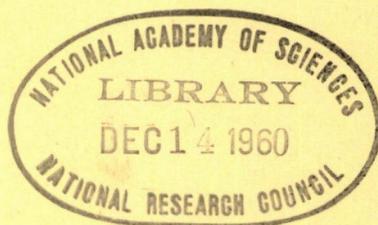


HIGHWAY RESEARCH BOARD

Bulletin 256

Urban Research
1960



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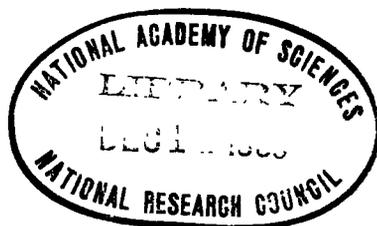
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R.C. **HIGHWAY RESEARCH BOARD**

Bulletin 256

Urban Research
1960

Presented at the
39th ANNUAL MEETING
January 11-15, 1960



1960
Washington, D. C.

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Report of Committee on Urban Research

E. WILLARD DENNIS, Chairman

● THE COMMITTEE on Urban Research, a special committee of the Highway Research Board, was created in April 1954 in response to the recommendations of a conference of researchers, engineers and planners called by the National Academy of Sciences — National Research Council to review the problems of burgeoning metropolitan areas.

The committee recognizes the interlocking character of the many human activities of the whole urban complex. It is sensitive to the need for research which takes into account this interrelationship of all forms of urban activity. The committee underscores the great need for research into urban transportation problems, not as a separate subject in itself, but in its context as a vital part of urban life. Transportation problems affect not only the physical and functional city but also the social aspects of urban life; this must be kept in mind when studying these problems.

The mission of this committee is to promote study of the workings of the urban system in order to increase understanding of the interrelation of urbanization and transportation. Specific committee objectives are:

1. To identify needed research and to recommend priorities.
2. To promote such needed research through conferences, publications and staff activities, and to encourage financial support from public agencies, businesses, foundations, and other organizations.
3. To establish and maintain a clearinghouse for urban research to (a) inform researchers on current work and (b) inform interested persons and groups on new research findings and publications.

Committee activity from February 1959 to April 1960 was concerned with the matters outlined in the following.

URBAN RESEARCH FRAMEWORK STUDY

In October 1959 the Highway Research Board published its Special Report 52, "A Framework for Urban Studies — An Analysis of Urban-Metropolitan Development and Research Needs." This study was sponsored by the Committee on Urban Research, upon the recommendation of its Research Subcommittee, because of the growing awareness that urban problems were great and gaps in knowledge were numerous, and because little thought had been directed to priority needs and the sequence of research tasks. A careful over-all analysis was needed to provide an outline within which individual projects and research could best be undertaken and correlated. The committee enlisted the services of Dr. Coleman Woodbury, Director of Urban Research, University of Wisconsin, to carry out this task. HRB Special Report 52 is the result of his efforts.

It was not possible in this undertaking to detail specific projects or to deal with methods of research. The objectives of the study were to point out the scale and complexity of current urban metropolitan growth and development and to outline a number of major areas of urban study that add up to a significant program that might properly be endorsed and encouraged by a committee associated with the Highway Research Board.

The recommended program focuses on subjects, topics or areas in which competent studies would seem likely: (a) to add to basic understanding of urban growth and change, (b) to aid in public and private policy formulation and revision, and (c) to have some bearing on the job of moving goods and people in urban metropolitan areas. Following these three criteria, the program proposes inquiry into the nature, functioning, and interrelationships of the economic, governmental, physical and social character of cities. It contemplates direct research into urban phenomena, evaluation of policies and measures, and estimates of the costs and consequences of possible, but nonexistent, arrangements of urban facilities and agencies.

The proposed program is wide ranging but has two unifying themes: the need for basic understanding of current urbanization and the need for intelligent, farsighted and democratically formulated policies for realizing the potentialities of an increasingly urban civilization.

SEPTEMBER BUSINESS MEETING

A business meeting of the Committee on Urban Research was held in Chicago September 2, 1959, to consider a preliminary draft of Professor Woodbury's "Framework for Urban Studies." After discussion of the objectives, form, and function of the report, it was decided that the committee should take the following action:

1. Issue the report for the information of:
 - (a) Selected groups in the Highway Research Board and National Academy of Sciences — National Research Council.
 - (b) Colleges and Universities.
 - (c) Organizations concerned with urban problems.
2. Delegate to committee members the job of explaining to various organizations the needs expressed in this report, and to have these organizations interpret aspects of the report which appeal to them.
3. Attempt to get a prospectus which combines elements of this report and the previous suggestions for research projects.

SUGGESTED SUBJECTS FOR RESEARCH

The "Framework for Urban Studies" is a statement of needs in terms of broad research subject areas. In accordance with the course of action decided on at the September 2 committee meeting, the Research Subcommittee undertook to combine elements of the Framework Study with suggestions from other sources to come up with a prospectus for a program of specific studies in the field of urban research.

A chart and outline of "Proposed Subjects for Urban Research,"¹ prepared under the direction of the Research Subcommittee chairman, David R. Levin, represents, in the opinion of the subcommittee, the specific areas or subjects which are most deserving of research. The next steps will be to design studies to cover these subjects, to select persons and organizations to do the work, to obtain sponsorship for the work and, finally, to set up the studies as operating research projects.

ANNUAL BUSINESS MEETING

On January 11, 1960, the committee held a business meeting during the Highway Research Board annual meeting. The main topic of discussion was the possibility that an Urban Research Board would be created in the National Academy of Sciences and the effect of such an event on the activities of the Committee on Urban Research. Louis Jordan, Executive Secretary of the Division of Engineering and Industrial Research, NAS-NRC, and Professor Kenneth B. Woods, a member of the Executive Committee of that Division, discussed the status of the proposed organization and its relation to the committee.

The committee adopted the following motion as its position on this matter:

"The Committee on Urban Research of the Highway Research Board endorses and will enthusiastically support the establishment of an Urban Research Board in the NAS-NRC, and will continue to develop its own program of research in the Highway Research Board."

Another motion authorized the Research Subcommittee to develop a tentative program, concentrated on the transportation elements of urban research, and to bring such a program to the general committee for further action.

PAPERS PRESENTED AT ANNUAL MEETING

The Committee on Urban Research sponsored two open sessions at the annual meeting. Both were well attended. Four of the following nine excellent papers presented

¹ The chart and outline are included in Committee on Urban Research Memorandum 5 (HRB Circular 420, May 1960).

are included in this bulletin, the other five being in other HRB Bulletins as indicated:

"Research Needs in the Behavioral Sciences Relative to Highway Planning," by Lawrence Krader, Professor of Sociology, American University.

The paper comments on some of the human and community factors now taken into account in highway planning. It points out that the goal of planning is some image of a future America. The clearer and sharper this image is in focus, the better are the chances of achieving it. Behavioral science can contribute to highway planning by probing the conceptions of physical, social and cultural patterns which constitute this future image or goal in the minds of engineers and planners, legislators and administrators of public funds, and the public.

"Open Space Control," by Erling D. Solberg, Agricultural Economist, U.S. Department of Agriculture.

It is suggested that purchase of development rights be used along with acquisition of title and zoning regulations as a means of reserving open spaces. This device does not deprive the landowner of his present use, as does outright buying of title, and does provide a more permanent degree of control than is achieved through zoning. He covers the function of reserved open spaces and the benefits to be derived from them. He also points out some of the economic, legal, taxation, and planning problems involved in a program of open space control.

"Transportation Plans: Washington's Next Steps," by Robert A. Keith, Traffic Planning Engineer, National Capital Planning Commission; and Project Director, Mass Transportation Survey.

The paper briefly covers the outstanding features of the completed 4-yr survey of transportation needs in the Washington, D. C. area and goes on to indicate what steps will probably be taken as the proposal evolves from a planning agency report to a development agency construction program. The first steps undertaken will be studies by a permanent transportation agency to refine and improve background information on which system details are to be resolved. The most important steps will be working out the details of the physical system and the means of financing. A limited program of land acquisition should also be carried on during this study period in advance of construction.

"Zoning and Traffic Congestion," by William H. Stanhagen, Chief, Laws Research Project, Highway and Land Administration Division, Bureau of Public Roads.

Skillful use of zoning controls can do much to promote effective transportation systems. In this comprehensive analysis of the application of transportation factors in zoning law, zoning criteria which are responsive to transportation needs are identified and their use by the courts in deciding zoning cases is traced. It is suggested that certain criteria should be given more widespread recognition and that this can be achieved by use of better statements of legislative purpose in zoning laws and ordinances. Also proposed are new zoning criteria which, if recognized, would have a beneficial effect on the serviceability of transportation facilities.

"Estimating Efficient Spacings for Arterials and Expressways," by Roger L. Creighton, Irving Hoch, Morton Schneider, and Hyman Joseph, Chicago Area Transportation Study (in HRB Bulletin 253).

"Generation of Person Trips by Areas Within the Central Business District," by B. C. S. Harper, City and County of Denver; and H. M. Edwards, Queen's University, Kingston, Ontario (in HRB Bulletin 253).

"Analyzing the Socio-Economic Impacts of Urban Highways," by William W. Nash and Jerrold R. Voss, Graduate School of Design, Harvard University (in HRB Bulletin 268).

