HIGHWAY RESEARCH BOARD

Bulletin No. 10

REPORT OF COMMITTEE ON

Land Acquisition and Control of Highway Access and Adjacent Areas

INCLUDING SPECIAL PAPERS

1948

PRESENTED AT THE
TWENTY-SEVENTH ANNUAL MEETING

HIGHWAY RESEARCH BOARD

1948

OFFICERS

Chairman ..... F. V. Reagel
Vice-Chairman ..... R. A. Moyer
Director ..... R. W. Crum
Associate Director ..... Fred Burggraf

EXECUTIVE COMMITTEE

Thomas H. MacDonald	Commissioner, Public Roads Administration
Frederick M. Feiker	Chairman, Division of Engineering and Industrial Research, National Research Council
Hal H. Hale	Executive Secretary, American Association of State Highway Officials
R. H. Baldock	State Highway Engineer, Oregon State Highway Commission, Salem, Oregon
Pyke Johnson	President, Automotive Safety Foundation, 700 Hill Building, Washington, D. C.
Burton W. Marsh	Director, Safety and Traffic Engineering Department, American Automobile Association, Mills Building, Washington, D. C.
Roger L. Morrison	Professor of Highway Engineering and Highway Transport, Department of Civil Engineering, University of Michigan, Ann Arbor, Michigan
R. A. Moyer	Research Associate Professor of Highway Engineering, Iowa State College, Ames, Iowa
F. V. Reagel	Engineer of Materials, Missouri State Highway Department, Jefferson City, Missouri
Charles M. Upham	Engineer-Director, American Road Builders' Association, 1319 F Street, N. W., Washington, D.C.
Stanton Walker	Director of Engineering, National Sand and Gravel Association, Munsey Building, Washington, D.C.

EDITORIAL STAFF

R. W. Crum — Fred Burggraf — W. N. Carey, Jr.

PUBLICATION OFFICES

2101 Constitution Avenue — Washington 25, D. C.

HIGHWAY RESEARCH BOARD
BULLETIN NO. 10

REPORT OF COMMITTEE ON LAND ACQUISITION AND CONTROL OF HIGHWAY ACCESS AND ADJACENT AREAS

AND SPECIAL PAPERS

PRESENTED AT THE TWENTY-SEVENTH ANNUAL MEETING

1947

HIGHWAY RESEARCH BOARD
DIVISION OF ENGINEERING AND INDUSTRIAL RESEARCH
NATIONAL RESEARCH COUNCIL

WASHINGTON 25, D. C. FEBRUARY 1948

DEPARTMENT OF ECONOMICS, FINANCE AND ADMINISTRATION

H. S. Fairbank, *Chairman*
Deputy Commissioner, Department of Research
Public Roads Administration

COMMITTEE ON LAND ACQUISITION AND CONTROL OF HIGHWAY ACCESS AND ADJACENT AREAS

David R. Levin, *Chairman*
Head, Special Studies Unit
Division of Financial and Administrative Research
Public Roads Administration, Federal Works Building
Washington 25, D. C.

Frank C. Balfour, Chief Right-of-Way Agent, California Division of Highways, 263 Public Works Building, Sacramento 7, California

J. M. Devers, Chief Counsel, Oregon State Highway Commission, Salem, Oregon

J. L. Dickson, Engineer-Manager, San Antonio-Urban Expressways, 1018 Frost Building, San Antonio, Texas

H. E. Hilts, Deputy Commissioner, Department of Design, Public Roads Administration, Federal Works Building, Washington 25, D. C.

L. W. Kern, Right-of-Way Engineer, Maryland State Roads Commission, Federal Reserve Bank Building, Baltimore, Maryland

Theodore M. Matson, Director, Bureau of Highway Traffic, 311 Strathcona Hall, Yale University, New Haven, Connecticut

H. J. Neale, Landscape Engineer, Virginia Department of Highways, Central Highway Office Building, Richmond 19, Virginia

Flavel Shurtleff, Counsel, American Planning and Civic Association, 130 East 22nd Street, New York 10, New York

TABLE OF CONTENTS

FOREWARD

Increasing interest has been evidenced by State right-of-way officials and highway administrators as well, in the activities of the Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Department of Economics, Finance, and Administration, Highway Research Board

In order to make available the papers and discussions and a knowledge of the committee projects at the earliest possible moment, this bulletin is issued herewith

REPORT OF COMMITTEE ON LAND ACQUISITION AND CONTROL OF HIGHWAY ACCESS AND ADJACENT AREAS

The Committee on Land Acquisition and Control of Highway Access and Adjacent Areas has enjoyed a year of extensive activity during 1947.

The 1946 annual report of the committee and special papers and discussions presented at the 26th Annual Meeting of the Highway Research Board were published in May 1947 as Bulletin No. 4 entitled "Report of Committee on Land Acquisition and Control of Highway Access and Adjacent Areas and Special Papers on Right-of-Way Acquisition and Administration."

HIGHWAY LAND ACQUISITION

RIGHT OF IMMEDIATE POSSESSION. Illinois has now been added to the list of States authorizing immediate possession of lands for highway purposes.[1] New sections added in 1947 to the State's original law providing for the exercise of the right of eminent domain authorize the State to take title to any real property needed for highway purposes in fee simple absolute, upon filing with the clerk of court of a declaration of taking and a deposit of the amount of estimated compensation for use of the persons entitled thereto. The declaration of taking must be signed by the Governor of the State or his duly authorized agent and must declare that property taken is for a public purpose. The following must be included in the declaration of taking:

1. A statement of the public use for which such real property is taken.
2. A description of the real property taken sufficient for the identification thereof.
3. A statement of the estate or interest in such real property taken for said public use.
4. A plan showing the real property taken.
5. A statement of the amount of money estimated to be just compensation for the real property taken.

