in the city. Relief for the condition is found partially in the Chester-Hough development and in the Mayfield-Superior connection, both of which will serve to remove Mayfield Road traffic from the congested Cedar Glen section. The primary relief route in this section is the extension of Shaker Boulevard as a four-lane depressed highway from its present terminus at Woodhill Road to a Broadway connection at Pittsburgh Avenue and 34th Street. This development will provide a direct high-speed route to the business section of the city, relieving the traffic congestion caused by the convergence of routes into Woodland Avenue and relieving the Cedar Glen section by removing from it traffic which can more directly use the Shaker Boulevard extension. An extension of South Moreland Boulevard which by-passes Chagrin Falls and provides a route without excessive grades or curvature is also planned in the east-central section of the county. Existing arterial routes with the exception of Kinsman Road, which is planned for reconstruction, are in good condition.

Another serious congestion area occurs in the southeastern section of the county centering about the convergence of routes into Broadway. Primary relief is provided by the development of a new four-lane, uninterrupted route through the Cuyahoga River Valley from Broadway at Jefferson, to Willow. A belt route connects the new route with each of the southeast arterials from Brecksville Road to South Miles Road. Further relief for Broadway between the Cleveland city line and Bedford is provided by a direct extension of Northfield Road from Bedford to Warrensville Center Road at Emery Road. This route

by-passes Bedford, eliminates curves and railroad grade crossings and connects Northfield Road with the east-central entrances to the city. Improvements on existing arterials are largely limited to the badly needed reconditioning of Broadway through Garfield Heights and the reconstruction of Canal Road.

The next serious congestion area occurs on the west side of the Cuyahoga River Valley due to the convergence of routes into West 25th Street. Relief in this section is provided principally by the new Valley route crossing the Cuyahoga River Valley from connections with Wooster Pike, State Road and Broadview Road to a connection with Independence Road. This route brings traffic into the business section east of the river and not only relieves congestion on West 25th Street but also on Central Viaduct and the Superior high-level bridge. On the present arterial routes in this section, reconditioning and widening is planned for a part of Broadview Road and for Ridge Road.

The western approaches to the cities of Cleveland and Lakewood form another congestion area, particularly at the present Rocky River bridge. Relief for this area is provided by the development of a new crossing of Rocky River in the lake front which will provide a four-lane direct connection from West Lake Road to Lake Avenue. Connections between other western arterial routes and this new route will be made by the Spencer Road belt route. On the present arterial routes widening is planned on West Lake Road and reconditioning and widening on Center Ridge Road (U. S. Route 20). Alternative routes to these arterials are provided by the proposed Wolf Boulevard and Hilliard Boulevard.

The present Superior high-level bridge is another serious congestion point. Partial relief in this area is provided by the Valley route which will absorb a part of the West 25th Street traffic now crossing this bridge and further relief will result from the development of a new Cuyahoga River high-level crossing at the approximate location of the present Main Street bridge. This new route affords an opportunity to by-pass the Public Square section and through its connection with the new Lake Front Boulevard provides a

fast-line by-pass for traffic moving between the eastern and western parts of the city.

The most important belt-line development results in the provision of a complete inner belt route forming a complete circuit on the western, southern and eastern sides of the city. On the western side Spencer Road, developed as a four-lane roadway, connects all the western arterial routes. Spencer Road connects with the southern belt route on a projection of Brook Park Road west over the Rocky River to a junction with Spencer Road extended. Further connections with the western arterials are provided by a projection of Brook Park Road directly west to a connection with Mills Road at the Lorain County line.

On the southern side of the city the present Brook Park Road is to be reconditioned and widened to a four-lane roadway, and from the present terminus of this road a new four-lane roadway is projected eastward to an intersection with Brecksville Road at Willow and thence eastward intersecting all important arterial routes to connections with East Boulevard, Lee Road and Warrensville Center Road.

Lee Road forms an inner belt route near the eastern limits of Cleveland, but traverses a densely populated area producing a large volume of local traffic. Warrensville Center Road, also a four-lane roadway, which parallels Lee Road, forms an important eastern belt route. From Mayfield Road to Euclid Avenue a direct extension of the Warrensville Center belt route is planned via parts of Bluestone Road and the proposed Belvoir Boulevard.

Other north-south routes east and west of Cleveland and east-west routes south of Cleveland are planned for reconditioning where required as two-lane roadways. With the development of these new relief routes, the reconditioning and widening where required of existing arterial routes and of their laterals, the development of an adequate belt route around the city and the reconditioning and widening where required of routes forming secondary belt routes, a complete traffic distribution system adjusted to present and future traffic demands in all parts of the area will be provided.

COSTS OF THE PLANNED IMPROVEMENTS

THE estimated cost of construction of the entire plan for the regional area is \$63,078,000. The plan covered by this estimate is shown in Figure 32 and described in detail in Appendices IV and V.

The estimate includes the cost of roadways and structures on new routes; of constructing, reconstructing or widening roadways on existing routes; of constructing new structures on existing routes; and of replacing structures as required on existing routes.

It does not include the cost of right-of-way acquisition and of property damages resulting from the improvement program.

The summary of these costs by counties is shown in Table 40.

The estimated costs, shown in Table 40, are based on modern design and construction practices and on current prices paid for materials and labor in the regional area and in comparable sections. Changes in the price level during the plan period or marked changes in construction methods will necessitate corresponding changes in the estimated costs.

Of this total cost, the expenditures in Cuyahoga County are estimated to be \$41,203,000. Except for maintenance charges, which should be reduced below the present level of annual expenditures due to the early reconditioning of a considerable part of the highway system, this sum should represent the approximate expenditures for highways exclusive of right-of-way acquisition and property damages during the next ten years, provided that projects now in progress or under contract are completed during 1928. It is probable that developments which cannot be foreseen at the present time will require minor additions to the county highway system resulting in a slight increase in the estimated expenditures.

The necessary costs of right-of-way acquisition and property damage charges, which cannot be estimated with any degree of accuracy, will also increase the total costs.

Of the total of \$41,203,000, the roadways and structures on new routes cost \$26,300,000 or 64 per cent of the total. The urgency of the need for many of these new routes to relieve present congestion which will become progres-

Table 40—Estimated construction cost of the plan of highway improvement

County	Roadways			Structures			Total
	On new routes	On existing routes	Total	On new routes	On existing routes	Total	
Cuyahoga.....	\$6,975,000	\$10,577,000	\$17,552,000	\$19,325,000	\$4,326,000	\$23,651,000	\$41,203,000
Lake.....	1,802,000	1,983,000	3,785,000	1,474,000	2,728,000	4,202,000	7,987,000
Lorain.....	1,054,000	2,651,000	3,705,000	438,000	766,000	1,204,000	4,909,000
Summit.....	121,000	2,201,000	2,322,000	108,000	956,000	1,064,000	3,386,000
Portage.....		2,548,000	2,548,000		596,000	596,000	3,144,000
Medina.....		1,337,000	1,337,000		158,000	158,000	1,495,000
Geauga.....	192,000	714,000	906,000		48,000	48,000	954,000
Total.....	10,144,000	22,011,000	32,155,000	21,345,000	9,578,000	30,923,000	63,078,000

sively more severe, demands that they be opened for use as rapidly as possible. This will result in an unbalanced grouping of expenditures in the first few years of the plan period, but this procedure is more than justified by the greatly improved traffic service which will result.

In order to place these new routes in service at the earliest possible date, the major structures which require the longest period to complete should be placed under construction as soon as plans and designs can be completed.

The reconstruction and widening program, except in a few cases where immediate improvements are essential due either to the present condition of the roadway or to large present volumes of traffic on narrow roadways, can be budgeted over the 10-year period in approximately equal annual amounts.

Modern annual highway improvement programs should be scheduled in the order of urgency of each improvement based upon traffic and present roadway condition. They should also provide for the continuous improvement of each route, so as to make the improvements available for use as quickly as possible, and prevent the unnecessary inconvenience and obstruction of traffic by the simultaneous improvement of parallel routes traversing the same area.

In the parts of the six surrounding counties of Lake, Lorain, Summit, Portage, Medina and Geauga, included in the regional area, the estimated construction cost, as shown in Table 40, represents the approximate total expenditures that will be required for highway construction during the 10-year period on the principal routes in those sections of the counties included in the regional area. In no case does it represent the total required for the entire county; neither does it include costs of right-of-way acquisition or of property damage, nor necessary maintenance costs. Improvements on routes which are not of regional importance, and which are therefore not included in the plan, will also be required.

In Lake County the urgent need for several grade crossing eliminations, for the completion of the widening of U. S. Route 20 and for the development of the St. Clair Avenue extension, requires comparatively large expenditures in the

early years of the plan period. In the remaining five counties expenditures can be approximately uniformly distributed over the plan period, although improvements should be carried on as rapidly as financial ability permits. The immediate completion of all improvements planned for the first half of the plan period is economically justified on the basis of motor vehicle operating costs but in some cases the improvement can be deferred three or four years without serious inconvenience to traffic.

The plan of improvement for the entire area has been developed throughout on the basis of facts as determined by the planning survey. The improvements planned are all necessary to a properly coordinated highway system for the direct and expeditious distribution of traffic. The total expenditures involved are within the financial ability of the several counties without inequitably burdening the future and without allotting an unwarranted portion of total revenues for highway purposes.

The completion of the plan will relieve traffic congestion and eliminate many of the most serious traffic bottle necks in the area, although several congestion areas, particularly within the City of Cleveland, which are principally of city rather than of regional importance, have been considered as outside the scope of this survey and have not therefore been treated. The new routes planned for development will greatly increase the volume of traffic approaching the Public Square section from the southeast, and unless proper recognition of this fact is taken in the planning of future improvements in the central distributing area a serious congestion center will be developed. The volume of traffic moving into and out of the central business section of Cleveland on the radial routes greatly exceeds the traffic crossing these radial routes and should therefore be given precedence over such cross traffic.

Traffic conditions are constantly changing. The general trend of these changes for the area as a whole and for sections of the area have been analyzed and are reflected in the plan of improvement. Changes in traffic conditions within small sections of the area frequently cannot be foreseen and the recurrence of present conditions of im-

paired traffic service due to such changes can be prevented only by careful and farsighted planning based on a definite knowledge of these changing traffic and highway conditions.

Proper highway planning must be a continuous process based on a continuing series of facts in order that the constantly increasing traffic demands may be foreseen and met with highway improvements as required.

The plan is designed to provide for the regional area a complete distribution system for highway traffic adequate for traffic demands in the various sections of the area. The degree to which traffic facilities are improved and congestion centers eliminated depends upon carrying the present plan into effect, and making provisions for future planning to prevent the recurrence of unsatisfactory traffic conditions.

Control Over the Development of the Plan of Improvement in Cuyahoga County

The budget for county road and bridge work for many years past in Cuyahoga County has been a very substantial one, and in order to carry out the recommendations of this report, it will be necessary to adjust this budget progressively in successive years to the execution of a series of definite projects. This work will require the closest possible correlation of authority between

the County Board and the County Surveyor's office, including the county bridge engineer and the authorities responsible for water and sewer development. A definite schedule should be adopted covering surveys, designing, advertising for contracts, lettings and construction, and this should be so far as possible a continuing schedule which will enable the smallest possible organization to handle the work. Such an arrangement will require imperatively a closer and more definite organization of county forces and authority. This organization should include a laboratory available for the control of materials, of which millions of dollars' worth will be purchased before the plan is completed. A testing laboratory should be established as a part of the county organization.

The budget for each year's work should originate with the County Board, and be made up as far in advance as knowledge is had of available funds. The Surveyor's office should then undertake the necessary surveys and designs, including the structural work involved. A schedule of lettings should be adhered to as nearly as possible, in such order and at such seasons as will best fit the individual projects. Final authority should rest with the County Board, which should be considered ultimately responsible for carrying out the entire program.

APPENDIX I

Motor Vehicle Traffic on the Highways of the Cleveland Regional Area

1. Cuyahoga County

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
Akins.....		W. of Broadview Rd.....	56	80	100	79	55	26	1	.....
Albion.....		W. of Webster Rd.....	61	90	110	98	55	12	1	.....
		E. of Webster Rd.....	50	70	90	79	45	8		.....
		W. of York Rd.....	114	160	200	416	63	5		.....
		E. of York Rd.....	40	60	70	146	22	1		.....
Alexander.....		W. of Walton Rd.....	28	40	50	77	21	1		.....
Anderson.....		W. of Richmond Rd.....	341	490	590	458	304	157	14	9
Aurora.....	43	Geauga County line.....	1,608	2,330	2,800	4,232	1,079	146	13	4
Avery.....		N. of Royalton Rd.....	33	50	60	89	24	2		.....
		S. of Royalton Rd.....	56	80	100	64	54	2		.....
		S. E. of Lake Shore Blvd.....	286	420	500	222	269	43	2	3
Babbitt.....		W. of Front St. (Berea).....	2,827	4,100	4,900	4,498	2,375	302	11	8
Bagley.....		E. of Front St. (Berea).....	2,287	3,320	4,000	3,591	1,929	261	28	4
		W. of Engle Rd.....	1,641	2,380	2,800	2,547	1,389	206	18	5
		E. of Engle Rd.....	1,633	2,370	2,800	2,534	1,382	205	18	5
Bainbridge.....		E. of S.O.M. Ctr. Rd.....	60	90	100	133	45	11		.....
Barr.....		N. of Richfield Rd.....	16	20	30	31	13			.....
Barton.....		N. W. of Lorain Rd.....	317	460	550	476	289	26	1	.....
		S. of Lorain Rd.....	64	90	110	95	58	3		.....
Bassett.....		N. of Detroit Rd.....	360	520	620	681	291	36	2	1
		S. of Detroit Rd.....	412	600	710	767	336	46	2	1
Bell St. (Chagrin Falls).....		E. of Russell Rd.....	274	400	470	378	244	35	1	.....
		W. of Russell Rd.....	467	680	810	628	437	70	1	.....
Benbow.....		S. of Drake Rd.....	18	30	30	30	16	2		.....
Bennett.....		S. W. of Ridge Rd.....	64	90	110	133	52	10		.....
		N. E. of Boston Rd.....	77	80	90	149	62	14	1	.....
Berea.....		N. E. of Madison Ave.....	5,384	7,810	9,300	4,181	5,488	791	*	*
		S. W. of Madison Ave.....	8,579	12,440	14,800	6,758	8,809	1,208	*	*
Bishop.....		N. of Wilson Mills Rd.....	793	1,150	1,400	1,838	556	56	2	1
Bliss (E. 222nd St.).....		N. of Lake Shore Blvd.....	247	360	430	367	228	24		.....
		S. of Lake Shore Blvd.....	1,566	2,270	2,700	1,420	1,674	202	10	12
Bluestone.....		W. of Green Rd.....	52	80	90	66	47	14		.....
Bradley.....		S. of West Lake Rd.....	373	540	640	700	302	50	2	1
		N. of Detroit Rd.....	548	800	950	983	453	78		.....
		S. of Detroit Rd.....	986	1,430	1,700	1,818	784	87	2	2
		N. of Center Ridge Rd.....	744	1,080	1,300	1,407	578	59	2	.....
Brainard.....		N. of Cedar Rd.....	328	480	570	562	285	31	1	1
		S. of Cedar Rd.....	321	460	560	548	269	20	1	.....
Brecksville.....	U. S. 21	N. of Schaaf Rd.....	4,466	6,480	7,700	9,736	3,466	450	46	19
	U. S. 21	S. of Schaaf Rd.....	2,880	4,180	5,000	6,354	2,213	237	22	12
	U. S. 21	N. of Rockside Rd.....	2,775	4,020	4,800	6,079	2,143	254	16	18
	U. S. 21	S. of Rockside Rd.....	2,757	4,000	4,800	5,960	2,136	267	20	19
	U. S. 21	N. of Pleasant Valley Rd.....	2,082	3,020	3,600	4,490	1,629	245	21	15
	U. S. 21	S. of Pleasant Valley Rd.....	1,952	2,830	3,400	4,245	1,520	210	18	14
	U. S. 21	N. of Fitzwater Rd.....	1,824	2,640	3,200	3,882	1,378	169	15	14
	U. S. 21	S. of Fitzwater Rd.....	2,038	2,960	3,500	4,305	1,545	208	18	13
	U. S. 21	N. of Station Rd.....	2,099	3,040	3,600	4,428	1,596	231	11	13
	U. S. 21	S. of Station Rd.....	1,879	2,720	3,300	3,820	1,413	192	6	12
Broadview.....	U. S. 21	N. W. of Pearl Rd.....	1,313	1,900	2,300	1,522	1,224	124	*	*
	176	S. E. of Pearl Rd.....	8,821	12,790	15,300	9,532	8,399	970	*	*
	176	N. of Schaaf Rd.....	7,098	10,290	12,300	9,028	6,528	692	28	70
	176	S. of Schaaf Rd.....	5,416	7,850	9,400	6,973	4,964	478	20	50
	176	N. of Brook Park Rd.....	4,467	6,480	7,700	5,719	4,101	420	27	45
	176	S. of Brook Park Rd.....	3,835	5,560	6,600	4,942	3,512	326	28	35
	176	N. of Short Rd.....	2,590	3,760	4,500	3,355	2,374	211	18	20
	176	S. of Short Rd.....	2,269	3,290	3,900	2,951	2,076	174	15	17
	176	N. of Wallings Rd.....	2,122	3,080	3,700	4,777	1,613	158	15	6
	176	S. of Wallings Rd.....	1,940	2,810	3,400	4,402	1,468	125	10	4
	176	N. of Oakes Rd.....	1,642	2,380	2,800	3,710	1,245	111	10	4
	176	S. of Akins Rd.....	1,587	2,300	2,700	3,653	1,178	90	10	2
Broadway ¹	8 & 14	N. W. of E. 55th St.....	14,523	21,060	25,100	12,875	14,511	2,164	*	*
	8 & 14	S. E. of E. 55th St.....	20,896	30,300	36,200	18,036	20,980	3,468	*	*
	8 & 14	Cleveland City line.....	3,078	4,460	5,300	3,649	2,901	649	70	163
	8 & 14	N. W. of Dunham Rd.....	3,885	5,630	6,700	4,818	3,552	606	76	52
	8 & 14	S. E. of Dunham Rd.....	3,141	4,550	5,400	4,002	2,852	418	49	30
	8 & 14	N. W. of Columbus St. (Bedford).....	7,800	11,310	13,500	15,217	6,363	676	59	31
	8 & 14	S. E. of Columbus St. (Bedford).....	10,160	14,730	17,600	19,504	8,356	1,052	70	38
	8 & 14	N. W. of Northfield Rd.....	8,044	11,660	13,900	15,611	6,578	701	61	32
	14	S. E. of Northfield Rd.....	3,092	4,480	5,300	6,033	2,543	275	27	13
	14	N. W. of Macedonia Rd.....	2,370	3,440	4,100	4,223	1,958	183	16	7
	14	S. E. of Macedonia Rd.....	2,175	3,150	3,800	3,876	1,794	167	15	6
	14	N. W. of Laing Rd.....	1,850	2,680	3,200	3,296	1,526	142	11	7

* Density of 3 to 7½-ton truck traffic not available within the City of Cleveland.

¹ Roadway was in poor condition on Broadway between Cleveland city limits and McCracken Road and caused traffic to be less than normal.

APPENDIX

(1. Cuyahoga County—Continued)

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
Brook Park		E. of Broadview Rd.	1,344	1,950	2,300	1,816	1,256	222	19	24
		W. of Broadview Rd.	2,873	4,170	5,000	3,885	2,677	444	39	48
Brook Park		E. of State Rd.	2,816	4,080	4,900	3,816	2,573	369	39	45
		W. of State Rd.	3,048	4,420	5,300	3,822	2,844	524	45	63
Brook Park		E. of Wooster Pike.	4,445	6,440	7,700	5,089	4,277	1,291	75	90
		W. of Wooster Pike.	4,415	6,400	7,600	5,397	4,168	951	60	75
Brook Park		E. of West 130th St.	1,834	2,660	3,200	3,018	1,591	283	35	37
		W. of West 130th St.	1,472	2,130	2,500	2,996	1,179	146	10	11
Brookside Pl. Entrance		E. of Riverside Drive.	1,344	1,950	2,300	3,151	1,000	129	10	12
		W. of Riverside Drive.	165	240	280	305	131	18	1	4
Brookside		S. of Denison Ave.	1,524	2,210	2,600	4,647	978	38	*	*
		W. of Canal Rd.	92	130	160	244	63	8	*	*
Buckeye		S. E. of Woodland Ave.	11,743	17,030	20,300	10,691	11,449	1,388	*	*
		W. of Woodhill Rd.	13,677	19,830	23,700	18,007	12,394	1,298	*	*
Bulkley Blvd.		E. of Woodhill Rd.	9,344	13,550	16,200	12,530	9,124	1,444	*	*
		W. of S. Moreland Blvd.	4,313	6,250	7,500	5,654	4,239	707	53	77
Butternut Ridge		N. W. of Detroit Ave.	32,274	46,800	55,800	29,161	31,418	98	*	*
		S. E. of Lorain Rd.	643	930	1,100	948	576	54	2	1
Button		E. of Dunham Rd.	40	60	70	101	30	2	*	*
		N. W. of Warner Rd.	2,971	4,310	5,100	3,574	2,826	391	15	50
Canal		S. E. of Warner Rd.	1,750	2,540	3,000	2,079	1,648	228	5	20
		N. W. of Dunham Rd.	1,405	2,040	2,400	3,715	970	116	10	5
Cannon		S. E. of Dunham Rd.	1,150	1,670	2,000	3,021	799	102	9	5
		N. of Fitzwater Rd.	1,096	1,590	1,900	2,827	773	122	11	5
Carnegie Ave.		S. of Fitzwater Rd.	588	850	1,000	1,480	422	78	3	2
		E. of South Miles Rd.	114	170	200	213	91	17	1	1
Cedar Ave.		W. of East 55th St.	31,270	45,340	54,100	19,602	32,369	242	*	*
		E. of East 55th St.	38,248	55,460	66,200	25,997	39,011	546	*	*
Cedar Glen		W. of East 55th St.	7,680	11,140	13,300	3,892	8,205	2,186	*	*
		E. of East 55th St.	9,024	13,080	15,600	5,082	9,569	2,410	*	*
Cedar Rd.		W. of Murray Hill Rd.	36,649	53,140	63,400	32,737	35,082	1,830	159	198
		E. of Murray Hill Rd.	36,212	52,510	62,600	32,929	34,552	1,609	140	174
Cedar Rd.		W. of Fairmount Blvd.	23,383	33,900	40,500	21,107	22,354	1,255	109	136
		E. of Fairmount Blvd.	11,785	17,090	20,400	10,510	11,301	816	71	88
Cedar Point		W. of Lee Rd.	6,627	12,510	14,900	9,177	8,054	682	59	65
		E. of Lee Rd.	6,324	9,170	10,900	7,762	5,743	577	50	55
Center Ridge		W. of Warrensville Ctr. Rd.	4,624	6,700	8,000	5,748	4,182	340	30	23
		E. of Warrensville Ctr. Rd.	4,720	6,840	8,200	5,869	4,262	374	33	26
Center Ridge		W. of Richmond Rd.	3,832	5,560	6,600	4,879	3,434	189	13	16
		E. of Richmond Rd.	3,430	4,970	5,900	4,362	3,073	171	12	16
Center Ridge		W. of Brainard Rd.	3,013	4,370	5,200	3,810	2,706	169	12	10
		E. of Brainard Rd.	2,802	4,060	4,800	3,551	2,514	147	12	9
Center Ridge		W. of Woodstock Rd.	296	430	510	826	194	22	1	1
		E. of Woodstock Rd.	158	230	270	307	122	11	*	*
Center Ridge		W. of Lewis Rd.	223	320	390	422	176	25	1	1
		S. W. of Wooster Rd.	2,490	3,610	4,300	4,381	2,029	383	30	20
Center Ridge		E. of Clague Rd.	2,812	4,080	4,900	4,711	2,405	614	26	15
		W. of Clague Rd.	3,566	5,170	6,200	6,300	2,984	643	36	19
Center Ridge		E. of Hall Rd.	3,591	5,210	6,200	6,447	2,978	576	36	18
		W. of Hall Rd.	4,466	6,480	7,700	8,171	3,668	615	36	17
Center Ridge		N. E. of Dover Ctr. Rd.	4,318	6,260	7,500	7,810	3,567	654	36	16
		S. W. of Dover Ctr. Rd.	4,355	6,320	7,500	7,892	3,597	655	36	15
Center Ridge		N. E. of Bradley Rd.	3,686	5,340	6,400	6,762	3,037	522	36	14
		S. W. of Bradley Rd.	3,837	5,560	6,600	7,150	3,136	479	34	13
Chagrin River	174	N. of Wilson Mills Rd.	181	260	310	339	142	14	1	1
	174	S. of Wilson Mills Rd.	474	690	820	852	383	62	3	1
Chagrin River	174	N. of Mayfield Rd.	567	820	980	918	478	104	1	1
	174	N. of So. Woodland Rd.	245	360	420	670	164	17	*	*
Chagrin River	174	S. of So. Woodland Rd.	398	580	690	1,009	280	31	1	1
	174	N. of So. Kinsman Rd.	63	90	110	159	45	2	*	*
Chardon		S. of So. Kinsman Rd.	76	110	130	207	56	2	*	*
		N. of Euclid Ave.	1,677	2,430	2,900	2,204	1,562	286	25	16
Chardon	85	S. E. of Euclid Ave.	2,209	3,210	3,860	5,625	1,641	131	4	3
	85	W. of Richmond Rd.	1,521	2,200	2,600	3,370	1,115	145	6	3
Chestnut Hills Drive		N. of Richmond Rd.	1,293	1,880	2,200	3,669	823	120	5	3
		N. of North Park Blvd.	413	600	710	374	400	20	1	2
Clague		S. of Lorain Rd.	454	660	780	887	361	36	1	1
		N. of Lorain Rd.	1,142	1,660	2,000	1,516	1,028	121	1	3
Clague		S. of Center Ridge Rd.	1,640	2,380	2,800	1,897	1,557	78	3	5
		N. of Center Ridge Rd.	2,775	4,020	4,800	3,650	2,575	322	9	5
Clague		S. of Detroit Rd.	2,857	4,140	4,900	3,909	2,644	400	14	5
		N. of Detroit Rd.	514	740	890	972	397	90	1	1
Clark Ave.		S. of West Lake Rd.	462	670	800	827	370	104	*	*
		E. of Scranton Rd.	10,328	14,980	17,900	11,216	10,084	1,529	*	*
Cleveland		W. of Scranton Rd.	12,629	18,310	21,800	13,962	12,630	2,012	*	*
		S. of Kinsman Rd.	2,283	3,310	4,000	5,869	1,567	173	15	6
Cleveland		N. W. of North St. (Chagrin Falls)	2,335	3,390	4,000	5,974	1,608	191	12	15
		S. E. of North St. (Chagrin Falls)	60	90	100	38	63	12	*	*

* Traffic on Center Ridge between Hall and Wooster Roads below normal because of condition of roadway between Wooster and Clague Roads and the fact that Wooster Road was closed south of the Rocky River Bridge.
 * Eastbound traffic over U. S. Route 20 was routed over Clague Road and resulted in abnormally high traffic on Clague Road between Center Ridge and Detroit Roads.