"Influence of Transportation Changes on Urban Land Uses and Values," by Paul F. Wendt, University of California (in HRB Bulletin 268).

"Tests of Interactance Formulas Derived from O-D Data," by F. Houston Wynn and C. Eric Linder, Wilbur Smith and Associates, New Haven, Conn. (in HRB Bulletin 253).

URBAN RESEARCH CORRELATION MEMORANDA

During 1959, the Committee on Urban Research put out four Highway Research Correlation Service circular memoranda. The purpose of these circulars is to serve as a source of information on items of general interest in the field of urban research. The subjects reported on in 1959 were as follows:

Number 1, March, 1959

Economic Impact Research – Current Status.

A brief report on the number of studies in progress and some of the uses of economic impact data.

Problem of Interchange Land Use Control.

Excerpts from a speech by Clifton W. Enfield, General Counsel, Bureau of Public Roads, in which are pointed out some of the problems resulting from controlled access Interstate highways intersecting state, county and city roads.

National Conference on Highways and Urban Development (Sagamore Conference)—Report of the Research Committee.

A summary of the report which categorizes and classifies the urban research needs enunciated by the participants in this conference of highway officials, city planners, and local government officials.

Recent Court Decisions Defining "Comprehensive Plan" and "Master Plan."

Excerpts from two New Jersey cases which carefully consider the precise meaning of these two terms often used in planning and zoning legislation and literature.

Number 2, April, 1959

The Official Map – A Rejuvenated Planning Tool.

A discussion of the nature and use of official map powers and a detailed analysis of the County Official Map Act recently passed by New York State.

Number 3, August, 1959

Economic Impact of Highways on Trade and Commerce.

A comparison of certain commercial trends in the central city and the suburbs. The material was abstracted from the 1959 interim report to Congress of the Bureau of Public Roads Highway Cost Allocation Study.

Number 4, August, 1959

Tennessee's Use of Official Map as a Planning Tool.

An analysis of the Official Map Acts for Nashville and for Davidson County.

Research Needs in the Behavioral Sciences Relative to Highway Planning

LAWRENCE KRADER, Professor of Anthropology,
The American University, Washington, D. C.

● THE UNDERLYING problems of urban and transport systems impose rigorous restrictions on one's thinking; an increasingly delimited set of solutions to these problems is a necessary consequence of current social and economic trends. Solutions are becoming scarcer as the problems are aggravated. The role of planning is changing as society and its needs change. Human and community factors in planning are becoming recognized to a degree which they had not achieved before. Planning of highways is embracing new dimensions.

Highway engineers and planners are committed in increasing numbers to the consideration of social needs and uses of the highway. The social and cultural aspects of highway design have been introduced into statements of program and theory by leading highway engineers, and into highway engineering training curricula. The decision to introduce the social context of highway design is a systemic commitment. It is necessary to understand the nature of this commitment in terms of the research as well as training requirements in the social and behavioral sciences.

Harmer Davis has directed our attention to the changing conception of highway design and planning. In an earlier day highway planning was more or less the equivalent of physical design of isolated elements. Economic, social, and technological contexts of the isolated design elements which have today created the foundation for systems analysis were then unrecognized. Davis has called for highway planning and design which take into account the projected cumulations of scientific knowledge and the effect of these cumulations on our societal arrangements (1). This statement demands changes in research and education, with implications outside of engineering proper.

The role of the behavioral sciences in highway and urban research and planning may well be defined within these limits. Davis has suggested that a key criterion for planning and design is that of optimizing transportation services for the economy. The criterion in any planning operation is the optimization of services for the community. The economic argument is a necessary point of departure, but it is only a point of departure. In the ultimate context of design are people, their problems of living together and communicating with each other.

The engineer, then, has found his way to social considerations via the economy. Perloff (2) has created an architectonic conception of highway planning in its relation to regional planning. Here is posed a team activity, jointly concerned with physical, economic, political, and social problems. Not the least of the contextual factors in design is the educational process (3). How are these conceptions being carried out? What are the problems facing us?

By all odds the most important social factor that is changing is the urban population. Woodbury (4) has projected present urban growth trends in the United States into the future. Starting from a series of United States Bureau of the Census data from 1950-1956, he has looked 15 yr ahead to 1975. The prospect is, if anything, alarming; and if anything, Woodbury has, with scientific caution, understated the problem of urban growth. Urban society has so changed during the 1950's that the Bureau of the Census ceased the publication of its urban data in 1956, and intends to re-define and clarify the problem of urban size and growth only in the light of the 1960 census.

The engineer, the planner and the economist, then, have accomplished a crucial break-through. Thanks to their efforts, the highway in space — in social space — can be seen. Of all the behavioral sciences, the most relevant is that of human ecology, whose task it is to study problems of social space.

The lesson of ecology has been this chiefly: that man lives in communities, and that communities have forms. The question is, whose ends are served by these forms? There is no such thing as a "natural" community today. Communities are all either

well- or poorly-designed. The urban community of the present is a hodge-podge of neighborhoods more or less connected by systems of roads and utilities, in general by our communications net. Now the problem of total community living is being considered, although solutions are at best in the probing and groping stage. The recognition of the social context by the highway engineer and planner is a first step in the way to improved and progressive planning of communities of the future. Human ecology is passing from a descriptive to an analytical and prescriptive phase. The behavioral sciences can and must work out a body of ecological research undertakings to meet the engineer who has recognized the impact of his designs on society.

Although highway planning has proceeded along a developmental line from the stage of isolated design concerns, to the stage of systemic research, the same cannot be said of urban, suburban and town planning. These fields have tended to oscillate between two poles. At the one end, the role of social and economic factors has been minimized; at the other, total community planning has introduced as many social and cultural factors as possible. Perhaps at the present time, through the efforts of research in regional planning and education toward that end, an organic growth process has been introduced, which for the first time will prove to be irreversible, which will not give up its gains and will continue to plan in terms of the largest number of social variables possible, with a view to the wholeness of social life.

At present, planners have developed the concept of comprehensive planning, rethinking through to older conceptions and values of Geddes and Burnham.

A new spirit in education is accomplishing the change toward comprehensive planning. Engineering and planning curricula are now interacting more closely than formerly in universities and engineering schools. The U.S. Bureau of Public Roads has introduced human ecology into the advanced training of engineering internes as a standard matter. However, as Perloff has emphasized, education and research go hand in hand. The advances in education (5) must be accompanied by more imaginative and creative research.

One of the consequences of specialized and compartmentalized society is that the relevant groups in planning enterprises have grown apart and have ceased to communicate freely with each other.

If an era of comprehensive planning is to be entered the goals of that planning must be established. This follows logically from the nature of planning, which is a means of increasing control over activities and fortune. By planning, the vicissitudes of fortune and fortuitous circumstance are overcome. Both a goal and the means to achieve it are set forth. The goal of planning is some image of a future America. Research into this image of the future — the nature of the goal — is needed; this is the first task in ecology.

Two elements enter into this image: (a) physical and technological designs, and (b) social relations and patterns. America is not at one or all of these; it is much too large. There are numerous regions, which are roughly coterminous in anthropology with sub-cultures. Each will probably have a significantly different image of the future; this difference in future projections undoubtedly corresponds to important differences in contemporary practices and needs in different parts of the United States.

America has grown apart as a nation of sub-cultures; has grown apart as a nation of professionals and specialists. In any highway planning operation engineers, planners, and administrators are directly involved. In widening circles, there will be comptrollers and disbursers of the public funds, legislators concerned with transport problems, specialists in metropolitan expansion, administrators and legislators active in this area, as well as countless other groups. A powerful influence, both direct and indirect, on the conceptions of many of these groups, especially of the engineer and planner, is that of the educator. People are becoming more intensively aware of the importance of teaching and of curricula, not only in disseminating specific skills, but also in creating the general climate of development.

An image study must probe, not only into conceptions of the projected physical appearance of highways, but also into the social and cultural patterns that will embrace the physical design. Here the most vital distinction of all must be made. An image study is not merely a wishful projection into the future. What is needed is a sense of consequences: What will be the forms of life which will result from present trends and undertakings? What can be done to intervene in the process of filling out these patterns?

What is the community of the future to look like, and what is being done to realize this image? The clearer and sharper the focus on the image, the better are the chances of realizing it.

It is proposed that a series of three studies in ever widening circles be undertaken. Because of increasing specialization and compartmentalization, those who have most to do with the planning have moved apart. In the first and innermost circle, it is suggested that engineers, planners, administrators and educators recognize their mutual dependence. Their images are not identical, nor is it necessary that they be so. But each set of images must bear some relation to the others. In expressing their relationship, a mutual clarification can and will result; a sharper sense of direction in their realization will result; and this is "feedback" in the proper meaning of the term.

The task of the engineer and planner will be made easier, if the suggestion will be permitted, by closer knowledge of what is in the minds of the legislators and supervisors of public funds. And the decisions of supervisors and legislators will be made easier if they have a fuller understanding of the aims and a more detailed grasp of the means and techniques available to the engineers. The image study proposes to include these questions as well. This is the second ring in the series.

The outermost ring in the image study is the public, the users of the highways, the inhabitants of communities and regions. The image in the eye of the public is the most obscure because it lacks specialized training of the engineer and expert advice of the legislative committee. But planning in a democracy requires probing the public image as well as the others. With the research task goes the task of educating the public to its needs and responsibilities. Again, research and education go hand in hand. Education of the public may be accomplished through the mass media — newspapers, radio, television, magazines — and civic associations, public welfare and service organizations, and the school and university systems.

