Some Recent Highway Development.

Progress Noted in State-Wide Planning, Estimating Financial Returns, and Roadside Improvemer

ADDRESSES on three recent developments in the highway field were made on January 21, 1937, at the Annual Meeting of the Society. Abstracts of these papers follow. The first two papers, dealing with planning for highway systems on a state-wide basis and methods for estimating financial returns from a typical new major artery, were delivered before the Highway Division. The third, presented at a session of the City Planning Division, emphasizes the importance of rural zoning in roadside improvement.

In the first paper, Mr. Fairbank points out that the expansion of good roads in America has been in part unsound and uncoordinated, because factual data for better planning were not available. But now a better type of planning is in view, and already forty states have undertaken to cooperate with the U. S. Bureau of Public Roads in extensive planning surveys, largely with the aid of federal funds. The surveys include an inventory of road details and structures, a study of traffic as to character and flow, weight and commodity surveys, financial compilations, and studies of road life.

The second paper of the symposium, by Mr. Downer, deals with one of the latest additions to New York City's highway facilities—the Henry Hudson Parkway, opened in December 1936. Starting near the north end of Manhattan Island, it provides an outlet for Riverside Drive to the north, connecting with the parkway system of Westchester County. Favorable income figures for the first month of operation lead him to conclude that the project will easily carry its interest load and will also increase traffic on connecting parkways.

Various ways for improving roadsides are discussed by Mr. Carmalt. The best and most important of these is control of the countryside through which the highway passes, to be effected by broad zoning regulations restricting the use of land. This rural zoning is usually much simpler than that for cities, and local plans may be developed simultaneously with general or regional ones.

State-Wide Highway Planning Surveys

By H. S. FAIRBANK

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IN the summer of 1935 the U. S. Bureau of Public Roads laid before all state highway departments a proposal that they join with it in a series of related fact-finding studies designed to develop information needed for a sound program of future highway improvement. The Bureau also proposed that advantage be taken of a recent provision which would permit the larger part of the cost of the studies to be met with federal funds. Several states responded favorably at once, and in November 1935 the first work was begun in Pennsylvania, followed quickly within a year by cooperation in 40 states.

In proposing the studies, the Bureau recognized that in improving our roads we have reached the end of a pioneer period and that policies and attitudes adapted to former needs would require modification to fit them to the altered conditions of the new stage. It was to develop the essential information and to draw a clearer picture of further improvement needs that the studies were mainly designed. A secondary motive is to replace with indubitable facts the mass of conflicting opinion and biased report used at present in the taxation and regulation of highway vehicles and traffic, and in the coordination of highway transport with other forms of transportation.

RURAL ROADS IN TWO CLASSES

Until recently rural roads have been treated in two distinct categories for purposes of administration and improvement. In the one group there has been a gradually increased mileage, now approximating 330,000, constituting the state and federal-aid systems of main intercity highways. This has been improved under the state highway departments, in part alone but often jointly with the Bureau of Public Roads, and financed with state and federal funds. These main highways vary in proportion to the whole rural road mileage from state to state, ranging from about 5 to 40 per cent. According to rough approximations, they serve from 50 to 70 per cent of the whole rural highway traffic, measured in vehicle-miles. These roads as a result of methods designed to hasten their improvement as a continuous system, now permit travel to all parts of the country with reasonable facility, but much remains to be done to make them truly adequate for the service they are called upon to render. They need improvement not only to provide

AN AUTOMATIC, ELECTRIC-EYE TRAFFIC RECORDER

Invisible Beams from Twin Lights at Right Are Focused on Electric Cell of Counting Mechanism Opposite. Pedestrians, Intercepting Only One Beam at a Time, Are Not Recorded

further refinement, deliberately deferred in favor of more essential fundamental improvements over the whole system, but also to meet the progressive demands of traffic, especially the recent marked changes in the speeds of automobiles.

In the second of the two principal groups has remained the far larger part of the rural mileage, roughly estimated at 2,700,000. This group, made up mainly of roads inferior in traffic importance to the first, and affording local service, has been improved to varying degrees under thousands of local governing authorities. Serving in the aggregate roughly 40 per cent of the total rural vehicle-mileage, these roads include some sections that probably compare favorably in importance with parts of the main system and, at the other extreme, thousands of miles on which the daily traffic can be tallied on the fingers of one hand.

Because of the chaotic state of local government records, it is little better than a guess that approximately a third of the total mileage has been improved to some degree. But to what extent the improvement is satisfactory, and how much further improvement is needed are questions that have been wholly beyond the possibility of reasonable answer.

GROWING TAX DIVERSIONS

From the beginning it has been the policy to improve main highways through motor-vehicle license fees and gasoline taxes and all federal highway appropriations. An assured and increasing revenue from these sources has made possible an orderly improvement. Real property taxes, at first furnishing considerable revenue, have been progressively withdrawn and are now unimportant.