Right of immediate entry may be had in all cases after five days from the date title is vested in the State, unless the court finds that undue hardship will result, in which case possession may be postponed for a period not to exceed six months. The court may not postpone right of entry where the party in possession has received any part of the award unless agreement is made for payment of reasonable rent, as determined by the court, during the period of occupancy.

AASHO SURVEY OF RIGHT-OF-WAY PRACTICES. The Committee on Right of Way of the American Association of State Highway Officials is now engaged in surveying State right-of-way practices by questionnaire.

[1] See Memorandum No. 14, Nov. 1947, Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Highway Research Correlation Service, Cir. No. 26.

All significant phases of highway land acquisition are included, such as right-of-way finance, acquisition agencies, right of entry and immediate possession, methods of acquiring lands, parcel plats and records, appraisal technique, title searching and examination, condemnation proceedings, special benefits, marginal land acquisition, public utility installations, roadside development, and related matters.

In order to avail itself of the research and publication facilities of the Correlation Service of the Highway Research Board, the AASHO Committee on Right of Way has requested this Committee to analyze and synthesize the right-of-way questionnaire returns. This is a formidable assignment and a most important endeavor.

Because of the magnitude of the task, research will be undertaken piecemeal on the divisible subject matter, giving priority to that which appears to be of greatest current importance.

RIGHT-OF-WAY ORGANIZATION AND SALARIES. The Committee has given extensive consideration to the matter of State right-of-way organization and salaries. In addition to previous studies on the matter, it sponsored a paper entitled, "State Administration of the Highway Right-of-Way Function," by G. E. Strauss, Right-of-Way Engineer, Ohio Department of Highways, at the 1947 Annual Meeting of the Highway Research Board. This paper is included in this bulletin.

APPLICATION OF CONTINUOUS STRIP AERIAL PHOTOGRAPHY TO HIGHWAY RIGHT-OF-WAY.[2] Recent development of continuous strip aerial photography offers noteworthy possibilities in its application to the determination and acquisition of highway right-of-way, as well as to highway location, design, maintenance, and traffic operations activities. The highlights of this new technique are sketched herein as an aid to highway administrators and right-of-way officials.

The Sonne continuous strip aerial camera has opened a new vista in aerial photography, by permitting clear pictures to be taken at unprecedentedly low altitudes. Ground objects are thus depicted at a scale never before possible. Such minute detail is produced that sometimes individual blades of grass may be discernible. The camera is especially adapted to the taking of flat or stereoscopic vertical photographs along existing highways, prospective rights-of-way, shore lines, or any other continuous strip of territory. The continuous feature facilitates uninterrupted stereoscopic viewing as if the observer himself were flying over the terrain. The ability to view in three dimensions also permits photogrammetric measurements of the heights of objects such as trees, walls, structures, cliffs, and river banks with an accuracy which conventional photography cannot approach (See Fig. 1).

The Sonne aerial camera is revolutionary in design and conception. It has no shutter, but instead makes use of a slit that controls exposure. When the camera is in operation, the film moves in the direction of and at the same speed as the image in the focal plane. The synchronization of image motion with film speed produces a motion-stopping effect.

One of the principal advantages of this camera is that it can photograph the equivalent of a single uninterrupted exposure on a strip of film up to 200 feet in length. Its design enables a sharp clear photograph to be taken from an air-

[2]See Memorandum No. 6, Jan. 1947, Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Highway Research Correlation Service, Cir. No. 10.

Figure 1. Illustration of Continuous Strip Aerial Photography

plane travelling at high speed and low altitude without the slightest blurring. The technique results in the production of photographs at image scales larger than have been possible heretofore from an airplane.

The film strip is 9 in. by 200 ft., and when stereoscopic viewing is desired, a double strip is required, each strip being 4½ in. wide, as shown by Figure 1. The most practical image scales range from 1 in. = 25 ft. to 1 in. = 100 ft. Curves, unless of very large radius, require two or more flight lines because of the limited coverage.

Presuming that the photographic airplane has been brought to the area, costs of strip photography vary from $25 to $50 per mile, depending on the image scale. It is obvious, too, that the unit cost will diminish with an increase in the length of the area photographed. If a given set of strip photographs thus obtained can be utilized for a number of different purposes in the State highway department, for right-of-way, design, maintenance purposes, and so on, the costs attributable to each such purpose can be diminished.

A stereoscopic viewer with a magnification from 1.5 to 6 times is available. The roll film or paper is attached at one end and rolled across a lighted glass provided for viewing, and is picked up by an empty roll at the opposite end. Thus, as the crank is turned, the whole strip moves across the vision, providing a continuous uninterrupted review for interpretive analysis. A measuring comparator has been developed for engineering use in determining localized heights.

Continuous strip photography can have a variety of possible applications in State and local right-of-way activities. It can be invaluable in a determination of the most economic route locations. Relative costs of proposed widenings of varying widths may be estimated accurately. Likewise, an insight into the details of property arrangement and direct and consequential damages resulting from acquisition of needed property for highway rights-of-way may be obtained. Such photographs may provide an excellent "before" and "after" record, frequently desirable for right-of-way and other purposes. Sections of such continuous strips may be used in connection with individual parcel acquisitions and perhaps incorporated into office files, in lieu of or in addition to surface photographs utilized by some States.

In addition, the nature of land use development adjacent to public roads can be ascertained, with an accuracy impossible under any other photographic technique. The number, variety, size, spacing, and general nature of billboards, gasoline service stations, restaurants, and other roadside establishments may be ascertained in a single operation, at the cost indicated above.

Possible uses of continuous strip photography of a like nature in highway department operations generally could be multiplied, in the fields of design, maintenance, traffic, construction, and planning generally. (The application of this method in obtaining performance survey data was described in the paper, "The Application of Aerial Strip Photography to Highway and Airport Engineering," by J. E. Hittle of Purdue University, given at the December, 1946 Meeting of the Highway Research Board.)