HIGHWAY PLANNING REPORT

(L. Cuyahoga County—Continued)

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
Cochran.....		N. of Solon Rd.....	79	120	140	125	67	12	1	
		S. of Solon Rd.....	122	180	210	196	101	15	1	
Columbia.....	252	N. of Mastic Rd.....	388	560	670	692	325	79	3	2
	252	S. of Mastic Rd.....	933	1,350	1,600	1,796	763	100	9	5
	252	N. of Cook Rd.....	906	1,310	1,600	1,217	807	138	7	2
	252	S. of Cook Rd.....	1,057	1,530	1,800	1,459	958	159	12	5
	252	N. of Irish Rd.....	1,582	2,290	2,700	2,201	1,444	237	12	5
	252	S. of Irish Rd.....	942	1,370	1,600	1,581	816	135	12	5
	252	N. of Sprague Rd.....	659	960	1,100	1,080	575	124	11	4
	252	S. of Sprague Rd.....	244	350	420	383	203	45	2	1
Columbus St. (Bedford)..	175	N. E. of Broadway.....	1,332	1,930	2,300	2,686	1,153	151	12	7
Cook.....		W. of Columbia Rd.....	329	480	570	461	296	48	6	2
		E. of Mackenzie Rd.....	282	410	490	553	225	30	1	1
		W. of Mackenzie Rd.....	241	350	420	470	194	27	1	
Coventry.....		S. of Superior Rd.....	5,139	7,450	8,900	4,705	5,170	340	30	37
		N. of Euclid Hgts. Blvd.....	10,427	15,120	18,000	9,120	10,569	1,131	98	122
		S. of Euclid Hgts. Blvd.....	8,188	11,870	14,200	8,172	8,139	900	78	97
		N. E. of Fairmount Blvd.....	8,782	12,730	15,200	8,671	8,721	899	78	97
		S. W. of Fairmount Blvd.....	14,257	20,670	24,700	13,769	14,204	1,044	91	100
		N. of Shaker Blvd.....	6,980	10,120	12,100	6,896	6,936	392	34	42
		S. of Shaker Blvd.....	5,895	8,550	10,200	5,678	5,871	497	43	54
Denison Ave.....		S. E. of Lorain Ave.....	8,088	11,730	14,000	9,130	7,765	1,295	*	*
		N. W. of West 73rd St.....	13,302	19,290	23,000	15,368	12,691	1,763	*	*
		S. E. of West 73rd St.....	13,004	18,860	22,500	16,236	12,269	1,736	*	*
		N. W. of Fulton Rd.....	10,695	15,510	18,500	13,767	10,023	1,396	*	*
		S. E. of Fulton Rd.....	9,379	13,600	16,200	11,981	8,804	1,383	*	*
		W. of West 25th St.....	6,853	9,940	11,900	7,589	6,628	915	*	*
		E. of West 25th St.....	7,871	11,410	13,600	8,888	7,584	1,099	*	*
Depot.....		N. W. of Royalton Rd.....	782	1,130	1,400	1,750	578	135	9	13
Detroit Ave.....		W. of West 25th St.....	14,016	20,320	24,200	10,200	14,138	2,811	*	*
Detroit Rd.....	254	S. W. of Westland Ave.....	10,616	15,390	18,400	13,002	9,566	1,207	*	*
	254	E. of Clague Rd.....	7,091	10,280	12,300	11,486	5,974	928	75	20
	254	W. of Clague Rd.....	4,892	7,090	8,500	8,361	4,016	769	65	15
	254	E. of Dover Ctr. Rd.....	3,312	4,800	5,700	5,733	2,700	540	20	10
	254	W. of Dover Ctr. Rd.....	2,839	4,120	4,900	5,006	2,291	401	12	7
	254	E. of Bassett Rd.....	2,590	3,760	4,500	4,584	2,117	382	9	7
	254	W. of Bassett Rd.....	2,334	3,380	4,000	4,093	1,914	362	5	5
	254	E. of Bradley Rd.....	2,388	3,460	4,100	4,202	1,955	364	4	4
	254	W. of Bradley Rd.....	1,561	2,260	2,700	2,710	1,304	273	4	4
Dexter Place.....		N. W. of Franklin Ave.....	1,612	2,340	2,800	1,461	1,641	366	*	*
Dover Center.....		S. of Lorain Rd.....	270	390	470	374	245	36	3	1
		N. of Lorain Rd.....	466	680	810	624	415	73	3	2
		S. of Center Ridge Rd.....	618	900	1,100	1,166	531	103	3	2
		N. of Center Ridge Rd.....	822	1,190	1,400	1,613	697	103	10	5
		S. of Detroit Rd.....	1,088	1,580	1,900	2,000	945	193	10	5
		N. of Detroit Rd.....	825	1,200	1,400	1,377	743	230	13	6
		S. of West Lake Rd.....	579	840	1,000	1,185	478	54	2	2
Drake.....		E. of Hunt Rd.....	61	90	110	92	57	14	1	
		W. of Hunt Rd.....	247	360	430	397	223	48	2	
Dunham.....		S. W. of Broadway.....	2,405	3,490	4,200	3,067	2,207	350	35	21
		N. of Turney Rd.....	1,454	2,110	2,500	3,776	1,024	128	11	9
		S. of Turney Rd.....	1,093	1,580	1,900	2,802	771	97	4	4
		N. of Button Rd.....	663	960	1,100	1,822	443	25	1	1
		W. of Egypt Rd.....	724	1,050	1,300	1,973	488	34	1	1
		E. of Canal Rd.....	880	1,280	1,500	2,355	603	55	2	1
East Boulevard.....		S. of North Park Blvd.....	474	690	820	438	458	12	1	1
East Road.....		N. of First St. (Berea).....	338	490	590	655	269	36	1	1
		S. of First St. (Berea).....	195	280	340	371	157	24	1	1
		N. of Whitney Rd.....	136	200	240	264	111	18	1	
		S. of Whitney Rd.....	134	190	230	257	109	18	1	
E. 49th St. (Wash. Blvd.)..		N. of Harvard Ave.....	2,551	3,700	4,400	2,695	2,521	560	35	138
		S. of Harvard Ave.....	2,216	3,210	3,800	2,435	2,244	469	33	101
East 55th St.....		N. of St. Clair Ave.....	2,550	3,700	4,400	1,912	2,661	671	*	*
		S. of St. Clair Ave.....	5,152	7,470	8,900	4,108	5,317	964	*	*
		N. of Superior Ave.....	9,970	14,460	17,200	6,267	10,564	1,734	*	*
		S. of Superior Ave.....	14,546	21,090	25,200	9,889	15,274	2,339	*	*
		N. of Euclid Ave.....	20,382	29,550	35,300	14,108	21,356	3,069	*	*
		S. of Euclid Ave.....	22,515	32,650	39,000	16,040	23,407	3,560	*	*
		N. of Prospect Ave.....	23,931	34,700	41,400	18,069	24,705	3,798	*	*
		S. of Prospect Ave.....	23,389	33,910	40,500	17,442	23,732	3,530	*	*
		N. of Carnegie Ave.....	22,253	32,270	38,500	16,722	22,547	3,156	*	*
		S. of Carnegie Ave.....	20,721	30,040	35,900	16,162	21,110	3,124	*	*
		N. of Cedar Ave.....	21,581	31,290	37,300	16,772	22,000	3,354	*	*
		S. of Cedar Ave.....	21,533	31,220	37,300	16,917	21,907	3,053	*	*
		N. of Woodland Ave.....	17,944	26,020	31,000	14,144	18,145	2,366	*	*
		S. of Woodland Ave.....	15,902	23,060	27,500	12,554	16,149	2,272	*	*
		N. of Broadway.....	9,933	14,400	17,200	9,090	9,854	1,209	*	*
East 71st St.....	U. S. 21	N. of Grant Ave.....	4,502	6,530	7,800	9,881	3,533	466	31	67
East 72nd St.....	U. S. 21	S. of Grant Ave.....	4,092	5,930	7,100	8,952	3,198	418	27	55
East 84th St.....		N. of St. Clair Ave.....	11,471	16,630	19,800	10,100	11,608	641	*	*
		N. of Woodland Ave.....	1,633	2,370	2,800	1,439	1,604	253	*	*

APPENDIX

(1. Cuyahoga County—Continued)

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927					
			1927	1932	1937		Total traffic	Truck traffic				
								Total	3-4 tons capacity	5-7½ tons capacity		
East 93rd St.		N. of Kinsman Rd.	10,884	15,780	18,800	11,218	10,614	1,482	*	*		
		S. of Kinsman Rd.	10,360	15,020	17,900	10,731	10,114	1,370	*	*		
		N. of Union Ave.	7,742	11,230	13,400	8,025	7,586	1,188	*	*		
		S. of Union Ave.	7,523	11,910	13,000	7,775	7,378	1,190	*	*		
		N. of Harvard Ave.	6,537	9,480	11,300	6,545	6,444	1,224	*	*		
East 105th St.		S. of Harvard Ave.	5,075	7,360	8,800	5,141	4,992	874	*	*		
		N. of Superior Ave.	9,509	13,790	16,500	9,770	9,300	1,143	*	*		
		S. of Superior Ave.	9,509	13,790	16,500	9,770	9,300	1,143	*	*		
		N. of Euclid Ave.	10,215	14,810	17,700	10,585	9,986	1,202	*	*		
		S. of Euclid Ave.	10,215	14,810	17,700	10,585	9,986	1,202	*	*		
East 131st St.		N. of Miles Ave.	5,908	8,570	10,200	8,114	5,490	1,319	*	*		
		S. of Miles Ave.	4,738	6,870	8,200	6,550	4,564	1,197	*	*		
East 152nd St.		N. of St. Clair Ave.	8,086	11,720	14,000	8,085	7,933	915	*	*		
		S. of St. Clair Ave.	5,023	7,280	8,700	4,364	5,053	647	*	*		
East 185th St.		N. of Lake Shore Blvd.	217	320	380	343	208	14	*	*		
		S. of Lake Shore Blvd.	1,008	1,460	1,700	959	1,072	51	3	5		
East 200th St.		N. of St. Clair Ave.	248	360	430	296	252	40	*	2		
		E. of State Rd.	147	210	250	258	128	33	1	1		
Edgerton.		W. of State Rd.	154	220	270	269	138	43	2	1		
		S. of Dunham Rd.	204	300	350	561	137	7	*	*		
Egypt.		N. of Sagamore Rd.	132	190	230	357	90	*	*	*		
		W. of Green Rd.	478	690	830	968	401	57	1	*		
		E. of Green Rd.	462	670	800	918	385	59	1	*		
Emery.		W. of Harper Rd.	194	280	340	370	152	20	1	*		
		N. of Bagley Rd.	74	110	130	164	62	4	*	*		
Engle.		S. of Bagley Rd.	65	90	110	134	52	4	*	*		
		W. of E. 55th St.	24,264	35,180	42,000	18,968	23,964	1,801	*	*		
Euclid Ave.		E. of E. 55th St.	27,878	40,420	48,200	21,525	27,352	2,381	*	*		
		W. of East 105th St.	21,947	31,820	38,000	20,155	21,011	1,983	*	*		
		E. of East 105th St.	21,947	31,820	38,000	20,155	21,011	1,983	*	*		
		S. W. of Superior Ave.	24,460	35,470	42,300	25,869	23,237	2,450	*	*		
		U. S. 20	N. E. of Superior Ave.	32,276	46,800	55,800	34,691	30,588	2,841	*	*	
		U. S. 20	S. W. of Noble Rd.	22,826	33,100	39,500	30,833	20,661	2,280	*	*	
		U. S. 20	N. E. of Noble Rd.	22,817	33,080	39,500	30,429	21,203	3,072	*	*	
		U. S. 20	S. W. of Green Rd.	15,025	21,790	26,000	19,906	13,508	1,831	*	*	
		U. S. 20	N. E. of Green Rd.	14,860	21,550	25,700	19,743	13,351	1,807	*	*	
		U. S. 20	S. W. of Chardon Rd.	11,157	16,180	19,300	15,175	9,964	1,083	147	148	
		U. S. 20	N. E. of Chardon Rd.	10,176	14,760	17,600	14,082	9,247	997	145	147	
		U. S. 20	S. W. of Upson Rd.	8,660	12,560	15,000	11,978	7,865	810	70	33	
		U. S. 20	N. E. of Upson Rd.	8,614	12,490	14,900	11,907	7,824	811	71	33	
		Euclid Hgts. Blvd.		E. of Coventry Rd.	3,946	5,720	6,800	3,533	3,740	281	24	30
				S. W. of Coventry Rd.	6,267	9,090	10,800	5,589	5,935	411	36	44
S. of Cedar Rd.	13,894			20,150	24,000	15,229	13,035	685	60	74		
Fairmount Blvd.		N. W. of Coventry Rd.	10,949	15,880	18,900	11,950	10,279	590	51	64		
		S. E. of Coventry Rd.	4,887	7,090	8,500	5,509	4,578	308	27	33		
		W. of Taylor Rd.	3,999	5,800	6,900	4,796	3,690	568	23	66		
		E. of Taylor Rd.	3,886	5,640	6,700	4,550	3,698	587	16	59		
		S. of West Rd. (Berea)	1,586	2,300	2,700	2,530	1,350	184	16	8		
Fair Rd.		S. W. of East Rd. (Berea)	182	260	320	352	145	21	1	1		
		N. of John Rd.	83	120	140	115	75	13	*	*		
Fitch.		S. of John Rd.	74	110	130	104	66	9	*	*		
		W. of Canal Rd.	656	950	1,100	1,878	431	70	3	2		
Fitzwater.		N. E. of Brecksville Rd.	685	990	1,200	1,924	434	61	3	1		
		E. of Grayton Rd.	105	150	180	203	93	18	1	1		
Five Points.		S. of Wilson Mills Rd.	751	1,090	1,300	1,996	487	55	2	1		
		W. of Wooster Pike.	336	490	580	630	278	55	2	1		
Ford.		E. of West 28th St.	13,965	20,250	24,200	13,857	13,451	1,166	*	*		
		N. of West 28th St.	12,550	17,910	21,400	12,816	11,795	333	*	*		
Franklin Ave.		N. of Bagley Rd. (Berea)	4,825	7,000	8,300	7,290	4,185	527	40	12		
		S. of Bagley Rd.	4,861	7,050	8,400	5,995	4,433	501	21	3		
Fulton Ave.		S. E. of Euclid Ave.	5,994	8,690	10,400	5,579	5,990	1,091	*	*		
		N. of Denison Ave.	4,299	6,230	7,400	5,947	3,960	528	*	*		
Garfield Blvd.		W. of Turney Rd.	2,024	2,940	3,500	2,372	1,922	214	26	7		
		E. of Turney Rd.	2,039	2,960	3,500	2,485	1,910	113	2	7		
Garfield Dr.&Edge Pk.Dr.		E. of Canal Rd.	65	90	110	71	62	15	2	4		
		W. of East 49th St.	869	1,260	1,500	1,049	842	126	10	24		
Granger.		N. of Five Points Rd.	73	110	130	143	64	12	1	*		
		S. of Five Points Rd.	66	100	110	126	58	11	*	*		
Grant.		S. E. of Euclid Ave.	651	940	1,100	920	560	101	4	5		
		N. W. of Bluestone Rd.	1,213	1,760	2,100	996	1,196	748	133	44		
Green.		S. E. of Bluestone Rd.	1,231	1,780	2,100	1,028	1,210	746	133	44		
		N. of Mayfield Rd.	2,163	3,140	3,700	2,419	2,001	519	45	30		
		S. of Mayfield Rd.	1,522	2,210	2,600	1,781	1,385	268	23	15		
		N. of Emery Rd.	82	120	140	161	71	15	1	4		
		S. of Emery Rd.	112	160	190	167	103	45	1	4		
Hamm Ave.		S. W. of Broadway.	3,169	4,600	5,500	2,832	3,170	524	*	*		
		N. of Center Ridge Rd.	1,218	1,770	2,100	2,361	1,007	134	10	5		
Hall.	252	S. of Center Ridge Rd.	478	690	830	837	413	105	9	6		
		N. E. of Schreiber Rd.	161	230	280	428	111	13	1	*		
Hathaway.	252	S. W. of Schreiber Rd.	198	290	340	521	135	17	1	1		
		N. of Emery Rd.	212	310	370	397	173	27	1	1		
Harper.		S. of Emery Rd.	197	290	340	367	155	21	1	*		

* Westbound traffic over U. S. Route 20 was routed over Hall Road between Detroit and Center Ridge Roads resulting in abnormally high traffic.

HIGHWAY PLANNING REPORT

(1. Cuyahoga County—Continued)

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
Harvard Ave.		W. of East 49th St.	8,361	12,120	14,500	9,437	8,126	1,193	59	205
		E. of East 49th St.	7,886	11,440	13,600	9,029	7,652	1,007	56	135
Highland		W. of East 93rd St.	6,716	9,740	11,600	7,680	6,521	870	*	*
		E. of East 93rd St.	5,536	8,030	9,600	6,356	5,368	688	*	*
		W. of Richmond Rd.	306	440	530	625	239	36	2	2
Hilliard		E. of Richmond Rd.	277	400	480	574	208	21	1	2
		W. of Miner Rd.	187	270	320	516	122	18	*	*
		E. of Miner Rd.	23	30	40	75	14	*	*	*
Hunt		On Hilliard Bridge	4,705	6,820	8,100	8,457	3,816	664	36	25
		N. W. of Bennett Rd.	231	250	260	469	181	30	1	*
Independence		S. E. of Drake Rd.	218	320	380	349	199	42	2	1
		Under Clark Ave. Bridge	(5)	(5)	(5)	(5)	270	27	*	*
Irish		W. of Stearns Rd.	673	980	1,200	1,257	521	83	5	7
		E. of Stearns Rd.	738	1,070	1,300	1,370	579	99	8	7
Ivanhoe		W. of Columbia Rd.	1,124	1,630	1,900	2,131	872	116	10	5
		E. of Columbia Rd.	2,164	3,140	3,700	3,704	1,740	270	23	5
Jackson		S. E. of St. Clair Ave.	4,278	6,200	7,400	3,914	4,252	630	*	*
		E. of Harper Rd.	89	130	150	163	69	10	*	*
Jacque		S. of Sprague Rd.	44	60	80	70	40	10	*	*
		S. E. of Fitch Rd.	40	60	70	46	36	10	*	*
John		S. W. of Mayfield Rd.	6,806	9,870	11,800	8,088	6,119	415	36	45
		W. of Columbia Rd.	185	270	320	310	156	47	2	1
Kennithworth		S. E. of Woodland Ave.	10,271	14,890	17,800	14,153	9,156	1,600	*	*
		N. W. of East 93rd St.	11,038	16,000	19,100	14,967	9,945	1,873	*	*
Kennedy Ridge		S. E. of East 93rd St.	11,953	17,330	20,700	16,299	10,736	1,930	*	*
		W. of Lee Rd.	8,552	12,400	14,800	12,113	7,736	1,283	113	110
Kinsman		E. of Lee Rd.	5,166	7,490	9,000	8,697	4,176	667	60	86
		W. of So. Kinsman Rd.	2,098	3,040	3,600	3,598	1,815	231	21	5
Laird		E. of So. Kinsman Rd.	527	760	910	879	454	71	3	2
		W. of Cleveland Rd.	2,288	3,320	4,000	5,883	1,569	172	15	6
Lake Shore Blvd		E. of Cleveland Rd.	136	200	240	329	97	19	1	*
		N. of Broadway	68	100	120	121	57	5	*	*
Lander		S. W. of East 185th St.	12,522	18,160	21,700	18,350	11,162	393	21	29
		N. E. of East 185th St.	12,415	18,000	21,500	17,978	11,097	427	20	26
Lee		S. W. of East 222nd St.	8,851	12,830	15,300	12,581	7,958	470	20	25
		N. E. of East 222nd St.	8,213	11,910	14,200	11,640	7,348	412	20	25
Libby		N. of Mayfield Rd.	1,261	1,830	2,200	1,634	1,187	133	12	5
		S. of Mayfield Rd.	923	1,340	1,600	1,543	788	106	9	4
Liberty		N. of So. Woodland Rd.	78	110	140	152	70	4	*	*
		S. of So. Woodland Rd.	66	100	110	129	60	2	*	*
Linndale		N. of Mayfield Rd.	1,768	2,560	3,100	2,159	1,738	199	51	56
		S. of Mayfield Rd.	5,496	7,970	9,500	6,617	5,408	585	108	117
Lorain Ave. & Abbey Ave.		N. of Cedar Rd.	12,716	18,440	22,000	15,400	12,467	1,236	122	133
		S. of Cedar Rd.	13,404	19,440	23,200	16,036	13,184	1,402	104	113
Lorain Ave.		N. of Buckeye Rd.	11,236	16,290	19,400	14,891	10,827	1,192	100	90
		S. of Buckeye Rd.	9,635	13,970	16,700	12,600	9,235	1,111	114	76
Lorain Rd.		N. of Kinsman Rd.	9,629	13,960	16,700	12,397	9,027	1,078	83	65
		S. of Kinsman Rd.	6,887	9,990	11,900	10,620	6,103	789	67	63
Libby		N. of Miles Ave.	5,713	8,280	9,900	8,803	5,008	535	61	62
		S. of Miles Ave.	6,451	9,350	11,200	9,886	5,662	614	36	34
Libby		N. of Libby Rd.	4,512	6,540	7,800	6,927	3,954	417	28	26
		S. of Libby Rd.	3,603	5,220	6,200	5,564	3,166	323	16	1
Liberty		S. of Cedar Point Rd.	123	180	210	229	98	19	9	8
		E. of Broadway	1,805	2,620	3,100	2,208	1,639	277	19	9
Liberty		W. of Lee Rd.	1,781	2,580	3,100	2,568	1,574	224	19	8
		E. of Lee Rd.	1,068	1,550	1,800	1,471	963	174	15	10
Liberty		W. of Warrensville Ctr. Rd.	382	550	660	578	359	68	3	4
		E. of Warrensville Ctr. Rd.								
Linndale		S. of Solon Rd.	39	60	70	69	33	2	*	*
		E. of Tiedeman Rd.	2,443	3,540	4,200	4,654	2,069	237	21	23
Lorain Ave. & Abbey Ave.		W. of Tiedeman Rd.	2,427	3,520	4,200	4,622	2,057	237	21	23
		E. of West 25th St.	11,759	17,050	20,300	8,600	11,887	3,030	*	*
Lorain Ave.		W. of West 25th St.	14,542	21,090	25,200	11,188	14,573	3,086	*	*
		E. of Denison Ave.	12,953	18,780	22,400	10,785	13,068	2,017	*	*
Lorain Rd.		W. of Denison Ave.	16,367	23,730	28,300	13,443	16,558	2,825	*	*
		E. of Rocky River Drive	9,485	13,750	16,400	13,648	8,305	1,800	*	*
Lorain Rd.		N. E. of Mastic Rd.	1,934	2,800	3,300	2,005	1,804	693	15	10
		S. W. of Mastic Rd.	3,579	5,190	6,200	4,297	3,257	832	20	15
Lorain Rd.		N. E. of Spencer Rd.	2,344	3,400	4,100	3,029	2,100	379	10	7
		S. W. of Spencer Rd.	1,955	2,840	3,400	2,498	1,758	346	5	7
Lorain Rd.		N. E. of Clague Rd.	1,166	1,690	2,000	1,534	1,041	176	3	5
		S. W. of Clague Rd.	1,121	1,620	1,900	1,513	995	158	3	2
Lorain Rd.		N. E. of Dover Ctr. Rd.	931	1,350	1,600	1,262	826	130	3	2
		S. W. of Dover Ctr. Rd.	894	1,300	1,500	1,180	788	139	3	3
Lorain Rd.		N. E. of Butternut Ridge Rd.	923	1,340	1,600	1,259	806	111	10	5
		S. W. of Butternut Ridge Rd.	1,009	1,460	1,700	1,403	876	101	9	4
Lorain Rd.		N. E. of Stearns Rd.	701	1,020	1,200	969	611	74	3	1
		S. W. of Stearns Rd.	699	1,010	1,200	969	609	75	3	1
Lorain Rd.		N. E. of Barton Rd.	679	980	1,200	930	592	80	3	1
		S. W. of Barton Rd.	486	700	840	653	426	65	3	1
Macedonia		S. of Broadway	123	180	210	210	104	15	1	*

* Only weekday traffic figures available.

† Traffic on Kinsman between Lee and South Kinsman Roads low because of condition of roadway on Kinsman Road east of east limits of Shaker Heights Village.

APPENDIX

(1. Cuyahoga County—Continued)

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
Mackenzie.....		N. of Cook Rd.....	128	190	220	241	106	23	1	.....
Madison.....		E. of Berea Rd.....	16,606	24,080	28,700	12,755	16,838	2,524	*	*
		W. of Berea Rd.....	16,189	23,470	28,000	12,321	16,482	2,700	*	*
Main Ave.....		N. E. of Detroit Ave. (Cleveland).....	7,039	10,210	12,200	3,090	7,414	560	*	*
Mastic ¹		E. of Columbia Rd.....	760	1,100	1,300	1,517	625	60	3	2
		S. of Lorain Rd.....	456	660	790	645	404	41	2	3
Mayfield.....	U. S. 322	W. of Kenilworth Rd.....	3,924	5,690	6,800	4,385	3,592	528	46	57
	U. S. 322	N. E. of Kenilworth Rd.....	10,014	14,520	17,300	11,797	9,050	824	72	89
	U. S. 322	S. W. of Lee Rd.....	11,780	17,080	20,400	12,362	10,753	1,219	106	116
	U. S. 322	N. E. of Lee Rd.....	12,626	18,310	21,800	14,386	11,510	1,322	116	126
	U. S. 322	W. of Taylor Rd.....	11,403	16,530	19,700	12,871	10,425	1,314	114	108
	U. S. 322	E. of Taylor Rd.....	14,104	20,450	24,400	17,204	12,700	1,642	143	135
	U. S. 322	W. of Noble Rd.....	5,775	8,370	10,000	7,210	5,184	505	35	59
	U. S. 322	E. of Noble Rd.....	6,480	9,400	11,200	8,006	5,824	687	58	60
	U. S. 322	W. of Green Rd.....	6,102	8,850	10,600	7,553	5,481	628	55	50
	U. S. 322	E. of Green Rd.....	5,423	7,860	9,400	6,767	4,887	598	52	34
	U. S. 322	W. of Richmond Rd.....	5,177	7,510	9,000	6,182	4,240	529	46	24
	U. S. 322	E. of Richmond Rd.....	4,305	6,240	7,400	5,565	3,543	488	42	22
	U. S. 322	W. of Lander Rd.....	3,469	5,030	6,000	5,974	2,868	423	37	17
	U. S. 322	E. of Lander Rd.....	3,407	4,940	5,900	5,758	2,839	464	30	18
	U. S. 322	W. of S. O. M. Ctr. Rd.....	2,447	3,550	4,200	4,199	2,026	274	27	18
	U. S. 322	E. of S. O. M. Ctr. Rd.....	1,473	2,140	2,500	2,524	1,220	180	25	13
	U. S. 322	W. of Chagrin River Rd.....	1,195	1,730	2,100	1,980	1,001	196	17	8
	U. S. 322	E. of Chagrin River Rd.....	829	1,200	1,400	1,373	691	136	16	7
Miles Ave.....	43	N. W. of Lee Rd.....	4,073	5,910	7,000	7,485	3,263	463	53	59
	43	S. E. of Lee Rd.....	2,914	4,220	5,000	5,223	2,303	356	33	36
	43	N.W. of Warrensville Ctr. Rd.....	2,326	3,370	4,000	4,300	1,828	282	36	30
	43	S.E. of Warrensville Ctr. Rd.....	2,971	4,310	5,100	5,583	2,455	457	65	38
	43	W. of North Miles Rd.....	3,196	4,630	5,500	5,925	2,615	493	51	40
Miller.....		E. of Richfield Rd.....	64	90	110	99	54	14	1	.....
Miner.....		N. of Highland Rd.....	162	240	280	453	104	16	.....	.....
		S. of Highland Rd.....	229	330	400	596	155	21	.....	.....
Murray Hill.....		N. of Cedar Glen.....	2,373	3,440	4,100	1,835	2,352	519	30	25
Noble.....		N. W. of Euclid Ave.....	2,317	3,360	4,000	2,044	2,255	412	*	*
		S. E. of Euclid Ave.....	10,813	15,680	18,700	9,615	10,721	2,017	*	*
Northfield.....	8	At Greyton Rd.....	10,128	14,690	17,500	9,618	9,961	1,515	132	164
	8	S. W. of Broadway.....	5,343	7,750	9,200	10,374	4,402	494	43	23
	8	N. of Sagamore Rd.....	3,931	5,700	6,800	7,684	3,232	329	26	16
North St.....		S. of Cleveland Rd. (Chagrin Falls).....	2,679	3,880	4,600	6,043	1,993	229	20	14
		N. of Cleveland Rd.....	1,330	1,930	2,300	3,202	942	134	11	9
North Miles.....		E. of Miles Ave.....	1,304	1,890	2,300	2,650	1,027	253	30	21
		W. of S. O. M. Ctr. Rd.....	767	1,110	1,300	1,341	588	112	26	5
		E. of S. O. M. Ctr. Rd.....	751	1,090	1,300	1,361	582	92	12	2
North Morland Blvd.....		N. of Larchmere (Woodland).....	7,065	10,240	12,200	6,540	7,099	679	59	73
		S. of Larchmere (Woodland).....	6,677	9,680	11,600	6,419	6,664	422	37	46
North Park Blvd.....		E. of Chestnut Hills Drive.....	4,594	6,660	7,900	4,319	4,428	20	1	2
		W. of Chestnut Hills Drive.....	4,991	7,240	8,600	4,684	4,812	31	1	3
North Woodland.....		W. of Richmond Rd.....	778	1,130	1,300	1,656	618	51	2	2
		E. of Richmond Rd.....	619	900	1,100	1,319	491	40	2	2
		W. of S. O. M. Ctr. Rd.....	505	730	870	1,074	401	35	2	1
		E. of S. O. M. Ctr. Rd.....	323	470	560	587	272	28	1	.....
Nottingham.....		N. W. of St. Clair Ave.....	3,421	4,960	5,900	3,780	3,285	581	*	*
		S. E. of St. Clair Ave.....	1,480	2,150	2,600	1,167	1,500	254	*	*
Norwood.....		N.W. of Warrensville Ctr. Rd.....	3,345	4,850	5,800	4,302	3,062	356	40	29
Oakes.....		E. of Broadview Rd.....	30	70	90	43	49	6	.....	.....
Pettibone.....		N. E. of S. O. M. Ctr. Rd.....	56	50	60	85	24	2	.....	.....
		W. of S. O. M. Ctr. Rd.....	183	260	320	282	153	31	1	1
Pleasant Valley.....		W. of Brecksville Rd.....	447	650	770	779	382	60	3	4
		E. of State Rd.....	569	820	980	1,337	414	48	2	4
		W. of State Rd.....	564	820	980	1,350	405	37	2	3
		E. of Ridge Rd.....	542	790	940	1,302	386	32	2	1
		W. of Ridge Rd.....	562	820	970	1,341	401	36	3	1
		S. E. of Wooster Pike Rd.....	434	630	750	800	349	64	3	2
Porter.....		N. of Lorain Rd.....	447	650	770	800	392	49	2	1
Prospect Ave.....		W. of East 55th St.....	8,679	12,580	15,000	6,513	8,852	1,166	*	*
Prospect Rd.....		N. of Royalton Rd.....	439	640	760	810	352	80	1	.....
		S. of Royalton Rd.....	377	550	650	683	305	70	.....	.....
Richfield.....		S. of Barr Rd.....	136	200	240	218	115	18	1	.....
		N. E. of Barr Rd.....	130	190	220	216	108	12	1	.....
		W. of Brecksville Rd.....	498	720	860	837	416	70	9	.....
Richmond.....	175	S. of Chardon Rd.....	826	1,200	1,400	1,585	635	119	10	5
	175	N. of Highland Rd.....	790	1,150	1,400	1,521	603	108	11	5
	175	S. of Highland Rd.....	793	1,150	1,400	1,556	611	104	12	5
	175	N. of Anderson Rd.....	1,329	1,930	2,300	2,537	1,026	198	17	11
	175	S. of Anderson Rd.....	1,310	1,900	2,300	2,337	1,056	295	23	15
	175	N. of Mayfield Rd.....	1,676	2,430	2,900	2,864	1,381	240	21	11
	175	S. of Mayfield Rd.....	1,263	1,830	2,200	2,173	1,041	174	10	8
	175	N. of Cedar Rd.....	1,202	1,740	2,100	2,493	945	98	5	10
	175	S. of Cedar Rd.....	1,010	1,460	1,700	2,053	795	76	5	4
	175	N. of No. Woodland Rd.....	1,037	1,500	1,700	2,131	816	90	4	4
	175	S. of No. Woodland Rd.....	1,172	1,700	2,000	2,432	918	88	4	4
	175	S. of South Miles Rd.....	275	400	480	587	228	19	1	1

¹ Mastic Road closed between Puritas Springs and Spencer Roads.