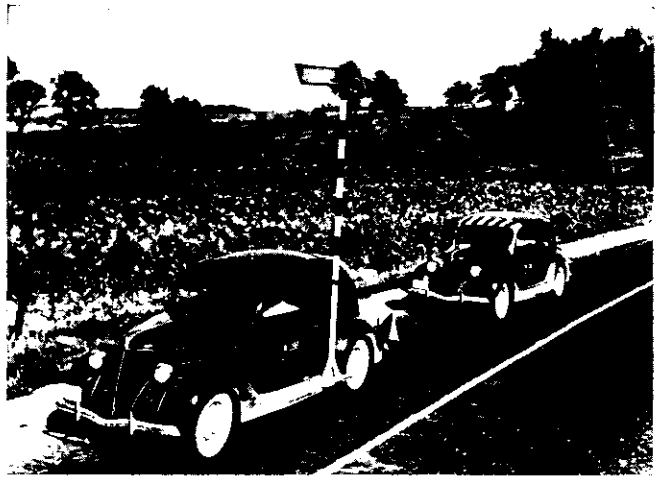
For the local roads, property taxes have always, until lately, furnished the greater part of the revenue required; but as time has gone on motor-vehicle and gasoline taxes have been slowly but steadily transferred, in increasing amounts, for their improvement. And in recent years, by abrupt and in most instances ill-considered action, the whole burden of local as well as main road improvement in several states has been shifted to the shoulders of the motor-vehicle owner and gasoline taxpayer. Also, there has been a similarly gradual increase in those revenues allotted for city street purposes.

These tendencies reached a climax during the depression, with the widespread abandonment of the effort to raise property taxes for road purposes and the aim to devert motor-vehicle and gasoline revenues to various purposes foreign to road improvement. This tendency was halted by the penalty provisions in the Hayden-Cartwright Act of 1934, but not before the diversions had imperiled the continuance of even the most essential highway operations. The situation was relieved—in some states in the nick of time—by the increase in federal highway appropriations designed to promote employment during the emergency.

What might have been a major catastrophe was thus temporarily averted, but as many of the causes that tended to precipitate it remain, there is still occasion for grave concern as to the future support of the highway program.

SAFETY AND ECONOMICS ARE PRIME OBJECTIVES

Although not generally realized, it should be apparent that the first obligation payable from future highway funds is the maintenance and further improvement of the more important highways. Such roads urgently need further improvement. Recent increases in speeds require a general easing of existing sharp curvature and a general lengthening of present restricted sight distances. Surfaces of low type, intended for temporary service, must be raised to their ultimate standards. There is widespread need for more liberal width on two-lane roads, for pavements providing more than two lanes, and for the correction of devious alignment and indirect routing. These will necessarily involve expendi-



TWO CARS ARE USED TO MEASURE SIGHT DISTANCES
All Those Less Than 1,000 Ft on Main Highways Are Recorded

tures far beyond past outlays, especially in view of the greater widths now considered essential. Other probable needs are for a limited mileage of express highways, for a program of railroad grade-crossing elimination, and for separation of grades at intersections of important highways.

These needs are expressed in most cases in the undeniable terms of safety and prime economic and social benefit. They constitute therefore, with maintenance of the existing capital investment, a first draft on future available revenues, and must be so treated. But though the need is recognized in general, there is nowhere such an exact knowledge of the particular requirements as will be necessary for a prudent reservation of covering revenues. Such an itemization of the further needs of the main highways is one of the principal objects of the planning surveys.

Other purposes are: First, to determine, by such objective tests as may be feasible, the relative economic and social services performed by all parts of the large mileage of roads not included in the present main highway system; and then to determine how much of the more important parts of this mileage it will be possible to improve, and to maintain as well, within the limits of the funds likely to be available after deduction of the amounts essential for the support of main highways.

Observe that emphasis is placed upon a proper provision for the maintenance of what is built. This includes also the renewal of road plant as depreciation and obsolescence require. Unless this future obligation is provided for, we may find eventually that we have created a larger investment than we can comfortably maintain. In determining how far it is wise to go in improving additional mileage of local roads, we must set off against future revenues the whole annual cost of the improved mileage, in which the costs of future maintenance and renewal must be included.

In their bearing upon the problems of the lesser roads, the planning surveys are designed to reveal not only the relative importance of the roads and the true cost of their improvement, not only the mileage that can be improved within the limits of funds probably available, but also their future administrative control, and especially

the sources from which the revenues necessary for their construction and maintenance may fairly be drawn, with due consideration of the benefits they afford.

SOME QUESTIONS TO BE ANSWERED

The tendency to transfer a larger part of the cost of highways to those who, as users, benefit most directly

SHOWING METHOD OF DETERMINING WHEN THE SIGHT DISTANCE IS LESS THAN 1,000 FT

Rear Car Keeps Approximately 1,000 Ft Behind Front One by Watching Interception of Horizontal Sighting Bar on the Stadia Rod Carried by Forward Car. When Occupants of Cars So Spaced Lose Sight of Each Other, They Have Found a Sight Distance That Must Be Measured

from them, raises important questions as to the additional amount that may be extracted from such users as a body and, particularly, as to the relative amounts of the whole road-user contribution that should be paid by passenger automobiles and by trucks and busses. At present there is a lack of acceptable basic information concerning the actual characteristics of the various classes of vehicles in relation to highway demand.