LAND ACQUISITION EXCHANGE FUND. It is becoming apparent once again that advance planning for and advance acquisition of the needed lands and property is a necessary and desirable prerequisite to normal highway construction and improvement programs.[3] The Minnesota legislature has recently enacted a law that indicates a desirable direction such advance land acquisition might take.[4] Though the law is applicable only to a single county in the State, its general principles are sound.

The Board of County Commissioners in counties in the State of Minnesota now or hereafter having a population in excess of 150,000 and an area of more than 5,000 sq. mi.[5] may, by a 5/7 vote, purchase or exchange lands, or both, whenever, in its opinion, it would be to the best interest of the county to do so, in anticipation of unreasonable costs of right-of-way acquisition for the future construction or modernization of public roads.

Whenever the county board deems it advisable to purchase or exchange lands under this law, the board

[3]See Memorandum No. 8, March 1947, Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Highway Research Correlation Service, Cir. No. 12.

[4]Laws of Minnesota, 1945, Chapt. 223, Approved April 5, 1945.

[5]St. Louis county, containing the city of Duluth, Minnesota, is the only one that qualified, according to the 1940 census.

shall refer the matter to a committee composed of the county engineer, the land commissioner, the county auditor, and the county board, as to the value of the land to be purchased or of the lands to be exchanged. If it is determined that the purchase or exchange is to be made, a time and place shall be set by resolution for a public hearing. A copy of the resolution shall be served upon the owner in the same manner as a summons is served in a civil action. All persons shall be heard. If the county board decides that it is for the best interest of the county either to purchase or exchange land, then it authorizes the county auditor and other county officials to draw warrants and execute other necessary papers.

The owner may appeal to the District Court from the decision of the county board in the same manner as appeals from the disallowance of claims by the county board are taken.

County boards that come within the scope of the act may levy, appropriate, and expend an amount not to exceed $25,000 annually, for this purpose. Such boards may also accept gifts of money, lands, and other things from the State, its agencies, municipalities, and persons, for the purposes of the act. All moneys levied and received and payments made shall be transacted from a special fund to be known as the "Exchange Land Fund."

PROVISION FOR FUTURE RIGHT-OF-WAY NEEDS. Attention is invited to section 80.64 of the Wisconsin Statutes (1945) which provides an administrative mechanism authorizing the establishment and present acquisition of highway rights-of-way needed for future street or highway development.[6]

[6] See Memorandum No. 11, July 1947, Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Highway Research Correlation Service, Cir. No. 17.

With the approval of the governing body of the municipality in which a street or highway is located, the county board may, to promote the general welfare, establish street and highway right-of-way widths in excess of the widths in use; and likewise may adopt plans showing the location and width proposed for any future street or highway. Such streets or highways or plans therefor shall be shown on a map then filed in the office of the register of deeds, and notice of such filing shall be duly published in a newspaper of general circulation in the territory in which such streets or highways are located and shall be posted in at least three conspicuous places along each such street or highway.

The excess width for streets or highways in use, or the right-of-way required for those planned may be acquired at any time either in whole or in part by the State or county or municipality in which located; but no part shall be acquired in less than the full extent, in width, of the excess width to be made up of land on the same side of the street or highway, nor for less than the full length of such excess width lying within contiguous land owned by the same owner. Any land so acquired, whether the excess width is acquired for the full length of the street or highway or not, shall at once become available for highway purposes. The power to acquire such right-of-way or additional width in portions as provided herein may be exercised to acquire the land on advantageous terms.

RIGHT-OF-WAY COSTS AND LAND VALUES. As the highway construction program is swinging into high gear, right-of-way acquisition activities are likewise assuming unprecedented proportions. In that connection, the present value of land and property is of more than passing interest.[7]

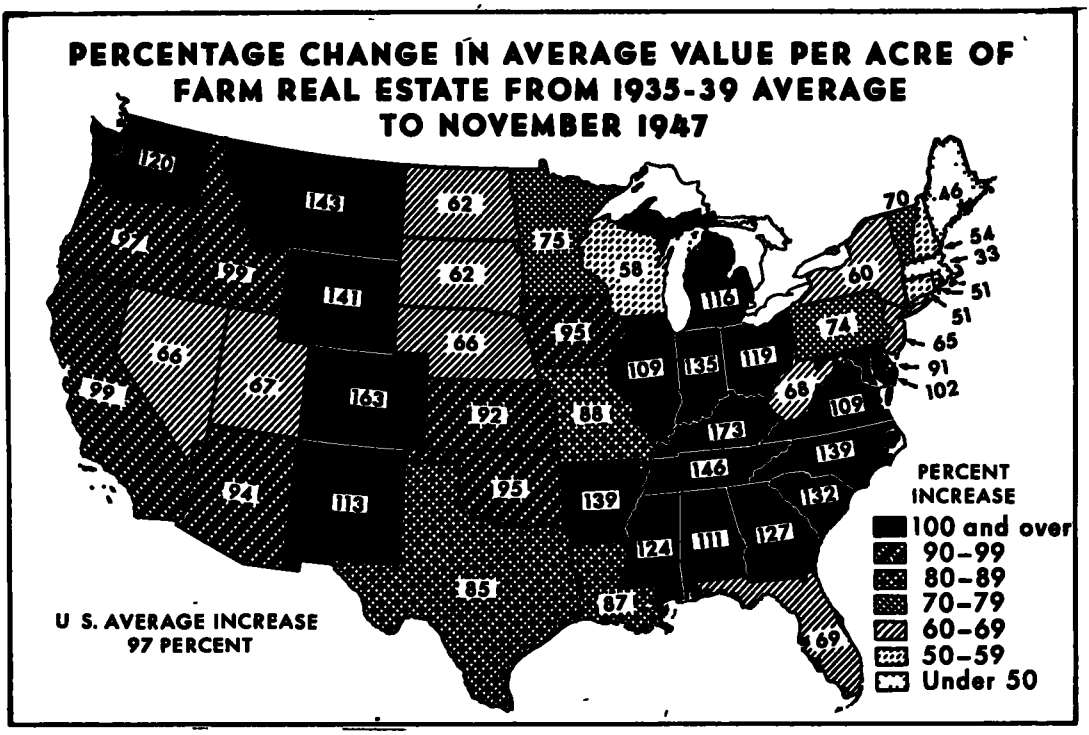

Figure 2. Right-of-Way Costs Are A Function of Land Values. --Courtesy Bureau of Agricultural Economics

Continuing studies of the Bureau of Agricultural Economics, U. S. Department of Agriculture, reveal that farm real estate on the average has practically doubled in value in the last ten years, in the United States. Figure 2 indicates the percentage change for each State over the average of the period 1935 to 1939. Average values are now only three percent below the 1920 inflationary peak. Authorities have observed that urban property has also doubled in value in the last decade.