HIGHWAY PLANNING REPORT
(1. Cuyahoga County—Continued)

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
Ridge.....	3	S. of Wooster Pike.....	2,871	4,160	5,000	2,803	2,810	424	30	40
	3	N. of Ridgewood Dr.....	880	1,280	1,500	887	861	99	4	7
	3	S. of Ridgewood Dr.....	762	1,100	1,300	771	745	75	3	5
	3	N. of Pleasant Valley Rd.....	525	760	910	919	450	43	1	3
	3	S. of Pleasant Valley Rd.....	434	630	750	765	369	32	1	3
Ridgewood (Bean Rd.).....	3	N. of Bennett Rd.....	496	720	860	842	431	53	2	1
	3	S. of Bennett Rd.....	483	700	840	840	413	45	2	1
	3	E. of Ridge Rd.....	499	720	860	473	473	66	3	4
Riverside Drive ⁸	232	W. of Ridge Rd.....	379	550	660	361	359	45	2	3
	232	N. of Lorain Ave.....	766	1,110	1,300	393	793	290	*	*
	232	S. of Lorain Ave.....	5,391	7,820	9,300	7,588	4,724	784	*	*
	232	N. E. of Brook Park Rd.....	4,256	6,170	7,400	8,623	3,301	401	36	28
	232	S. W. of Brook Park Rd.....	4,423	6,410	7,700	9,302	3,401	417	36	26
Riverview.....	232	N. E. of Sheldon Rd.....	3,445	5,000	6,000	7,212	2,669	366	32	21
	232	S. W. of Sheldon Rd.....	3,530	5,120	6,100	7,406	2,730	366	32	21
		N. of Station Rd.....	153	220	260	380	109	20	1	
		S. of Station Rd.....	127	180	220	308	92	18	1	
		N. of Snowville Rd.....	286	420	500	742	209	31	1	
Rockside.....		S. of Snowville Rd.....	290	420	500	752	211	31	1	
		E. of Brecksville Rd.....	92	130	160	110	89	26		1
		W. of Brecksville Rd.....	582	840	1,000	757	540	67	3	3
Rocky River Bridge.....	2-254 U. S. 20)	West End.....	19,915	28,880	34,500	28,018	16,850	2,082	*	*
Royalton.....	82	N. W. of Brecksville Rd.....	534	770	920	1,440	350	35		3
	82	E. of Avery Rd.....	502	730	870	1,526	304	32	1	1
	82	W. of Avery Rd.....	516	750	890	1,523	320	34	1	1
	82	E. of State Rd.....	563	820	970	1,375	398	80	13	6
	82	W. of State Rd.....	836	1,210	1,400	1,885	623	98	1	5
	82	E. of York Rd.....	573	830	990	1,698	354	60	3	10
	82	W. of York Rd.....	601	870	1,000	1,813	368	67	3	10
	82	E. of Wooster Pike.....	646	940	1,100	1,917	402	87	8	16
	82	S. W. of Wooster Pike.....	606	880	1,000	1,471	433	67	1	1
	82	E. of Prospect Rd.....	544	790	940	1,000	436	95	3	2
	82	W. of Prospect Rd.....	513	740	890	922	416	102	2	2
	82	N. E. of Bell St.....	230	330	400	268	216	37		
	Russell (Chagrin Falls).....		W. of Northfield Rd.....	83	120	140	216	58	6	
		E. of Egypt Rd.....	81	120	140	204	56	8		
		W. of Egypt Rd.....	80	120	140	204	54	8		
		W. of Brecksville Rd.....	1,914	2,780	3,300	2,616	1,779	255	27	15
		S. E. of Broadview Rd.....	2,052	2,980	3,600	2,834	1,899	250	7	11
Schaaf.....		W. of Usher Rd.....	22	30	40	47	19	2		
Schady.....		E. of Hathaway Rd.....	109	160	190	300	74	6		
Schreiber.....		N. of Clark Ave.....	14,797	21,460	25,600	16,675	14,484	1,701	*	*
Scranton.....		S. of Clark Ave.....	15,268	22,140	26,400	17,404	14,892	1,505	*	*
Settlement.....		S. of Brook Park Rd.....	1,374	1,990	2,400	2,918	1,055	149	25	8
		N. of Wooster Pike.....	1,041	1,510	1,800	2,199	796	100	12	7
		N. E. of Woodhill Rd.....	4,820	6,990	8,300	7,127	4,439	55	*	*
Shaker Blvd.....		W. of Coventry Rd.....	3,137	4,550	5,400	3,944	3,014	130	11	14
		E. of Coventry Rd.....	3,018	4,380	5,200	3,694	2,873	128	11	14
		E. of Riverside Drive.....	12	20	20	22	10	2		
Sheldon.....		W. of Riverside Drive.....	173	250	300	331	138	12	1	
		E. of Broadview Rd.....	434	630	750	831	356	47	2	4
		W. of Broadview Rd.....	110	160	190	213	89	10		1
Snowville.....		W. of Riverview Rd.....	29	40	50	81	20	1		
Solon.....	174	N. E. of Liberty Rd.....	730	1,060	1,300	1,419	585	83	3	1
	174	S. W. of Liberty Rd.....	721	1,040	1,200	1,394	577	82	3	1
		E. of Cochran Rd.....	83	120	140	138	72	14	1	
		W. of Cochran Rd.....	59	90	100	102	47	4		
		E. of Broadway.....	525	760	910	1,050	456	62	3	2
S. O. M. Center ⁹	91	N. of Wilson Mills Rd.....	1,554	2,250	2,700	3,524	1,121	91	7	3
	91	S. of Wilson Mills Rd.....	1,586	2,300	2,700	3,572	1,165	125	13	6
	91	N. of Mayfield Rd.....	1,901	2,760	3,300	4,316	1,387	140	12	3
	91	S. of Mayfield Rd.....	1,429	2,070	2,500	3,264	1,038	96	11	3
	91	N. of No. Woodland Rd.....	2,638	3,820	4,600	5,989	1,924	146	19	6
	91	S. of No. Woodland Rd.....	2,708	3,930	4,700	6,102	1,991	152	20	6
	91	N. of So. Kinsman Rd.....	1,955	2,840	3,400	4,508	1,363	94	20	1
	91	S. of So. Kinsman Rd.....	1,488	2,160	2,600	3,887	961	76	11	1
	91	N. of No. Miles Rd.....	1,236	1,790	2,100	2,977	836	81	13	2
	91	S. of No. Miles Rd.....	1,124	1,630	1,900	2,728	750	65	5	
	91	N. of So. Miles Rd.....	1,498	2,170	2,600	3,783	1,047	99	4	1
	91	S. of So. Miles Rd.....	1,067	1,550	1,800	2,742	740	62	2	
	91	N. of Pettibone Rd.....	996	1,440	1,700	2,863	642	64	3	1
	91	S. of Pettibone Rd.....	977	1,420	1,700	2,924	609	46	2	1
	South Kinsman ¹⁰	U. S. 422	S. E. of Kinsman Rd.....	1,677	2,430	2,900	2,882	1,446	179	20	3
U. S. 422		N. W. of S. O. M. Ctr. Rd.....	1,469	2,130	2,500	2,500	1,270	176	26	3
U. S. 422		S. E. of S. O. M. Ctr. Rd.....	1,817	2,640	3,100	3,211	1,582	217	36	3
U. S. 422		N. W. of Chagrin River Rd.....	2,153	3,120	3,700	3,861	1,862	227	20	7
174 U. S. 422)		S. E. of Chagrin River Rd.....	2,147	3,110	3,700	3,852	1,858	227	20	7
South Miles.....	43	S. E. of Miles Ave.....	2,039	2,960	3,500	3,889	1,638	243	21	20
	43	N. W. of Cannon Rd.....	1,687	2,450	2,900	3,773	1,265	187	16	11

⁸ Riverside Drive north of Lorain under construction but open to traffic.

⁹ Traffic on S. O. M. Center Road between Cedar Road and Kinsman Road heavier than normal because of condition of roadway on Kinsman Road east of east limits of Shaker Heights Village.

¹⁰ Traffic on South Kinsman low because of condition of roadway on Kinsman Road.

APPENDIX

(1. Cuyahoga County--Continued)

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
South Miles.....	43	S. E. of Cannon Rd.....	1,775	2,570	3,100	3,990	1,328	187	16	11
	43	N. W. of S. O. M. Ctr. Rd..	1,621	2,350	2,800	3,666	1,203	134	12	5
	43	S. E. of S. O. M. Ctr. Rd..	1,847	2,680	3,200	4,637	1,280	124	10	5
South Moreland Blvd.....		N. W. of Buckeye Rd.....	4,220	6,120	7,300	5,196	3,969	125	10	4
		S. E. of Buckeye Rd.....	4,838	7,020	8,400	6,630	4,440	200	12	7
South Woodland.....		E. of So. Moreland Blvd.....	4,319	6,260	7,500	6,047	4,172	643	49	73
		E. of Lee Rd.....	3,964	5,750	6,900	5,597	3,833	589	51	56
		E. of Lee Rd.....	4,237	6,140	7,300	6,061	4,164	479	40	30
		W. of Warrensville Ctr. Rd..	1,562	2,260	2,700	2,369	1,500	157	15	15
		E. of Warrensville Ctr. Rd..	1,511	2,190	2,600	2,317	1,448	132	12	10
		W. of Lander Rd.....	1,101	1,600	1,900	1,863	894	78	3	2
		E. of Lander Rd.....	1,065	1,540	1,800	1,785	859	77	3	2
		N. W. of Chagrin River Rd.	284	410	490	611	210	33	1	1
Spencer.....		S. of Lorain Rd.....	710	1,030	1,200	900	648	116	5	4
Sprague.....		E. of Jacque Rd.....	85	120	150	145	75	12	1	
		W. of Jacque Rd.....	90	130	160	151	80	12	1	
		E. of Columbia Rd.....	529	770	920	857	468	111	10	4
		W. of Columbia Rd.....	33	50	60	53	30	8		
State.....	94	N. of Brook Park Rd.....	2,766	4,010	4,800	2,738	2,709	501	47	51
	94	S. of Brook Park Rd.....	3,975	5,760	6,900	5,140	3,684	568	79	55
	94	N. of Pleasant Valley Rd..	1,233	1,790	2,100	2,287	1,011	173	25	20
	94	S. of Pleasant Valley Rd..	1,128	1,640	2,000	2,073	930	168	25	20
	94	N. of Royalton Rd.....	992	1,440	1,700	1,787	826	167	25	13
	94	S. of Royalton Rd.....	1,030	1,490	1,700	1,837	846	161	14	15
	94	N. of Edgerton Rd.....	788	1,140	1,400	1,370	655	142	12	8
	94	S. of Edgerton Rd.....	749	1,090	1,300	1,319	618	125	11	4
	94	N. W. of Wiltshire Rd.....	576	840	1,000	1,043	470	76	3	1
	94	S. E. of Wiltshire Rd.....	567	820	980	1,020	464	78	3	1
State St.....		N. W. of Washington St. (Chagrin Falls).....	48	70	80	48	46	5		
Station.....	U. S. 422	S. E. of Washington St.....	3,399	4,930	5,900	7,378	2,529	261	24	4
	82	S. E. of Riverview Rd.....	379	550	660	880	262	56	2	1
	82	W. of Riverview Rd.....	493	720	850	1,170	350	75	3	1
	82	E. of Brecksville Rd.....	791	1,150	1,400	1,929	548	92	9	1
St. Claire Ave.....		S. W. of East 55th St.....	19,904	28,860	34,400	16,176	19,960	2,648	*	*
		N. E. of East 55th St.....	24,821	35,990	42,900	20,092	24,908	3,425	*	*
		S. W. of East 72nd St.....	29,695	43,060	51,400	24,263	29,746	3,741	*	*
		N. E. of East 72nd St.....	20,874	30,270	36,100	16,405	21,062	3,654	*	*
		S. W. of East 152nd St.....	8,031	11,640	13,900	6,526	8,050	1,244	*	*
		N. E. of East 152nd St.....	4,453	6,460	7,700	4,360	4,305	713	*	*
		S. W. of Nottingham Rd.....	2,895	4,200	5,000	3,000	2,772	515	*	*
		N. E. of Nottingham Rd.....	3,194	4,630	5,500	3,351	3,052	506	*	*
		S. W. of East 200th St.....	1,956	2,840	3,400	2,004	1,879	363	91	22
		N. E. of East 200th St.....	1,909	2,770	3,300	1,949	1,835	360	97	22
Stearns.....		S. of Lorain Rd.....	93	140	160	123	90	21	1	
		N. of Irish Rd.....	80	120	140	165	67	8	2	
		S. of Irish Rd.....	71	100	120	122	62	16	1	
Superior high-level bidge (West End)		E. of West 25th St.....	56,162	81,440	97,200	47,800	55,281	4,527	*	*
Superior Ave.....	U. S. 20	S. W. of East 55th St.....	33,076	47,960	57,200	32,851	31,986	2,944	*	*
	U. S. 20	E. of East 55th St.....	31,073	45,060	53,800	25,443	30,981	2,940	*	*
	U. S. 20	W. of East 105th St.....	20,288	29,420	35,100	16,698	20,182	1,617	*	*
	U. S. 20	E. of East 105th St.....	20,288	29,420	35,100	16,698	20,182	1,617	*	*
	U. S. 20	W. of Euclid Ave.....	16,004	23,210	27,700	17,271	15,206	1,157	*	*
Superior Rd.....		S. E. of Euclid Ave.....	19,768	28,660	34,200	21,488	18,773	1,437	*	*
		N. W. of Coventry Rd.....	21,423	31,060	37,100	23,567	20,282	1,242	108	134
		S. E. of Coventry Rd.....	15,796	22,900	27,300	19,738	14,553	931	81	101
Surry.....		N. of Cedar Rd.....	2,874	4,170	5,000	2,940	2,725	363	32	39
Taylor.....		S. of Mayfield Rd.....	4,465	6,470	7,700	5,514	4,162	641	56	53
		N. of Fairmount Blvd.....	2,594	3,760	4,500	3,349	2,397	353	9	31
Tiedeman.....		S. W. of Linndale Rd.....	621	900	1,100	1,198	524	52	2	4
Troyan.....		E. of Broadway.....	171	250	300	288	143	16	1	
Turney ¹¹		S. E. of Warner Rd.....	7,110	10,310	12,300	8,230	6,775	852	*	*
		N. of Garfield Blvd.....	6,111	8,860	10,600	7,057	5,831	759	54	82
		S. of Garfield Blvd.....	4,632	6,720	8,000	5,311	4,428	614	34	75
		W. of Dunham Rd.....	759	1,100	1,300	2,122	547	67	3	3
		E. of Dunham Rd.....	81	120	140	158	72	38	2	2
Union Ave.....		E. of East 93rd St.....	8,256	11,970	14,300	11,817	7,439	1,127	*	*
		W. of East 93rd St.....	8,015	11,620	13,900	11,446	7,227	1,117	*	*
Upson.....		N. of Euclid Ave.....	119	170	210	129	107	14	1	1
Usher.....		N. E. of Schady Rd.....	97	140	170	162	86	18	1	
		S. W. of Schady Rd.....	90	130	160	141	81	21	1	
Wallings.....		E. of Broadview Rd.....	472	680	820	1,304	308	61	5	
		W. of Broadview Rd.....	244	350	420	707	152	17		1
Walton.....		N. of Alexander Rd.....	80	120	140	204	58	7		
		S. of Alexander Rd.....	77	110	130	204	55	7		
Warner.....		N. E. of Turney Rd.....	13,713	19,880	23,700	16,052	13,014	1,579	*	*
		S. W. of Turney Rd.....	6,780	9,830	11,700	7,926	6,235	786	*	*
		N. of Canal Rd.....	2,162	3,140	3,700	2,533	2,069	363	16	61
Warrensville Center ¹²		N. of Mayfield Rd.....	2,233	3,240	3,900	2,677	2,028	329	33	38
		S. of Mayfield Rd.....	979	1,420	1,700	1,139	886	172	13	23
		N. of Cedar Rd.....	797	1,160	1,400	930	774	173	15	12

¹¹ Turney Road being paved but passable and open to traffic.
¹² Traffic on Warrensville Center Road between Mayfield and Kinsman Roads was abnormally low because of condition of roadway, parts of which were practically impassable.

HIGHWAY PLANNING REPORT
(1. Cuyahoga County—Continued)

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
Warrensville Ctr. 12		S. of Cedar Rd.	512	740	890	589	493	112	10	8
		N. of So. Woodland Rd.	321	460	560	452	289	36	1	7
		S. of So. Woodland Rd.	289	420	500	407	260	31	3	5
		N. of Norwood Rd.	611	890	1,100	678	581	108	9	9
		S. of Norwood Rd.	3,923	5,690	6,800	4,946	3,611	447	49	37
		N. of Miles Ave.	4,635	6,720	8,000	10,544	3,506	464	55	32
		S. of Miles Ave.	4,065	5,890	7,000	9,259	3,000	300	50	30
		N. of Libby Rd.	3,438	4,980	5,900	5,177	3,026	387	34	32
		S. of Libby Rd.	3,306	4,790	5,700	5,028	2,906	341	30	28
		N. of Broadway.	3,300	4,780	5,700	6,033	2,738	479	32	22
		S. E. of Coventry Rd.	2,064	2,990	3,600	1,891	1,973	117	10	13
Washington Blvd.		W. of State St.	3,401	4,930	5,900	7,404	2,527	261	24	4
Washington St. (Chagrin Falls)		N. of Albion Rd.	75	110	130	121	66	12	1	
Webster		S. of Albion Rd.	59	90	100	91	54	12	1	
West Rd. (Berea)		E. of Fair Rd.	1,741	2,520	3,000	2,779	1,472	191	17	8
		W. of Fair Rd.	324	470	560	511	278	44	2	1
West Blvd.		N. of Lorain Ave.	6,192	8,980	10,700	7,826	5,761	115	*	*
		S. of Lorain Ave.	4,027	5,840	7,000	5,032	3,759	135	*	*
West Lake Rd.	2	W. of Detroit Rd.	9,301	13,490	16,100	15,017	7,285	874	*	*
	2	E. of Clague Rd.	5,429	7,870	9,400	9,849	4,073	469	17	18
	2	W. of Clague Rd.	5,444	7,890	9,400	10,048	4,140	508	17	19
	2	E. of Dover Center Rd.	4,603	6,670	8,000	8,802	3,465	329	13	14
	2	W. of Dover Center Rd.	4,542	6,590	7,900	8,664	3,422	335	13	14
	2	E. of Bradley Rd.	3,371	4,890	5,800	6,371	2,553	285	10	12
	2	W. of Bradley Rd.	3,337	4,840	5,800	6,299	2,529	288	10	12
West 25th St.	3-94-176	S. of Detroit Ave.	21,696	31,460	37,500	16,862	21,647	2,273	*	*
	U. S. 42	N. of Lorain Ave.	11,186	16,220	19,400	10,889	10,792	1,128	*	*
	3-94-176	S. of Lorain Ave.	6,639	9,630	11,500	7,231	6,277	618	*	*
	U. S. 42	N. of Denison Ave.	21,942	31,820	38,000	23,533	20,620	2,244	*	*
	3-94-176	S. of Denison Ave.	21,018	30,480	36,400	23,218	19,643	2,119	*	*
West 25th St. (Pearl Rd.)	U. S. 42	N. E. of Broadview Rd.	24,920	36,130	43,100	26,270	23,517	2,929	*	*
	3-94-176	S. W. of Broadview Rd.	19,585	28,400	33,900	20,475	18,870	2,698	*	*
	U. S. 42	N. of Franklin Ave.	3,357	4,870	5,800	3,249	3,298	445	*	*
	3-94-176	S. of Franklin Ave.	1,695	2,460	2,900	1,546	1,564	204	*	*
West 73rd St.	U. S. 42	N. of Denison Ave.	3,218	4,670	5,600	3,820	3,074	422	*	*
	3-94-176	S. of Denison Ave.	5,628	8,160	9,700	8,293	5,173	826	*	*
West 101st St.	U. S. 42	N. of Lorain Ave.	1,782	2,580	3,100	2,031	1,707	265	*	*
West 130th St.	U. S. 42	N. of Brook Park Rd.	2,002	2,900	3,500	3,492	1,652	272	34	31
West 199th St. (Wooster Rd.)	U. S. 42	S. of Center Ridge Rd.	1,883	2,730	3,300	3,418	1,512	224	6	5
	3-94-176	N. of Lorain Rd.	2,192	3,180	3,800	3,066	1,939	187	5	4
White		E. of Chardon Rd.	191	280	330	522	123	22		
Whitney		E. of East Rd. (Berea)	81	120	140	162	64	7		
Willis St. (Bedford)		S. of Broadway.	390	570	680	772	341	55	2	1
Wiltshire		E. of State Rd.	32	50	60	55	28	4		
Wilson Mills		W. of Bishop Rd.	818	1,190	1,400	1,597	640	116	10	3
		E. of Ford Rd.	911	1,320	1,600	1,986	680	118	10	3
		W. of S. O. M. Ctr. Rd.	1,068	1,550	1,800	2,390	783	105	17	12
		E. of S. O. M. Ctr. Rd.	753	1,090	1,300	1,658	559	92	12	6
		S. W. of Chagrin Falls Rd.	532	770	920	964	429	65	3	1
Woodhill		N. of Buckeye Rd.	10,718	15,540	18,500	11,063	10,448	1,436	*	*
		S. of Buckeye Rd.	12,101	17,550	20,900	12,618	11,767	1,455	*	*
Woodland Ave.		W. of East 55th St.	22,014	31,920	38,100	18,654	21,442	3,947	*	*
		E. of East 55th St.	13,803	20,010	23,900	11,704	13,673	2,701	*	*
		W. of Buckeye Rd.	17,480	25,350	30,200	15,436	17,162	2,662	*	*
		E. of Buckeye Rd.	6,804	9,870	11,800	5,791	6,734	1,308	*	*
Woodland Ave., (Larchmere)		W. of No. Morland Blvd.	5,402	7,830	9,300	4,881	5,468	915	80	99
		E. of No. Morland Blvd.	2,048	2,970	3,500	2,405	1,974	341	30	37
Woodstock	U. S. 42	N. of Cedar Rd.	371	540	640	694	301	40	2	1
Wooster Pike	U. S. 42	N. E. of Brook Park Rd.	9,485	13,750	16,400	13,222	8,630	1,355	105	95
	U. S. 42	S. W. of Brook Park Rd.	8,813	12,780	15,200	12,344	8,003	1,205	100	90
	U. S. 42	N. E. of Ridge Rd.	8,567	12,420	14,800	11,875	7,811	1,283	100	90
	U. S. 42	S. W. of Ridge Rd.	5,802	8,410	10,000	9,186	5,100	843	85	60
	U. S. 42	N. E. of York Rd.	4,463	6,470	7,700	6,961	3,843	608	90	28
	U. S. 42	S. W. of York Rd.	3,684	5,340	6,400	5,710	3,182	533	86	24
	U. S. 42	N. E. of Settlement Rd.	3,714	5,380	6,400	6,682	2,730	431	60	30
	U. S. 42	S. W. of Settlement Rd.	4,392	6,370	7,600	10,353	3,202	464	60	32
	U. S. 42	N. E. of Pleasant Valley Rd.	4,114	5,960	7,100	9,404	3,059	571	50	33
	U. S. 42	S. W. of Pleasant Valley Rd.	4,276	6,200	7,400	9,804	3,174	581	51	33
	U. S. 42	N. E. of Fowles Rd.	3,507	5,080	6,100	7,924	2,626	529	46	24
	U. S. 42	S. W. of Fowles Rd.	3,535	5,130	6,100	8,099	2,629	536	47	25
	U. S. 42	N. of Royalton Rd.	3,515	5,100	6,100	7,728	2,658	455	35	25
	U. S. 42	S. of Royalton Rd.	3,136	4,550	5,400	6,930	2,367	407	32	21

APPENDIX

(1. Cuyahoga County—Continued)

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
Wooster Rd.....	U. S. 20	N. of Center Ridge Rd.....	3,698	5,360	6,400	6,600	2,994	511	36	25
York.....		S. of Wooster Pike.....	1,245	1,800	2,200	1,913	1,006	114	5	5
		N. of Albion Rd.....	641	930	1,100	2,141	344	43	2	1
		S. of Albion Rd.....	559	810	970	1,856	301	40	2	1
		N. of Royalton Rd.....	326	470	560	1,006	193	53	2	1
		S. of Royalton Rd.....	166	240	290	464	116	31	1	1

2. Geauga County

Road	Route No.	Location of Station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
	44	N. of U. S. Route 322.....	490	550	570	853	399	70	3	1
	44	S. of U. S. Route 322.....	126	140	150	217	103	19	1	
	44	N. of U. S. Route 422.....	100	110	120	135	86	10		
	44	S. of U. S. Route 422.....	456	510	530	949	340	58		
	87	W. of Chillicothe Road.....	1,092	1,220	1,300	2,580	783	135	12	4
	87	E. of Chillicothe Rd.....	763	860	890	1,775	550	104	9	3
	87	W. of Chardon-Auburn Ctr. Rd.....	719	800	840	1,811	497	103	9	3
	87	E. of Chardon-Auburn Ctr. Rd.....	774	870	910	1,743	565	111	10	3
	88	N. of U. S. Route 422.....	610	680	710	964	499	90	4	1
	88	S. W. of U. S. Route 422.....	270	300	320	549	199	55	2	1
	U. S. 322	W. of Chillicothe Road.....	1,070	1,200	1,300	1,828	884	137	12	4
	U. S. 322	E. of Chillicothe Road.....	1,023	1,150	1,200	1,729	840	138	12	4
	U. S. 322	W. of Route 44.....	575	640	670	975	474	101	9	3
	U. S. 322	E. of Route 44.....	627	700	730	1,036	524	134	12	4
	U. S. 422	W. of Route 44.....	2,489	2,790	2,900	4,762	1,954	187	16	5
	U. S. 422	E. of Route 44.....	2,408	2,700	2,800	4,557	1,899	198	17	5
	U. S. 422	W. of Route 88.....	2,265	2,540	2,600	4,448	1,764	187	16	5
	U. S. 422	E. of Route 88.....	2,350	2,630	2,800	4,599	1,827	161	14	4
Bainbridge-Solon.....		E. of Chagrin River Rd.....	151	170	180	336	116	27	1	
		W. of Chagrin River Rd.....	28	30	30	67	21	4		
Chagrin Falls-Bainbridge.....		N. W. of Chillicothe Rd.....	265	300	310	665	193	18	1	
		E. of Chillicothe Rd.....	111	120	130	226	97	38	2	
Chagrin River.....		N. of Bainbridge Rd.....	152	170	180	332	118	30	1	
Chardon-Auburn Ctr.....		N. of Route 87.....	189	180	180	263	130	30	1	
		S. of Route 87.....	189	210	220	265	163	34	1	
Chillicothe.....		N. of U. S. Route 322.....	832	930	970	1,464	703	105	9	3
		S. of U. S. Route 322.....	531	600	620	898	445	81	3	1
		N. of Route 87.....	524	590	610	1,259	375	59	2	1
		S. of Route 87.....	161	180	190	412	113	11		
		N. of Chagrin Falls-Bainbridge Rd.....	50	60	60	114	39	11		
		S. of Chagrin Falls-Bainbridge Rd.....	337	380	390	791	262	55	2	1
Parkman-Nelson.....		S. of Route 88.....	100	110	120	140	83	24	1	

HIGHWAY PLANNING REPORT

3. Lake County

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
	U. S. 20	S. W. of Route 91.....	7,646	9,100	10,500	13,148	6,627	753	39	27
	U. S. 20	N. E. of Route 91.....	7,923	9,430	10,900	12,882	6,886	764	42	26
	U. S. 20	S. W. of Center St. (Mentor).....	8,088	9,620	11,100	13,336	6,989	647	36	23
	U. S. 20	N. E. of Center St. (Mentor).....	9,227	10,980	12,600	15,237	7,967	725	40	25
	U. S. 20	W. of Township Park Rd.....	5,297	6,300	7,300	8,678	4,591	487	42	13
	U. S. 20	E. of Township Park Rd.....	4,736	5,640	6,500	7,764	4,102	428	37	12
	44	N. of Concord-Hambden Rd.....	961	1,140	1,300	1,574	800	63	3	1
	44	S. of Concord-Hambden Rd.....	912	1,080	1,200	1,493	758	59	2	1
	84	W. of Riverside Drive.....	2,928	3,480	4,000	4,810	2,543	287	25	8
	84	E. of Riverside Drive.....	2,521	3,000	3,500	4,147	2,189	242	21	7
	85	W. of Bishop Road.....	1,058	1,260	1,400	3,084	677	87	4	3
	85	E. of Bishop Road.....	988	1,180	1,400	3,176	585	84	4	3
	85	W. of Route 91.....	1,022	1,220	1,400	3,315	596	69	3	2
	85	E. of Route 91.....	1,283	1,530	1,700	4,160	740	83	3	2
	85	W. of Chillicothe Rd.....	921	1,100	1,300	2,368	630	72	3	1
	85	E. of Chillicothe Rd.....	827	980	1,100	2,080	575	73	3	1
	86	N. W. of Bank St. (Painesville).....	1,154	1,370	1,600	1,726	991	193	17	5
	86	S. E. of Bank St. (Painesville).....	966	1,150	1,300	1,469	826	145	13	4
	91	S. of U. S. Route 20.....	1,285	1,530	1,700	3,285	876	100	3	1
	91	N. of Route 85.....	1,499	1,780	2,100	4,056	1,015	57	2	1
	91	S. of Route 85.....	1,514	1,800	2,100	4,099	1,027	61	3	1
	175	S. W. of Vine St.....	5,142	6,120	7,000	11,054	3,905	255	13	7
	175	N. E. of Vine St.....	3,041	3,620	4,200	6,751	2,349	125	6	4
	175	S. W. of Lost Nation Rd.....	1,913	2,280	2,600	3,430	1,573	92	5	3
	175	N. E. of Lost Nation Rd.....	2,542	3,020	3,500	4,577	2,086	111	5	3
Bank St. (Painesville).....		N. E. of Route 86.....	93	110	130	148	79	10		
		S. W. of Route 86.....	320	380	440	473	275	2	1	
Bishop.....		S. of Route 85.....	709	840	970	1,907	456	57	2	2
Center St. (Mentor).....		N. of U. S. Route 20.....	1,281	1,520	1,700	2,061	1,118	144	13	4
		S. of U. S. Route 20.....	1,247	1,480	1,700	2,038	1,081	121	11	3
Chillicothe.....		N. of Willoughby-Kirtland-Chardon Rd.....	1,250	1,490	1,700	2,006	1,048	109	9	3
		S. of Willoughby-Kirtland-Chardon Rd.....	1,593	1,900	2,200	2,500	1,345	160	14	4
		N. of Route 85.....	1,074	1,280	1,500	2,831	755	73	3	1
		S. of Route 85.....	808	960	1,100	2,142	563	57	2	1
Concord-Hambden.....		E. of Route 44.....	89	110	120	145	73	6		
		W. of Route 44.....	14	20	20	21	12	2		
French.....		N. of Route 85.....	912	1,080	1,200	2,259	616	83	3	3
Lloyd.....		N. W. of St. Clair Ave.....	1,320	1,570	1,800	2,314	1,077	147	13	10
		S. E. of St. Clair Ave.....	1,462	1,740	2,000	2,451	1,230	207	18	14
Lost Nation.....		S. of Route 175.....	1,648	1,960	2,300	2,936	1,359	101	5	3
Riverside Drive (Painesville).....		S. of Route 84.....	481	570	660	785	418	52	2	1
St. Clair Ave.....		W. of Lloyd Rd.....	447	530	610	808	368	107	9	7
		E. of Lloyd Rd.....	297	350	410	413	254	34	1	2
Township Park (Painesville).....		N. of U. S. Route 20.....	832	990	1,100	1,361	720	78	3	1
Vine St.....		E. of Route 175.....	2,429	2,890	3,300	4,786	2,043	160	8	5
Willoughby - Kirtland-Chardon.....		N. W. of Chillicothe Rd.....	1,120	1,330	1,500	1,746	947	119	10	3
		S. E. of Chillicothe Rd.....	294	350	400	454	249	34	1	