Nominal capacity classifications of motor trucks by manufacturers give no clue to the loads actually carried. But what are these actual loads? Gross loads of vehicles do not determine the design or the cost of the highway structures; wheel loads are the determining factors. But what are the customary maximum wheel loads of separable classes of vehicles? The mileage of roads that must be designed for use by heavy vehicles and the consequent effect of such heavy vehicles upon the total highway cost depends upon the actual range of operation of such vehicles. What roads are they likely to use in sufficient numbers to require an improvement consistent with such use? The surveys will supply the factual answers.

The existing hodgepodge of laws regulating the use of the highways is commonly deplored. Generally, there is lip service to the need of uniformity as between states. Among the studies included in the planning surveys there is definite provision to supply these needed facts with certainty and beyond controversial refutation.

BEGINNING WITH AN INVENTORY

As a precise knowledge of the present extent and condition of the whole highway system is the first essential to further effort in highway improvement, so an inventory is the first phase of the planning surveys. The inventory is taken by driving over every mile of the rural road system as it exists on the ground. By odometer measurement the length of each section is determined, and a record is made of all the other details of the road and its structures.

On the main roads, where safe service of high-speed traffic is an imperative objective, the existing curvature and sight distances are being tested according to standards chosen as the minima essential for the service of definite maximum speeds, assumed to be 60 miles an hour in non-mountainous areas and 40 miles an hour in mountains. Reasoning that 6 deg is the limit of curvature safe for travel at 60 miles an hour in the presence of a maximum practicable superelevation of $1^1/_4$ in. per ft, all curves on the main highways in non-mountainous territory that exceed this limit are being located and measured. In mountainous terrain, with a 40-mile speed as the criterion, there is similar location and measurement of curvature on the main highways exceeding 14 deg.

With the same speeds in view, the inventory of the main highways also includes the location and measurement of all sight distances that, for any reason, are less than 1,000 ft in non-mountainous sections and 650 ft in the mountains. Also, on the main highways, where heavy trucks and trailers of relatively low hill-climbing ability are to be expected, all grades longer than 500 ft are being measured and recorded—in non-mountainous areas if they exceed 5 per cent, and in mountains if they exceed 8 per cent.

At level crossings of railroads all existing physical conditions are being exactly recorded. To these data there is to be added later a record of the highway traffic over each crossing, and with the aid of the railroads, a record of rail traffic and accidents. When all these facts are available for every crossing, it should be possible, as it has not been heretofore, to measure the dimensions of the grade-crossing problem and to establish an order of priority in grade-crossing elimination.

Such an inventory, which also includes exact information concerning the distribution of homes and business places in rural areas, should be invaluable to future highway and other public planning.

THEN TRAFFIC STUDIES

As the second major department of the surveys, there will be a variety of studies of the character and flow of traffic, of the kind generally included in traffic surveys

A WEIGHT STATION ON OHIO ROUTE 31

Portable Scales Are Used for Trucks and Busses

but extended for the first time beyond the main highways and covering the whole rural road system. The first use of these studies will be to establish the present relative traffic importance of all rural roads. On the basis of such information it will be possible for the first time to determine what selected sections of the road system serve any given percentage of the whole traffic movement, measured in vehicle-miles.

Origin-and-destination studies of one type will provide the data necessary for the solution of recognized problems of highway relocation. Another type will bring out clearly such differences as there may be in the character of use of the main highways and the local roads. It is generally supposed that main highways serve a far-ranging traffic, which in considerable part spans state lines and constitutes a through movement between cities. It is also assumed that traffic on the lesser roads is of more local origin and service. The origin-and-destination studies will establish the true conditions, whatever they may be.

A SURVEY RECORDER QUESTIONS A TRUCK DRIVER AS TO HIS ORIGIN, DESTINATION, AND OTHER MATTERS

The purpose of these determinations lies in the necessity of making a fair distribution of the cost of highways between urban and rural taxpayers and between road user and property-taxpayer—an object of such importance, and yet so elusive, that it is considered necessary to approach it by another type of investigation, called the road-use study. This is classed generally with the financial group, constituting the third major department of the surveys.

Two weight and commodity inquiries are also under way. One, conducted at many points on the main system with portable scales, and on the local roads by methods of estimation, seeks to determine the range of vehicles of the various weight groups over the whole road system, with the double object of supplying information essential for road-surface and subgrade design and determining the relative responsibility of the several vehicle groups for the repayment of road costs. The second study is conducted generally at a few permanent pit-scales, and is intended to fix with accuracy the true characteristics of various classes of vehicles. In both, account is taken of the commodities transported, for consideration in connection with weights and recorded lengths of haul in future efforts to promote a better coordination of all transportation facilities.

FINANCIAL STUDIES HAVE DIRECT APPLICATION

The financial studies, although the last to be mentioned, are likely to be the first resorted to in the program-planning effort for which the present surveys are designed to supply the basis. Their first purpose is to determine the full magnitude of the present financial provision for road and street purposes, and to reveal the existing relation between the sum of all highway revenues and expenditures and the grand total of all revenues of the states and their subdivisions for all purposes of government and public service. The next object is to classify revenues according to source, and expenditures according to object, and then to discover the incidence of the revenues, as payable by various taxpaying groups, and the shares of the same groups in the benefits resulting from the expenditures.