The inference is clear: On the average, right-of-way costs for highway improvements will be found to have practically doubled over what they were a decade ago.

[7]See Memorandum No. 13, Sept. 1947, Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Highway Research Correlation Service, Cir. No. 22.

HIGHWAY ACCESS CONTROL

Controlled-access highways are now sanctioned by legislative act in 26 States[8], by constitutional provision in one State[9], and by judicial decision in an additional State.[10]

EFFECT OF EXPRESSWAYS UPON LAND VALUES. Great interest has been manifested recently by highway administrators, planners, businessmen and civic leaders in the effect of express highway development upon adjacent property values and upon the

[8]California, Colorado, Connecticut, Florida, Illinois, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, Texas, Utah, Virginia, Washington, and West Virginia.

[9]Missouri.

[10]Minnesota.

land use pattern in general. The Committee is developing a technique for the study and analysis in this segment of highway economics. As little scientifically-derived data are available and because the subject matter involved is necessarily complex in character, this undertaking is not an easy one. Existing express facilities in California and New York and perhaps elsewhere appear to be the most likely subjects for investigation.

TERMINOLOGY STUDIES. In order to simplify technical discussion and popular presentation of highway matters, and to promote clarity and precision in highway literature, legislation and highway administration generally, the Committee has undertaken a study of the more important highway terms, particularly as they relate to express highways. Tentative findings and recommendations will be evolved shortly.

Committee efforts in this direction are based upon three basic principles it has developed:

1. Concepts of the more important types of public roads should first be designated; the assignment of appropriate terms for each concept will thereafter become a much simpler task.
2. Whatever terms are finally evolved from a purely functional approach must be reconciled in large part with dominant existing legislative and judicial usage.
3. Because the technical and popular needs for standard highway terminology are fundamentally different from one another, two sets of terms may be indicated.

PLANNING AND HOUSING APPROACH TO EXPRESS HIGHWAYS. In an effort to develop more fully the housing and general city planning approach to the provision of express highways in urban areas, the Committee sponsored two companion papers at the 1947 Annual Meeting of the Highway Research Board. One entitled "Housing Development and Express Highways," was given by Earl von Storch, Urban Studies Director, Housing and Home Finance Agency; the other entitled "A Planner's View of Express Highways," by Paul Opperman, Urban Planning Officer, Federal Works Agency. Considerable interest in both subjects was indicated. Both are included in this Bulletin.

APPRAISAL OF ACCESS RIGHTS. Ever since the various States began to acquire rights-of-way and access rights for controlled-access highways, pleas have been made by right-of-way officials for detailed information on how to appraise damage caused by loss, in whole or in part, of access rights. Because the subject matter of acquisition in these cases is entirely new, there was little precedent for a technique that could be practically applied.

In response, the Committee sponsored at the 1947 Annual Meeting a paper entitled "Estimating Damage Caused by Loss of Access Rights," by Frank K. Wall, Appraiser, Public Roads Administration, Washington, D. C. This discussion, included in this Bulletin, will bear detailed study.

SECONDARY ROUTES AS FREEWAYS. An Illinois county has recently designated a Federal-aid secondary route as a freeway, perhaps the first such action taken by a subdivision of a State.[11]

A resolution adopted by the County Board of Supervisors of St. Clair

[11] See Memorandum No. 12, August 1947, Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Highway Research Correlation Service, Cir. No. 21.

County, Illinois (adjoining St. Louis, Missouri) on March 29, 1947 declared a portion of State Aid Route No. 23, Section 146A, Federal-aid Secondary Route No. 840, to be a freeway. The resolution is of interest because it is the first one issued by a county board under the authority of the Illinois Freeway Act of 1943. All previous designations have been made by the Illinois State Department of Public Works and Buildings.

JUDICIAL DECISIONS ON CONTROL OF ACCESS. Because of the current importance of litigation involving the acquisition of necessary lands for express highways and the right of access thereto, a recent discussion of Illinois decisions on the subject may be of interest to State highway department attorneys and right-of-way officials. An eight-page summary, with citations, is contained in Committee Memorandum No. 9, April 1947, issued by the Highway Research Board as Correlation Service Cir. No. 13. Copies are available.

A significant decision has recently been made by the Missouri State Supreme Court involving the right to control access as granted by the revised 1945 Missouri Constitution. It is the case of MISSOURI ex. rel. STATE HIGHWAY COMMISSION OF MISSOURI, versus HONORABLE JOHN R. JAMES, Judge of the 16th Judicial Circuit, 205 SW (2d) 534 (Nov. 10, 1947).[12]

The Missouri State Highway Commission sought to improve approximately six miles of Highway 40 in Jackson County by limiting access to certain designated points and by the construction of frontage roads in connection therewith. The highway commission attempted to acquire such access rights by condemnation. The lower court held that the commission had no power to condemn or extinguish the easement or right of access of abutting owners and that the court lacked jurisdiction to ascertain just compensation for the extinguishment of such easement or right. The highway commission accordingly sought and obtained an alternate writ of mandamus from the Missouri Supreme Court. The writ was thereafter made permanent by the Court.