APPENDIX

4. Lorain County

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
	2	E. of Lakebreeze Rd.	2,718	3,780	4,300	5,096	2,156	266	10	11
	2	W. of Lakebreeze Rd.	2,661	3,700	4,200	5,126	2,090	271	10	11
	U. S. 20	E. of Belden-Avon Rd.	4,649	6,460	7,300	6,663	4,056	583	38	14
	U. S. 20	W. of Belden-Avon Rd.	4,733	6,580	7,500	6,809	4,097	600	40	19
	U. S. 20	N. of Lagrange Rd.	4,786	6,650	7,600	7,001	4,109	491	60	14
	U. S. 20	S. W. of Lagrange Rd.	3,888	5,400	6,100	5,665	3,345	425	50	12
	57	N. of North Ridge Rd.	3,257	4,530	5,200	5,659	2,640	276	18	3
	57	S. E. of North Ridge Rd.	2,457	3,420	3,900	4,280	1,989	204	13	2
	57	N. W. of Elyria Ave.	2,065	2,870	3,300	3,649	1,664	152	10	2
	57	S. E. of Elyria Ave.	3,683	5,120	5,800	4,990	3,209	327	24	4
	57	N. W. of Indian Hollow Rd.	2,136	2,970	3,400	3,170	1,814	139	11	3
	57	S. E. of Indian Hollow Rd.	1,718	2,390	2,700	2,538	1,462	118	10	3
	57	N. of Belden-Lagrange Rd.	586	820	930	1,194	482	76	3	1
	57	E. of Belden-Avon Rd.	387	540	610	779	321	52	2	.....
	59	W. of Leavitt Rd.	1,098	1,530	1,700	1,423	976	154	7	2
	82	E. of Route 252.	945	1,310	1,500	1,224	841	134	5	2
	82	W. of Route 252.	488	680	770	841	430	75	3	1
	82	E. of Belden-Avon Rd.	523	730	830	920	456	68	3	1
	82	W. of Belden-Avon Rd.	460	640	730	710	419	70	3	1
	82	W. of Belden-Avon Rd.	479	670	760	744	436	70	3	1
	252	N. of Route 82.	140	200	220	236	124	21	1	.....
	252	S. of Route 82.	165	230	260	279	147	29	1	.....
	254	E. of French Creek Rd.	1,851	2,570	2,900	3,324	1,540	274	11	4
	254	S. W. of French Creek Rd.	992	1,380	1,600	1,822	822	138	6	1
Belden-Avon.....		N. of Walker Rd.	384	530	610	485	347	81	1	1
		S. of Walker Rd.	416	580	660	539	377	90	1	1
		N. of U. S. Route 20.	497	690	780	678	468	113	2	2
		S. of U. S. Route 20.	541	750	860	826	493	98	5	3
		N. of Route 82.	168	230	270	255	156	29	1	.....
		S. of Route 82.	169	240	270	246	157	37	1	.....
		S. of Route 57.	419	580	660	794	358	76	3	1
Belden-Lagrange.....		W. of Belden-Avon Rd.	161	220	250	269	146	46	2	.....
Broadway.....		S. of North Ridge Rd.	329	460	520	557	270	39	.....	.....
Butternut Ridge.....		N. E. of Root Road.	957	1,330	1,500	1,497	865	141	12	5
		S. W. of Root Road.	740	1,030	1,200	1,153	669	112	10	4
Elyria Ave.....		N. of Route 57.	1,885	2,620	3,000	2,375	1,674	212	14	2
French Creek.....		W. of Route 254.	1,034	1,440	1,600	1,833	856	150	5	2
Indian Hollow.....		S. of Route 57.	425	590	670	637	359	25	1	.....
Lagrange.....		S. of U. S. Route 20.	1,085	1,510	1,700	1,604	925	87	10	2
Lakebreeze.....		S. of Route 2 (Sheffield).	282	390	450	346	253	38	.....	.....
Leavitt.....		N. of Route 59.	700	970	1,100	944	610	64	3	1
		S. of Route 59.	483	670	760	643	425	54	2	1
North Ridge.....		S. W. of Route 57.	1,781	2,480	2,800	3,098	1,444	129	5	1
Root.....		N. W. of Butternut Ridge Rd.	449	620	710	702	407	61	3	1
		S. E. of Butternut Ridge Rd.	234	320	370	350	216	48	2	1
		E. of Belden-Avon Rd.	150	210	240	175	132	26	.....	.....
Walker.....		W. of Belden-Avon Rd.	81	110	130	92	75	26	.....	.....

HIGHWAY PLANNING REPORT

5. Medina County

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
	3	N. of Belden-Hudson Rd. . .	354	390	400	319	350	82	3	1
	3-94	S. of Belden-Hudson Rd. . .	397	440	450	807	316	69	3	1
	3	N. of Center Medina Co. Rd. .	368	400	420	791	281	39	2	.....
	3	S. of Center Medina Co. Rd. .	317	350	360	682	247	37	2	.....
	3	S. of U. S. Route 42.	3,330	3,660	3,800	7,094	2,555	343	30	9
	3	N. of Chippewa Lake Rd. . . .	1,944	2,140	2,200	4,131	1,495	208	18	6
	3	S. of Chippewa Lake Rd. . . .	1,714	1,880	1,900	3,667	1,327	185	16	5
	18	E. of Route 94.	1,685	1,850	1,900	3,171	1,332	144	13	4
	18	W. of Route 94.	1,607	1,770	1,800	3,013	1,268	139	12	4
	18-57	S. E. of Route 253.	1,403	1,540	1,600	2,688	1,109	110	10	3
	18	W. of Jct. with Rt. 253.	1,475	1,620	1,700	2,828	1,169	112	10	3
	U. S. 42	N. of Belden-Hudson Rd. . . .	2,746	3,020	3,100	6,061	2,078	348	30	15
	U. S. 42	S. of Belden-Hudson Rd. . . .	2,713	2,980	3,100	5,626	2,122	357	31	15
	U. S. 42-3	N. of Route 57.	4,490	4,940	5,100	9,673	3,429	411	36	11
	U. S. 42	S. W. of Route 3.	1,984	2,180	2,200	4,272	1,516	183	16	5
	57	W. of Route 252.	73	80	80	143	60	10	.....	.....
	57	S. of Speith Rd.	117	130	130	220	97	18	.....	.....
	57	S. E. of U. S. Route 42.	951	1,050	1,100	2,010	733	106	9	3
	94	E. of Jct. with Rt. 3.	494	540	560	935	407	94	4	1
	94	N. of Route 18.	440	480	500	914	351	64	3	1
	94	S. of Route 18.	444	490	500	938	355	61	3	1
	252	N. of Abbeyville-Valley City Road.	115	130	130	212	95	14	1	.....
	252	S. of Abbeyville-Valley City Road.	41	40	50	81	34	6	.....	.....
	252	N. of Speith Rd.	62	70	70	116	52	12	1	.....
	253	E. of Route 18.	120	130	140	231	110	12	1	.....
Abbeyville-Valley City.		S. E. of Route 252.	85	90	100	154	72	12	1	.....
Belden-Hudson.		W. of Station Rd.	258	280	290	492	215	48	2	.....
		E. of Station Rd.	336	370	380	639	277	58	2	1
		W. of U. S. Route 42.	569	630	640	1,053	466	111	5	1
		E. of U. S. Route 42.	367	400	420	603	311	76	3	1
		W. of Route 3.	308	340	350	655	241	55	2	1
Boston.		E. of Bennett Rd.	99	110	110	197	80	16	1	.....
		W. of Bennett Rd.	14	20	20	28	11	2	.....	.....
Center Medina Co.		W. of Route 3.	98	110	110	199	74	12	1	.....
Chippewa Lake.		W. of Route 3.	567	620	640	1,235	433	55	2	1
Hunt.		S. of Bennett Rd.	311	340	350	617	247	48	2	1
Speith.		E. of Route 57.	60	70	70	114	49	7	.....	.....
Station.		N. of Belden-Hudson Rd. . . .	75	80	80	147	62	12	1	.....
		S. of Belden-Hudson Rd. . . .	95	100	110	183	80	18	1	.....

6. Portage County

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
	14	S. E. of Route 36.	824	1,020	1,100	1,389	699	85	4	1
	18	E. of Route 44.	1,795	2,230	2,500	3,506	1,393	190	17	5
	18	W. of Route 44.	2,273	2,820	3,100	4,813	1,698	169	15	5
	36	N. E. of Riddle Rd.	1,617	2,000	2,200	3,142	1,294	103	9	3
	36-14	W. of Riddle Rd.	2,358	2,920	3,300	4,223	1,952	196	17	5
	36	E. of Brady Lake Rd.	2,427	3,010	3,300	4,364	2,007	210	18	6
	36	W. of Brady Lake Rd.	2,403	2,980	3,300	4,089	2,024	211	18	6
	43	N. W. of Route 82.	1,488	1,840	2,100	3,907	1,028	167	15	5
	43	S. of Route 82.	684	850	940	1,812	474	76	3	1
	43	N. of Kent-Mantua Rd.	1,061	1,320	1,500	1,544	945	148	13	4
	43	S. of Kent-Mantua Rd.	1,493	1,850	2,100	2,225	1,354	204	18	6
	44	N. of Route 82.	679	840	940	1,453	498	63	3	1
	44	S. of Route 82.	1,269	1,570	1,700	2,770	961	138	12	4
	44	N. of Route 18.	2,040	2,530	2,800	3,346	1,731	185	16	5
	44	S. of Route 18.	1,597	1,980	2,200	3,117	1,274	167	15	5
	44	E. of Route 44.	773	960	1,100	1,665	599	108	9	3
	82	W. of Route 44.	1,047	1,300	1,400	2,280	797	121	11	3
	82	E. of Route 43.	982	1,220	1,400	2,473	679	135	12	4
	82	W. of Route 43.	7	10	10	8	6	1	.....	.....
Brady Lake Entrance.		S. of Kent-Ravenna Co. Rd. . .	180	220	250	322	150	14	1	.....
Brady Lake Road.		N. of Route 36.	270	340	370	519	218	10	.....	.....
Kent-Mantua Rd.		N. E. of Route 43.	437	540	600	682	415	62	3	1
Kent-Ravenna Co. Rd.		E. of Brady Lake Entrance. . .	1,362	1,690	1,900	2,067	1,186	109	9	3
		W. of Brady Lake Entrance. . .	1,474	1,830	2,000	2,245	1,280	113	10	3
Riddle.		E. of Route 14.	104	130	140	134	94	10	.....	.....

APPENDIX

7. Summit County

Road	Route No.	Location of station	Average daily total traffic			Average Sunday traffic 1927	Average week-day traffic (Monday-Friday)—1927			
			1927	1932	1937		Total traffic	Truck traffic		
								Total	3-4 tons capacity	5-7½ tons capacity
	8	S. of Sagamore Rd.	3,828	5,550	6,600	7,474	3,150	324	26	16
	8	N. of Route 82	3,494	5,170	6,500	6,304	2,964	332	29	11
	8	S. E. of Route 82	3,237	4,790	6,000	5,823	2,736	278	24	9
	8	N. of Belden-Hudson Rd.	3,081	4,560	5,700	6,006	2,539	280	29	9
	8	S. of Belden-Hudson Rd.	3,354	4,960	6,200	6,563	2,756	297	32	11
	8	N. of Kelso Rd.	4,687	6,940	8,700	9,297	3,836	445	35	12
	8	S. of Kelso Rd.	4,789	7,090	8,900	9,496	3,922	459	40	12
	8	N. W. of Stow Corners-Springfield Rd.	5,759	8,520	10,700	7,393	5,303	612	53	17
	8	S. E. of Stow Corners-Springfield Rd.	7,218	10,680	13,400	9,315	6,640	746	65	20
	14	S. E. of Laing Rd.	1,847	2,680	3,200	3,292	1,528	146	11	6
	14	N. W. of Route 91	2,279	3,370	4,200	4,005	1,898	223	19	6
	14-82	E. of Route 91	587	870	1,100	788	532	108	9	3
	17	E. of South Main St.	2,465	3,650	4,600	3,125	2,223	251	22	7
	17	W. of South Main St.	4,760	7,040	8,800	6,184	4,365	408	35	11
	18	W. of U. S. Route 21	2,048	3,030	3,800	4,073	1,756	234	20	6
	18	E. of U. S. Route 21	2,278	3,370	4,200	4,366	1,980	233	20	6
	18	W. of Route 92	2,469	3,650	4,600	4,417	1,998	238	21	6
	18	E. of Route 92	4,860	7,190	9,000	8,192	4,020	494	43	13
	18	S. W. of Cuyahoga Falls-Brittain Rd.	1,679	2,480	3,100	1,983	1,511	139	12	4
	18	N. E. of Cuyahoga Falls-Brittain Rd.	2,583	3,820	4,800	3,253	2,278	212	18	6
	18	W. of Mogadore-Monroe Falls Rd.	3,074	4,550	5,700	3,868	2,714	260	23	7
	18	E. of Mogadore-Monroe Falls Rd.	2,872	4,250	5,300	3,604	2,526	239	21	6
	U. S. 21	N. of Route 176	1,153	1,710	2,100	2,351	866	104	7	4
	U. S. 21	S. of Route 176	2,634	3,900	4,900	6,042	1,971	179	22	4
	U. S. 21	N. of Route 18	1,178	1,740	2,200	2,432	905	84	4	1
	U. S. 21	S. of Route 18	1,717	2,540	3,200	3,681	1,296	132	11	4
	36	E. of Route 91	4,233	6,260	7,800	8,213	3,407	404	35	11
	36	W. of Route 91	5,432	8,040	10,000	10,656	4,321	416	36	11
	82	W. of Route 91	260	380	480	418	226	56	2	1
	82	E. of Route 8	836	1,240	1,500	1,408	675	96	4	2
	82	W. of Route 8	619	920	1,100	1,046	500	66	3	1
	91	N. of Route 82	1,011	1,500	1,900	2,008	801	70	3	1
	91	S. of Route 82	2,550	3,770	4,700	4,961	2,039	203	18	5
	91	N. of Route 36	3,480	5,150	6,400	6,794	2,805	296	26	8
	92	N. of Route 18	2,463	3,640	4,600	3,896	2,082	281	24	8
	176	N. W. of U. S. Route 21	1,656	2,450	3,100	3,826	1,233	113	16	1
Belden-Hudson		E. of Route 8	872	1,290	1,600	2,135	645	71	4	6
		W. of Route 8	627	930	1,200	1,295	504	52	2	1
Cuyahoga Falls-Brimfield		E. of Cuyahoga Falls-Brittain Rd.	44	60	80	43	42	8		
		W. of Cuyahoga Falls-Brittain Rd.	11	20	20	7	7	1		
Cuyahoga Falls-Brittain		N. of Cuyahoga Falls-Brimfield Rd.	65	100	120	68	62	5		
		S. of Cuyahoga Falls-Brimfield Rd.	183	270	340	182	172	20	1	
		N. of Route 18	591	880	1,100	600	556	50	2	
		S. of Route 18	893	1,320	1,700	885	844	71	3	1
Cuyahoga Falls-Mogadore		N. W. of Cuyahoga Falls-Brittain Rd.	1,974	2,920	3,700	2,628	1,795	126	11	3
		S. E. of Cuyahoga Falls-Brittain Rd.	1,715	2,540	3,200	2,258	1,154	120	10	3
E. Akron-Brimfield		E. of Stow Corners-Springfield Rd.	157	230	290	204	143	12	1	
		W. of Stow Corners-Springfield Rd.	2,135	3,160	4,000	2,772	1,908	158	14	4
Hudson-Cleveland		S. of Cuyahoga Co. Line	143	210	250	388	97	9		
Kelso		E. of Route 8	152	220	280	298	125	17	1	
Mogadore-Monroe Falls		N. of Route 18	225	330	420	222	214	32	1	
		S. of Route 18	63	90	120	58	55	6		
Northfield-Brandywine		S. of Route 82	282	420	520	477	229	30	1	
Old Forge-Brimfield		E. of Route 18	59	90	110	27	61	6		
		W. of Route 18	1,805	2,670	3,300	1,862	1,707	214	19	6
South Main St.		N. of Route 17	8,209	12,150	15,200	10,728	7,443	563	49	15
		S. of Route 17	5,217	7,720	9,700	6,763	4,642	279	24	8
Stow Corners-Springfield		S. of Route 36	2,693	3,990	5,000	5,118	2,163	279	24	8
		N. of E. Akron-Brimfield Rd.	3,193	4,730	5,900	4,192	2,867	231	20	7
Stow Corners-Springfield		S. of E. Akron-Brimfield Rd.	3,217	4,760	6,000	4,221	2,905	256	22	7
Wayne Avenue		N. of Route 8	2,038	3,020	3,800	2,646	1,858	202	18	5
		E. of Stow Corners-Springfield Rd.	84	120	160	111	77	7		

APPENDIX II

Origin and Destination of Traffic Recorded on Euclid Avenue at Chardon Road
(Average Week-day Passenger Car Traffic)

Section	Cleveland Section 18	Euclid Vil.	Richmond Hgts. Vil.	Lake County	North Geauga County	Counties East of Lake County	Counties S. E. of Reg. Area	States East of Ohio	States South of Ohio	Total
Cleveland Section 1 ¹		265		764	100	113	4	252	9	1,507
Cleveland Section 2		17		48	9			9		83
Cleveland Section 3		39		82	13	9				143
Cleveland Section 4		139	9	235	52	34		26		495
Cleveland Section 5		31		22	13			4		70
Cleveland Section 6		13		4						17
Cleveland Section 7		44		61	30	13				148
Cleveland Section 8		56	4	96	22	13		9		200
Cleveland Section 9		91	4	227	26	22	4	13		387
Cleveland Section 10		30		35	9			9		83
Cleveland Section 11		57		61	13	13				144
Cleveland Section 12		126	9	161	34	9		9		348
Cleveland Section 13		52		82	13	9		4		160
Cleveland Section 14		179		313	39	4		9		544
Cleveland Section 15		44		18	4			4		70
Cleveland Section 16				22	4					26
Cleveland Section 17		13		9		4				26
Cleveland Section 18		525		356	144	22		4		1,051
Cleveland Section 19		17		18	9					44
Cleveland Section 20		13		13						26
Cleveland Section 21		5		22		4				31
Cleveland Section 22		35		65	13	4		13		130
Cleveland Section 23		22		35	4	9				70
Cleveland Section 24		17		18		4				39
Cleveland Heights 25		65		96	17	9		9		196
Cleveland Heights 26		169		178	13	26		22		408
Bay Village				4						4
Beachwood Village		9								9
Bedford Village		4		9						13
Berea Village		4								4
Bratenahl Village		4		5						9
Chagrin Falls Village		4								4
Chagrin Falls Twp.		4								4
Dover Village		4								4
East Cleveland, City of		287								4
Euclid Village		313		491	79	26		13		896
Fairview Village				4						4
Garfield Hgts. Vil.		13		9		4				26
Gates Mills Vil.	5	8								13
Highland Hgts. Vil.	4									4
Hunting Valley Vil.				4						4
Independence Vil.		4								4
Lakewood, City of		47		61	9	9		4		130
Lyndhurst Vil.	9	22								31
Maple Hgts. Vil.	4			13				5		22
Mayfield Vil.	9	4								13
Mayfield Hgts. Vil.	5	4								9
North Randall Vil.				4						4
Parma Vil.		5		4						9
Richmond Hgts. Vil.	4	17	5							26
Rocky River Vil.		13	4	13						30
Shaker Hgts. Vil.		39	9	43				13		104
South Euclid Vil.		13		9	4	4				30
University Hgts. Vil.		13		9						22
Warrensville Hgts. Vil.	4	5								9
Warrensville Twp.				9						9
Geauga County—South	4									4
Portage County (Akron & Vicinity)	5									5
Summit County				13		8		9		30
Medina County		9		17		4		5		35
Lorain County—North		4		18						22
Lorain County—South		5		9	4	4		4	9	35
Counties S. E. of Reg. Area		5		18				44		5
Counties S. W. of Reg. Area		5		13		13		52		78
Counties W. of Reg. Area				17		13		222		252
States West of Ohio										
Total	53	2,932	44	3,837	677	410	8	767	18	8,746

¹ For description of Cleveland and Cleveland Heights Sections, see App. Fig. 1.

APPENDIX III

Comparison of Population and the Number of Motor Vehicles in the Counties of the Cleveland Regional Area 1. Cuyahoga County

Year	Registration of motor vehicles		Population	Persons per car	
	Actual	Estimated		Actual	Estimated
1920.....	92,678	86,140	943,495	10.18	10.95
1921.....	109,154	109,320	985,000	9.02	9.01
1922.....	129,672	134,500	1,024,000	7.90	7.61
1923.....	164,334	161,100	1,065,000	6.48	6.61
1924.....	197,106	188,500	1,104,650	5.60	5.86
1925.....	216,474	216,100	1,135,750	5.25	5.26
1926.....	242,714	243,380	1,171,950	4.83	4.82
1927.....	262,973 ¹	269,940	1,213,975	4.78	4.50
1932.....	.....	382,180	1,453,700	.....	3.80
1937.....	.....	454,570	1,716,900	.....	3.78

2. Geauga County

Year	Registration of motor vehicles		Population	Persons per car	
	Actual	Estimated		Actual	Estimated
1920.....	1,589	1,473	15,036	9.46	10.21
1921.....	1,897	1,979	15,088	7.95	7.62
1922.....	2,515	2,528	15,138	6.02	5.99
1923.....	3,265	3,096	15,190	4.65	4.91
1924.....	3,921	3,663	15,240	3.89	4.16
1925.....	4,131	4,211	15,290	3.70	3.63
1926.....	4,586	4,727	15,335	3.34	3.24
1927.....	5,076 ¹	5,202	15,375	3.03	2.96
1932.....	.....	5,550	15,570	.....	2.81
1937.....	.....	5,930	15,720	.....	2.65

3. Lake County

Year	Registration of motor vehicles		Population	Persons per car	
	Actual	Estimated		Actual	Estimated
1920.....	3,663	3,302	28,667	7.83	8.68
1921.....	5,040	4,752	29,510	5.86	6.21
1922.....	6,022	6,328	30,378	5.04	4.80
1923.....	7,823	7,928	31,272	4.00	3.94
1924.....	9,860	9,465	32,192	3.26	3.40
1925.....	10,922	10,880	33,139	3.03	3.05
1926.....	11,998	12,140	34,114	2.84	2.81
1927.....	12,879 ¹	13,240	35,118	2.73	2.65
1932.....	.....	15,260	40,439	.....	2.65
1937.....	.....	17,680	46,931	.....	2.65

4. Lorain County

Year	Registration of motor vehicles		Population	Persons per car	
	Actual	Estimated		Actual	Estimated
1920.....	8,895	8,031	90,612	10.19	11.28
1921.....	10,588	10,492	92,500	8.74	8.82
1922.....	12,548	13,151	94,250	7.51	7.17
1923.....	16,133	15,916	96,250	5.97	6.05
1924.....	19,572	18,700	98,250	5.02	5.25
1925.....	21,587	21,429	100,125	4.64	4.67
1926.....	24,065	24,040	102,125	4.24	4.25
1927.....	25,718 ¹	26,493	104,000	4.04	3.93
1932.....	.....	35,809	114,750	.....	3.20
1937.....	.....	40,761	128,250	.....	3.15

HIGHWAY PLANNING REPORT

5. Medina County

Year	Registration of motor vehicles		Population	Persons per car	
	Actual	Estimated		Actual	Estimated
1920.....	3,725	3,664	26,067	7.00	7.11
1921.....	5,019	4,899	26,150	5.21	5.34
1922.....	5,908	6,062	26,250	4.44	4.33
1923.....	6,967	7,087	26,360	3.78	3.72
1924.....	8,039	7,948	26,480	3.29	3.33
1925.....	8,489	8,645	26,600	3.13	3.08
1926.....	9,367	9,195	26,740	2.85	2.91
1927.....	9,686 ¹	9,621	26,900	2.78	2.80
1932.....	.....	10,617	28,100	.....	2.65
1937.....	.....	10,836	28,640	.....	2.64

6. Portage County

Year	Registration of motor vehicles		Population	Persons per car	
	Actual	Estimated		Actual	Estimated
1920.....	4,501	4,019	36,269	8.06	9.02
1921.....	5,427	5,308	36,900	6.80	6.95
1922.....	6,501	6,647	37,480	5.77	5.64
1923.....	7,883	7,974	38,050	4.83	4.77
1924.....	9,250	9,238	38,650	4.18	4.18
1925.....	10,234	10,405	39,225	3.83	3.77
1926.....	11,851	11,460	39,800	3.36	3.47
1927.....	12,294 ¹	12,380	40,200	3.27	3.25
1932.....	.....	15,350	43,500	.....	2.83
1937.....	.....	16,940	45,660	.....	2.70

7. Summit County

Year	Registration of motor vehicles		Population	Persons per car	
	Actual	Estimated		Actual	Estimated
1920.....	29,959	28,900	286,065	9.55	9.90
1921.....	30,499	35,000	292,000	9.57	8.34
1922.....	34,855	41,600	298,800	8.57	7.18
1923.....	45,355	48,500	305,600	6.74	6.30
1924.....	54,768	55,400	313,000	5.72	5.65
1925.....	62,816	62,900	320,800	5.11	5.10
1926.....	72,961	70,600	328,200	4.50	4.65
1927.....	79,002 ¹	78,400	336,500	4.26	4.29
1932.....	.....	117,000	387,000	.....	3.31
1937.....	.....	146,000	453,000	.....	3.10

¹Estimated on basis of registrations during first eight months of year. Final registration figures show registrations as follows: Cuyahoga 258,722, Geauga 4,864, Lake 12,897, Lorain 25,500, Medina 9,812, Portage 12,393 and Summit 79,172. The estimated figures were used in predicting future traffic and are in such close agreement with the final figures that no revision is considered necessary.

APPENDIX IV

Detailed Description of the Plan of Highway Improvement in the Regional Area City of Cleveland

Road	From	To	Miles	Plan of Improvement		
				Width (feet)	Type of construction ¹	Period of construction ²
New Routes:						
Brook Park Rd. extension.....	Cleveland city line.....	Cleveland city line.....	0.5	40	A	1
Independence Rd.....	Broadway.....	do.....	2.0	40	A	1
Lake Front Blvd. ³	Main Ave.....	do.....	12.1	40	A	1
Shaker Blvd.....	Pittsburgh Ave.....	Woodhill Rd.....	2.8	40	A	1
Valley—Independence connection....	Independence Rd.....	State Road.....	2.4	40	A	1
Walworth Rd.—Train Ave.....	Scranton Rd.....	W. 61st St. & Clark Ave.....	2.4	40	A	1
W. 14th St. & Jennings Rd.....	W. 14th St.....	Cleveland city line.....	2.3	20	A	1
Total.....			24.5			

¹ A Major type; B. Medium type; C. Minor type.

² 1. Improvement during first 5 years; 2. Improvement during second 5 years.

³ Includes section in the village of Bratenah

Northeast section of Cuyahoga County

New Routes:						
Belvoir Blvd.....	Bluestone Rd.....	Euclid Ave.....	2.0	40	A	1
Lake Front Blvd.—St. Clair Ave. connection.....	City line.....	Bliss Rd.....	0.2	40	A	1
Mayfield Rd.—Superior Ave. connection.....	Mayfield Rd.....	Superior Ave.....	1.8	40	A	1
Belvoir Blvd.—Ivanhoe Rd. connection.....	Belvoir Blvd.....	Euclid Ave.....	1.6	20	A	1
Green Rd. Relocation.....	do.....	Green Rd.....	0.4	20	A	1
Richmond Rd. Extension.....	Richmond Rd.....	Euclid Ave.....	0.8	20	A	1
Total.....			6.8			
Widening:						
Euclid Ave.....	City line.....	County line.....	3.8	56	A	1
Noble Rd.....	Mayfield Rd.....	East Cleveland line.....	1.7	50	A	1
Lee Rd.....	Euclid Ave.....	End of section.....	0.2	40	A	1
Total.....			5.7			
Reconstruction and Widening:						
Coventry Rd.....	End of section.....	Mayfield Rd.....	0.2	40	A	1
Lee Rd.....	do.....	End of section.....	0.2	40	A	1
Green Rd.....	Top of hill.....	Mayfield Rd.....	2.9	20	A	1
Richmond Rd.....	Chardon Rd.....	Cedar Rd.....	5.1	20	A	1
S. O. M. Center Rd.....	County line.....	Mayfield Rd.....	3.4	20	A	1
Total.....			11.8			
New Construction:						
Lee Rd.....	East Cleveland line.....	Mayfield Rd.....	0.5	40	A	1
St. Clair Ave.....	Bliss Rd.....	County line.....	2.6	40	A	1
Green Rd.....	Mayfield Rd.....	Cedar Rd.....	1.3	20	A	1
Highland Rd.....	Euclid Ave.....	End of section.....	0.6	20	A	1
Total.....			5.0			
Grand total.....			29.3			

East-central section of Cuyahoga County

New Routes:						
Brook Park Rd. extension.....	Cleveland city line.....	Lee Rd.....	1.0	40	A	1
Emery Rd.....	Northfield Rd. extension.....	Miles Ave.....	1.0	40	A	1
Northfield Rd. extension.....	McCracken Rd.....	Emery Rd.....	1.2	40	A	1
Chagrin Falls Blvd.....	Gates Mills Blvd.....	Kinsman Rd.....	1.5	40	A	1
So. Moreland Blvd. extension.....	Kinsman Rd.....	Chagrin Falls Blvd.....	1.3	40	A	1
Brook Park Rd. extension.....	Lee Rd.....	McCracken Rd.....	1.9	20	A	1
N. Miles Rd. relocation.....	Northfield Rd. extension.....	Green Rd.....	0.9	20	A	1
So. Moreland Blvd. extension.....	Kinsman Rd.....	County line.....	5.7	20	A	1
Total.....			14.5			
Widening:						
Cedar Rd.....	Lee Rd.....	Warrensville Center Rd.....	1.5	40	A	1
Kinsman Rd.....	East city line.....	East line of Shaker Heights.....	2.0	40	A	1
Lee Rd.....	North of Monmouth Rd.....	South line of Shaker Heights..	2.7	40	A	1
Lee Rd.....	Superior Rd.....	Mayfield Rd.....	1.5	40	A	1
Lee Rd.....	Miles Ave.....	McCracken Rd.....	1.1	40	A	1
Warrensville Center Rd.....	South line of Shaker Heights..	Miles Ave.....	2.2	40	A	1
Cedar Rd.....	Warrensville Center Rd.....	Richmond Rd.....	2.0	40	A	2
Total.....			12.0			

HIGHWAY PLANNING REPORT

East-central section of Cuyahoga County—Continued

Road	From	To	Miles	Plan of improvement		
				Width (feet)	Type of construction	Period of construction
Reconstruction and Widening:						
Kinsman Rd.	East line of Shaker Heights....	So. Moreland Blvd. extension.	2.1	40	A	1
Green Rd.	Cedar Rd.	N. Woodland Rd.	1.0	20	A	1
Kinsman Rd.	So. Moreland Blvd. extension.	End of section	4.2	20	A	1
Richmond Rd.	Cedar Rd.	N. Woodland Rd.	1.0	20	A	1
S. Kinsman Rd.	Kinsman Rd.	West line of Chagrin Falls....	3.8	20	A	1
N. Woodland Rd.	S. O. M. Center Rd.	State Route 174.	1.9	20	B	2
Total			14.0			
New Construction:						
State Route 87	Kinsman Rd.	County line	0.7	20	B	1
Total			0.7			
Grand total			41.2			

Southeast section of Cuyahoga County

New Routes:						
Brook Park Rd. extension ¹	Cuyahoga Heights line.	Cleveland city line.	1.7	40	A	1
Northfield Rd. extension.	Northfield Rd.	McCracken Rd.	3.2	40	A	1
Warner Rd. relocation.	Warner Rd.	Brook Park Rd. extension.	0.3	40	A	1
Richmond Rd.	N. Miles Rd.	S. Miles Rd.	1.0	20	A	1
So. Miles Rd. relocation.	McCracken Rd.	Laing Rd.	2.7	20	A	1
Total			8.9			
Widening:						
Northfield Rd.	Broadway	Forbes Rd.	1.2	40	A	1
Lee Rd.	McCracken Rd.	Broadway	0.8	40	A	1
S. O. M. Center Rd.	So. Miles Rd.	County line.	2.7	20	A	2
Dunham Rd.	Schreiber Rd.	East line of Valley View.	1.4	20	B	2
Total			6.1			
Reconstruction and Widening:						
Dunham Rd.	Granger Rd.	Schreiber Rd.	1.7	20	A	1
Turney Rd.	Rockside Rd.	Dunham Rd.	1.3	20	B	1
Total			3.0			
New Construction:						
Broadway	City line	McCracken Rd.	2.0	48	A	1
Warner Rd.	City line	Warner Rd. relocation.	0.3	40	A	1
Union St.	Northfield Rd.	Broadway	0.5	20	A	1
Warner Rd.	Brook Park Rd. extension.	Canal Rd.	0.5	20	A	1
Bainbridge Rd.	So. Miles Rd.	County line.	2.4	20	B	1
Egypt Rd.	Dunham Rd.	County line.	1.9	20	B	1
Solon Rd.	Broadway	So. Miles Rd.	4.7	20	B	2
Total			12.3			
Grand total			30.3			

¹ Exclusive of section of Garfield Boulevard used by new route.