The relation found to exist will serve to indicate whether, and to what extent, it will be possible in the future to count upon a higher rate of taxation and expenditure for highway purposes; whether the tax burden is equitably distributed at present, and if not, what changes are needed to effect a juster balance. Special studies will ascertain how nearly the present rates approach the point of diminishing returns from all forms of taxes. By such studies as these it is hoped to indicate the probable maximum financial support that will be available for highways in the future and the taxing measures that will most equitably distribute the burden of such support.

And finally, by means of what are called road-life studies, an effort is being made to determine the economic life expectancy of various parts of the highway structure, and the amounts and trends of construction and maintenance costs, in order to determine the feasibility of future programs by comparison with the expected total of future annual revenues.

The surveys are being conducted in the states under the direct supervision of the state highway departments through organizations especially created for the purpose. The Bureau of Public Roads is assisting with advice and suggestions in the conduct of all the surveys. It is hoped that the experience of the accelerated surveys will lead to the establishment of a permanent fact-finding and planning function in all state highway departments.

Henry Hudson Parkway and Its Traffic

By JAY DOWNER
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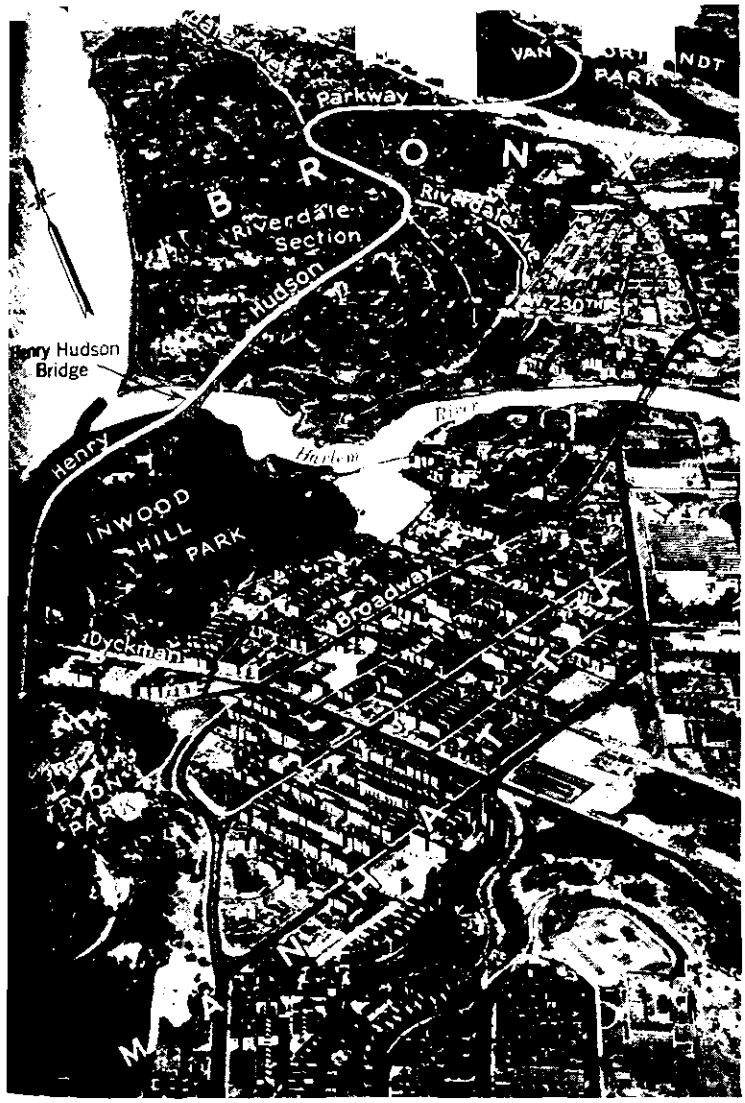
WHEN Westchester County built its main north and south parkways, it was realized that their connections in the Borough of the Bronx were inadequate. The pressure of traffic was there, but no effective steps were taken until about three years ago, when Commissioner Robert Moses took charge of New York City's park system with the result that, among the many recent improvements, we now have the Henry Hudson Parkway, opened for traffic in December 1936.

One of the main arteries for passenger-car traffic to the north through Manhattan has been the Riverside Drive. Extending from 72nd Street along the Hudson adjacent to Riverside Park for about seven miles, it discharged its heavy traffic on to city streets near the upper end of the island. Thence vehicles found their way as best they could over crowded thoroughfares with resulting conges-



AERIAL VIEW OF PARKWAY PROJECT FROM SOUTHERN END

tion, until they reached state highways; or if they could follow the tortuous connections to the city line, the several parkways of Westchester County would provide free movement of traffic.

THE HARLEM RIVER BOTTLENECK

The problem was to by-pass the bottleneck where Broadway crosses the Harlem River on a narrow drawbridge with approaches obstructed by elevated columns and burdened with the heavy truck and passenger-car traffic bound for the westerly side of Manhattan Island. Many studies had been made, but the cost of a new bridge over the Harlem River has heretofore blocked and discouraged official action. The serious congestion caused by this bottleneck is now relieved by the Henry Hudson Bridge and Parkway. Although it is now (January 1937) an infant of only one month in point of service (with northerly approaches still under construction), it has already assumed an importance and dignity reminiscent of maturity. In thus complimenting the parkway, I can renounce any personal credit because I had no connection with the construction except, in common with many engineers and civic officials, to encourage this extension of Riverside Drive to tap the Westchester County system.