The Supreme Court held that the circuit court did have jurisdiction to determine and decide all issues tendered by the condemnation petition, since the constitutional provision, cited below, granting the power to limit access, was adequately supported by statutes:

> Article IV, Section 29: "It (referring to the highway commission) shall have authority . . . to limit access to, from and across state highways where the public interest and safety may require, subject to such limitations and conditions as may be imposed by law."

PUBLIC NOTICE OF ESTABLISHMENT OF FREEWAYS.[13] The Illinois Freeway Act of 1943 authorizes the designation of highways as "freeways" when traffic safety and convenience will be promoted and the public interest furthered thereby. The law provides that when a highway has been declared a freeway, all existing means of access shall be frozen and no new points of entry may be established without consent of the highway authority. Pursuant to this statute, approximately 515 miles of State highway have been designated as freeways.

In order to serve public notice of the establishment of such freeways, after an appropriate order of

[12] See Memorandum No. 15, Dec. 1947, Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Highway Research Correlation Service, Cir. No. 29.

[13] See Memorandum No. 8, March 1947, Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Highway Research Correlation Service, Cir. No. 12.

Figure 3. Freeway Notice Sign Erected on U.S. No.66 North of Springfield, Illinois

the Department of Public Works and Buildings of Illinois, large signs are erected by the Department on all routes where the ultimate development coincides with or approximates the location of an existing highway. Figures 3 and 4 are typical of such signs.

The notices have been placed at one mile intervals approximately, and generally halfway between intersections. The State is presently considering erecting one or more signs at each intersection. If a proposed freeway is to be relocated a considerable distance from the

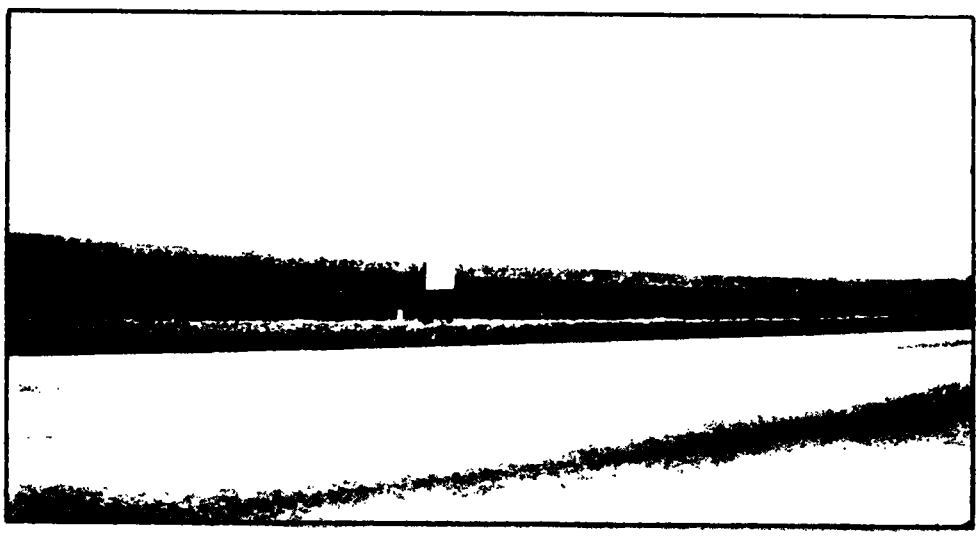

Figure 4. The Same Sign in Relation to the Roadway

existing highway, signs do not appear to be necessary and none probably will be placed until construction has been started.

This practice may be helpful to States that are contemplating similar action with respect to an express highway system that must perforce be designated and planned in advance.

THE PROBLEM OF THE ROADSIDE

NEW YORK OUTDOOR ADVERTISING CONTROL. Some significant standards have recently been issued by the Landscape Bureau of the Department of Public Works, for the appraisal of objectionable advertising signs along public roads in the State of New York.[14] The New York law prohibits all advertising within the highway right-of-way. All signs within the right-of-way for the warning and control of traffic are approved and controlled by the State.

The following types of outdoor advertising signs are objectionable, and should be removed, set back, or modified, according to the Landscape Bureau:

1. Advertising signs along the highway which obstruct sight distance not otherwise limited.
2. Advertising signs which have red or green lights or red or green reflectors.
3. Advertising signs which have flashing or intermittent illumination.
4. Advertising signs which display the form of an arrow.

The following types of outdoor advertising signs are considered objectionable and may be judged on their merits or demerits as requiring removal, setting back, or modification:

5. Advertising signs located with reference to a railroad grade crossing, highway intersection, or access road intersection which reduce sight distance below the standard for the established highway speed at that point.
6. Advertising signs located so close to the pavement as to be hazardous because of the possibility of their falling into the highway or endangering a car out of control.
7. Advertising signs readable from any section of a highway where the vertical or horizontal curvature, or the existence of immovable objects reduce the sight distance on the highway to less than 1000 ft.
8. Advertising signs which are self-illuminating and permit leaking or direct rays of light toward traffic, or are reflectorized and reflect an objectionable amount of light.
9. Advertising signs using traffic warning words or slogans such as STOP, CAUTION, or SLOW.
10. Advertising signs or combinations of signs which contain reading matter which cannot be comprehended at the designated speed of the highway at that point.

BILLBOARDS ON MAIN TURNPIKES.[15] "In order to better safeguard the interests and investments of the State and its people in the State turnpike system, to afford a greater measure of protection to the users of the turnpike by elimination of dangerous hazards, to best maintain the turnpikes for the welfare of society," the Maine legislature in

[14] See Memorandum No. 12, August 1947, Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Highway Research Correlation Service, Cir. No 21.