The motivation to inform the public about its future and to learn from the public is not solely negative, the fear of reprisal at the voting booth; there are positive virtues to be gained in working with the automobile drivers and public transport fare-payers. Better understanding of the public and its problems will make for better designs and better use of designs.

Thus, a dialogue starts within each circle, first among specialists. As they exchange views and clarify them, the legislative and supervisory authority makes its contribution. This is necessarily a second-phase operation, because these people are dependent for views and data on the first. Finally, the public must be brought in — an informed public.

There will necessarily be conflict among the different social groups; but it is certainly desirable to bring out the conflict than to permit it to lie dormant and emerge only after a plan has been committed.

The exploration of the image will have a side effect of considerable importance. If the concept of what is wanted in transport services becomes clearer, research may be initiated into the means of achieving the goal — not only scientific and technological, but social and cultural as well. Both are in need of comprehension, and with a high degree of urgency.

The task of the behavioral sciences in highway planning is not to tell engineers and planners what to do. It is rather to serve as a catalyst in the expression, realization and dissemination of ideas where the human community is concerned. The most direct and relevant contribution from the side of the behavioral sciences is the exploration of the image of the future of America as engineers and planners see it. Perhaps by this means a greater degree of control over the future can be gained. The purpose of planning is the increase of control. The alternative is chaos, wasteful expenditure, and impoverishment of the nation.

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Open Space Control

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● **THE URBAN EXPLOSION** is challenging old measures for controlling land uses. Farms and villages disappear. Towns and cities are joined to become metropolitan complexes. Open spaces melt away. The future threatens a vast megalopolis reaching from Augusta, Me., to Richmond, Va.

Growth is often haphazard. Its hallmarks are scattered building developments and dreary miles of monotony. In some metropolitan areas, development is scattered over vast areas. Fertile farmlands are prematurely subdivided. A large acreage remains undeveloped in small, idle patches. Sprawl increases the cost of public services; breaks up land holdings into parcels that are not usable for parks, schools, and related public purposes; augments right-of-way problems; inflates costs; and breeds traffic congestion.

CHANGE, GROWTH, AND LAG

Causes of the problems can be indicated with three short words: change, growth, and lag. To be more exact, there has been a technological revolution, a population explosion, and an institutional lag.

Good roads and cars have cleared the way to the countryside. Federal mortgage insurance has assured a home there for millions of families. The telephone, radio, and T.V. have ended rural isolation. Electric power, household appliances, and the short work week have given time for country living.

At the same time, electricity and motortrucks have permitted factories to locate in rural places.

Second, there are more and more people and they have been moving to the countryside. Since 1940, the rural nonfarm population of continental United States excluding Alaska increased by approximately 27 million people. These are the people who live on the urban fringe, in unincorporated villages, and scattered over the open country, often out among the farms.

The rate of growth has not declined. Population projections for 1975 and for the year 2,000 seem fantastic. Census estimates for 1975 range from 207 million to 228 million people. Estimates of the Social Security Administration for the year 2,000 range from a low of 261 million to a high of 361 million.

The third cause is institutional lag. The suburban explosion has rolled too fast. It has been too far-reaching. It has overwhelmed local government, both urban and rural. Making adjustments to changing conditions takes time. It takes time to change long-cherished points of view; to reshape local governments; to expand governmental activities and services; and to provide the tax funds needed.

Capping the shortcomings of local government in fringe transition areas is the shortcomings of planning, especially for the long term. Both the physical plan and the land-use plan are neglected. The urban explosion demands space for living, for working, for transportation, and for other uses. Without a guiding master plan, it uses space haphazardly and lavishly. Future rights-of-way are preempted; potential park lands are covered with houses. Backyard-oriented suburbanites have little money for parks and other open spaces so long as tax funds are needed for schools and roads; besides, woods and farms can still be seen in the distance.

LAND RESOURCES ARE AMPLE

There is ample room for urban growth with open spaces included, if the land is used wisely. Land requirements of urban areas are less than 2.5 sq mi per 10,000 people. That is the national average. Suppose a half-section is added for suburbia (3 sq mi). A different yardstick may be suitable in your community (1).

A circle extending 5 mi from an urban center contains nearly 78 sq mi (Fig. 1). Assuming that the entire area is suitable for development, there is space within the 5-mi circle for 260,000 people.

CONVENTIONAL WAYS OF RESERVING OPEN SPACES

Two conventional techniques, for reserving open spaces are (a) by acquiring title to the land through purchase, gift, or otherwise; and (b) by exercising community zoning powers. A third and new technique is by acquisition of development rights in the land reserved (2).

Acquiring Title

Land for service, except for watersheds, is usually public owned. Local, State, or Federal tax funds are used to acquire title, except for occasional donations by reluctant subdividers and by generous citizens.

Parks are usually given a low priority by backyard-oriented suburbanites and by all levels of government.

Large parcels are often needed to structure development. An unusual example is the sprawl-checking greenbelt of 37,500 acres that will circle Ottawa, Canada. The price tag for the land titles must be high. Could a similar job have been done with zoning?

Zoning

Greenbelts comprised of some 50,000 acres have been set aside by zoning in Santa Clara County, Calif. Exclusive agricultural zoning districts, for farming and related uses only, were created. Similar districts have been established in other counties.

Are these agricultural greenbelts likely to last and continue to structure development over the long term? The exclusive agricultural zones were created after petition by farmers. They can be abolished in the same way. The future will bring pressures — tax, economic, and other — that may be reflected in zoning amendments.

Nor can the community save its greenbelts by rezoning them for parks or reservations. Such action would constitute a taking of private property for public purposes. Zoning merely regulates the use of land and buildings. It is legally charged with preventing harm to neighbors by keeping apart land uses that conflict.

An understanding of zoning principles and practices by highway officials and engineers is desirable. In many ways zoning can have a major bearing on their problems. Zoning ordinances, for example, may establish separate zoning districts for various land uses — agriculture, residence, business, industry, forestry-recreation, etc. These districts will have differing population densities and/or traffic-generating propensities.

A recent traffic study in the Detroit metropolitan area (3) found that an acre of residential land generates an average of 29 trips per day. But the average per acre was only 14 person-trips per day in the residential suburbs more than 12 mi from the city center.

The over-all average for commercial areas was 268 daily trips per acre. In fringe commercial areas, however, the daily average was only 182 trips per acre. The average was much lower for fringe industrial areas. These generated only 8 daily trips per acre.

Population densities in residential districts can be materially influenced with zoning tools. With building-tract regulations, the size of lots, yards, setbacks, and coverage by buildings can be controlled. With building-size regulations, the height, number of stories, and bulk of buildings can be limited. Large building tracts, large yards, and low coverage allowances result in lower densities of population, whereas smaller tracts, smaller yards, and greater track coverage permit higher population densities.

Large-lot zoning will produce open space of a kind but may induce sprawl.

Two other zoning tools are of special interest to highway people. One is zoning regulations that require buildings to be set back stated distances ranging from 20 to 60 ft or more from the right-of-way line. Deeper front yards are sometimes required along primary highways than along secondary roads. A reasonable setback reduces the noise, dust, and gas fumes that can reach the house. It promotes health and safety. That is its legal justification. Other benefits are permissible but legally incidental. Requiring an unduly wide setback to provide open spaces or to save right-of-way funds at a later time, when roads are widened, rests on dubious legal grounds. Both have the semblance of an uncompensated taking of private property for public purposes.

Detroit caused the open-space problem. Will it also provoke a solution? Perhaps in the near future with a new gadget, Detroit will cause conditions that will provide the basis for legally justifying much wider setback lines. Air cars that rise from ground or river on streams of air ejected under pressure from below are in the offing. Wider setback lines (open spaces) may then be needed for reasons of health to avoid the resulting dust. The same jets of air forced into foul waters may help cleanse our polluted rivers.

The other zoning tool mentioned earlier is the "special use permit." Extreme traffic-generating land uses such as outdoor theaters, and perhaps shopping centers, among others, might be located only on obtaining a special permit. Thus, aggravating traffic problems might be avoided.

Special-use permits are valuable also for influencing the location of large space-using activities, including institutions, cemeteries, and airports. A most neglected way of reserving open spaces and also avoiding grievous losses is by zoning hazardous flood plains so as to exclude damage-prone urban-type development.

The Dilemma Remains

Such in brief review are some attributes of the two conventional ways of reserving open spaces. One involves public ownership of land; the other involves public regulation of private land uses. Both methods have their advantages and grave limitations.

Reserving open spaces by acquiring title to land usually requires tax moneys, which may be in short supply. That is the big hurdle. Land prices are high. Also, there are confused objections to the resulting reduction of tax rolls. Moreover, hearty support for parks is received from only a limited cross-section of interest groups in the community.

Relying on zoning for reserving open spaces has its hazards too. Zoning regulations are usually applied by the local community; but the benefits from zoning may accrue largely to nonlocal people. Zoning districts may be created for various land uses with differing population densities and traffic-generating propensities. But zoning barriers of low-density districts may soon be swept aside by tax pressures and by economics. Traffic congestion increases and community problems multiply.