East-south-central section of Cuyahoga County

New Routes:						
Brecksville Rd. relocation.	Rockside Rd.	Willow Circle.	1.6	40	A	1
Brook Park Rd. extension.	Brook Park Rd.	Willow Circle.	2.4	40	A	1
Brook Park Rd. extension.	Willow Circle.	Garfield Heights line.	0.5	40	A	1
Independence Rd.	E. 49th St.	Willow Circle.	0.9	40	A	1
Valley—Independence connection.	City line	City line	0.5	40	A	1
W. 14th St. & Jennings Rd.	Cleveland city line.	Schaaf Rd.	1.0	20	A	1
Total			6.9			
Widening:						
Brook Park Rd.	Brooklyn Heights line.	Schaaf Rd.	0.4	40	A	1
Pleasant Valley Rd.	Broadview Rd.	Brecksville Rd.	2.5	20	A	2
Dunham Rd.	Canal Rd.	Valley View line.	1.4	20	B	2
Total			4.3			
Reconstruction and Widening:						
E. 49th St.	Cleveland city line.	Independence Rd. relocation.	1.9	40	A	1
Schaaf Rd.	Broadview Rd.	Brook Park Rd.	1.3	40	A	1
Brecksville Rd.	Rockside Rd.	Canal Rd.	1.6	20	A	1
Canal Rd.	Fitzwater Rd.	Willow Circle.	5.5	20	A	1
Schaaf Rd.	Brook Park Rd.	East line of Brooklyn Heights.	1.4	20	A	1
Station Rd.	Brecksville Rd.	Cuyahoga River.	2.5	20	A	1
Total			14.2			

APPENDIX

East-south-central section of Cuyahoga County—Continued

Road	From	To	Miles	Plan of Improvement		
				Width (feet)	Type of construction	Period of construction
New Construction Schaaf Rd.....	East line of Brooklyn Heights..	Brecksville Rd.....	0.6	20	A	1
Total.....			0.6			
Grand total.....			26.0			

West-south-central section of Cuyahoga County

Widening:						
Brook Park Rd.....	Broadview Rd.....	Brooklyn Heights line.....	0.5	40	A	1
Ridge Rd. and W. 73d St.....	Cleveland city line.....	Brook Park Rd.....	2.1	40	A	1
Wooster Pike.....	Ridge Rd.....	York Rd.....	1.9	40	A	1
Linndale Rd.....	W. 73d St.....	Cleveland city line.....	1.7	20	A	1
Pleasant Valley Rd.....	Settlement Rd.....	Broadview Rd.....	5.2	20	A	2
Total.....			11.4			
Reconstruction and Widening:						
Broadview Rd.....	Schaaf Rd.....	Short Rd.....	2.7	40	A	1
Brook Park Rd.....	West line of Parma.....	Broadview Rd.....	4.6	40	A	1
Broadview Rd.....	Short Rd.....	Wallings Rd.....	3.2	20	A	1
Ridge Rd.....	Ridgewood Drive.....	Pleasant Valley Rd.....	1.3	20	A	1
Settlement Rd.....	Brook Park Rd.....	Wooster Pike.....	2.7	20	A	1
York Rd.....	Ridgewood Drive.....	Pleasant Valley Rd.....	1.4	20	A	1
Ridge Rd.....	Pleasant Valley Rd.....	Royalton Rd.....	3.6	20	B	2
York Rd.....	Pleasant Valley Rd.....	Royalton Rd.....	3.6	20	B	2
Total.....			23.1			
New Construction:						
Settlement Rd. extension.....	Wooster Pike.....	Pleasant Valley Rd.....	1.0	20	A	1
Settlement Rd. extension.....	Pleasant Valley Rd.....	Royalton Rd.....	3.6	20	B	2
Settlement Rd. extension.....	Royalton Rd.....	County line.....	2.6	20	B	2
Tiedeman Rd.....	Brook Park Rd.....	Linndale Rd.....	1.7	20	B	2
Total.....			8.9			
Grand total.....			43.4			

Southwest section of Cuyahoga County

New Routes:						
Brook Park Rd. extension.....	Riverside Drive.....	Rocky River.....	1.3	40	A	1
Bagley Rd.—Pleasant Valley Rd. connection.....	Bagley Rd.....	Pleasant Valley Rd.....	1.0	20	A	1
Total.....			2.3			
Widening:						
Bagley Rd.....	Front St.....	East Rd.....	0.4	40	A	1
Irish Rd.....	Usher Rd.....	West Rd.....	0.5	40	A	1
Irish Rd.....	Riverside Drive extension.....	Front St.....	0.3	40	A	1
Bagley Rd.....	East Rd.....	Wooster Pike.....	2.3	20	A	1
Irish Rd.....	West Rd.....	Riverside Drive extension.....	1.4	20	A	1
Depot Rd.....	Wooster Pike.....	Prospect Rd.....	1.3	20	A	2
Pleasant Valley Rd.....	Settlement Rd.....	Wooster Pike.....	0.4	20	A	2
Irish Rd.....	County Line.....	Usher Rd.....	3.5	20	B	1
Prospect Rd.....	Fair Rd.....	Depot Rd.....	1.7	20	B	2
Total.....			11.8			
Reconstruction and Widening:						
Brook Park Rd.....	West line of Parma.....	Riverside Drive.....	2.5	40	A	1
Columbia Rd.....	Irish Rd.....	Olmsted township line.....	2.0	20	A	1
Columbia Rd.....	Irish Rd.....	County line.....	1.6	20	B	2
Total.....			6.1			
New Construction:						
East Rd.....	Riverside Drive.....	Fowles Rd.....	3.1	20	B	1
Fair Rd.....	Sprague Rd.....	West Rd.....	1.0	20	B	1
West Rd.....	Fair Rd.....	Prospect Rd.....	0.2	20	B	1
Total.....			4.3			
Grand total.....			24.5			

HIGHWAY PLANNING REPORT

West section of Cuyahoga County

Road	From	To	Miles	Plan of improvement		
				Width (feet)	Type of construction	Period of construction
New Routes:						
Brook Park Rd.	Mastic Rd.	Rocky River	0.6	40	A	1
Detroit Rd. cut-off	Detroit Rd.	Blount St.	0.2	40	A	1
Detroit Rd.-Hilliard Rd. connection	Detroit Rd.	Hilliard Rd.	0.9	40	A	1
Lake Front Blvd. ¹	Lake Ave.	West Lake Rd.	2.6	40	A	1
Spencer Rd.	Mastic Rd.	Brook Park Rd. extension	0.1	40	A	1
Spencer Rd.	Lorain Rd.	West Lake Rd.	3.0	40	A	1
Avon Rd. extension	Detroit Rd.	Bradley Rd.	0.9	20	A	1
Brook Park Rd. extension	Mastic Rd.	County line	5.0	20	A	1
Hilliard Rd. extension	Detroit Rd.-Hilliard Rd. connection	Canterbury Rd.	3.5	20	A	1
Wolf Blvd.	Spencer Rd.	County line	5.5	20	A	1
Total			22.3			
Widening:						
Mastic Rd.	Brook Park Rd. extension	Clague Rd.	0.5	40	A	1
Spencer Rd.	Lorain Rd.	Mastic Rd.	1.2	40	A	1
West Lake Rd.	Blount St.	East line village of Bay.	1.9	40	A	1
West Lake Rd.	East line village of Bay	Dover Rd.	2.7	40	A	2
Hall Rd.	Detroit Rd.	Lorain Rd.	3.1	20	A	2
Mastic Rd.	Spencer Rd.	Brook Park Rd. extension	0.1	20	A	2
Mastic Rd.	Clague Rd.	Columbia Rd.	1.2	20	A	2
Butternut Ridge Rd.	Lorain Rd.	Columbia Rd.	1.6	20	B	2
Dover Rd.	West Lake Rd.	Butternut Ridge Rd.	5.3	20	B	2
Total			17.6			
Reconstruction and Widening:						
Center Ridge Rd.	East line of Dover	County line	6.1	40	A	1
Columbia Rd.	Lorain Rd.	North line of Olmsted township	2.1	20	A	1
Clague Rd.	West Lake Rd.	Lorain Rd.	3.4	20	A	1
Bradley Rd.	Detroit Rd.	Center Ridge Rd.	2.6	20	A	2
Bradley Rd.	West Lake Rd.	Detroit Rd.	2.6	20	B	2
Total			16.8			
Reconstruction:						
Detroit Rd.	Clague Rd.	County line	4.7	20	A	2
Total			4.7			
Grand total			61.4			

¹ Located partly within the City of Lakewood

Lake County

New Routes:						
St. Clair Ave. extension	Lloyd Rd.	U. S. Route 20	15.8	40	A	1
Johnny Cake Rd. (State Route 84)	State Route 44	S. Ridge Rd.	1.1	20	A	1
Total			16.9			
Widening:						
Euclid Ave. (U. S. Route 20)	Center St. (Mentor)	Painesville city line	5.3	40	A	1
Lake Shore Blvd. (State Route 175)	Cuyahoga Co. line	End of section	0.7	40	A	1
St. Clair Ave.	Cuyahoga Co. line	Lloyd Rd.	0.4	40	A	1
Lake Shore Blvd. (State Route 175)	Lost Nation Rd.	Andrews Rd.	2.1	20	A	1
Lake Shore Blvd. (State Route 175)	Richmond village line	Painesville city line	1.1	20	A	1
Center St. and Chillicothe Rd.	Willoughby-Kirtland Rd.	Walnut Rd.	2.7	20	B	1
Total			12.3			
Reconstruction and Widening:						
Vine St.	St. Clair Ave. extension	U. S. Route 20	0.8	40	A	1
Lake Shore Blvd. (State Route 175)	Vine St.	Point West	0.7	20	A	1
Lost Nation Rd.	U. S. Route 20	Lake Shore Blvd. (State Route 175)	3.5	20	A	1
Vine St.	Lake Shore Blvd. (State Route 175)	St. Clair Ave. extension	2.6	20	B	1
Chillicothe Rd. and Willoughby-Kirtland Rd.	Geauga Co. line	U. S. Route 20	6.4	20	B	1
Total			14.0			
Reconstruction:						
Euclid Ave. (U. S. Route 20)	Cuyahoga Co. line	French Rd.	0.3	40	A	2
Euclid Ave. (U. S. Route 20)	Chandler Rd.	High-level bridge	1.3	40	A	1
Total			1.6			
New Construction:						
Johnny Cake Rd. (State Route 84)	U. S. Route 20	Button Rd.	0.7	20	A	1
Ridge Rd. (State Route 84)	French Rd.	Willoughby-Kirtland Rd.	5.3	20	A	1
State Route 174	Cuyahoga Co. line	Ridge Rd.	4.4	20	C	1
Total			10.4			
Grand total			55.2			

APPENDIX
Lorain County

Road	From	To	Miles	Plan of improvement		
				Width (feet)	Type of construction	Period of construction
New Routes:						
Brook Park Rd. extension	Cuyahoga Co. line	Detroit Rd. (State Route 254)	6.7	20	A	1
Hilliard Rd.	Cuyahoga Co. line	Brook Park Rd. extension	1.3	20	A	1
Hilliard Rd.	Brook Park Rd. extension	East River Rd.	5.2	20	A	1
Powdermaker Rd.	Moore Rd.	Miller Rd.	0.9	20	A	1
Powdermaker Rd.	Harris Rd.	Lorain city line	1.9	20	A	1
Butternut Ridge Extension	Township line	State Route 57	0.3	20	B	1
Butternut Ridge extension	Lagrange Rd.	U. S. Route 20	1.4	20	B	1
State Route 82 extension	State Route 57	Butternut Ridge Rd.	1.4	20	B	1
Total			19.1			
Widening:						
U. S. Route 20	Cuyahoga Co. line	Elyria	6.4	40	A	2
Butternut Ridge Rd.	State Route 57	Lagrange Rd.	2.5	20	B	1
Butternut Ridge Rd.	Belden-Avon Rd.	End of section	2.6	20	B	2
Total			11.5			
Reconstruction and Widening:						
Detroit Rd. (State Route 254)	Cuyahoga Co. line	French Creek Rd.	3.6	20	A	1
State Route 57	Elyria	Grafton	5.5	20	A	1
West Lake Rd. (State Route 2)	Cuyahoga Co. line	Lorain city line	8.9	20	A	1
State Route 57	Grafton	Belden-Avon Rd.	1.5	20	A	2
Belden-Avon Rd.	South line of Avon	U. S. Route 20	1.8	20	B	1
Butternut Ridge Rd.	Cuyahoga Co. line	Belden-Avon Rd.	3.4	20	B	1
Butternut Ridge Rd.	End of section	State Route 57	0.7	20	B	1
Irish Rd.	Cuyahoga Co. line	Butternut Ridge Rd.	1.1	20	B	1
French Creek Rd.	Detroit Rd. (State Route 254)	Lorain city line	4.1	20	B	1
Belden-Avon Rd.	Butternut Ridge Rd.	State Route 57	6.0	20	C	1
Total			36.6			
New Construction:						
Detroit Rd. (State Route 254)	West line of Avon	West River Rd.	1.9	20	A	1
Powdermaker Rd.	Cuyahoga Co. line	Moore Rd.	4.2	20	A	1
Powdermaker Rd.	Miller Rd.	Harris Rd.	1.6	20	A	1
Total			7.7			
Grand total			74.9			

Summit County

New Routes:						
Chittenden Corners relocation	Chittenden Corners	State Route 8	0.3	20	A	1
Ghent, relocation	U. S. Route 21	State Route 92	0.3	20	A	1
Tallmadge Ave. relocation	State Route 18	State Route 261	1.4	20	A	1
Total			2.0			
Widening:						
State Route 8	Broad St.	Limits of Cuyahoga Falls	0.9	40	A	1
State Route 18	Akron	State Route 92	2.7	40	A	1
State Route 36	Township line	End of section	0.8	40	A	1
State Route 36	Cuyahoga Falls line	Stow Corners	1.8	40	A	1
State Route 18	End of section	Medina Co. line	2.3	20	A	1
State Route 92	State Route 18	Ghent Relocation	2.4	20	A	1
Stowe Corners-Springfield Rd.	Tallmadge	State Route 8	3.1	20	A	1
S. O. M. Center Rd. (State Route 91)	Cuyahoga Co. line	Twinsburg	2.5	20	A	2
Total			16.5			
Reconstruction and Widening:						
State Route 8	Akron	Broad St.	0.6	40	A	1
State Route 36	End of section	Township line	0.5	40	A	1
State Route 36	End of section	Cuyahoga Falls line	1.1	40	A	1
State Route 36	Stow Corners	Portage Co. line	2.6	40	A	1
State Route 14	Cuyahoga Co. line	Twinsburg	3.6	20	A	1
State Route 18	Akron	Portage Co. line	4.2	20	A	1
State Route 18	State Route 92	End of section	1.6	20	A	1
U. S. Route 21	State Route 92	Cuyahoga Co. line	8.5	20	A	1
Stow Corners-Springfield Rd.	Stow Corners	Tallmadge	4.2	20	A	1
Tallmadge Ave.	Akron	Tallmadge	2.1	20	A	1
Total			29.0			
New Construction:						
State Route 82	State Route 14	Portage Co. line	1.5	20	B	1
Total			1.5			
Grand total			49.0			

HIGHWAY PLANNING REPORT

Portage County

Road	From	To	Miles	Plan of improvement		
				Width (feet)	Type of construction	Period of construction
Widening:						
State Route 44.....	In Mantua.....		0.2	40	A	1*
State Route 44.....	In Mantua.....		0.7	20	A	1
Total.....			0.9			
Reconstruction and Widening:						
State Route 36.....	Summit Co. line.....	Kent.....	0.8	40	A	1
State Route 18.....	Summit Co. line.....	State Route 44.....	7.8	20	A	1
State Route 36.....	Kent.....	Ravenna.....	4.7	20	A	1
State Route 43.....	Kent.....	State Route 18.....	2.9	20	A	1
State Route 44.....	Mantua.....	Ravenna.....	7.6	20	A	1
State Route 44.....	State Route 82.....	Mantua.....	1.6	20	A	1
State Route 82.....	State Route 43.....	State Route 44.....	7.1	20	A	1
State Route 43.....	State Route 14.....	Kent.....	5.4	20	A	2
State Route 43.....	State Route 82.....	State Route 14.....	4.7	20	B	1
Total.....			42.6			
New Construction:						
Chillicothe Rd.....	Geauga Co. line.....	State Route 82.....	2.2	20	C	1
Hudson-Streetsboro Rd.....	Summit Co. line.....	State Route 44.....	8.1	20	C	1
State Route 82.....	Summit Co. line.....	State Route 43.....	2.3	20	B	1
Total.....			12.9			
Grand total.....			56.4			

Medina County

Widening:						
State Route 18.....	Medina.....	B. & O. R. R.....	4.1	20	A	1
Belden-Hudson Rd.....	Township line.....	Wooster Pike.....	1.9	20	B	1
		(U. S. Route 42)				
State Route 3.....	Hinckley.....	Township line.....	5.1	20	B	1
State Route 57.....	Lorain Co. line.....	End of section.....	1.0	20	B	1
Belden-Hudson Rd.....	Wooster Pike (U. S. Route 42).....	Hinckley.....	4.7	20	C	2
Belden-Hudson Rd.....	Lorain Co. line.....	End of section.....	3.8	20	C	2
Total.....			20.6			
Reconstruction and Widening:						
Wooster Pike (U. S. Route 42).....	Cuyahoga Co. line.....	Medina.....	9.1	20	A	1
Settlement Rd. extension.....	Cuyahoga Co. line.....	Belden-Hudson Rd.....	2.6	20	B	1
Belden-Hudson Rd.....	Hinckley.....	State Route 94.....	1.0	20	B	2
State Route 94.....	Cuyahoga Co. line.....	Belden-Hudson Rd.....	2.8	20	B	2
Total.....			15.5			
New Construction:						
Belden-Hudson Rd.....	Through Hinckley.....		0.3	20	B	1
Settlement Rd. extension.....	Belden-Hudson Rd.....	State Route 3.....	2.7	20	B	1
Belden-Hudson Rd.....	State Route 94.....	Summit Co. line.....	1.9	20	C	1
Total.....			4.9			
Grand total.....			41.0			

Geauga County

New Routes:						
So. Moreland Blvd. extension.....	Cuyahoga Co. line.....	Bainbridge Rd.....	3.2	20	A	2
Total.....			3.2			
Widening:						
U. S. Route 322.....	Cuyahoga Co. line.....	Scotland.....	1.7	20	A	1
U. S. Route 422.....	Cuyahoga Co. line.....	State Route 44.....	6.7	20	A	1
Chillicothe Rd.....	Lake Co. line.....	Township line.....	5.0	20	B	1
State Route 87.....	Cuyahoga Co. line.....	Chillicothe Rd.....	2.9	20	B	1
Chillicothe Rd.....	Township line.....	State Route 87.....	2.6	20	B	2
State Route 87.....	Chillicothe Rd.....	State Route 44.....	7.8	20	B	2
Total.....			26.7			
Reconstruction and Widening:						
State Route 43.....	Cuyahoga Co. line.....	Geauga Co. line.....	0.9	20	A	1
Total.....			0.9			
New Construction:						
Bainbridge Rd.....	Chillicothe Rd.....	U. S. Route 422.....	3.2	20	A	1
State Route 87 cut-off.....	Cuyahoga Co. line.....	State Route 87.....	1.0	20	B	1
Bainbridge Rd.....	Cuyahoga Co. line.....	Chillicothe Rd.....	2.8	20	C	1
Total.....			7.0			
Grand total.....			37.8			

APPENDIX V

Structures Proposed in the Improvement Plan of the Regional Area Cuyahoga County

Construction proposed	Section of county	Road on which bridge is located	Bridge crosses	Width in feet
New bridge ¹ on existing route...	East-south-central...	Station Rd. (State Route 82).....	Cuyahoga River ²	20
	East-central.....	So. Moreland Blvd. extension.....	Chagrin River.....	20
Bridges on new routes.....	Southeastern.....	Northfield Rd. extension.....	Tinkers Creek.....	40
	East-south-central...	Brook Park Rd. extension.....	Cuyahoga River.....	40
		do	Canal.....	40
		Brecksville Rd. relocation (U.S. Route 21)	Cuyahoga River and Canal ³	40
		Canal Rd. relocation.....	Mill Creek ⁴	20
		Granger Rd. relocation.....	Mill Creek.....	20
	Western.....	Brook Park Rd. extension.....	Rocky River.....	40
		Lake Front Blvd. connection.....	Rocky River.....	40
		Spencer Rd.....	Stream south of West Lake Rd.....	40
	City of Cleveland....	Bulkley Blvd.-Summit Ave. connection.	Cuyahoga River ⁵	40
		Independence Rd. relocation.....	Industrial yards.....	40
		do	Burke Branch.....	40
		do	Kayvine in Forest City Park.....	40
		Independence Rd.-Valley Rd. connection.	Cuyahoga River ⁶	40
		do	Canal.....	40
		do	Big Creek.....	40
		Lake Front Blvd.-St. Clair Rd. connection.	Creek in Gordon Park.....	40
Railway grade separations on existing routes.	Northeastern.....	Bliss Rd.....	Nickel Plate Railroad.....	20
		Chardon Rd.....	do	40
		Dille Rd.....	do	40
	East-central.....	Lee Rd.....	Erie Railroad.....	40
	Southeastern.....	Broadway in Bedford.....	Wheeling and Lake Erie Railroad.....	50
		Northfield Rd.....	Pennsylvania Railroad.....	20
		S. O. M. Center Rd.....	Erie Railroad.....	20
	East-south-central...	Fitzwater Rd.....	Baltimore and Ohio Railroad.....	20
	West-south-central...	Brook Park Rd.....	do	40
		Settlement Rd.....	do	20
	Southwestern.....	Front St. relocation (Berea).....	New York Central and Big Four Railroads.	40
		Irish Rd.....	do	20
		Columbia Rd.....	New York Central Railroad.....	20
		Brook Park Rd.....	Big Four Railroad.....	40
		Columbia Rd.....	do	20
		Brook Park Rd.....	Cleveland Short Line Railroad.....	40
		Bagley Road.....	Baltimore and Ohio Railroad.....	20
		East Rd.....	New York Central Railroad.....	20
		Bagley Rd.....	Cleveland Southwestern Electric Railway.	20
		Royalton Rd. (State Route 82).....	Baltimore and Ohio Railroad.....	20
	Western.....	Dover Center Rd.....	Nickel Plate Railroad.....	20
		Hall Rd.....	do	20
		Clague Rd.....	do	20
		Bradley Rd.....	do	20
		Hall Rd.....	Lake Shore Electric Railway.....	20
		Dover Center Rd.....	do	20
		Clague.....	do	20
Railway grade separations on new routes.	East-central.....	Northfield Rd. extension.....	Erie Railroad.....	40
	Southeastern.....	Richmond Rd.....	do	20
		Northfield Rd. extension.....	Wheeling and Lake Erie Railroad.....	40
		Brook Park Rd. extension.....	Lake Erie and Pittsburgh Railroad.	40
		do	Pennsylvania and Wheeling and Lake Erie Railroads. ⁷	40
	East-south-central...	Brook Park Rd. extension.....	Baltimore and Ohio Railroad.....	40
		do	Branch of B. and O. Railroad.....	40
		Brecksville Rd.....	Baltimore and Ohio Railroad ⁸	40
		Granger Rd.....	Branch of B. and O. Railroad.....	20
	Western.....	Spencer Rd. extension.....	Nickel Plate Railroad.....	40
		do	Lake Shore Electric Railway.....	40
	City of Cleveland....	Lake Front Blvd.....	Pennsylvania Railroad.....	40
		Valley Rd.-Independence Rd. connection	Baltimore and Ohio Railroad ⁹	40
Highway grade separations.....	Southeastern.....	Northfield Rd. extension (upper).....	Broadway (lower).....	40 (upper)
		Brook Park Rd. extension (upper).....	Windfall Ave. (lower).....	30 (lower)
	East-south-central...	Schaaf Rd. (upper).....	Brook Park Rd. extension (lower).....	40 (upper)
		do	do	24 (lower)
		do	do	20 (upper)
	Western.....	Center Ridge Rd. (U. S. Route 20) (upper).	Spencer Rd. extension (lower).....	40 (lower)
		do	do	40 (upper)
	City of Cleveland....	Lake Front Blvd. (upper).....	East 72nd St. (lower).....	30 (lower)
		do	do	40 (upper)
		Woodhill Rd. (upper).....	Shaker Blvd. (lower).....	40 (lower)

¹ An intercounty bridge between Cuyahoga and Summit Counties.
² Also overpasses the Baltimore and Ohio Railroad.
³ Also overpasses branch of the Baltimore and Ohio Railroad.
⁴ Also bridges rail lines, Main St., and West 9th St.
⁵ Also overpasses Newburgh and South Shore Railroad.
⁶ Also overpasses Broadway.
⁷ Also overpasses Schaaf Road.
⁸ Also overpasses Jennings Road.