To understand the objective and financial status of the parkway, reference may be made to the public announcement of no less an authority than Commissioner Robert Moses. He is the sole member of the Henry Hudson Parkway Authority, charged with the responsibility for the work. At the time the parkway was opened, Commissioner Moses characterized it as the first completed link in an express highway and parkway system that will extend the full length of Manhattan Island and the Bronx, tying into all the major arteries entering New York City. When the West Side Improvement in Riverside and Fort Washington parks and the West Side Express Highway south of 72nd Street are finished, a motorist will be able to enter this marginal drive at the Battery—the lower tip of the island—and travel north without interruption to the parkways of Westchester County. Through traffic will flow directly into it from the George Washington Bridge, the Holland Tunnel, and the new Midtown Hudson Tunnel.

Bridging the $4\frac{1}{4}$ miles from the Saw Mill River Parkway in Westchester to Riverside Drive, as noted in one of the photographs, the Henry Hudson Parkway is a vital unit in this new metropolitan highway system. It eliminates one of the worst traffic "sore spots" in the city by breaking the bottleneck across the Harlem River at Broadway and 225th Street. Starting at the city line, this new parkway cuts south through Van Cortlandt Park, then through a residential section known as Riverdale, to the bluff above the Harlem River Ship Canal. A high-level bridge carries it across to Inwood Hill Park, through which it curves to reach Riverside Drive just below Dyckman Street. It also will connect at this point with the parkway under construction as part of the West Side Improvement.

The project was the joint work of the city, represented by the Henry Hudson Parkway Authority, and the State Department of Public Works. The Authority, which was created by the 1934 Legislature, built the Henry

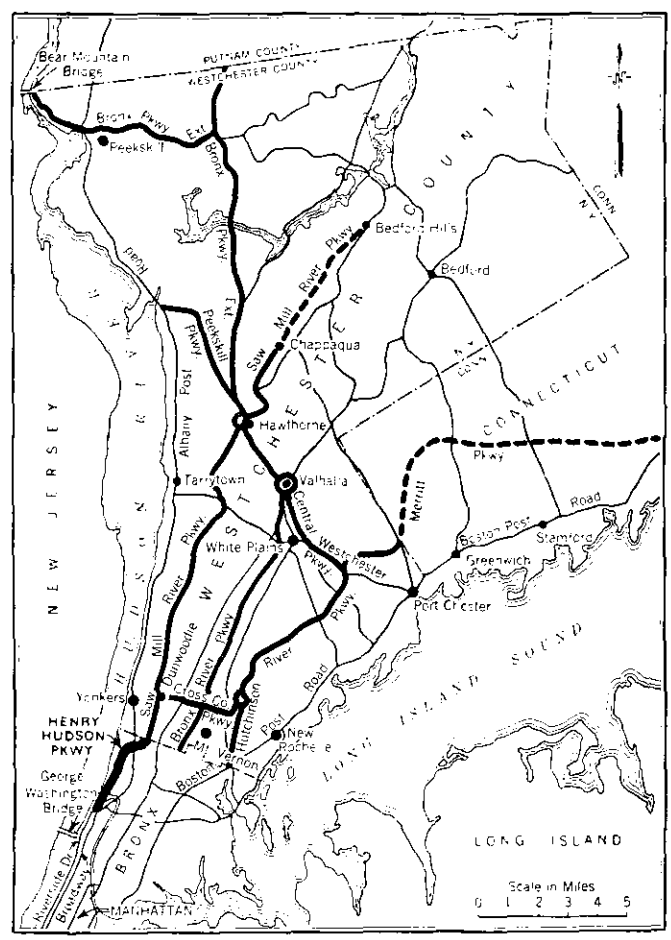


FIG. 1. WESTCHESTER COUNTY PARKWAY CONNECTIONS WITH HENRY HUDSON PROJECT

Hudson Bridge and the lower half of the parkway with the proceeds of a privately subscribed bond issue. The upper half, north of the Spuyten Duyvil Parkway, was constructed by the N. Y. State Department of Public Works with state and federal highway funds on rights of way acquired by the city and the Authority.

Outlining the development of the work, Mr. Moses explained that traffic and engineering studies for the

Fairchild Aerial Surveys, Inc.

HENRY HUDSON PARKWAY, SOUTHERN END, WITH ARCH BRIDGE OVER THE HARLEM

Inwood Park in Foreground; Riverdale Section Beyond; Hudson River at Left

improvement were made in 1934, and in the summer of that year work at the lower end was begun with relief labor. Throughout subsequent construction, relief labor continued to be used for grading operations and for the paving of service roads and sidewalks.

In January 1935, the city acquired the necessary right of way through the Riverdale section at a cost of approximately $1,260,000. The state started work on the northern 2¼-mile section in the spring of that year. Since then it has spent $2,750,000 of highway funds for grading, paving, and the construction of nine grade separations.

The Authority's bond issue of $3,100,000 was offered for sale in April 1935. About July, work was started on the $1,250,000 arch span over the canal. This structure was so located as to take advantage of the natural heights on each bank in providing adequate clearance for river traffic. It is 142.5 ft above mean high water at the center and has a total length from pier to pier of 840 ft. It is a fixed arch composed of steel plate girders. In addition to this bridge the Authority has built four grade separations and a ramp leading up to Riverside Drive.