The dilemma has prompted a searching for new legal techniques for reconciling private and public interests in land in ways that promise reservation now of open spaces for the future. A technique is needed that will encourage and facilitate the provision of open spaces by private individuals and by private, public, and quasi-public agencies; that will gain support from diverse interest groups in the community; and that will require fewer immediate tax dollars.

SEPARATE DEVELOPMENT RIGHTS AND KEEP THEM UNUSED

To help achieve these goals, it has been suggested that certain rights, called development rights, in suitable lands might be separated from remaining rights; that the development rights — the right to develop for subdivision, business, or industry — might be transferred for appropriate consideration, or by gift, to public or quasi-public agencies or foundations to be held in trust for open spaces; that all remaining rights in the land, including agricultural, might remain in private ownership and also on local tax rolls.

By not exercising the development rights, the land would be kept open.

An open-space program might begin with the acquisition of development rights in fertile valley lands near expanding cities. Both flood-free lands and those that flood periodically might be included. Similar rights might be acquired later in other fertile acreage, farms, or forests, in the path of urban expansion. The farmers who dispose of their development rights could continue to farm their lands as before. Fertile soil, therefore, would remain in agriculture. Land might be selected so as to structure development and separate cities and their satellite communities with agricultural greenbelts.

Acquisition of development rights in lands of suitable location would be facilitated by an exercise of the powers of eminent domain.

OPEN SPACES CONFER MANY BENEFITS

Open spaces are multiple-benefit resources. The legal techniques used in reserving open spaces — by zoning, by acquiring land titles, or by acquiring only the development rights therein — will foreshadow future land uses. In turn, the uses made of open spaces — for parks, or forest reservation, or for agriculture — will determine the number and kinds of benefits that accrue, and their incidence. Benefits may be largely urban, largely rural, or both. Benefits from some parks, for example, are mostly urban. But a comprehensive open-space program for the future that promises to succeed will need to gain favor with diverse groups in both town and country.

Agriculture-Oriented Benefits

If a program of open-space reservation is carried out by acquiring development rights and the land remains in agriculture pending use for public purposes, both rural and urban people will gain. The benefits that will go to farmers who work the land may be divided three ways — between ownership, management, and labor.

Benefits that accrue to agriculture-oriented business and industry from maintaining the community's productive agricultural base are often overlooked. A century ago farmers wanted little from the city. Few off-the-farm supplies were needed to grow a crop. Processing also was done largely on the farm with family or home labor.

It is different today. In this day of agri-business, the farm plant is coupled with much that is found in the city. Urban business enterprises that are agriculture-oriented to the greatest extent are farm supply and service firms, marketing outlets, and processing industries. Farmers buy hay, feed, seed, fertilizer, sprays, farm machinery, gasoline, lumber, crates, and hundreds of other items. They sell their crops in the city. Processing, depending on the crops grown, is performed in town in a variety of factories — canneries, freezers, packing plants, creameries, cheese factories, cold storage plants, warehouses, etc.

Urban-Oriented Benefits

Other benefits from open spaces that remain in agriculture will result to urban people generally and to the community. Foremost among urban-oriented benefits are those that structure development. Open-space reservations can break up continuous urban development, prevent cities from growing together, provide greenbelts between cities, and buffers between zones, separate neighborhoods, and provide major disaster firebreaks. Providing major open-space reservations is likely to be too costly, unless new legal techniques are developed that will induce landowners to keep their lands in agriculture or forestry.

The same open spaces of green fields and trees will prevent continuous ribbon development and urban monotony, lower over-all population densities, and reduce pressures on travel arteries and on other public facilities. Other benefits may accrue from reducing runoff, avoiding flood damages, reserving natural storm drainages, protecting watersheds and wildlife, and from an avoidance of sprawl-inflated costs of public services. There may also be benefits to consumers from local food production and there may be aesthetic values that accrue to urban people generally from reserving some natural countryside. Attractive agricultural greenbelts will enhance values of adjacent residential properties.

Finally, the community may gain from later acquisition, as land is needed for parks, playgrounds, rights-of-way, and other uses, of the remaining private rights in the open space reservations.

ASPECTS THAT NEED FURTHER STUDY

Reserving open spaces for the future by use of the development rights technique is a relatively new proposal. Much research is needed on insufficiently explored aspects, including areas in economics, law, taxation, planning, and administration.

Economic Studies

Many benefits have been mentioned, both urban and rural, that will occur from reserving open spaces for the future. Some of these benefits will begin when the program starts and as it progresses. Other benefits will be deferred until the near or even the distant future. Some benefits will be realized by present and/or future landowners. Other benefits will accrue to the public and community at large. Some of the expected benefits can be measured readily in dollars and cents with present economic techniques. Other benefits and values are difficult to quantify but are equally important to the community and its people.

Involved also are costs, present and future, direct and indirect. There are the initial costs of acquiring development rights, plus interest for successive years, plus losses of tax revenues, if any. Other possible costs include loss of income from keeping land undeveloped; outlays for additional road mileage; and increases in transportation costs.

Other economic studies might be concerned with valuation of development rights in various commuter time zones and at several ad valorem tax levels and with valuation of the remaining rights in the land under various permissible land uses.

Finding Legal Solutions

Many challenging problems remain for legal scholars. Development rights comprise only an important few of the total bundle of rights in land. Just what are their legal characteristics? Are development rights comparable to some existing legal device? For example, are they akin to easements, perhaps negative easements, either appurtenant or in gross? Are they more like restrictive covenants? Or, is one dealing with a new kind of contractual restriction or agreement with unfamiliar legal characteristics?

Are questions of legal devices largely semantic confusion? Are existing legal techniques adequate, perhaps with some reshaping; or are new legal devices needed to do a new job well? Custom-made legal devices may have advantages in some circumstances, including (a) overcoming certain constitution tax hurdles at State levels; (b) obtaining exemption of development rights from ad valorem taxation; (c) facilitating transfer, ownership, and protection of development rights; and (d) avoiding legalistic wagon ruts that may lead the wrong way.

The California legislature has allowed wide room for experimentation. It has granted counties and cities a large choice of legal devices for reserving open spaces. In 1959 the legislature declared "...that any county or city may acquire, by purchase, gift, grant, bequest, devise, lease or otherwise, the fee or any lesser interest, development right, easement, covenant or other contractual rights..." that is necessary for the preservation of open spaces, including purchase of the fee and then conveying or leasing the property back to the original owner or to others with limitations on its future use. (West's Annotated California Code, Government Code, Vol. 32, 1959 Cumulative Pocket Part, sec. 6950-6954. Added by Stats. 1959, c. 1658, sec. 1.)

Tax Problems

First among some vexing tax problems are provisions in many State constitutions that require assessment and taxation of all property to be based on fair market values. These constitutional provisions may be decisive if they are construed to require ad valorem taxation of open spaces that have been reserved either by using the development-right technique or by using other legal devices. The legal technique that is employed may be significant in overcoming these constitutional tax hurdles.

A practical solution may be to exempt from taxation all development rights that are held in trust for open spaces either by public agencies or by public or private foundations.

Tax studies are needed of development rights from two viewpoints: (a) that of the community which receives the appreciated development rights in return for a downpayment, plus annual taxes foregone, which would have increased over time as development rights appreciated in value and as tax rates increased with progressing urbanization; and (b) that of the landowner who receives the downpayment, which he can reinvest, and

who also has the use of land as permitted under the rights retained, without liability for ad valorem taxes on the transferred development rights.

Other tax aspects concern income taxes payable on sale of development rights. Also, tax studies might explore the comparative impact of open spaces in various uses on assessed valuations of selected areas.

Providing Planning Criteria

Research might also be concerned with providing criteria for selecting appropriate locations for open-space reservations. Here again, there are many problems. Maximization of benefits, both urban and rural, from open spaces is a sound objective. But the selection of sites will need to be guided by cost considerations. In this connection, studies of the value of development rights in alternative locations, as was mentioned earlier, will be helpful. Acquisition costs may not be excessive if the community plans far ahead.

Collateral to questions of "where" and "when" are questions concerning "how much" open space. The latter questions are related to the purposes of open-space reservations — for services, to structure development, to separate cities, etc. Automotive transportation at low costs and high speeds have outmoded old yardsticks. The future may bring transcending transportation innovations.

If the purpose of open spaces is to separate cities, and the reservations consist of fertile lands that remain in agriculture, the areas reserved might be large. Selection of the location and size of open spaces will need to be guided by their purposes, uses, and cost.

Administrative Aspects

There remain many vexing problems concerning governmental and administrative aspects of open-space reservations whether effected by use of the development-rights technique or by use of other legal devices. What level of government — local, regional, State, or national — promises to do the best job of administering development rights? Where will the purchase money come from? Might existing foundations be interested, perhaps on a pilot-area basis, in acquiring and holding development rights in trust as open spaces? Or should special local foundations or authorities be organized and empowered to acquire development rights by purchase, grant, gift, devise, or otherwise, and to accept donations of private or public funds?

There remain questions regarding citizen acceptance of a divided public-private ownership of land. Will the probable lower costs involved in acquiring development rights compared with costs of fee interest in land, plus retention of remaining rights on local tax rolls, be ameliorating factors?

A new transportation technology allows cities to sprawl far and wide over the countryside. New legal techniques are needed to help contain that sprawl and allow cities and farms to flourish side by side.