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Lake County

Construction proposed	Road on which bridge is located	Bridge crosses	Width in feet
New bridge on existing route.....	Ridge Rd. (State Route 84).....	Chagrin River.....	20
Bridges on new routes.....	St. Clair Ave. extension.....	do	40
	do	Grand River.....	40
Replacement or widening of bridges on existing routes.	Ridge Rd. connection.....	do	20
	State Route 175.....	Chagrin River.....	20
	do	Branch of Chagrin River.....	20
	U. S. Route 20.....	Nickel Plate Railroad.....	40
	Vine St.....	New York Central Railroad.....	40
	do	Nickel Plate Railroad.....	40
	do	New York Central Railroad.....	40
	do	Baltimore and Ohio Railroad yards.....	40
	do	New York Central Railroad.....	20
	do	Nickel Plate Railroad.....	20
Railway grade separations on existing routes.	Center St. (Mentor).....	New York Central Railroad.....	20
	do	Nickel Plate Railroad.....	20
	Liberty St. (Painesville).....	do	40
	State St. (Painesville).....	do	40
	State Route 44.....	Baltimore and Ohio Railroad.....	20

Lorain County

New bridge on existing route.....	State Route 254 and Mills Rd. extension.....	Black River.....	20
Bridges on new routes.....	Butternut Ridge Rd. relocation.....	East Branch of Black River.....	20
	do	West Branch of Black River.....	20
Replacement or widening of bridges on existing routes.	State Route 82 extension.....	East Branch of Black River.....	20
	U. S. Route 20.....	Creek near Ridgeville.....	40
	State Route 82.....	Creek near Eaton.....	20
	Beldon-Avon Rd.....	do	20
Railway grade separations on existing routes.	State Route 82.....	Big Four Railroad.....	20
	State Route 254.....	Baltimore and Ohio Railroad.....	20
	Root Rd.....	New York Central Railroad.....	20
	Beldon-Avon Rd.....	do	20

Summit County

New bridge on existing route.....	State Route 36.....	Cuyahoga River.....	40
Replacement or widening of bridges on existing routes.	State Route 8.....	do	40
	State Route 36.....	Creek near Portage County line.....	40
	State Route 82.....	Pond Brook.....	20
Railway grade separations on existing routes.	Richfield-Hudson Rd.....	Cuyahoga River.....	20
	do	Canal.....	20
	State Route 82.....	Lake Erie and Pittsburgh Railroad.....	20
	do	Wheeling and Lake Erie Railroad.....	20
	State Route 91.....	do	20
	do	Northern Ohio Traction Line.....	20
Railway grade separations on new routes.	State Route 18.....	Erie Railroad.....	20
	Stow Corners-Springfield Rd.....	do	20
	State Route 8 (Chittenden Corners relocation).....	Lake Erie and Pittsburgh Railroad.....	20

Portage County

Railway grade separations on existing routes.	State Route 36.....	Baltimore and Ohio Railroad.....	20
	State Route 44.....	Erie Railroad.....	40
	State Route 82.....	do	20
	State Route 18.....	Wheeling and Lake Erie Railroad.....	20
	State Route 261.....	do	20

Medina County

Replacement or widening of bridges on existing routes.	U. S. Route 42.....	West Branch of Rocky River.....	20
	State Route 18.....	Creek east of Medina.....	20
	State Route 3.....	Creek north of Weymouth.....	20
	State Route 94.....	East Branch of Rocky River.....	20
Railway grade separations on existing routes.	State Route 18.....	Baltimore and Ohio Railroad.....	20

Geauga County

Replacement or widening of bridges on existing routes.	State Route 87.....	Chagrin River.....	20
	Chillicothe Rd.....	do	20
	do	Creek north of Russell Center.....	20

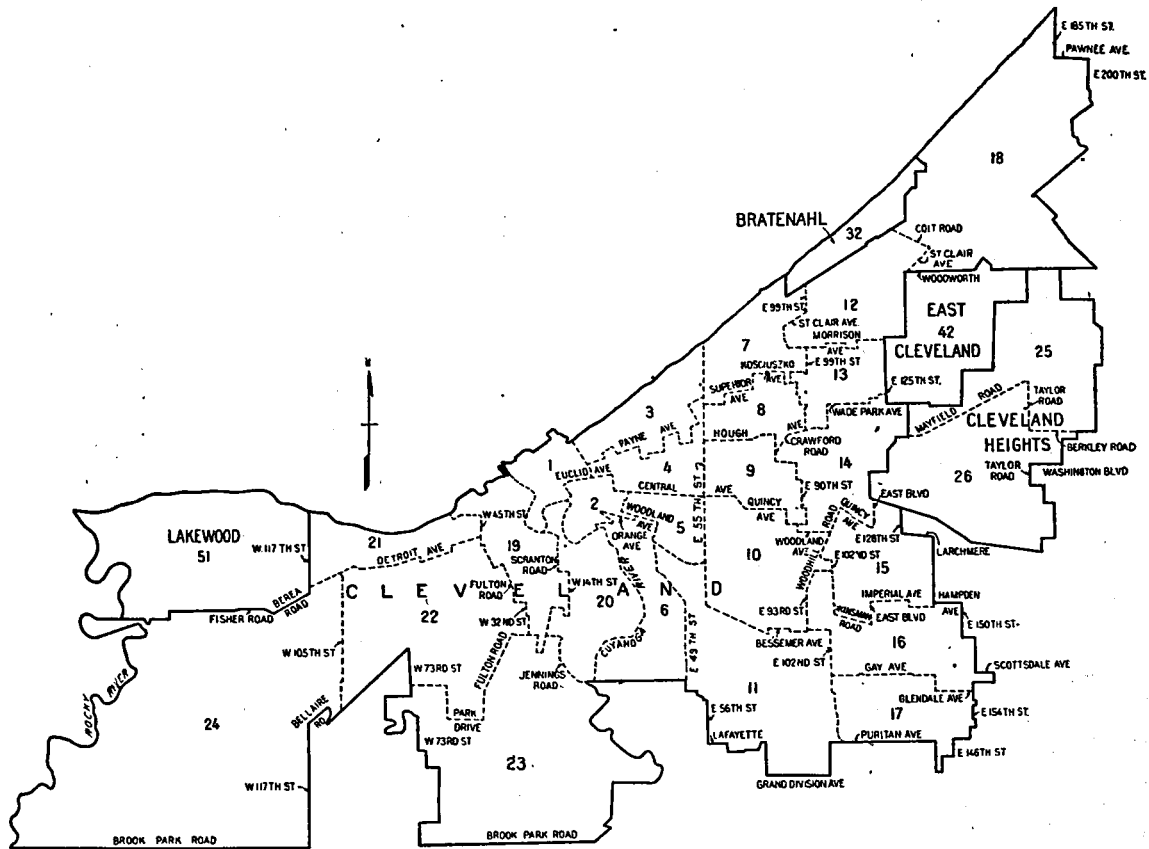


FIG. 1.—Map of Cleveland and adjacent cities showing sections into which they were divided for purposes of traffic origin and destination analysis

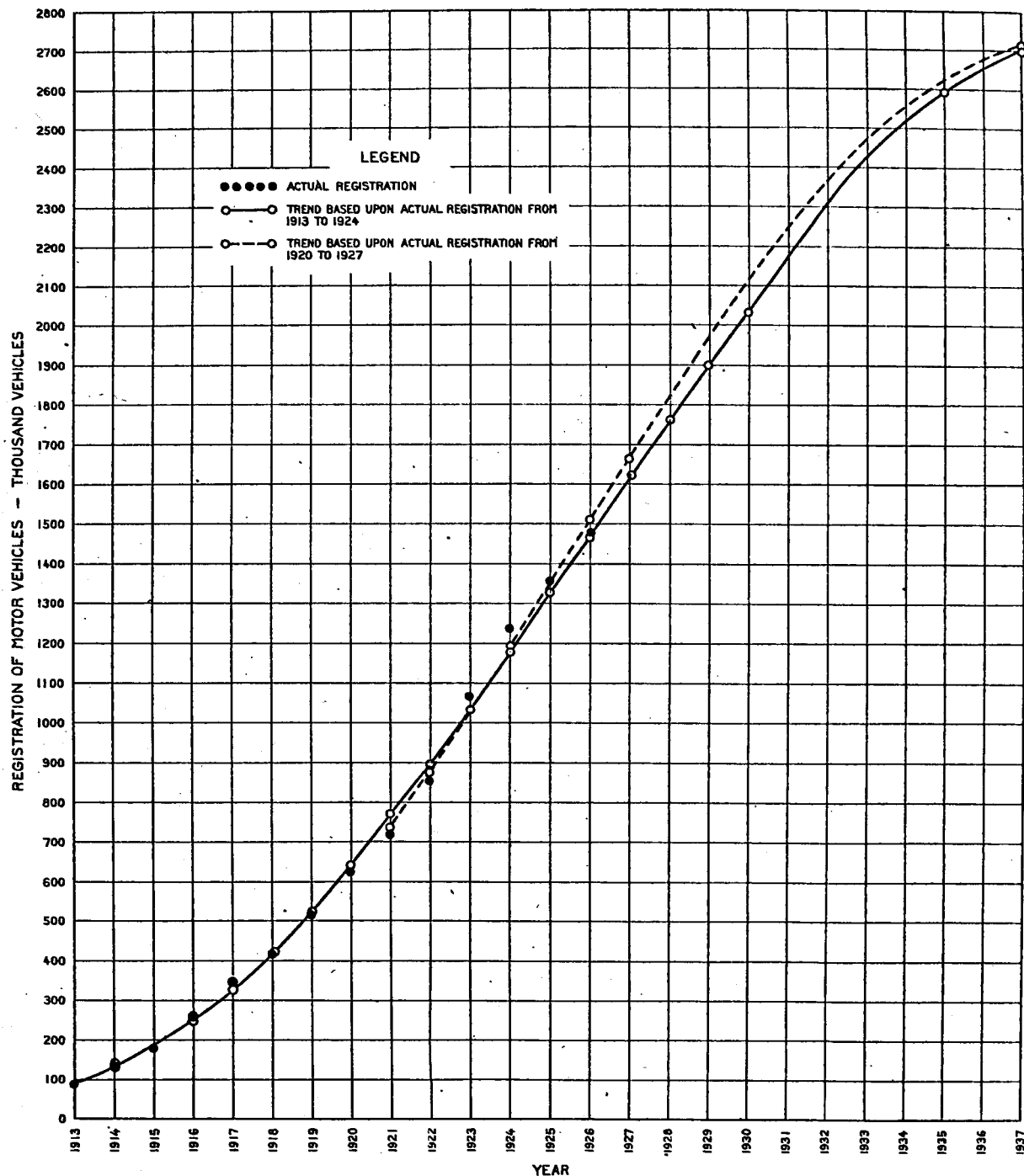


FIG. 2.—The growth and trend of motor vehicle registration in Ohio

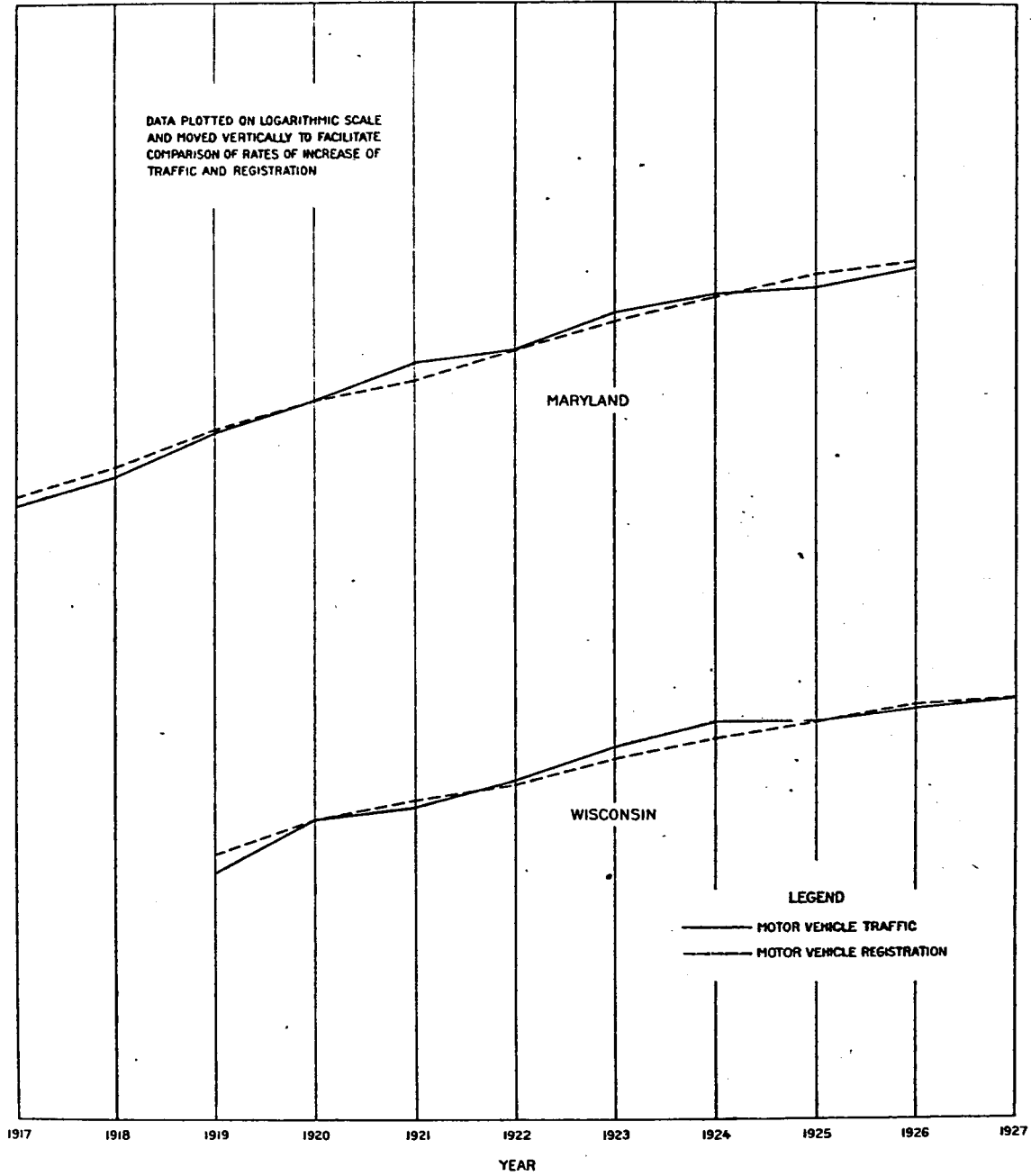


FIG. 3.—Trends of highway traffic and motor vehicle registration in Maryland and Wisconsin

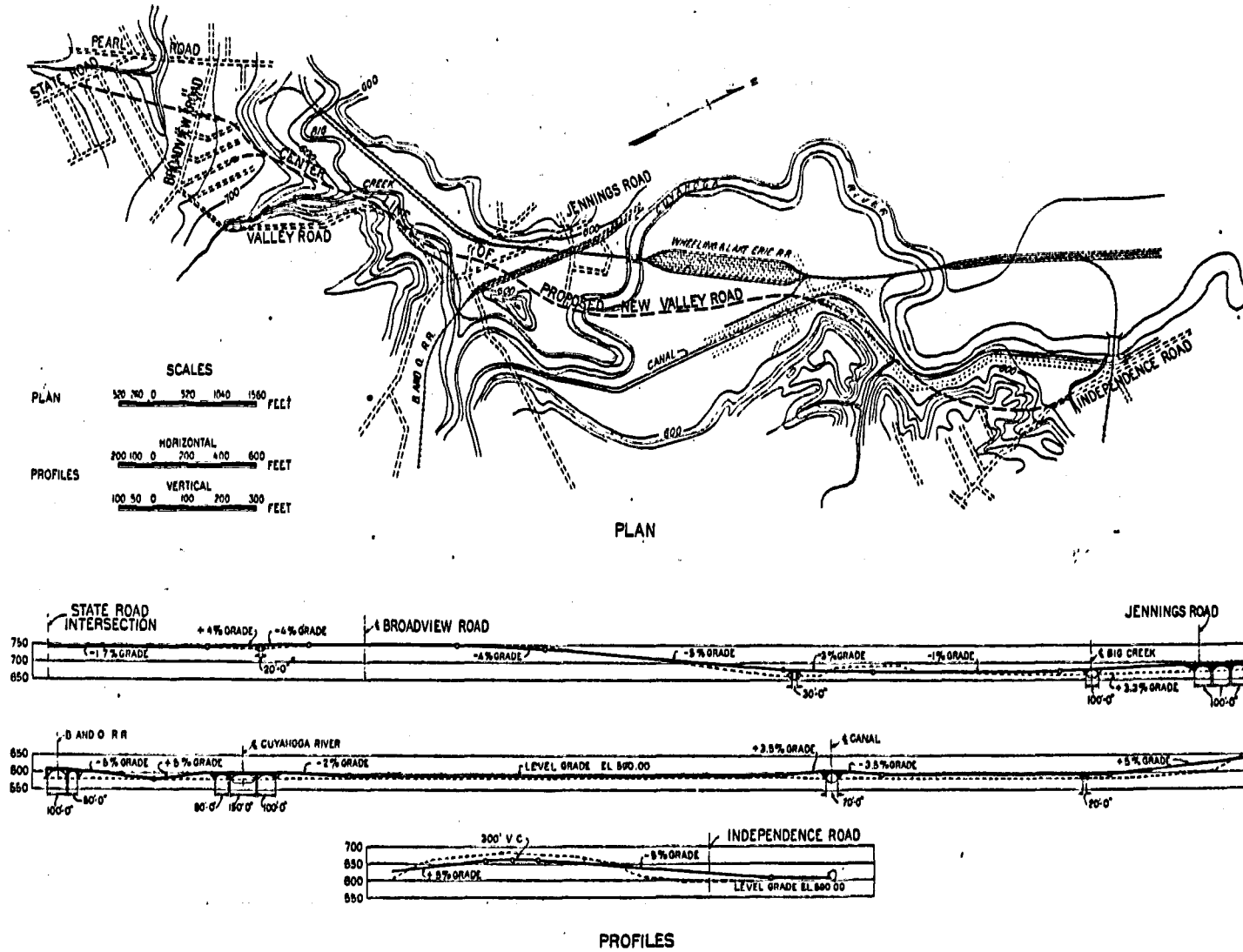


FIG. 4.—Study of the proposed Valley Road—Independence Road connection

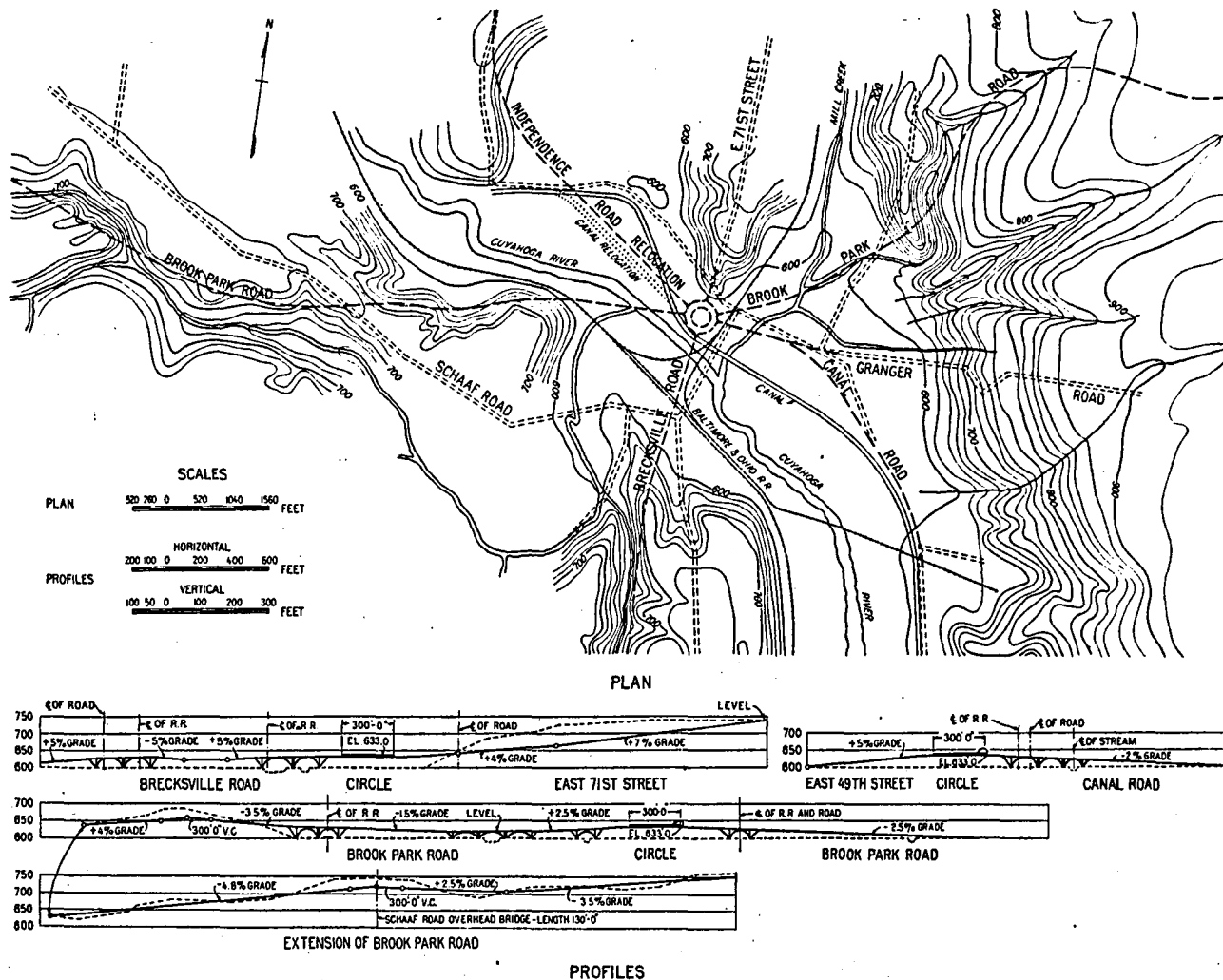


FIG. 5.—Study of the proposed circular intersection of East 71st Street, Independence Road, Brook Park extension, Brecksville Road, Canal Road, and Warner Road