According to the Authority's agreement with the bankers who floated the loan, they will advance an additional $1,400,000 for an upper deck on the bridge as soon as traffic tolls warrant it. At that time a second roadway will be built through Inwood Hill Park, and traffic will be made one-way on each deck. At present the 40-ft roadway through the park and over the bridge carries two lanes of traffic in each direction. North of the Harlem span, two 32-ft roadways separated by a central mall have been laid out, although they are only paved to 21 ft at present for part of the distance.

AMPLE CONNECTION TO WESTCHESTER

From this brief outline, based on Commissioner Moses' description, the main features of the work will be apparent. At the southerly line of Westchester County the parkway connects with the Saw Mill River Parkway and the entire Westchester County system (Fig. 1), comprising 170 miles for which rights of way have been acquired, of which 94 miles are completed and under traffic. The Saw Mill River Parkway, now opened to Chappaqua, also connects with the Bronx Parkway Extension, which was built by the State of New York to the Bear Mountain Bridge approach, and which connects with the Eastern State Parkway. The latter extends through Putnam County (adjacent to Westchester on the north) and recently was opened up into Dutchess County, still further north, to within a dozen miles of Poughkeepsie.

Branching from the Saw Mill River Parkway at Dunwoodie, the Cross County Parkway, temporarily using a quarter mile of city streets, runs easterly and feeds into the Hutchinson River system, now open to the Connecticut state line. From this point, the Merritt Parkway, headed towards Bridgeport and further east, has some 14 miles graded. This should be ready for traffic later in 1937.

Thus we find that the new project is the only direct parkway connection between New York City's great West Side system, connecting with bridges and tunnels to New Jersey, and Westchester's far-flung parkways connecting with up-state New York and New England.

In order to build this very important link and by-pass for the congested Harlem River crossings, it was necessary to obtain extensive funds. After months of strenuous effort and many traffic surveys by various engineers, Commissoner Moses persuaded a group of wary bankers

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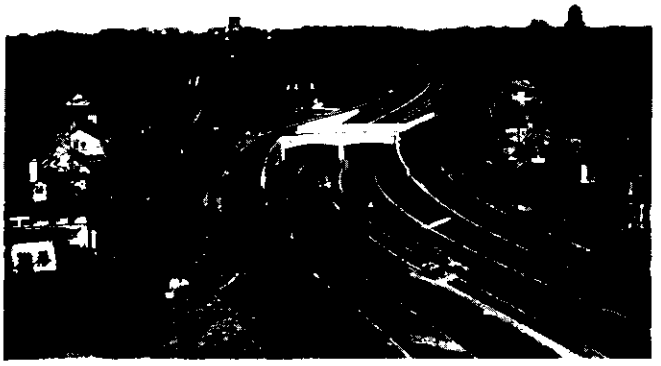
HENRY HUDSON ARCH BRIDGE OVER HARLEM SHIP CANAL

Longest Hingeless Steel Arch Has 800-Ft Span

to provide $3,100,000 against which the 10-cent tolls now being collected at the Henry Hudson Bridge were to be pledged. To get the remaining $6,000,000 to $7,000,000 ultimately required, Mr. Moses, with his characteristic energy and resourcefulness, proceeded to commandeer funds from all other available agencies, such as the U. S. Bureau of Public Roads, the State Highway Department, the City of New York, and WPA.

LOWER END OF THE HENRY HUDSON PARKWAY
Looking North from Fort Tryon Park



AT 232D STREET LOOKING NORTH
Bridge Construction Is Typical of That Used for Grade Separations

SOME TRAFFIC ESTIMATES

Based upon exhaustive traffic surveys and toll records of the Holland Tunnel and the George Washington Bridge, Madigan-Hyland, the consulting engineers, conservatively estimated that the Henry Hudson improvement, with its 10-cent toll at the bridge and free parkway approaches, would, in the 17 years 1937–1953 inclusive, earn $6,300,000 above operating expenses. Although this is more than double the amount of 4 per cent bonds issued, the estimate appears conservative. The bridge was opened to traffic on December 12, 1936, and collection of tolls began December 14. During the succeeding 35 days, December 14 to January 17, inclusive, tolls were collected from 368,598 cars, or an average of 10,531 cars per day. The George Washington Bridge, during these same 35 days, carried 8.171 per cent of its total traffic for the year 1936. If this 1936 ratio is assumed to hold for the Henry Hudson Bridge during 1937, it should carry more than 4,500,000 cars, or an average of 12,360 per day. Madigan-Hyland's estimate for 1937 was 3,560,000 cars, or an average of 9,750 per day.

Actually, however, the financial requirements for the first year will be met by a total of 2,690,000 cars, so that with experience thus far indicating 4,500,000 cars, the bondholders should be amply protected. The seasoned experience of this 10-cent toll route will be of particular interest to traffic engineers because it is in direct competition with a nearby free route. This alternate, along Broadway, is slightly shorter but is encumbered by heavy trucks, by elevated columns, and by a narrow drawbridge at the Harlem Ship Canal.