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Transportation Plans: Washington's Next Steps

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● A FOUR-YEAR SURVEY of transportation needs for the Washington, D. C., region was completed July 1959, by the National Capital Planning Commission and the Regional Planning Council when a final report containing the survey recommendations was presented to President Eisenhower. From the survey, a much clearer picture of future travel demands and a better understanding of changing urban travel patterns has resulted. Also, the general limits of both highways and rapid rail transit to serve the future travel patterns have been rather clearly established for the metropolitan Washington community. Most important the survey has shown for the very first time how much it is going to cost the region over the next 20 years in order to have an adequate transportation system.

The outstanding features of the survey are described, but only in brief form because such a description is not the purpose of this paper. The purpose is to point out to persons interested in getting a clearer understanding of urban development what the next steps will likely be as Washington's proposed plan evolves from a planning agency report to a development agency construction program. It is intended to show that this long-range plan for transportation is no different from any planning agency's general development plan for land use: It is a continually changing, continually evolving thing that recognizes changes in public attitudes, legislative policies and technology, and at the same time moves from general proposals to specific development. The Washington plan is now ready for a development agency to take over from the planners even though there may be a number of detailed planning questions yet to be answered. For only planners to continue with more general studies would be a waste of effort.

THE TRANSPORTATION SURVEY

The report "Transportation Plan — National Capital Region," prepared by the National Capital Planning Commission and the National Capital Regional Planning Council, completely describes the survey and its proposals and copies are available from the Superintendent of Documents, Washington 25, D. C. At the Highway Research Board's annual meeting in January 1958, Paul C. Watt, then Director of the Regional Planning Council, described the planning aspects of the survey to that date. A voluminous report, containing the testimony of a week-long Congressional hearing held by the Joint Committee on Washington Metropolitan Problems in November 1959 will soon be available. Interested persons may wish to refer to these documents, as well as to several other reports and papers on various aspects of the project.

Major Proposals

The plan has been designed to meet the needs of the region when 3,000,000 people live here, in about 1980. The primary proposals are for a rapid rail train and express bus transit system of nearly 100 mi (not round-trip miles) and a freeway system of approximately 330 mi. This may be compared with a transit system today that has virtually no express service and an 85-mi freeway system which would have been expanded to a 260-mi system under earlier plans. The express transit system would cost \$564 million and the freeway and major street system would cost \$1.8 billion. Under present Federal-aid programs and other local programs there would have been about \$1.3 billion spent by 1980 on major highways. The highway financing presents a tremendous challenge to the area for the new \$500 million would be 100 percent local funds. All local highway funds would as a result need to be more than double those local funds needed to carry on presently-established programs.

In round numbers, there is need for one billion dollars of new money, about one-half for highways and one-half for express transit. Almost one-half of the express transit cost would be repaid by transit fares if fares were similar to those existing in the District of Columbia at the time of the survey. However, if fares were to be set near the rate being requested by the major District of Columbia transit operator at the time

this paper was prepared, and at about the rate already charged in Virginia, more than three-fourths of the costs would be repaid.

The key to the realization of the proposed system is the early creation of several transportation agencies. The ultimate goal as proposed by the survey is to create an interstate metropolitan construction and operating agency by means of a compact between Maryland, Virginia, and the District of Columbia. Because it would take a number of years of legislative negotiation to create the agency, two other temporary agencies are proposed, one for regulation and one for development. The regulatory agency proposal is the product of the States and the District themselves. Before the survey was completed, Maryland and Virginia had formally approved it, and it now requires only the approval of the Congress to become a reality. The other temporary agency would be a Federal corporation (similar, for example, to the Saint Lawrence Seaway Development Corporation) created to extend the planning and design and carry through on the development of the system until the time that the ultimate interstate transportation agency is created.

Survey Procedures

A brief explanation of the survey procedures is essential to a discussion of what the next steps might be. It is necessary first to appreciate that the survey was one of the most comprehensive yet made in this country; it represents a significant break-through in transportation planning. This is not to say that improvements cannot be made, or that judgments and decisions are not subject to error. Most recent surveys are in fact developing some improved techniques on certain facets. But this survey is believed to be far more adequate and inclusive than has been the case for almost any previous survey.

First, you should know that all the studies and proposals were based on a land-use plan for the future region. This plan showed, for the first time in the Washington area, the location of homes and jobs, shopping areas and recreational areas, all in accordance with an agreed-upon, realistic plan for the future 3,000,000-person region. Then, using a rather new technique of projecting travel, the future daily traffic pattern was predicted based primarily upon the expected land-use development and the probable travel time between the different parts of the region in the future. One of the significant results was that 60 percent more people would result in approximately 200 percent more miles of week-day travel.

Next, three different transportation systems were tested by assigning the estimated traffic to each of them and then measuring their relative effectiveness. The different highway-and-transit systems ranged from one with no transit improvement to one with maximum transit improvement. For each system the appropriate amount of highways was included. Traffic was assigned separately for the peak hours and for the off-peak hours and several arrangements of routes in each system were tested. Finally, the recommended system was developed with the finding that a much-improved transit system was essential, together with an accelerated and expanded highway system.

THE NEXT STEPS

What is likely to happen in Washington in the near future? The next steps which will be required to advance the survey proposals are essentially of two different types, and it could take several years and several hundred thousand dollars to accomplish the goals set forth in the following paragraphs. The present survey required four years and \$450,000 directly, together with another one-half million dollars indirectly. The first type of studies to be undertaken can be considered as refinements to the present survey. These refinements are principally studies that should be made continually by a well-staffed transportation agency in any major urban area. For example, the Chicago area now has such a continuing study group. These studies are not expected to cause major changes in the proposed system, but they will be of immense value in developing details of the system. Although these studies are necessary, they are nevertheless secondary to the other type of studies that are needed. The latter involves two principal aspects: system details and financial details. Here is where more specific answers than the

survey was able to provide are required before huge sums of money could be committed to a construction program.

The refinement studies are principally concerned with improving the background information on which the system details are to be resolved. The land planning work will involve some simple steps, such as using more recent statistical data on population and employment, and accounting for land development decisions not foreseen four years ago. It will also take into account the findings of the special downtown Washington study group which was recently created. The work may also be able to reflect the findings of some recently initiated studies of sketch plans of the region for the year 2000. The year 2000 studies may require consideration of some alternative land development plans not yet imagined which may affect growth after the 3-million population is reached.

Additional traffic projection and traffic assignment analyses will likely be made, and these will generally reflect continued improvements in methodology that are being developed in the major traffic studies under way in several cities today. Three items on which it would be helpful to improve on should be mentioned. First, a substitute for the origin-destination studies developed some years ago by the Bureau of Public Roads is greatly needed. It may be a method which more directly measures trips into and out of the major traffic generators, such as the obtaining of data at employment centers, rather than by home interviews. It is the work trip that largely determines the urban transportation system, and the data can be obtained, analyzed and fed into traffic predicting formulas rather quickly. A second item is the method of assigning traffic in the peak hour. This survey was at least able to assign peak-hour, two-way travel, and it is now hoped that it will soon be possible to assign peak-hour, one-way trips. Such a method is being developed in the Minneapolis-St. Paul study. A third study item would be further general improvements in methods of assigning trips, both the allocation between various highways as is being worked on now by the highway agencies in the Washington area, and also between automobile and transit. All of these things will contribute to a better foundation on which later decisions can be made on the system details and the financial details.

System Details

Work involved in resolving system details includes more complete field studies for rights-of-way, test borings and detailed cost estimates, not only for the routes themselves but for transit stations, the large outer terminals, parking areas, and shops and yards. But it goes beyond this preliminary engineering work. It must also include consideration of community reaction to the presently proposed general locations of transit and highways, as well as the latest thinking of the area highway and planning agencies.

For example, the location of highway interchanges and transit stations will have a profound effect on nearby land development. What has happened around transit stations in an earlier generation of rapid transit construction is well-known. What might happen today, and what land planners might want to happen, is not so well-known, for this is an automobile-oriented age. Most experience has been from a pre-automobile age when transit had little or no competition. There are few so-called "experts" for this particular problem, and a good deal of hard thinking lies ahead. The transit land acquisition and development, both at stations and along the rights-of-way, may easily serve as the catalyst that gets the land planners to renew and redevelop older neighborhoods throughout the metropolitan area. Joint redevelopment and transit projects could be carried out just as joint redevelopment and highway projects are carried out.

Another significant system-design problem may come from the highway side. It is not possible at this time to say what the highway program eventually will be because many voices are being raised against the highway proposals. If there is a lack of decisions on the highways, it will be more difficult to decide on transit system details, particularly the specific transit route locations because all of the express bus routes and two of the rail lines would utilize freeway facilities.

Some who oppose the extent of the highway system do so because of the financial problems. But the most common dissatisfaction arises from the feeling that the prob-

lems of right-of-way acquisition and the after effects on nearby property not acquired are more than the urban community cares to face. This reflects not only the typical dislike for change itself, but a real and honest fear for loss of urban values, tangible and intangible. The unfortunate thing, however, is that without sufficient freeways there will be a great excess of local street traffic, which inevitably will overrun the very neighborhoods these people hope to save, and also cause a deterioration of properties in a much wider section of the city. A large proportion of the excess street traffic simply will not be in a position to use transit, and there will be a need for more one-way streets, street widenings and tree cuttings, and additional parking restrictions. Specific values on this potential neighborhood deterioration have not been determined, and most of the highway opponents do not want to believe that such a condition will result.