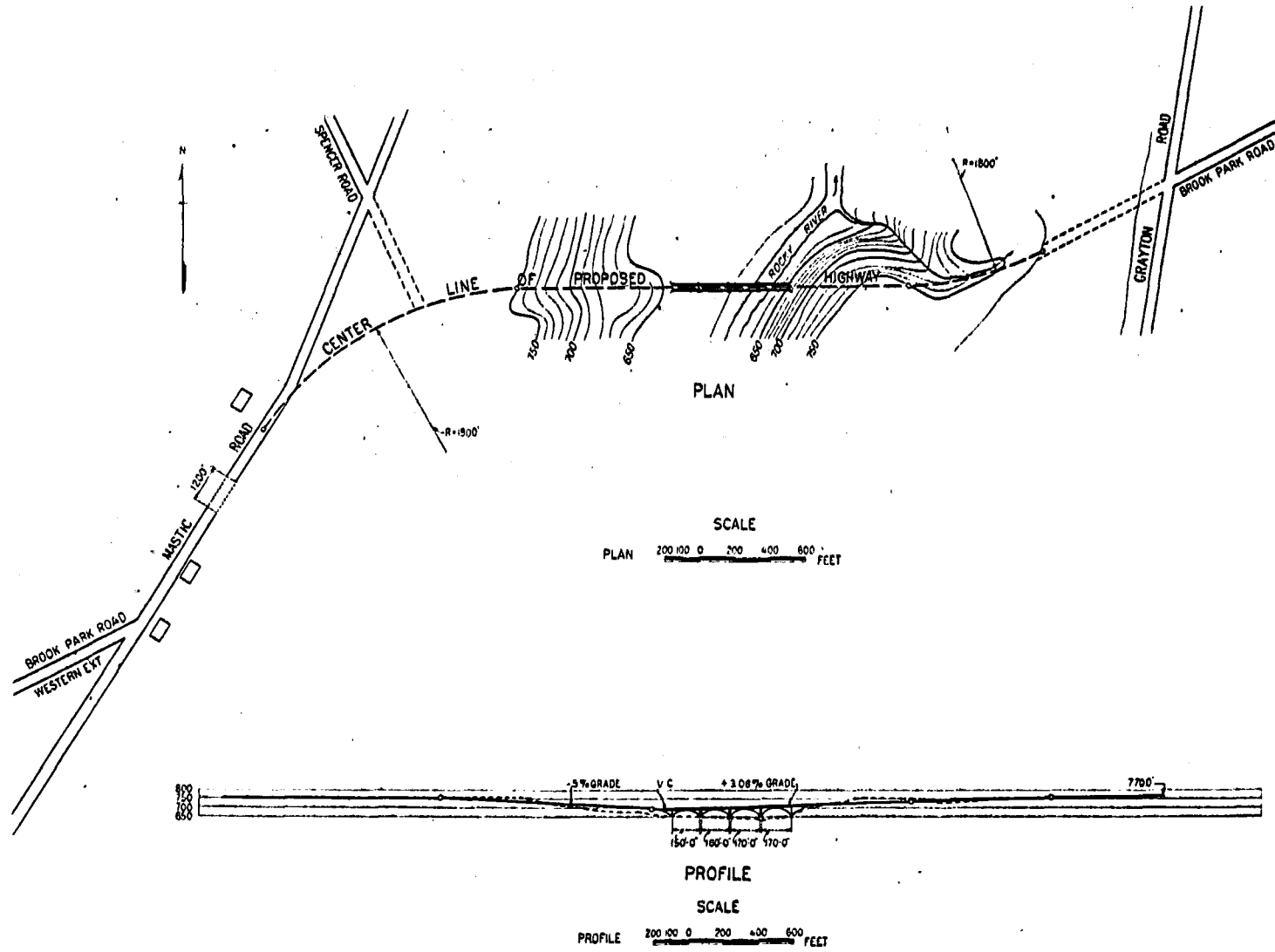


FIG. 6.—Study of Brook Park Road extension over Rocky River

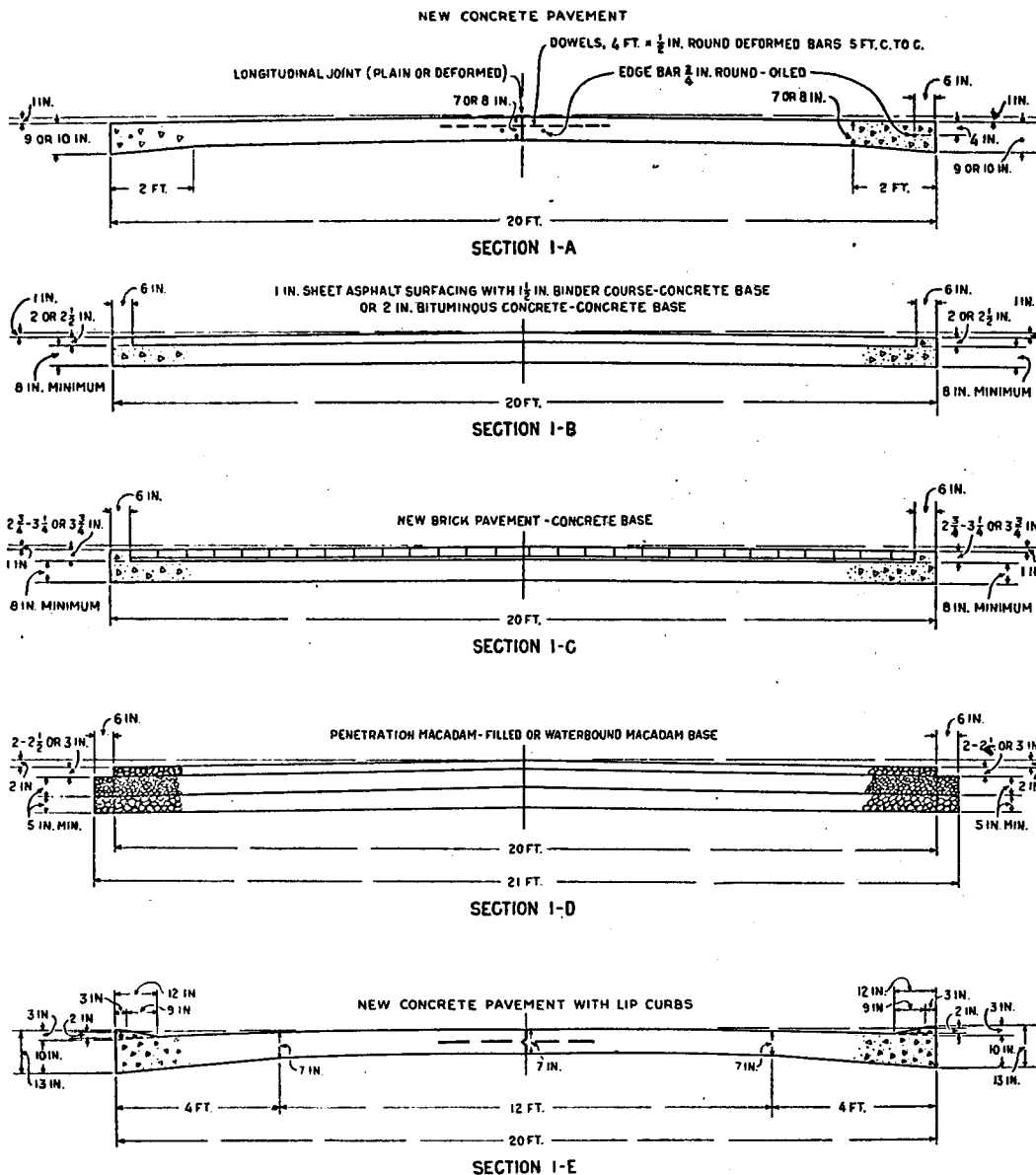


FIG. 7A.—Typical pavement cross-section designs

HIGHWAY PLANNING REPORT

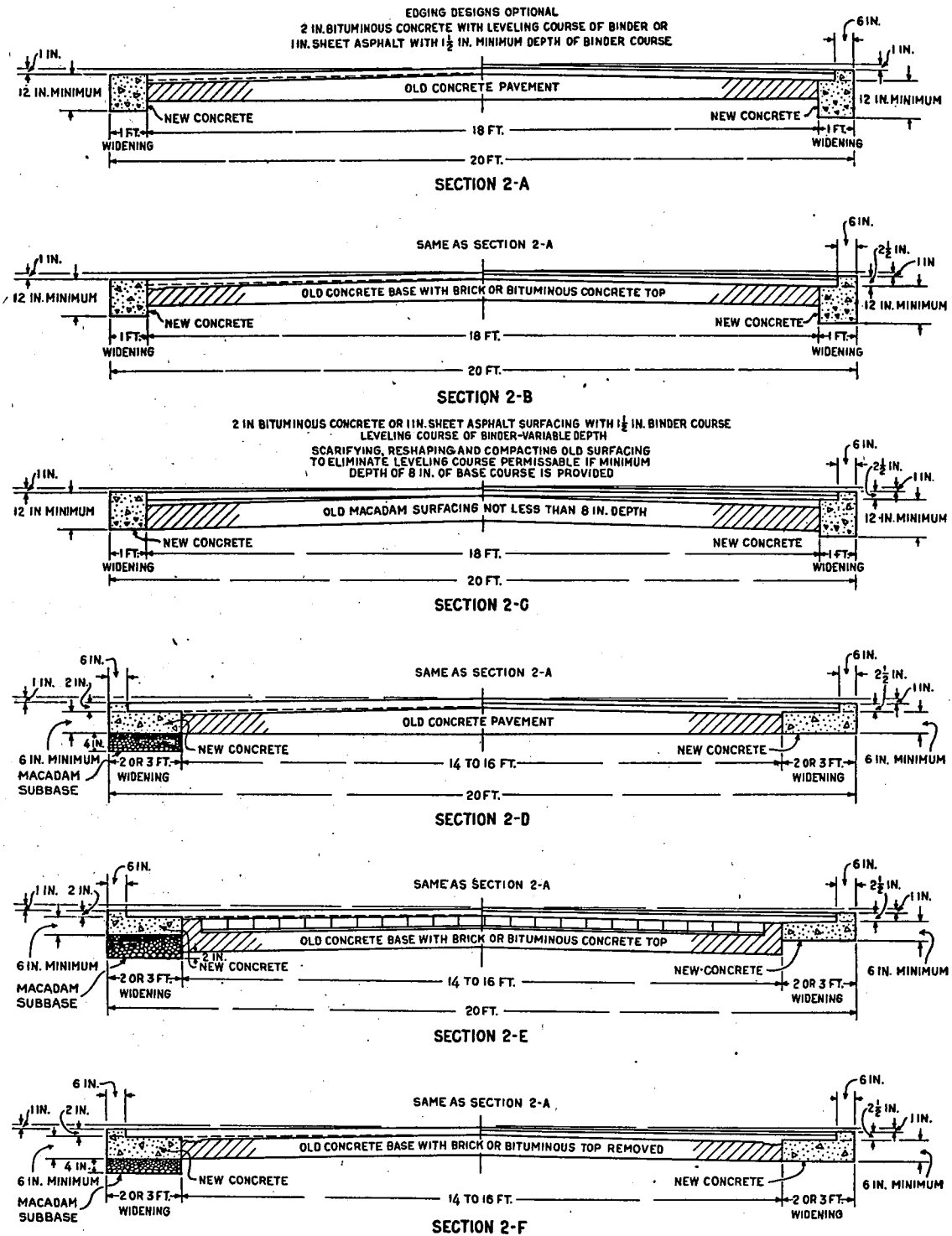


FIG. 7B.—Typical pavement cross-section designs

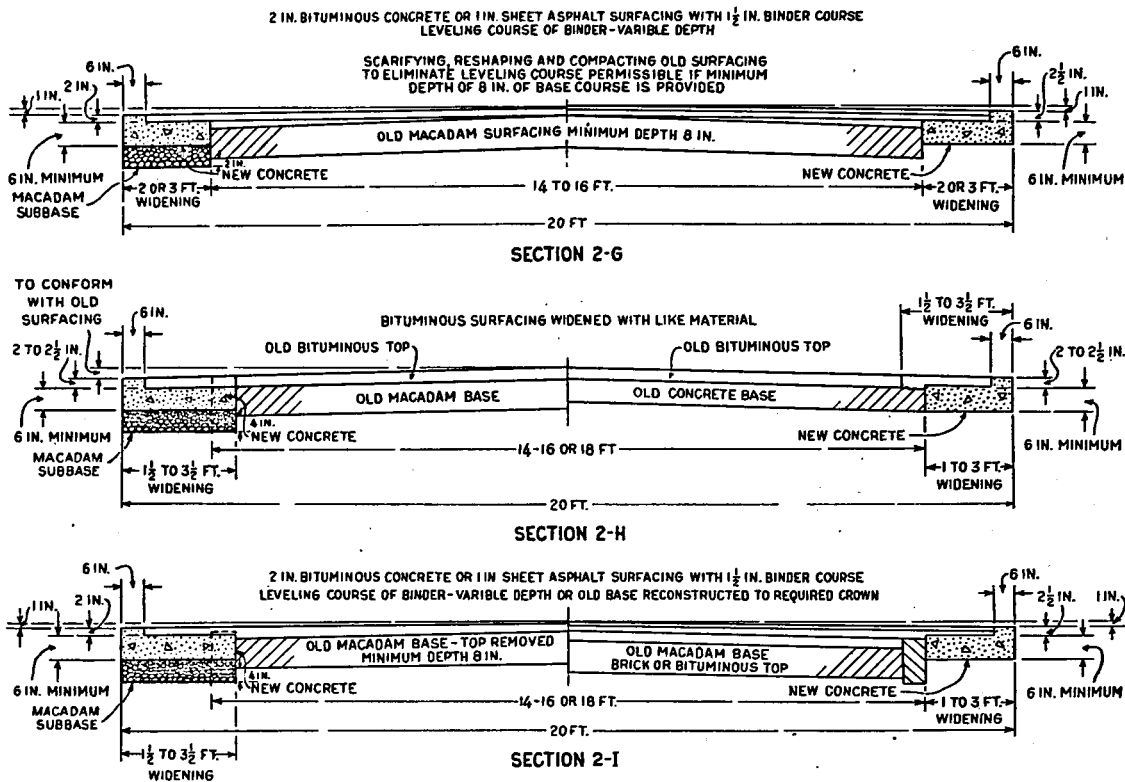


Fig. 7C.—Typical pavement, cross-section designs

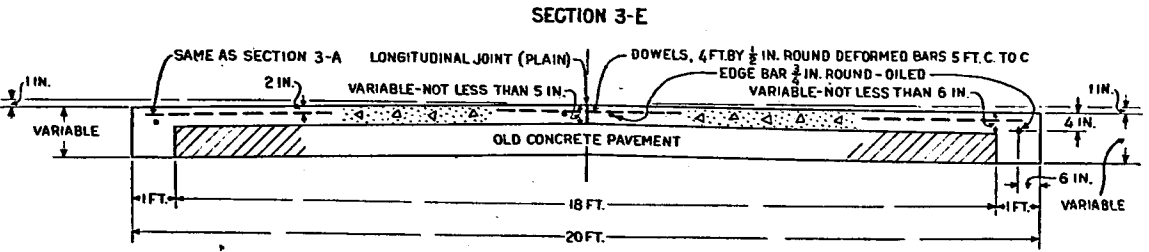
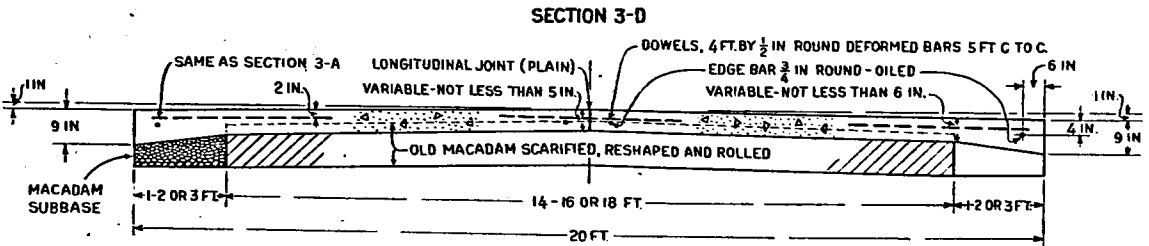
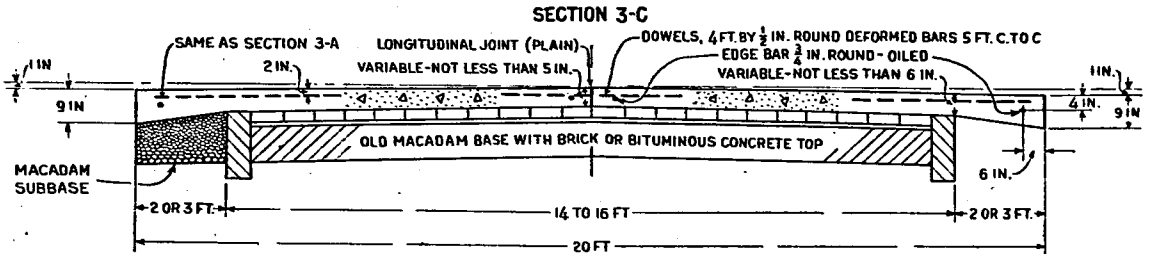
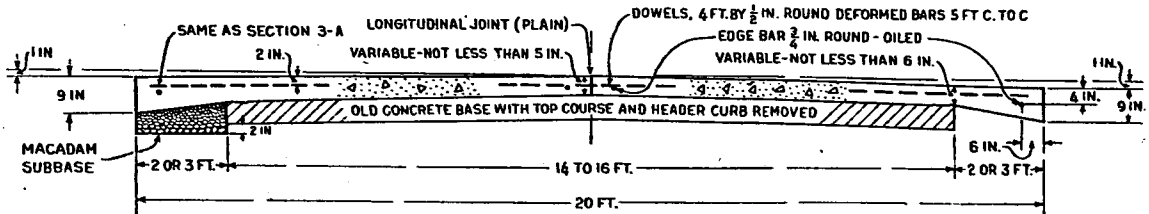
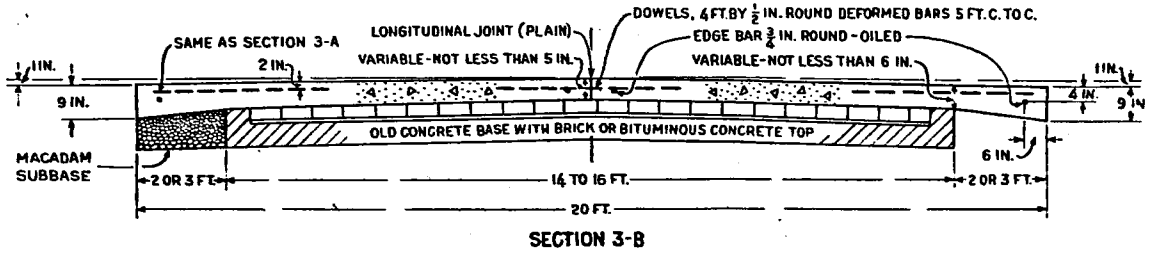
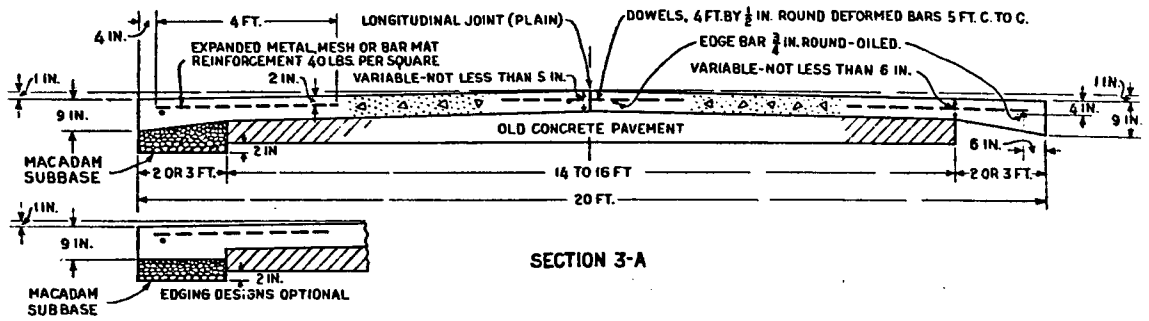


FIG. 7D.—Typical pavement cross-section designs

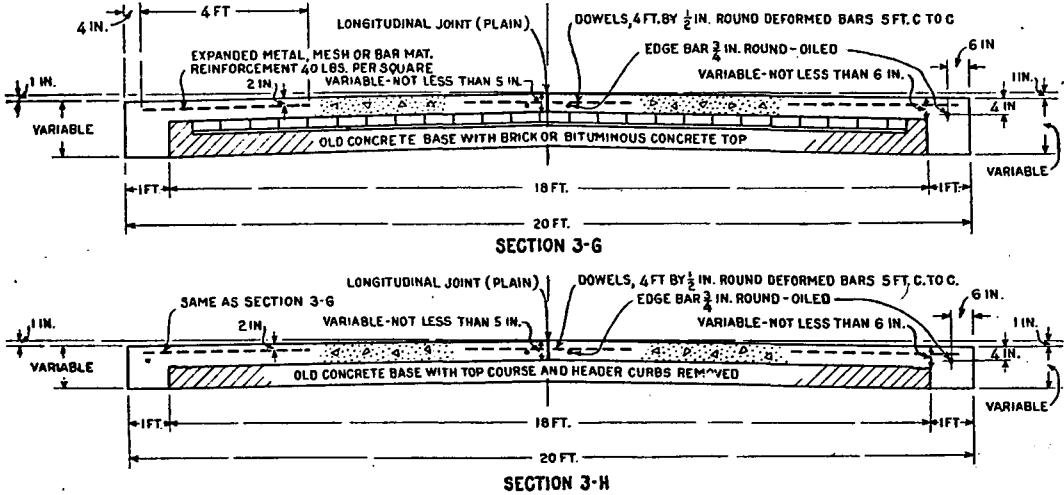


FIG. 7E.—Typical pavement cross-section designs

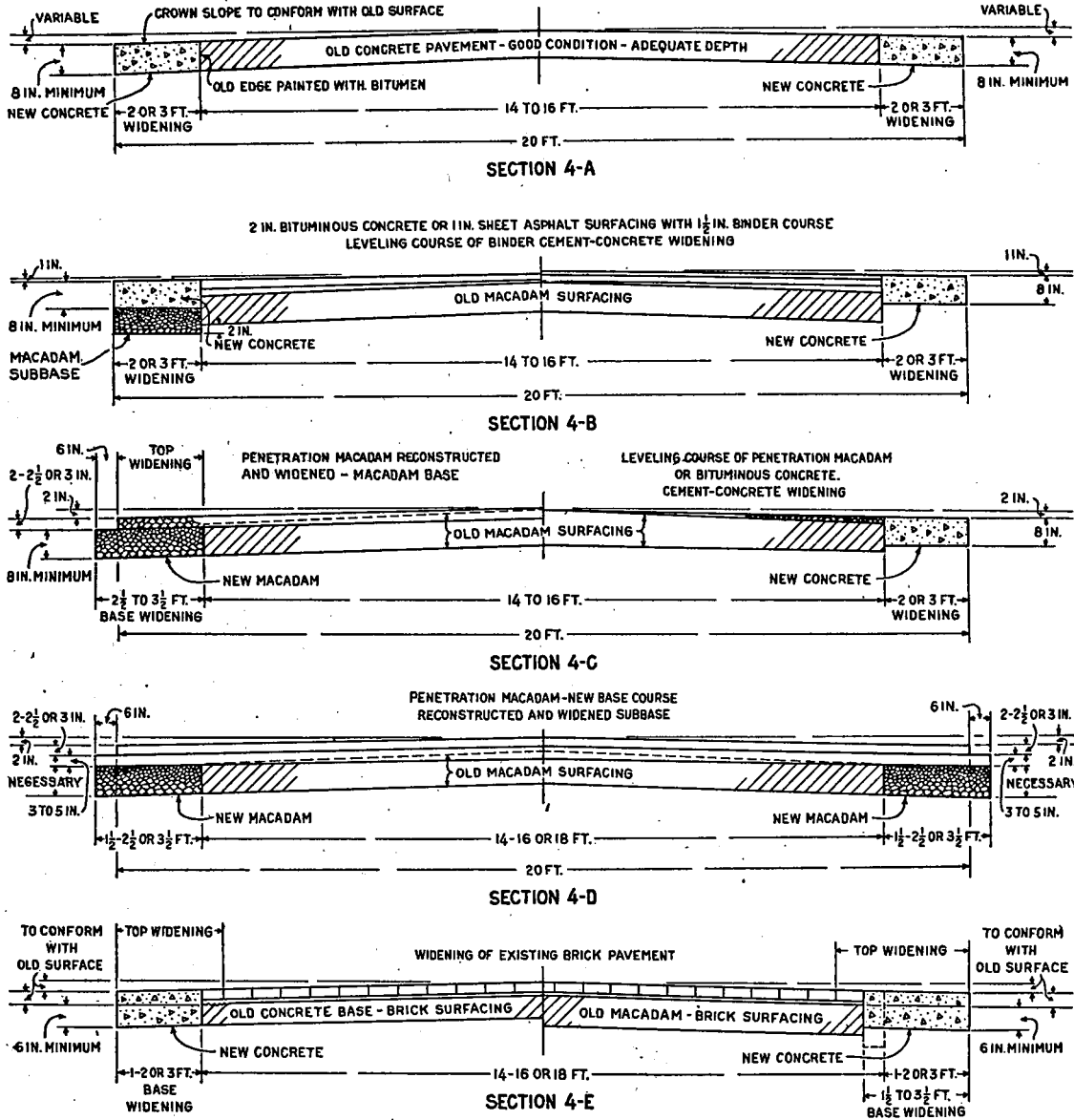


FIG. 7F.—Typical pavement cross-section designs

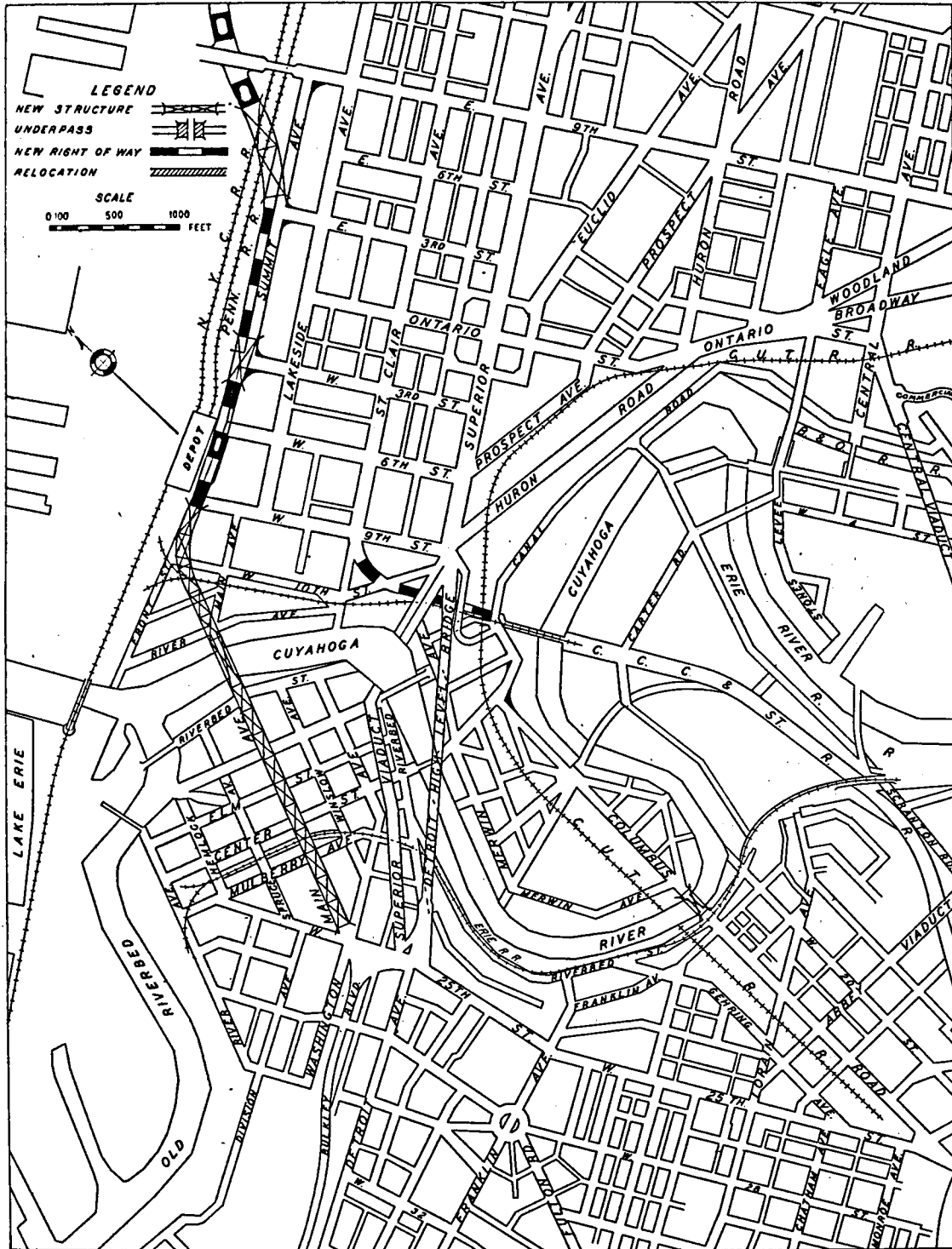


FIG. 8A.—Showing Main Avenue high-level bridge with Lake Front Boulevard connection and Columbus Road

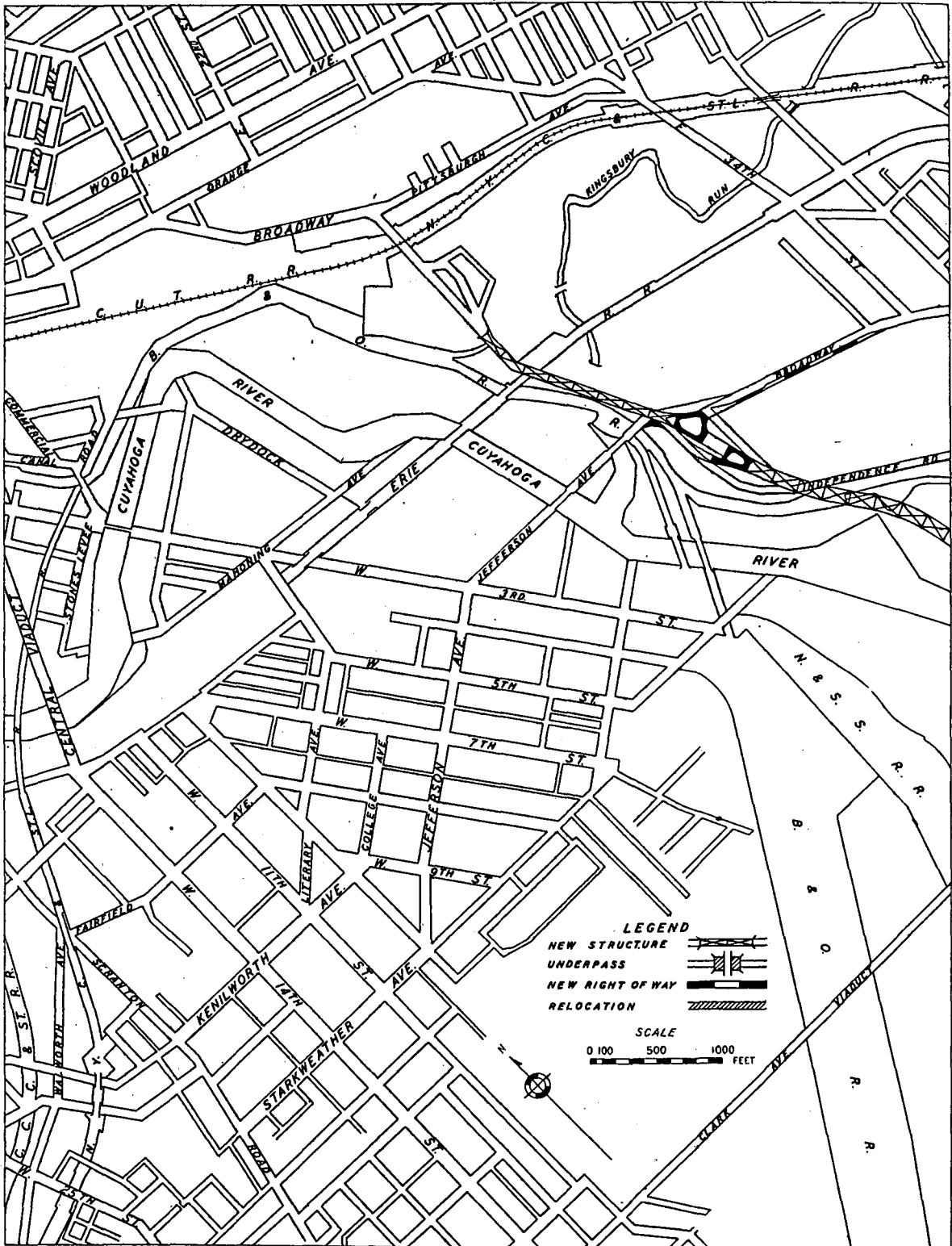


FIG. 8B.—South of area shown in Figure 8A, showing north end of Independence Viaduct with connection to Broadway

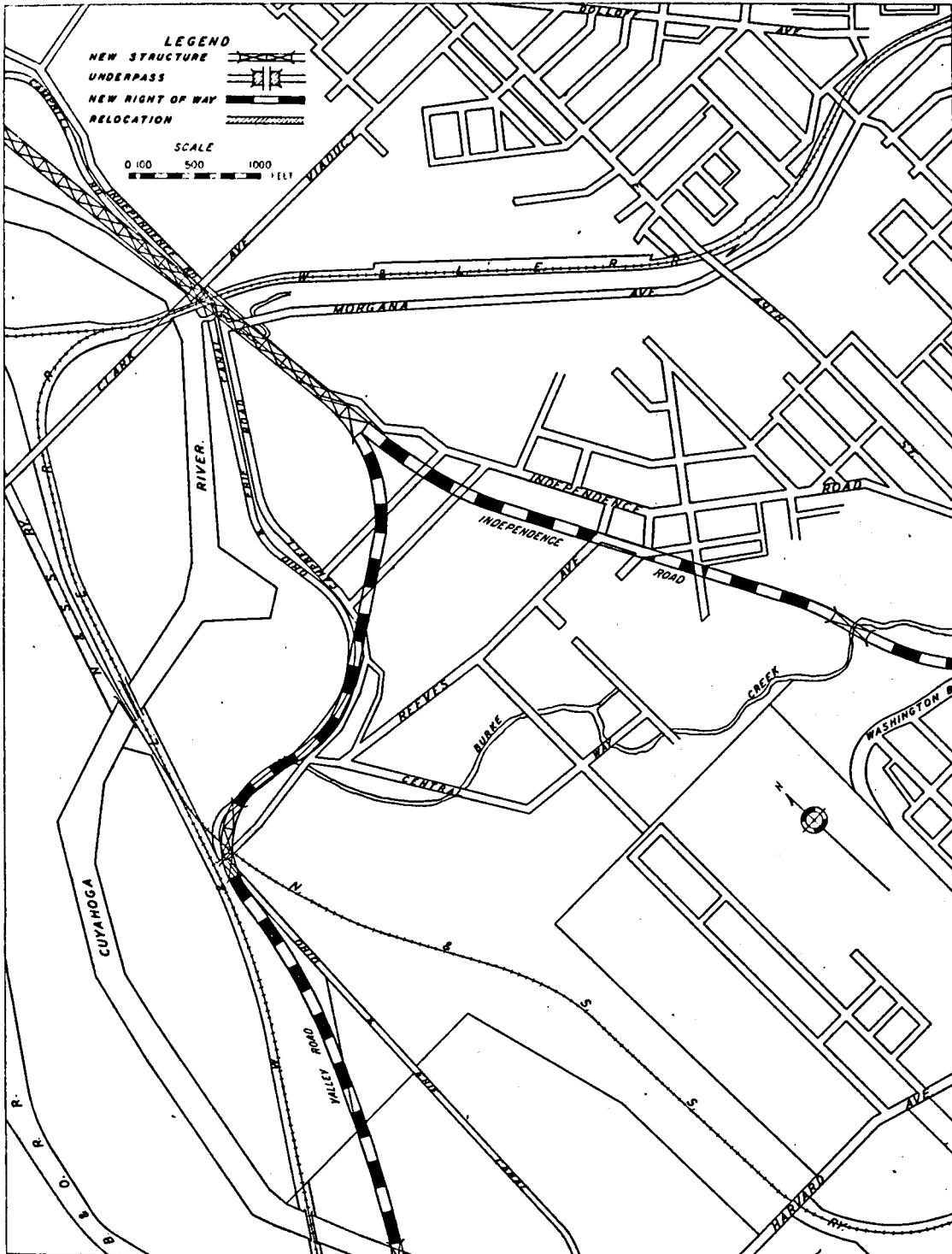
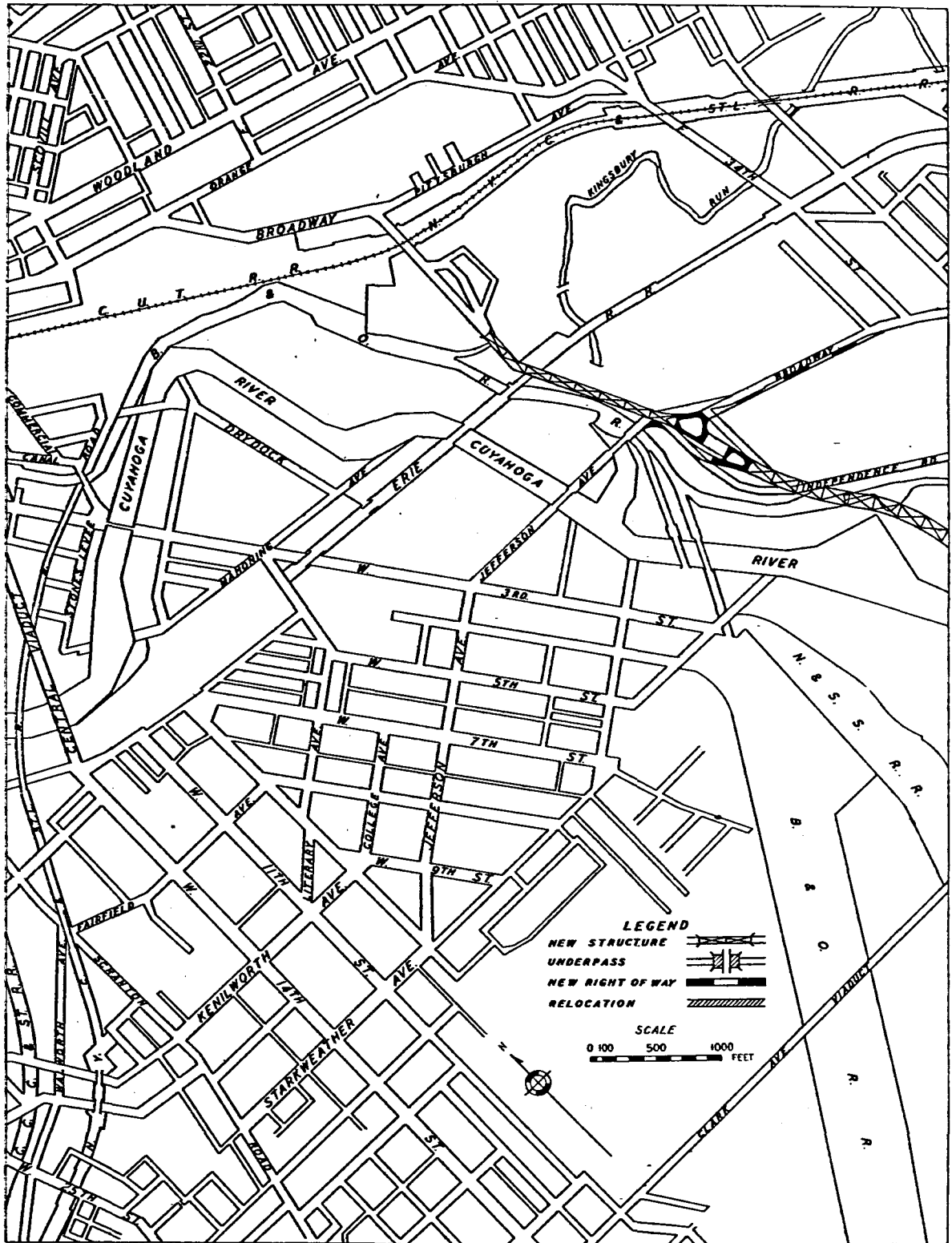


FIG. 8C.—South of area shown in Figure 8B, showing balance of Independence Viaduct and parts of Independence Road relocation and Valley Road



- FIG. 8B.—South of area shown in Figure 8A, showing north end of Independence Viaduct with connection to Broadway