[15] See Memorandum No. 13, Sept. 1947, Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Highway Research Correlation Service, Cir. No. 22.

its 1947 session acted to prevent indiscriminate erection of signs and billboards adjacent to these turnpikes by enacting Chapter 279, Public Laws of 1947, prohibiting the erection or maintenance within 500 ft. of the nearest right-of-way boundary line of any such highway advertising sign or advertising structure or device of any kind. The law does, however, exempt signs advertising the business conducted on the property, provided that not more than 10 such signs may be erected, to cover an area not greater than 250 ft. and to be located not more than 300 ft. from the place of business.

TEXAS ROADSIDE COUNCIL. The Texas State Highway Department has become increasingly aware of the importance of the roadside in its relation to the safety and efficiency of motor travel by highway. It has recently designated a nine-member citizen group called the Texas Roadside Council, the function of which is to head a State-wide organization of citizens interested in the improvement of areas adjacent to public roads. Figure 5 is an organization chart of this body and its relationship to the State highway department.

Its present program includes, among other things, a study by a committee of the Roadside Council looking toward a practical correction of the present indiscriminate use of advertising signs along Federal, State, and local highways.

The Council has recently issued a publication entitled "Citizens' Organization Pamphlet for the Improvement of Properties Adjacent to Highways," Texas Highway Department. The Chairman of the Texas Roadside Council is Bertram E. Giesecke, Austin, Texas.

This organization is an excellent vehicle for marshalling the public interest and support needed to effectuate an adequate program of public control of areas adjacent to public roads in the interest of a better transportation service.

MASSACHUSETTS OUTDOOR ADVERTISING AUTHORITY.[16] Solution of the billboard problem has been hampered largely by inadequate legal enabling authority, as well as by ineffective administration. As with all public enterprises, a sound legal mechanism and good administration thereof are necessary to obtain effective results.

A recent development in Massachusetts in this field is noteworthy. Heretofore, the Massachusetts Department of Public Works had been designated by law to formulate and promulgate regulations governing the control of billboards, signs, and other advertising matter on public ways or on private property within public view of any highway, public park, or reservation. For some time, groups interested in highway safety and in the preservation of the integrity of the roadside have indicated gross dissatisfaction with the administration of State billboard regulations in Massachusetts. Accordingly, under the impact of this criticism, the 1945 State Legislature appointed a Recess Commission on Outdoor Advertising, charged with the duty of studying existing laws, holding public hearings, and making suggestions for betterment. Pursuant to the recommendations of this Commission, the Massachusetts Legislature, in June 1946, created a special *ad hoc* body known as the Outdoor Advertising Authority, to administer the functions heretofore lodged with the State Department of Public Works.

[16] See Memorandum No. 14, Nov. 1947, Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Highway Research Correlation Service, Cir. No. 26.

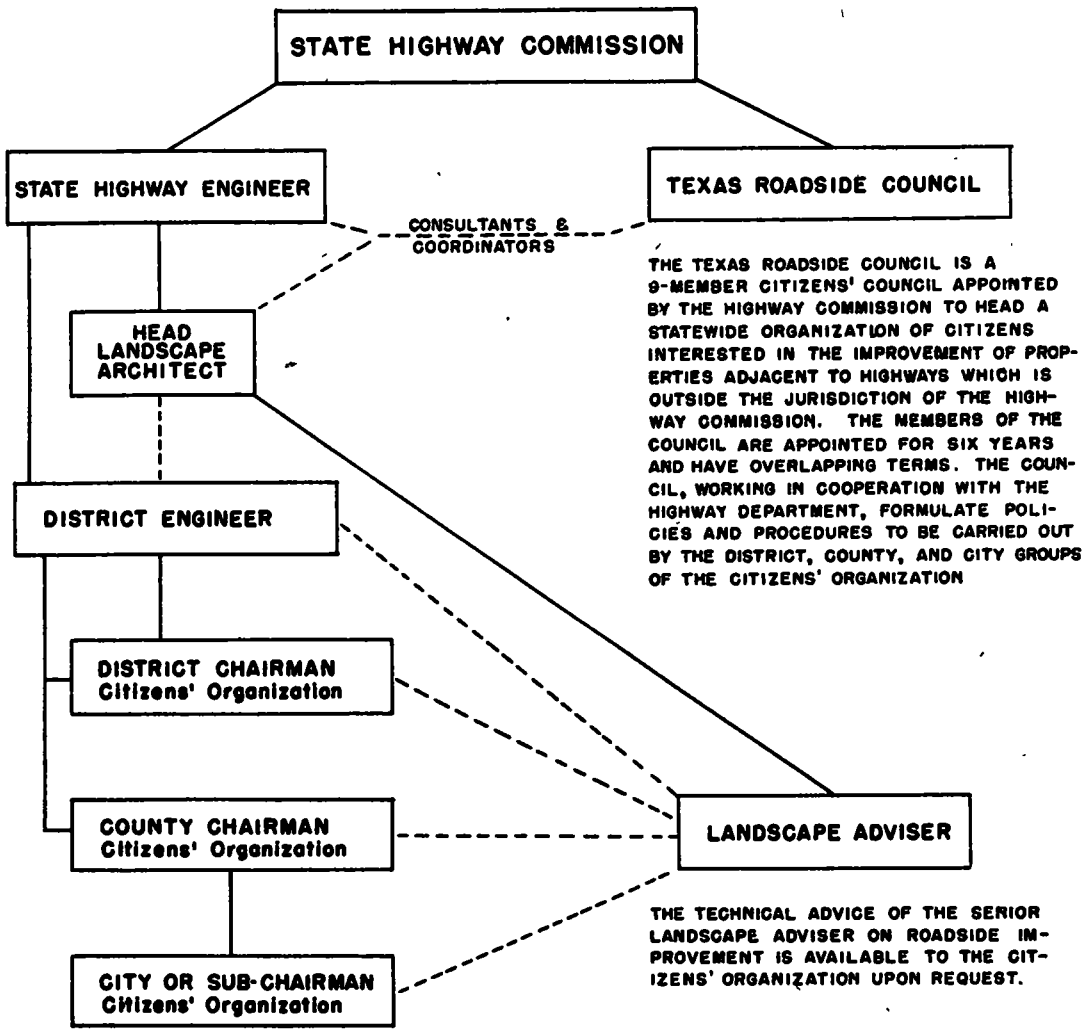

Figure 5. Roadside Council of Texas State Highway Department

Though the Authority has yet to demonstrate its superiority over its predecessor, this legal and administrative device as thus newly applied to the billboard problem may be of some significance.