REGARDING THE FUTURE

It seems reasonable to predict for this new route a steadily increasing traffic, of which much will be drawn from competing thoroughfares, often shorter but not providing free movement. The Henry Hudson Parkway will materially influence traffic between New York City and Westchester County. In fact traffic on the Saw Mill River Parkway has already notably increased. But it will require two to three years to fully develop this influence. Fortunately data are available for accurate comparison with future traffic surveys so that eventually the extent of the influence of the Henry Hudson Parkway can be satisfactorily measured.

Under the direction of Commissioner Moses, Madigan-Hyland were the engineers in general charge of the project. Of this firm, Emil H. Praeger is chief engineer; Gilmore D. Clarke is consulting landscape architect on the project; and Robinson and Steinman and Waddell and Hardesty were consultants on bridge design—all Members of the Society.

Rural Zoning and Highway Improvement

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BEFORE discussing the subject of rural zoning as related to highway improvement, it is desirable to clarify the terms used and the scope of the problem. The term "rural zoning" is used, not in the strictly legal sense of zoning outside incorporated areas, but to indicate zoning in rural districts as distinguished from urban or suburban districts, no matter how administered. The control unit may vary—it may be the city, town, borough, county, or state—but the legal limitations of land use constitute the problem to be considered.

The term "highway" is used to cover all major highways, whether state, county, or municipally controlled; and "improvement" refers not to the road structure but to its borders. Generally this is spoken of as "roadside improvement." Roadside improvement in rural areas may be subdivided according to its physical limits into

control of the right of way, control of the borders or roadside strips, and control of the countryside.

Only in a remote way can control of the right of way be associated with zoning, for within the right-of-way limits, the highway administration has complete control. The way in which the highway administration's power is exercised depends upon its vision and foresight, upon the funds at its disposal, and upon certain powers, mandatory or permissive, granted by the legislative body. Where the right of way is narrow, the most that can be done is to keep it as clear of obstructions as possible. If the right of way is sufficiently wide to permit adequate landscaping and to provide safe access from adjoining land, the highway administration can have some influence by example in inducing abutting owners to do their share in preserving the attractiveness of the open country.

A forward step along this line has been taken in some progressive areas where rights of way from 125 to 150 ft in width have been taken up in anticipation of heavy traffic. Under such conditions, provision can be made for the safety of through traffic by providing service roads and parking spaces entirely separate from the through lanes, with access to the latter completely under control. The same idea can be carried out with freeways and parkways. As all such rights of way become the property of the state, their control and use rest absolutely in the state, acting through its highway administration. Ample width is the controlling factor in this type of improvement.

THE VALUE OF BORDER RESTRICTIONS

The control of the borders through the zoning of roadside strips is an application of the police power similar to all other zoning. If control of land for distances up to 500 ft from the highway can be established, its enforcement will so regulate the private frontage that developments injurious to safe traffic operation can be prevented and the rural and natural features of at least that much of the countryside be preserved. A very able presentation of this form of control was given by Flavel Shurtleff, counsel for the American Planning and Civic Association, in its bulletin, *Planning Broadcasts*, for October-November, 1936, under the title, "Proposed Legislative Program for Roadside Improvement."

To summarize, control of roadside borders will prevent the improper location of billboards; concentrate commercial uses such as filling stations, repair shops, lunch rooms, and other roadside stands, and the normal commercial needs of the rural population at suitable places along the highway; and preserve for the enjoyment of travelers the natural features of the area. Although the provision of a controlled strip over 1,000 ft wide will go a long way towards our general objective, it has the drawback that it is limited in scope and is not under local but state control.

A NEW ENGLAND COUNTY ROAD THAT HAS BEEN RUINED BY UNDISTURBED EXPLOITATION

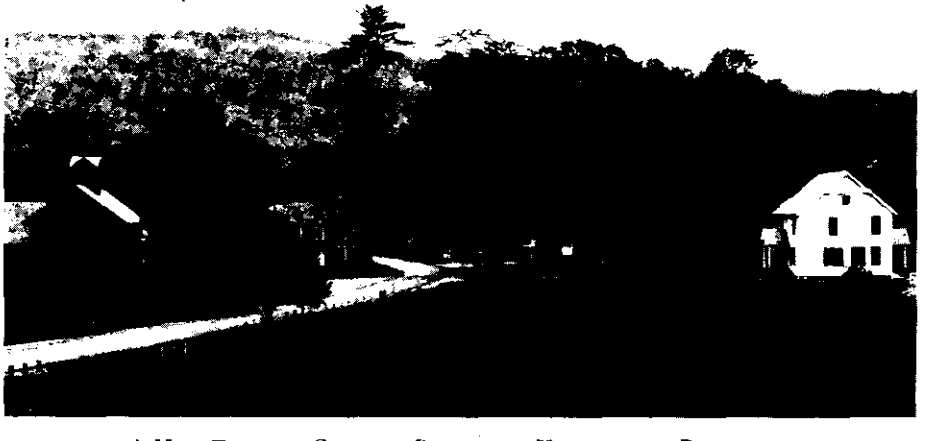
If balance between all phases of land use is desired, zoning of the countryside by local governmental bodies is necessary. This is true zoning as developed during the last 30 years, and is now thoroughly supported by judicial decisions. It would follow the accepted principles for segregation of the different land uses, as in the proposed control of roadside strips. To be effective it would have to be very closely coordinated with the general plan for the territory.