The people are generally willing to spend more and more money on good highways, even though it may not always seem this way because public officials are naturally slow to ask for it. For the highway proponents, the important task is to do a better job of "education" and back up the education by making the freeways more compatible with urban living.

It is quite possible that many of the transit system details will have to be decided on before the highway questions are fully resolved. This will be unfortunate, but there is such a degree of urgency to get on with subway construction that it would not be wise to delay the transit program.

Other transit system details to be decided on also include further consideration of the best transit train equipment to be used and possibly a reconsideration of the potentiality of the existing railroad facilities. In the interest of reducing initial capital costs, further consideration of the use of railroad facilities will likely be made. This study will be made easier by the new cooperative attitude of the area railroads. However, existing railroad facilities will not provide much improvement for transit riders who live in the District of Columbia. The main value would be as a low-cost, temporary facility that could be tied in with the first stage of subway construction in order to broaden the service area of the initial subway.

Financial Details

The term "financial details" encompasses a broad subject and while many of the items are tangible, many are not. For economists, the questions may not appear to be new. But most transportation economists will probably agree that specific answers to the questions would be new, and the decision-making governing officials will most certainly welcome some answers before a financial policy is firmly established. It seems essential that more extensive study, than the present survey was able to make, be undertaken so as to come up with better information on these questions of economics. One drawback to this economic analysis is that so many of the problems spill over into the social field, where still less specific values are to be found. The questions that ought to be answered include both highway and transit problems, for the survey has proposed that the metropolitan transportation agency build the transit system as well as assist the highway departments in overcoming any deficits in funds to the extent possible. Here are seven questions which should be answered:

1. What are the relationships between transportation costs and benefits? And, how far can the consideration of intangible values be carried?
2. Is a public welfare argument justified, particularly to pay for the cost of putting transit out of sight in subways, or should the users themselves pay all the direct and many of the indirect costs?
3. Should the revenues and costs of both transit and highways be pooled together?
4. Having determined the desirable amount of transit service that should be provided, how far should the community deviate from the goal in order to permit private transit firms to determine the quality of services?
5. What other community needs will require large expenditures? And, how do transportation costs compare with the other costs?
6. To what extent is it desirable to spend more for transportation services in the future, considering that per capita income may well double in 20 years?

7. As the work week gets shorter and weekends longer, will the public prefer to invest less in travel-to-work facilities and more in recreational travel facilities?

In addition to analyzing these difficult questions, there will need to be a reconsideration of the estimates already made for capital costs, revenues and expenses. The fare structure alone is subject to important adjustment. If the fare were set a little higher than the conservative figure assumed in the survey, the projected \$16 million annual capital cost amortization deficit could be significantly reduced. And if improved route locations can be found by more detailed studies, then the finance picture can again be improved because of additional patronage or because of lower construction cost.

Land Acquisition and Construction

The primary purpose of the paper has been to describe the steps which are needed to transform the planners' present report to the ultimate goal of the operation of a new rapid transit system. The study activities described here and community approval of a final plan may require up to 2 years, and would be followed by the preparation of engineering construction drawings.

During this study period, the transportation agency will need to acquire key rights-of-way and build bus stops along several new freeways. The major land acquisition will be in establishing extra-wide median strips in virtually all the new radial freeways that are being planned and built. Thus, the activities of the next few years should include some specific, but limited, development activities.

In summary, the next steps involve establishing a continuing transportation body to make a more thorough study of system details and bold attempts to understand some of the complex and vague economic problems. In order to accomplish these objectives, and to then build the proposed system will require the establishment of a temporary Federal corporation, to be followed in later years by an interstate agency of the two States and the District of Columbia. Not all the "next steps" discussed here would be carried out by the new corporation. Some of the work is clearly the responsibility of existing planning and highway agencies.

There is considerable support developing for creation of a Federal corporation. The most specific came in November 1959, when the Bureau of the Budget, in the Executive Office of the President, gave strong endorsement to the idea, and acknowledged a responsibility to meet the special Federal interest in the National Capital region by stating "...initial Federal financing of the proposed corporation will be necessary." Specific legislation is being prepared and is expected to be submitted to the Congress soon. A favorable action by the Congress will keep the planners' report from gathering dust and will enable the community to maintain its enthusiasm for the project.

Zoning and Traffic Congestion¹

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● **ZONING REGULATIONS** can be used to combat the almost universal urban problem of congested traffic facilities. Zoning, administered with an appreciation of the functional relationship between streets and the zones they serve, can help correct defects in existing street systems by achieving a desirable balance between (a) traffic generators of all types and sizes, (b) street capacity for moving vehicles, and (c) off-street parking and other terminal facilities.

Three purposes of special importance appear in all state zoning enabling legislation:

1. To lessen congestion in the streets.
2. To prevent undue concentration of population.
3. To promote the general welfare.

Far from being distinct purposes standing alone, these objectives are related and must be accomplished together if they are to be effective.

The elements of "the general welfare," as this term has been defined in zoning law, include:

- (a) Public health.
- (b) Public safety.
- (c) Appropriate uses of land.
- (d) Preservation of character of neighborhood.
- (e) Stabilization and protection of property uses and values.
- (f) Enhancement of value and utility of property.
- (g) Safeguarding of future development and use.
- (h) Stability of plan and conditions.
- (i) Prevention of undue concentration of population.
- (j) Aesthetic considerations.

Inasmuch as each of these elements is supported by court decisions, this list could be called a judicial statement of zoning purposes. Although a statement of zoning purposes by a city or regional planner would be somewhat broader and would stress the use of zoning to implement a land-use planning process, it would stress each of these elements as well. In any event, even the listed judicial statement of purposes cannot be achieved without proper handling of traffic arterials. Effective traffic management is implicit in each of them. For example, the future development of a city (Item g) and its street system are closely interrelated. Population density control (Item i) is aimed at solving some of the problems of congestion. It strikes at the root of the traffic problem by preventing over concentration. Urban development, even with good zoning regulations, will be stifled by an inadequate street system. Conversely, haphazard development under an inadequate zoning ordinance will reduce the effectiveness of an otherwise adequate street system. Thus, zoning programs and street systems, if not coordinated, will each tend to reduce the effectiveness of the other. Zoning regulations formulated with transportation requirements in mind can help prevent the zoning and highway programs from working at cross-purposes, and thereby help the community achieve the full benefit of both programs.

Additionally, zoning can provide a stabilizing influence (Item h) permitting a street plan to be developed to serve the various zoning districts by providing efficient and convenient movement of people and goods. A desirable distribution of traffic-generating uses can be encouraged (Item c) so that existing streets can be utilized with a minimum of congestion. Zoning regulations can aid in stopping the deterioration of a neighborhood

¹A more exhaustive legal analysis of this subject can be found in a Bureau of Public Roads document entitled "Highway Transportation in Zoning Law," scheduled to be published late in 1960.

(Items d and e) resulting from the overloading of existing streets that cannot be improved to increase the traffic flow. Zoning can enhance the use of a street or highway as a planning tool to give the city form and pattern, to demarcate land uses, and to protect neighborhoods (Items f and g). Therefore, the judicially adopted purposes of zoning can be promoted by recognizing the problems and needs of the street system.

USING ZONING TO ACCOMPLISH TRANSPORTATION OBJECTIVES

The preceding examples point up the intimate functional relationship between zoning and streets. In recognition of this relationship zoning powers should be used to their legal limits in order to accomplish transportation objectives. However, it must be borne in mind that there are often practical limitations which might preclude adopting regulations even though they are legally justifiable.

Some of these limitations stem from problems confronting the community planner. For example, intergovernmental and interagency relations are involved at every level of discussion — from the planning of transportation to the financing and operation of any transportation system. Frequently the planning, location, design, financing or construction of the highway has affected actions of the community planner, rendering his goals and objectives either unobtainable or more difficult to obtain. From a community or regional planning viewpoint this means one implementing measure, the highway system, is rendering other implementing measures and procedures less effective, hence the need for coordination becomes immediate.

Most planning enabling legislation delegates to the community or county planner the responsibility for proper coordination, but the legislation seldom provides a means for effectively meeting this responsibility. Such legislation usually does not specify the priority this coordination is to have in the total planning process. Nevertheless, increasing emphasis is being placed on coordinating city and highway planning.

This emphasis, in addition to making possible a greater benefit to the community from highway expenditures, provides the highway engineer with an opportunity to encourage the use of city planning implementing measures, including zoning, to further transportation objectives.

Specifically, the highway engineer can encourage the development of standards for implementing city planning through the zoning mechanism that takes into account highway problems. Opportunity to influence the development of standards is continually present in the changing modern urban scene. It is inevitable that there must be change in land use and planning standards as there have been changes in standards of living, work hours, travel methods, level of education, and the whole civilization.

It is the object of the planner to try to provide today for tomorrow's environment. The answer to the question, "What shall the standards be?" is that in the opinion of the planner, they should be standards that will be acceptable as far into the future as it is possible to see. With this one can agree, but certainly a greater effort can be made in the future than has been made in the past to develop standards that take into account highway transportation problems. Adequate standards, from a highway viewpoint, will more likely result if the highway engineer assists the local governments in developing them.