The Outdoor Advertising Authority consists of three persons appointed by the Governor, with the advice and consent of the council. The Authority is to make an annual report to the general court. The law provides that the first executive director of the Authority, to be appointed by the Authority, is to be the former head of the pre-existing Outdoor Advertising Division of the Department of Public Works.

As provided in the act, the Authority has now promulgated a set of rules and regulations for the proper control and restriction of

billboards, signs, and other advertising devices. These regulations provide for the licensing of persons, firms, associations, or corporations engaged in the business of outdoor advertising. A scale of license fees is established based on the number of permits granted licensees, ranging from 25 cents for ten permits or less, to $300 for over 500 permits.

Another section of the regulations prohibits posting, erecting, or displaying billboards, signs, or other advertising devices unless a permit therefor has been issued by the Authority. Applications for permits must be accompanied by sketches showing the exact location of the proposed billboards, signs, or other advertising devices. Fees required include an examination fee, an inspection fee, a renewal fee, and a renewal inspection fee. Costs range from 50 cents to $2.00 each according to the size of the structure.

An interesting provision included is that providing for local approval of proposed signs. A copy of each application for a permit is sent to the city or town where the billboard, sign, or other advertising device is to be located. If the city or town objects to the location it may file its objection with the Authority, which, in turn, notifies the applicant. The applicant is given the opportunity to file reasons why a permit should be granted and a hearing will be given by the Authority, if requested, before final action is taken.

The Authority may grant permits for the erection of billboards, signs, or other advertising devices in areas which the Authority may determine to be of a business character. A business area shall be any section which is commercial, industrial, marketing, mercantile, or on unrestricted commercial arteries and adjacent to commercial enterprises. The provisions of this paragraph shall not apply to billboards, signs, or other advertising devices located in other than business areas as herein defined and erected prior to the effective date of these regulations provided that all such existing billboards, signs and other advertising devices shall comply with the following provisions with respect to size and setback:

"1. If thirty-two (32) sq. ft. or less in area to be at least fifty (50) ft. from the boundary line of any public way.

"2. If more than thirty-two (32) sq. ft. in area and up to twenty-five (25) ft. in length and twelve (12) ft. in height to be at least one hundred (100) ft. from the boundary line of any public way.

"3. If more than twenty-five (25) ft. in length and twelve (12) ft. in height and up to a maximum size of fifty (50) ft. in length and twelve (12) ft. in height, to be at least three hundred (300) ft. from the boundary line of any public way, except that the Authority may permit the erection of billboards, signs, or other advertising devices which do not exceed forty (40) ft. in length and fifteen (15) ft. in height if not nearer than three hundred (300) ft. to the boundary line of any public way."

The Authority may regulate the dimensions and material of all billboards, signs, or other advertising devices and may also require removal of any matter displayed thereon which it considers objectionable. Routine provisions governing maintenance of structures are included; also restrictions on locations which might be considered as detrimental to health and safety, as fire hazards, or as destroying scenic beauty.

The manner and degree to which these regulations are enforced will be watched with interest.

MICHIGAN ROADSIDE CONTROL STUDY.[17] Increasing interest has been manifested by highway authorities in the effective public control of the areas adjacent to the highway, in order to promote the safety and efficiency of travel by motor vehicle. An important contribution in this field is being made by the State of Michigan.

The Michigan roadside control study was first outlined in Committee Memorandum No. 5, dated October 1946. Mr. Charles M. Ziegler, Michigan State Highway Commissioner, has recently indicated the progress which has been made on that project.

The Michigan roadside control study was initiated in 1946 to establish the bases for formulating a department policy to minimize the hazards of roadside enterprise to highway traffic along the principal State trunklines. It was thought that the results of the study would produce evidence of the extent that roadside establishments contribute to motor vehicle accidents on the highways. The work was to be done in conjunction with the interstate highway accident study. It was contemplated that the causes of highway accidents would be related to the characteristics of roadside establishments as well as highway design.

The department recognized the need for confining entrance and exit to roadside establishments to one or two driveways and for the separation of the traveled highway and shoulders from the standing and parking areas serving enterprise. The owners of roadside establishments were to be encouraged in improving the safety of their parking service to customers. A campaign of public information was planned with the belief that the success of the project would depend on how well the objectives were understood by the local citizenry.

A section of State trunkline U. S. 24 and U. S. 10 from a point south of Pontiac to the State line near Toledo, Ohio, was selected for the project. This section of road includes two-, three-, and four-lane pavements serving large volumes of State trunkline traffic containing a high percentage of truck-trailer combinations. Many roadside enterprises are peppered along this stretch of highway.

A continuous stationing system was established throughout the length of the project, with roadside station markers approximately 1,000 feet apart. A survey of all roadside features was undertaken, such as the location and type of buildings and structures, existing driveways, parking facilities, present paved surface, and existing signs. A strip map of the entire route has been prepared showing the topographic features as related to marginal uses, together with station markers as erected. Prints of the strip maps have been furnished the district office, county road commissioners, the sheriff, and the State police, to assist in locating accidents as well as to serve as a detailed record of billboard locations. The 1941 accidents have been plotted on the strip map.

Upon analysis, it was found that a large number of the highway accidents reported in 1941 could not be located with accuracy. In order to associate the location of an accident with characteristics of highway design and roadside development it is necessary to locate the spot where the accident occurred with greater accuracy than ordinarily found on accident reports. Accordingly, the cooperation of the State police was sought.