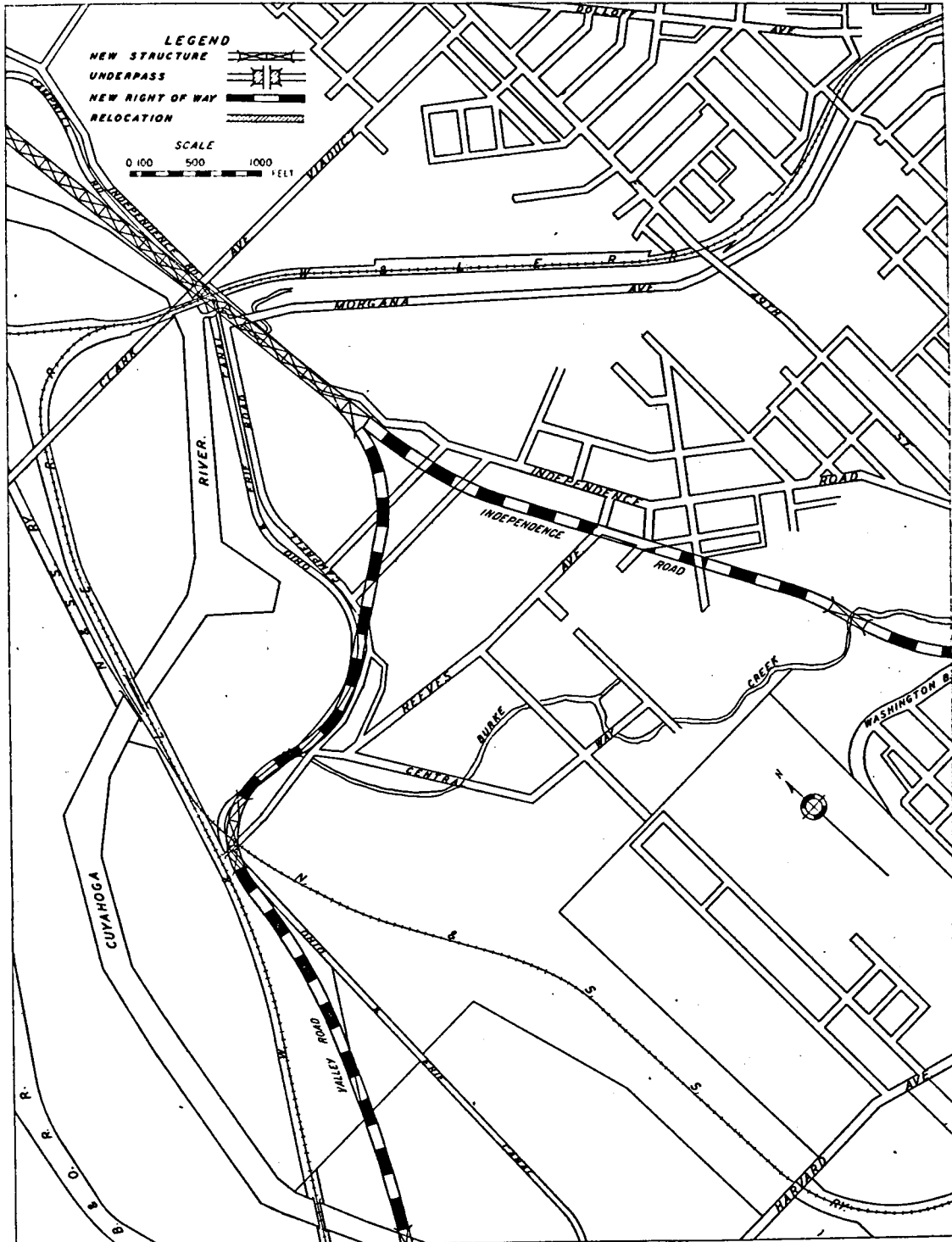


FIG. 8C.—South of area shown in Figure 8B, showing balance of Independence Viaduct and parts of Independence Road relocation and Valley Road

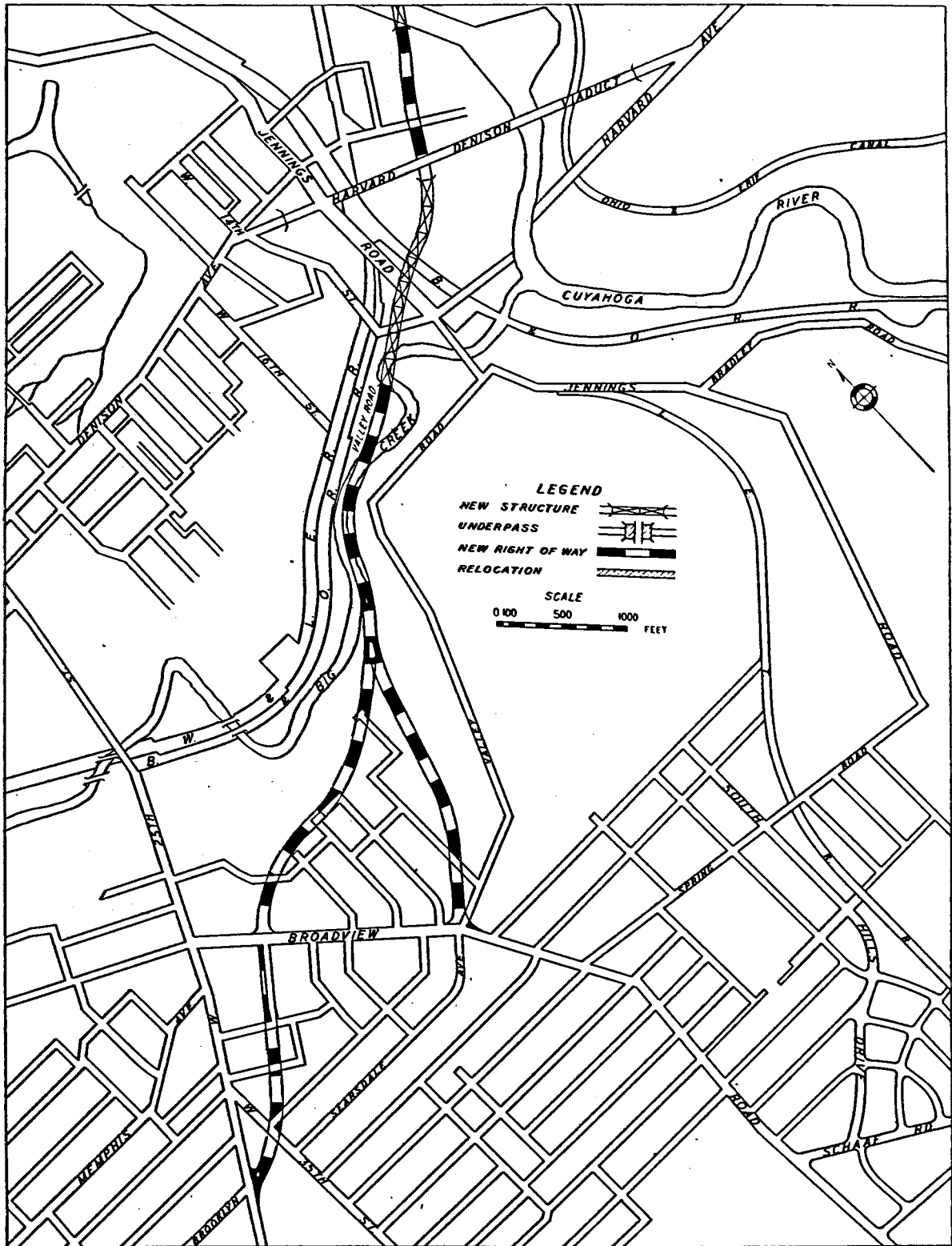


FIG. 8D.—West of area shown in Figure 8C, showing balance of Valley Road with connections to Broadview, State and Pearl Roads

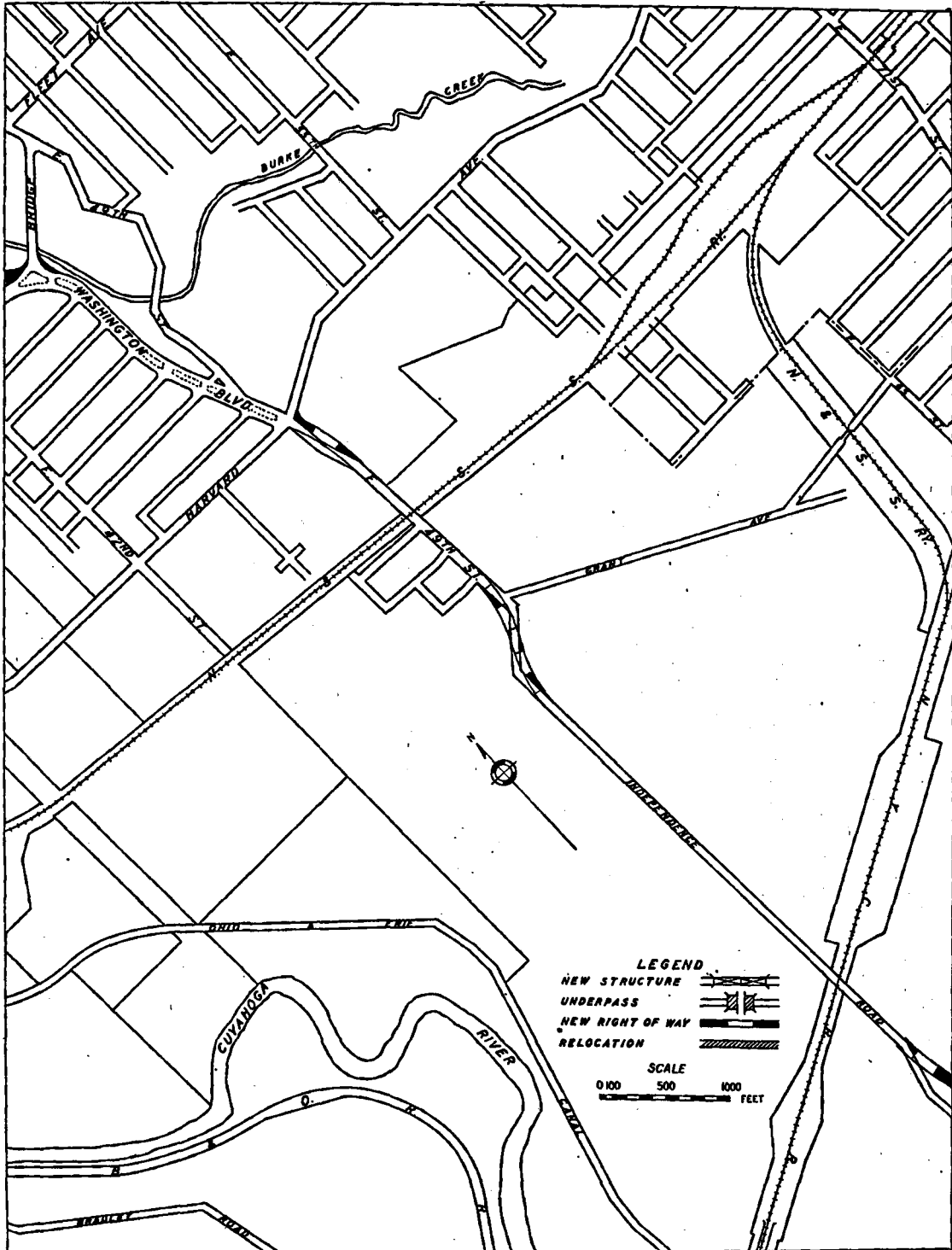


FIG. 8E.—South of area shown in Figure 8C, showing continuation of Independence Road relocation

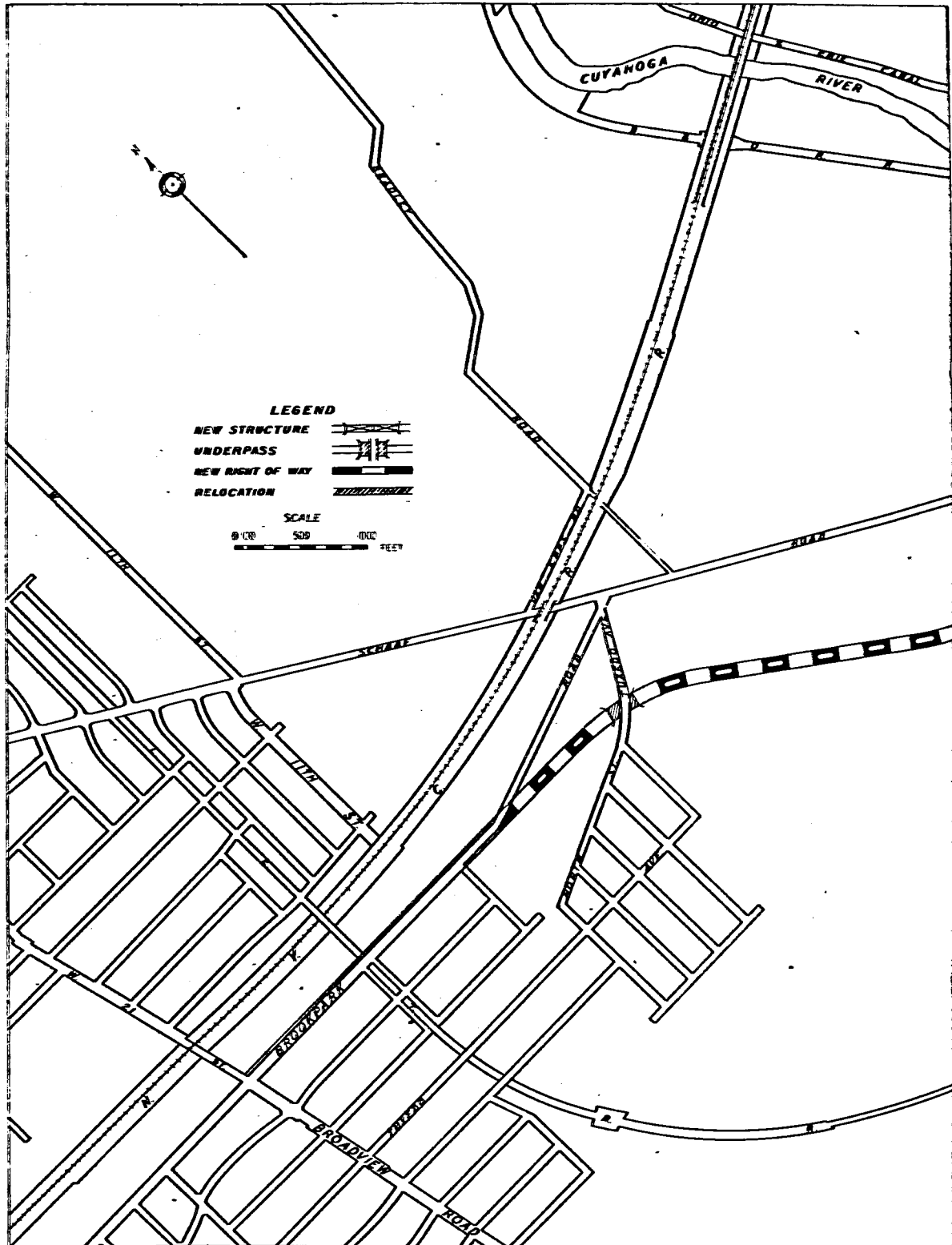


FIG. 8F.—South of area shown in Figure 8D, showing western part of Brook Park extension over Cuyahoga Valley

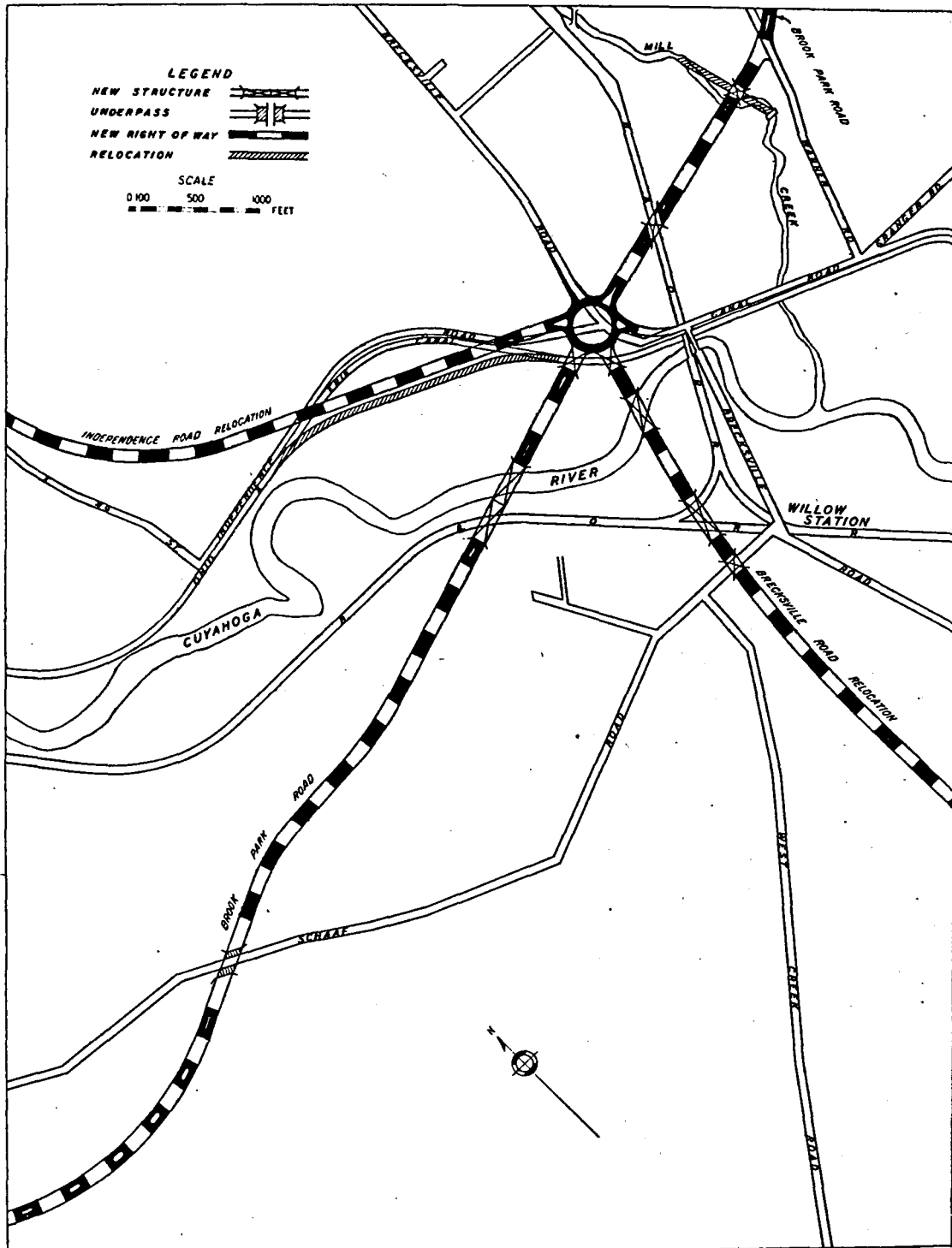


FIG. 8G.—South of area shown in Figure 8E and east of area of Figure 8F, showing Willow Circle with Independence Road, Brook Park Road, Brecksville Road and Canal Road connections

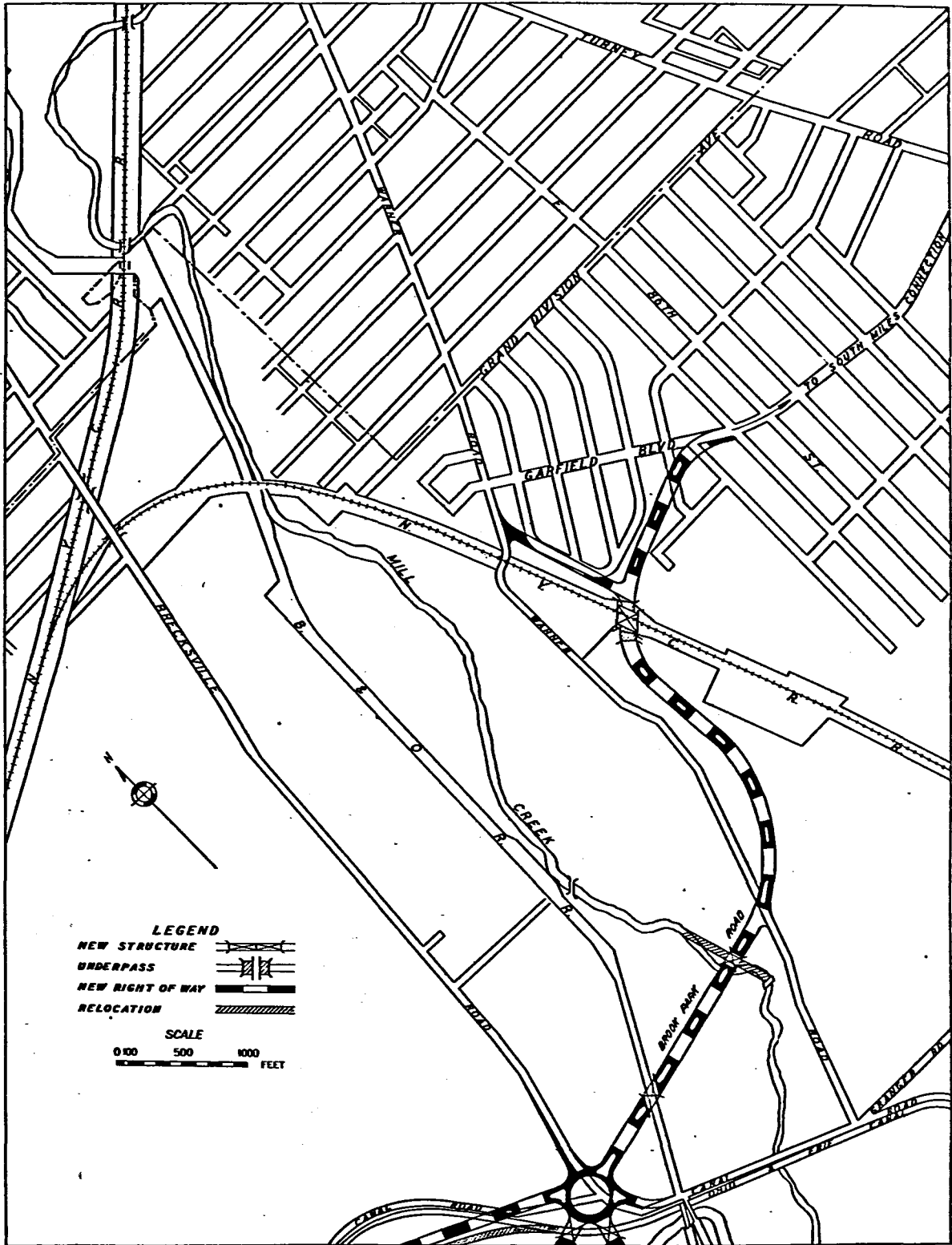


FIG. 8H.—East of and partially overlapping area of Figure 8G, showing Willow Circle with Brook Park Belt Road connection to Garfield Boulevard and Warner Road relocation

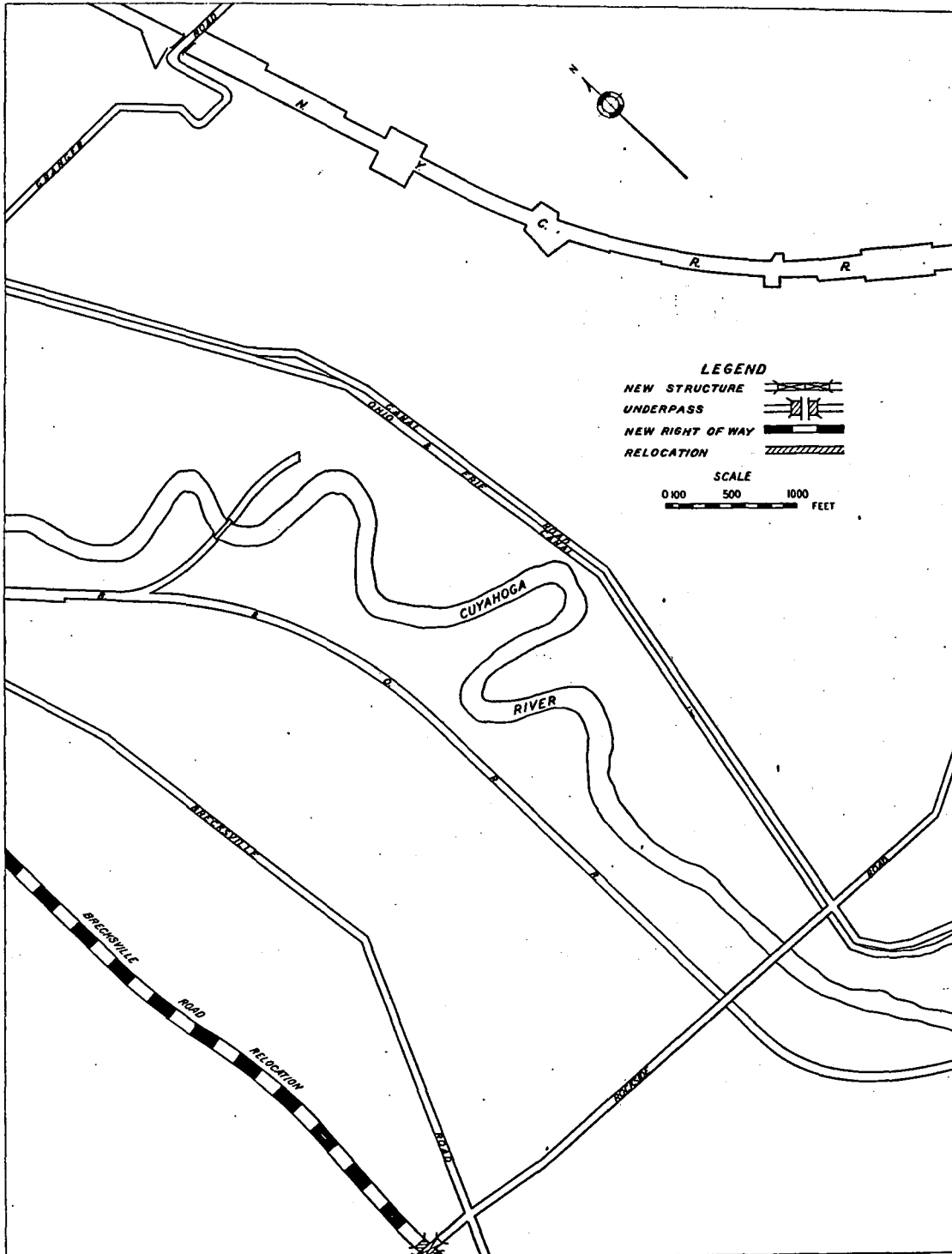


FIG. 8I.—South of area of Figure 8G, showing continuation of Brecksville Road relocation to Rockside Road

TOWN INDEX

Bay A B 4	Cleveland C D E F G H 2 3 4 5 6	Highland Heights I J 2 3	Miles Heights M 5 6	Rocky River C 4 5
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Broadview Heights F 8 9	Fairview C 5	Mesple Heights H 6	Parma D E 6 7	University Heights H 1 4
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Brooklyn Heights F 6	Gates Mills J K 3 4	Mayfield Heights J 3 4	Pepper Pike I J 4 5	Warrensville Heights I 5 6
Brookpark C D 6	Glenwillow I J 7	Middleburg C D 7	Richmond Heights I 2 3	Westview B 7
Chagrin Falls K 5 6				

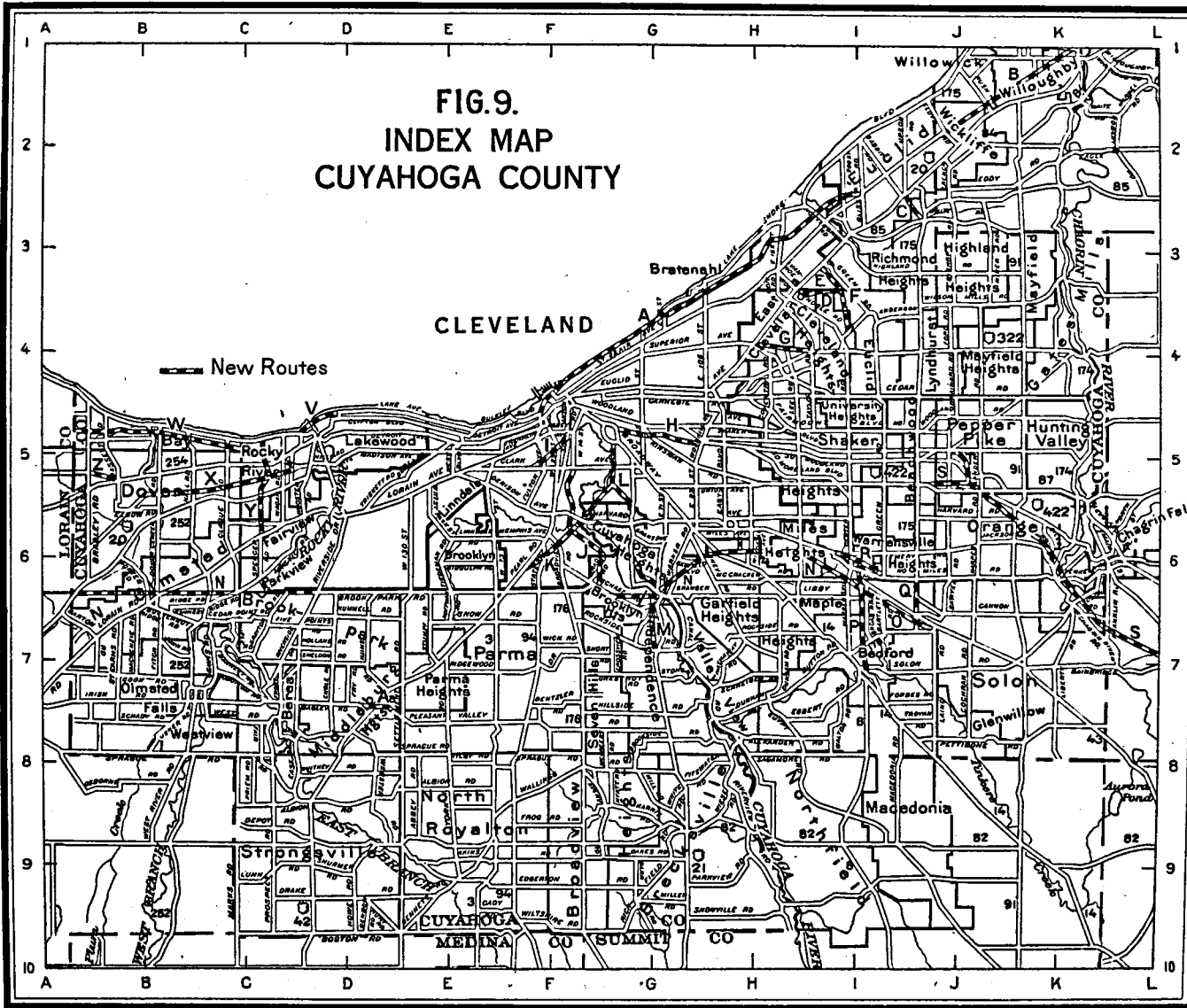
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Alexander Road H 7	Crossview Road F 6 7	Harper Road J 5 6	Miles Ave. G 5	Sprague Road E F 7
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FIG. 9.
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CUYAHOGA COUNTY



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