A study of standards currently in use shows conclusively that without such assistance highway problems will not be taken into account. Therefore, the burden is on the engineers to insure development of adequate city planning standards, and to do this it is necessary to understand city and regional planning techniques. Highway engineers should also understand transportation benefits which may be realized by the application of these planning techniques. Then standards can be developed for using city planning measures to aid in developing adequate transportation systems.

TRANSPORTATION ELEMENTS OF A COMPREHENSIVE ZONING PROGRAM

A zoning program, to be truly responsive to transportation needs, should have objectives similar to those grouped in the following four categories. These objectives should be clearly expressed, as part of a statement of legislative purpose in the law, which establishes the zoning program.

1. To promote the goals of comprehensive community planning.
 - (a) To develop reasonable and adequate standards to guide the implementation of comprehensive planning, including performance standards for granting special exceptions in transition and buffer areas, as well as in the usual zoning districts; and to insure that these standards are responsive to the problems involved in furnishing adequate public services.
 - (b) To coordinate zoning with subdivision regulations in order that the latter may provide for the harmonious development of a district; for the proper arrangement of streets and for the coordination of streets within subdivisions with other existing or planned streets or with other features of the master plan or official map of the district; for adequate open spaces for traffic, utilities, recreation, light, air, and access of fire fighting apparatus; for minimum setback distances from streets and other public ways for buildings and structures; for control of the number, spacing, type, and design of access points to existing or future streets from subdivision streets or from lots; for minimum width and area of lots; and for a distribution of population and traffic which will tend to create conditions favorable to health, safety, convenience, prosperity, or general welfare.
2. To balance land uses and the transportation facilities that serve them.
 - (a) To foster a more rational pattern of relationships between residential, business, manufacturing, and other land uses for the mutual benefit of all; to protect residential, business, manufacturing, and other use areas alike from harmful encroachment by incompatible uses; to insure that land allocated to a class of uses shall not be usurped by other inappropriate uses; and to isolate or control the location of unavoidable nuisance-producing uses.
 - (b) To control intensity of land use; to prevent overcrowding of land with buildings, and thereby insure maximum living and working conditions and prevent blight and slums.
 - (c) To promote a desirable distribution of population and traffic-generating land uses which will tend to create conditions favorable to adequate transportation.
 - (d) To insure that lands adjacent to interchanges of freeways, expressways and major arterials are utilized for their most productive and beneficial uses, and to secure safe and attractive development at points of access to such highway facilities.
 - (e) To check existing congestion and to prevent future congestion by limiting the development of land to a degree consistent with the capacity of the local government to furnish adequate transportation facilities.
3. To protect, preserve, and enhance the value, efficiency, utility, and traffic-carrying capability of freeways, expressways and major arterials in general.
 - (a) To reduce the opportunity for "strip commercial" districts, developing along the major arterials.
 - (b) To control development along arterials in undeveloped or partially developed zones through:
 - (1) Coordination of zoning and other police power tools available to control development.
 - (2) Development of adequate parking, properly located and designed.
 - (3) Effective use of setback requirements to provide for later improvements to the transportation facility.
 - (4) Permissive pooling of requirements for parking stalls and open space.
4. To aid in the elimination of traffic hazards produced by adjacent land-use prac-

tices and to facilitate maximum utilization of streets and highways for traffic movement.

- (a) To provide a solution to parking, loading, and terminal facility problems.
- (b) To insure safe and adequate site access and egress, to provide for inner-site circulation and turning movements, to minimize unnecessary congestion in the public streets.
- (c) To prevent the obstruction of driver visibility and to discourage uses which distract or confuse the motorist.

RECOGNITION BY COURTS OF ZONING MEASURES THAT BENEFIT TRAFFIC

It should be noted that the judicial decisions referred to in this section are discussed and analyzed more fully in the document previously referred to.¹ The coverage here is intended only as a summary to serve as a basis for the author's conclusions and recommendations.

The initial recognition of the relationship between transportation and zoning law occurred in the off-street parking decisions. These decisions, relying on the legislative purpose of zoning "to lessen congestion in the streets," upheld ordinances requiring specified land uses to provide off-street parking. Many courts then extended the justification of lessening traffic congestion and used it to support zoning measures including: (1) controlling the location and design of automotive service stations; (2) restricting the location and design of community and regional shopping centers; (3) restricting commercial development such as gasoline stations, automotive repair shops, businesses which are liable to create traffic hazards, and restaurants along major arterials thus encouraging a more desirable location of commercial traffic generators; (4) protecting traffic arteries from truck and bus turning, loading, and parking; (5) restricting location and design of fences at street corners; (6) encouraging a separation of types of traffic; (7) restricting traffic generators from locating in residential districts; (8) conditioning special exceptions so as to lessen traffic hazards; (9) establishing setbacks; (10) controlling the location and design of outdoor advertising; and (11) maintaining the traffic-carrying capability of the arterial through controlling the location and design and/or use of access to the arterial by: (a) establishing a prescribed footage and depth for "highway protection areas" and making it unlawful for any landowner to locate, lay out, construct or maintain any access road within the protective area, without first obtaining a permit, (b) applying the performance standard technique, discussed in the previous section on interchange areas, to these "highway protection areas;" and (c) establishing special highway business districts and other special districts designed to obtain a desirable distribution of traffic generators.

These decisions have recognized the effect of zoning on traffic and transportation. On the other hand, there have been many court decisions, directly affecting highway transportation, that have not recognized this need to balance transportation and land use it serves. For example, there are holdings in many jurisdictions which declare that zoning must subserve the long-range needs of the future, and that zoning is an implementing tool of sound planning, but which make no mention of transportation considerations. Recognizing that highway transportation and land-use planning are inter-related and that both are directly related to the health, safety, morals, and general welfare of the community, it would seem to follow that zoning must subserve the long-range needs of highway planning just as it must subserve the long-range needs of comprehensive planning. However, only infrequent, indefinite references by the courts to this relationship are found. (For instance, zoning for minimum lot area can strike at the root of the traffic problem by preventing overconcentration of population and traffic generators, but this is seldom recognized by the courts in handling these cases.) Nevertheless, since the transportation plan is an important component of comprehensive planning, mutually interdependent with all the other components, evidence showing that the street system is well planned and basic to the sound growth of the community or region involved, and that zoning is basic to keeping the street system operating efficiently, should be taken into consideration in adjudicating zoning cases. Evidence of this nature will be admitted more readily once the relationship between land use, the control of land use (zoning), and transportation is clearly understood.

Of course, where the zoning measures are directly related to the health, safety and morals, they may be upheld without resorting to the general welfare for justification. But where the relationship is not so direct or obvious, many courts test the validity of the measure on the basis of whether it serves the general welfare. In a majority of the states a zoning ordinance is presumed to be valid, hence the burden is placed on the person attacking the ordinance to show it to be arbitrary or unreasonable as to its classification and purposes. As a result of this presumption, the courts of these states have approved a liberal interpretation of the "general welfare". Because transportation objectives are so closely connected with comprehensive planning and general welfare considerations, it would seem that transportation considerations should be used by those courts applying the general welfare test to justify the use of the zoning power.

In any event, transportation considerations warrant more attention when zoning is reviewed in the courts than they have generally received. If proper emphasis is to be given to equating land use in the transportation system, criteria taking transportation and planning needs into account must be developed and used for determining the validity of zoning.

THE NEED FOR LEGISLATION

The 1926 Standard State Zoning Enabling Act of the Department of Commerce states that:

Such regulations shall be made in accordance with a comprehensive plan and designed to lessen congestion in the streets; to secure safety from fire, panic, and other dangers; to promote health and the general welfare; to provide adequate light and air; to prevent the overcrowding of land; to avoid undue concentration of population; to facilitate the adequate provision of transportation, water, sewerage, schools, parks, and other public requirements. Such regulations shall be made with reasonable consideration, among other things, to the character of the district and its peculiar suitability for particular uses, and with a view to conserving the value of buildings and encouraging the most appropriate use of land throughout such municipality.

This statement of purpose is adopted without significant change and proposed in two more recent model zoning laws (1, 2). No doubt it was thought, in drafting the model enabling act and the model ordinance, that a more specific and detailed statement was not needed. However, where the courts have been hesitant or slow to expand existing law to meet changing conditions more specific direction may well be in order.

The great majority of existing zoning enabling acts and ordinances do not expand on the 1926 statement of purpose. In 27 states the zoning enabling legislation includes substantially this same statement, and the zoning law of many of these states requires considerable development to meet current needs. The review of a large number of municipal ordinances, as a part of this research, reveals the same type of restatement and failure to expand.

The justification for well-drafted statements of legislative purpose in highway law is well documented in the recently published Highway Research Board Special Report 39, entitled "Legislative Purpose in Highway Law — An Analysis." In zoning legislation, a statement of purpose which sets forth the objectives listed in the section on "Transportation Elements of a Comprehensive Zoning Program" may lead to application of the law in a manner more responsive to transportation needs. However, if clearer, more specific statements of legislative purpose do not accomplish this result, a constitutional amendment directing the courts to construe such laws liberally in favor of municipal corporations may be desirable.²

²This approach was taken in New Jersey (N.J. Const. art. IV, Sec. 7, para. 11 (1947)) after a zoning measure was held unconstitutional as it had been applied. The New Jersey Supreme Court, in a series of decisions, significantly expanded the municipal zoning power after the amendment was passed.