COUNTRYSIDE CONTROL RELATED TO HIGHWAY USE

In connection with the control of the countryside, it is important to consider the purpose of the highway, whether it is needed for local use only, for through travel only, or for both. (The term "local" is here used to designate traffic which does not extend further than the distance between two adjoining centers of population.) While no hard and fast rules can be established for these different classes, each has its own field, and individual conditions have to be taken into account when broad principles are applied.

The first class of road, that for local use only, is practically confined to feeder or "farm-to-market" roads. Unless they are hard-surfaced, they are rarely used for recreational purposes. Occasionally they are purely commercial, connecting a quarry, gravel pit, sawmill, or other local industry with a main highway. Except at intersections, roadside stands and filling stations have no place, and the question of roadside treatment becomes negligible.

The second class of road, that for through traffic only, includes the freeway and parkway, as well as by-passes around centers of population and other congested points. In establishing freeways and parkways, the state has by its very act recognized the desirability of controlling a wide right of way. A by-pass, however, is usually little more than a diversion of the existing highway, and the control



A NEW ENGLAND COUNTRY ROAD WITH UNDISTURBED BORDERS
The Natural Setting Is Sufficient Beautification

Head and Body of "Giant" from a Distance

Close-Up of Head Reveals Quarrying Disfigurement

TWO VIEWS OF MT. CARMEL, "THE SLEEPING GIANT," NEAR NEW HAVEN, CONN.

of its roadside extends over the customary limited right of way only. Although these by-passes are intentionally located through open country, the opportunity for controlling the abutting property has rarely, if ever, been used, even where zoning commissions exist.

In one case in Connecticut a by-pass of some $2^1/_2$ miles through open farm land was zoned for commercial use throughout its entire length, although the community concerned has a population of less than 15,000. As might be expected, the result is a slow, scattered growth of unsightly stands and industries, with billboards at frequent intervals, and a slow deterioration of such residences as originally existed. The highway department, although it has an active roadside division, has done no landscaping except at some intersection islands, having been discouraged from any attempts along the borders, where hot-dog stands, garages, filling stations, or factories might be established any day. Since the value of by-passes as a preventive of traffic congestion is being appreciated more and more, they afford an exceptional opportunity for developing the principles of roadside control, and they might well be used as an object lesson for further expansion.

In the third class of road, that for both through and local traffic, we have by far the greatest part of our highway mileage, but the relative proportions of through and local traffic vary greatly. For example, U. S. Route 1 carries a large proportion of local traffic between Philadelphia, New York, and Boston, in addition to the through traffic. Treatment of an artery such as this would probably be in a class by itself. But the thousands of miles of state highways throughout the United States for which two traffic lanes will amply suffice constitute the major problem. It is to them that the recreational feature so largely applies, and it is there that broad-scale zoning is essential.

RURAL AND URBAN ZONING COMPARED

In considering the different types of zoning applicable to our problem, we must bear in mind certain factors which influence rural rather than urban conditions. Zoning, like all phases of planning, consists in looking forward, in providing for future improvement. Under urban conditions we have to deal with a complex mass of individual interests which, through long habit, have become so established that the changes necessary to make a harmonious pattern are difficult to carry out.

Our urban zoning maps, in consequence, are usually unbalanced. The effect of enforcing them can thus be merely the prevention of worse conditions rather than the improvement of existing ones. It is only on the outskirts of metropolitan areas that we can really look ahead and give serious attention to the esthetic features which should accompany any balanced and harmonious development. Of course, some attention can be given to the esthetic phases even in built-up sections, but the results can be of local effect only, and can hardly form a part of a general comprehensive harmony.

In the country, however, the situation is very different. Individual land holdings are large; consequently, conflicting interests are relatively few. The territory as well as the population is more homogeneous, and the individual problems are apt to be similar and consequently can be more readily solved. What would be a major change in the city becomes only a slight alteration in the country, because of the larger open spaces. As a result the zoning regulations can be much simpler and more readily understandable. The rural population, to be sure, is more independent and less aware than city dwellers of the need for cooperative effort. However, since there are fewer individuals to deal with, a well-planned campaign of education, founded on a careful study of conditions, should secure early approval of the ordinance and map.

CORRELATING LOCAL AND GENERAL ZONING PLANS

Rural zoning maps should be correlated with the general plan of the territory. In the country, the problems of both are closely allied and are relatively simple, as they are both based on the same fundamental principles —the economics of land use and regard for the recreational and other social needs of the relatively sparse population. Because of their homogeneity, the two problems can be readily studied together, and the economics of roadside and countryside improvement can be brought more easily into the picture. Provision for wide rights of way, and for highway locations and alignments that will bring out the natural beauty and reduce construction scars, are worth-while details which should be studied when developing the general plan; vice versa, such zoning regulations as will segregate unsightly uses, and assign them to the less prominent locations, should be given special consideration.

In conclusion it may be said that the subject of the relationship between rural zoning and highway improvement presents many phases. This paper is merely an attempt to bring into the foreground the salient factors involved. The multiple aspects of the problem should not distract attention from our main objective—the improvement of state highway roadsides by means of different forms of rural zoning.