Once these steps are taken, a court that understands the need for comprehensive regional planning, such as the New Jersey Supreme Court in *Duffcon Concrete Products v. Borough of Creskill*,³ will quite likely have little difficulty in broadening zoning measures in order to accomplish transportation objectives. For example, Chief Justice Vanderbilt in the *Duffcon* case said:⁴

What may be the most appropriate use of any particular property depends not only on all the conditions, physical, economic and social, prevailing within the municipality and its needs, present and reasonably prospective, but also on the nature of the entire region in which the municipality is located and the use to which the land in that region has been or may be put most advantageously. The effective development of a region should not and cannot be made to depend upon the adventitious location of municipal boundaries, often prescribed decades or even centuries ago, and based in many instances on considerations of geography, of commerce, or of politics that are no longer significant with respect to zoning. The direction of growth of residential areas on the one hand and of industrial concentration on the other refuses to be governed by such artificial lines. Changes in methods of transportation as well as in living conditions have served only to accentuate the unreality in dealing with zoning problems on the basis of the territorial limits of a municipality. Improved highways and new transportation facilities have made possible the concentration of industry at places best suited to its development to a degree not contemplated in the earlier stages of zoning. The same forces make practicable the presently existing and currently developing suburban and rural sections given over solely to residential purposes and local retail business services coextensive with the needs of the community. The resulting advantages enure alike to industry and residential properties and, at the same time, advance the general welfare of the entire region.

The court's reliance on those regional considerations suggests that the use of zoning to obtain a balance between the arterial system and the land use served by the system would be approved. If this general planning goal is accepted as a proper zoning objective, then the more specific objectives in categories 2, 3 and 4 of the section on "Transportation Elements of a Comprehensive Zoning Program" should be even easier to justify.

EXAMPLES OF ZONING PROVISIONS DEALING WITH TRANSPORTATION PROBLEMS

Many city planners and municipal lawyers have indicated the need for more effective planning legislation. Perhaps all planning, zoning, subdivision control, and other enabling legislation pertaining to urban matters should be reformed, modernized, integrated, and codified in every state which has not done so recently. But there is no need to wait until this is done to develop better ordinances, standards and implementing techniques at the local level.

Some provisions which are directed at traffic and parking problems are referred to in the following as examples of how a zoning ordinance can be made to meet the transportation needs of the community. An attempt has been made to direct attention to a variety of provisions from ordinances of different cities. To give some sense of order to their presentation, the examples are listed under the category headings used in the section on "Transportation Elements of a Comprehensive Zoning Program."

1. To Promote the Goals of Comprehensive Community Planning

Few zoning ordinance provisions are specifically written to promote comprehensive planning goals. Even where an ordinance gives recognition to the role of planning, the provisions are not emphasized and are easily disregarded or avoided. Proper emphasis lessens the possibility that the provisions will be disregarded. This is illustrated by

³ 1 N.J. 509, 64 A. 2d 347 (1949).

⁴ *Id.*, 1 N.J. at 513, 64 A. 2d at 349-50.

the zoning ordinance of the Town of Cortlandt, New York, quoted in an excellent article by Hugh R. Pomeroy, "Bringing Zoning Up to the Automobile Era," in Bulletin 101 of the Highway Research Board, page 47 (1955).

Another example is the use of standards for special permits in the zoning ordinance for Fairfax County, Virginia.⁵ The ordinance requires the standards to take into account traffic safety and appropriate patterns of land use in accordance with the Master Plan. The ordinance indicates how the standards are to be employed to guide the implementation of comprehensive planning. It further provides that zoning is to be coordinated with subdivision and other community regulations.

Section 616 of the Zoning Ordinance of the City and County of Denver, Col. (codified as of July 1, 1955) provides a special plan for planned building group developments under procedures designed to coordinate zoning with planning objectives. The provisions require recognition of transportation problems.

2. To Balance Land Uses and Transportation Facilities That Serve Them

The Denver ordinance previously referred to (Secs. 612.11 and 612.15) provides for two special zoning districts which gives implied recognition to this objective.

The Township of Princeton Zoning Ordinance, Princeton, N.J. (adopted Dec. 6, 1955) provides for several districts which group compatible, heavy traffic-generating land uses. The location and distribution of districts on the Princeton zoning map indicate recognition of the importance of establishing a balance between land uses and the transportation system serving them. This ordinance utilizes a set of standards termed nuisance factors. Several of these nuisance factors involve traffic and transportation considerations. In addition, the Land Subdivision Ordinance of the Township of Princeton, N.J. (adopted Dec. 6, 1955) is referred to in the Zoning Ordinance and also contains provisions which give direct attention to the balance between planned use and transportation facilities.

3. To Protect, Preserve, and Enhance the Value, Efficiency, Utility and Traffic-Carrying Capability of Freeways, Expressways and Major Arterials

The Fairfax County Zoning Ordinance, previously cited, includes special setback provisions for major arterials.

With similar intent but in a more specific and limited manner, the zoning regulations of the City of Greensboro, N.C. (adopted July 6, 1954) requires building setback lines on specific thoroughfares listed in the ordinance.

Provisions for separate service roads, buffer strips, additional setbacks, and extra street widening are provided in the Princeton Township Subdivision Ordinance, previously cited.

An example of buffer zones which can be used to protect the unique character of limited access highways is given in A Guide for Zoning, The Regional Planning Commission of Greater Harrisburg, Pennsylvania, 1958.

The Zoning Ordinance for the City of Pittsburgh, Pennsylvania, 1958, requires that any new commercial or industrial development fronting on a designated major traffic thoroughfare must have site plan approval by the Planning Commission before an occupancy permit can be issued. Also, the ordinance provides special regulations designed to control the use of land along major thoroughfares in the form of its "C2" Highway Commercial District.

4. To Aid in the Elimination of Traffic Hazards Produced by Adjacent Land-Use Practices and to Facilitate Maximum Utilization of Streets and Highways for Traffic Movement

Zoning provisions which provide for off-street parking and loading as a means of reducing marginal friction and congestion in the streets are fast gaining general acceptance (3, 4, 5). Inasmuch as provisions dealing with the general spatial requirements

⁵ Chap. 6 of Vol. II of the Code of Fairfax County, Virginia, as amended, Aug. 4, 1959.

for off-street parking and loading are quite readily available, none are included here. Good examples are the Fairfax County, Virginia; Denver, Colo.; and Greensboro, N. C. Zoning Ordinances, previously cited (Secs. 6.1.3, 614.5, 35.22, respectively).

Restrictions on signs which may distract or confuse the motorist are provided in the Princeton Zoning Ordinance, previously referred to (Secs. 4:5 and 4:6).

For additional examples of somewhat similar signing restrictions see Section 7.2.7 of the Fairfax County Zoning Ordinance and Article XXVII of the Harrisburg, Pennsylvania Zoning Guide.

The Fairfax County Zoning Ordinance also includes specific provisions preventing obstruction of the motorist's vision, especially at intersections (Sec. 4.5).

Other examples can be found in the Harrisburg Zoning Guide and The Text of a Model Zoning Ordinance, by Fred H. Bair, Jr. and Ernest R. Bartley (2, pp. 35-36).

CONCLUSIONS

Research

The enumerated benefits to highway transportation resulting from enlightened zoning practices could easily be expanded. Each zoning measure should be investigated to determine more precisely how zoning powers can be employed to assist the highway program. This research would include:

1. Pilot studies to point up existing and potential trouble spots where zoning controls could make a positive and significant contribution to the highway program.
2. Research into the experiences and practices of other states facing similar problems in developing land-use controls.
3. A study and evaluation of existing zoning and planning legislation to determine its adequacy for controlling land development affecting highway cost, safety, and capacity.
4. Distribution to local governments of a report explaining the zoning planning powers available to them and suggesting the desirable procedures for organizing and operating zoning and planning agencies.
5. Drafting of codes, ordinances, suggested legislation, and technical guides.

Legislation

A number of legislative and constitutional changes appear to be necessary if zoning is to be an effective aid to highway transportation. For example:

1. Legislative statements of purpose and intent for zoning enabling legislation, expressly recognizing transportation considerations as essential in zoning, should be adopted. Further, the legislation should be amended with specific provisions authorizing zoning measures and procedures that benefit highway transportation.
2. Zoning ordinances should be updated in a manner that will enable them to handle today's problems.
3. Consideration should be given to adopting a constitutional mandate requiring any law concerning municipal corporations to be construed liberally in their favor.

Standards

Action on these recommendations would go far toward satisfying the need for legislative guidance in the use of zoning powers to promote efficient operation of transportation systems. Realistic legislation, however, must include workable and practical standards. Highway engineering and highway planning research must be conducted to establish the connection between justifying and applying zoning. Once established, these relationships will serve as the basis for workable and reasonable standards. For example by studying the transportation requirements of various classifications of land uses, standards could be developed, which if incorporated into the zoning process would render zoning responsive to the transportation needs of the land uses being regulated.

Administration of the Zoning Ordinance

The techniques and procedures available for administering the zoning ordinance (for example, special use permits or exceptions, variances, performance standards, special districts or zones) should be adapted to take highway transportation needs into account.

Administration and Adjudication of Zoning Controversies

The engineer and planner must be called on to play a more important role in hearings before the zoning boards of appeal and in court trials. Only by placing increased reliance on engineering and planning studies can zoning and transportation be coordinated in an efficient implementation of a comprehensive community plan.

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