The Michigan State Police have been asked to designate the exact

[17] See Memorandum No. 10, May 1947, Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Highway Research Correlation Service, Cir. No. 15.

location of all highway accidents that occur this year on the study section. Locations are to be referred to the station markers that have been established every thousand feet.

During 1946, some improvement of roadside conditions has been obtained in isolated locations. A program similar to the 1946 endeavor is being formulated for 1947. Each of the district traffic engineers has submitted a list of 10 to 15 hazardous locations with respect to driveways and parking, and selections will be made from these submissions.

The Planning and Traffic Division of the Michigan State Highway Department is cooperating with the Michigan State College, in encouraging rural land use planning and zoning. Their specialists are furnished, at informal conference, with current information concerning the need for off-the-highway parking facilities, set-back lines, clear-vision areas, and so on. Consideration is being given to the possible achievement of desirable roadside development by means of rural zoning ordinances. Occasionally, a representative of the division meets with local planning agencies to explain the objectives of good roadside control.

The following observations have been made, as a result of these State-local relations:

1. Local planning and zoning agencies are anxious to incorporate clauses in their zoning ordinances that will preserve the public investment in roads and yield safe highway transportation.
2. Local bodies are willing to incorporate pertinent clauses in their zoning ordinances if such additions are practical in light of present public understanding.
3. There is a need for factual material concerning the extent that existing objectionable roadside conditions contribute to highway accidents and interfere with the free flow of traffic.
4. Roadside control on interstate and primary State trunkline highways is urgent but there is little prospect of obtaining it promptly by means of appropriate clauses in county and township zoning ordinances.
5. The enthusiasm of individual members of planning committees and zoning boards for the preservation of safety in highways and off-the-highway parking facilities suggests that active public support for the program can be obtained as soon as highway authorities carry out a reasonably good campaign to inform the public about the facts and the need for good roadside control through appropriate State and local government agencies.

It is expected that this element of highway needs will be considered by the Highway Study Committee and that recommendations will be incorporated in their report on highway facts and needs to the Governor and the legislature.

The Joint Committee on Highway Control was organized on December 12, 1946, because a definite need for enforcement officials and highway engineers to reach a mutual understanding of their problems of promoting the safety and convenience of highway traffic operations, with respect to the design, application, and enforcement of traffic control measures. It was believed that by means of a mutual understanding of each other's problems, they would promote uniform standards and operational procedures, and formulate needed legislation.

The Committee is composed of one or more representatives of the Michigan State Police, the State

Highway Department, the County Road Association of Michigan, and the Michigan Municipal League. The immediate objectives of the committee are:

1. Clarification of the present statutes with respect to parking on roadways outside of incorporated places.
2. Revision of legislation to prohibit all angle parking on State trunklines and county roads in urban and rural areas.
3. Formulation of legislation for the control of roadside development, limitation of egress and ingress, and for the provision of off-the-highway parking facilities for all new or altered land uses.
4. Enforcement of no-passing zone regulations.
5. Prohibition of the use of bridges for any purpose other than for travel.

The committee has obtained legal assistance from the Wayne County Road Commission and the State Highway Department in the drafting of needed legislation.

ROADSIDE CONTROL IN NEW JERSEY BY CONSTITUTION.[18] New Jersey's new constitution, adopted by the people on November 4, 1947, contains the following broadly conceived and somewhat unusual provision for land acquisition and roadside protection:

> Article IV, Sec. 6, Subsection 3.
> "Any agency or political subdivision of the State, or any agency of a political subdivision thereof, which may be empowered to take or otherwise acquire private property for any public highway, parkway, airport, place, improvement, or use, may be authorized by law to take or otherwise acquire a fee simple absolute or any lesser interest, and may be authorized by law to take or otherwise acquire a fee simple absolute in, easements upon, or the benefit of restrictions upon, abutting property to preserve and protect the public highway, parkway, airport, place, improvement, or use; but such taking shall be with just compensation."

This section, if implemented by legislation to spell out some of the administrative details more adequately, should provide adequate means for preserving and protecting public highways in that State. The constitutional provision is broadly conceived to apply to designated public improvements in addition to highways. The authority granted must be exercised under the power of eminent domain rather than under the police power.

LEGAL ASPECTS OF PARKING

PARKING LEGISLATION. During 1947, the Highway Research Board published two of a series of four studies on parking legislation sponsored by the Committee, i.e., "An Analysis of General State Enabling Legislation Dealing with Parking Facilities," Bulletin No. 2 Revised; and "An Analysis of State Enabling Legislation of Special and Local Character Dealing with Automobile Parking Facilities." Legislative suggestions are included.

The third of this series, soon to be released, will concern the requirements for off-street automobile parking facilities contained in zoning ordinances, building codes or other local laws. One hundred fifty-five such local laws will be included, in cities, counties, towns, and villages. Model provisions appropriate for inclusion in local codes will be drafted in accordance with the indicated needs.

The last study, almost completed,

[18] See Memorandum No. 15, Dec. 1947, Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Highway Research Correlation Service, Cir. No. 29.

deals with requirements for off-street truck loading and unloading facilities contained in zoning ordinances, building codes, or other local laws. An analysis will be made of ordinances containing such provisions. Legislative suggestions will also be presented.

A summary of this fourth study, entitled "Zoning Requirements for Off-street Truck Loading and Unloading Facilities," was presented at the 1947 Annual Meeting of the Highway Research Board before the Committee on Parking, Department of Traffic and Operations.

PARKING ZONING PROVISION HELD INVALID.[19] Because there has been little or no litigation concerning requirements for the provision of off-street parking facilities as contained in local zoning ordinances, a recent judicial decision involving New York City is significant.

On November 1, 1944, the New York City Planning Commission adopted a resolution proposing amendments to the existing building zone resolution. The 431 Fifth Avenue Corporation initiated litigation against the City of New York for a declaratory judgment as to the validity of these proposed amendments.

While other issues were at stake in the legal controversy, the only provision involving off-street parking facilities was subsection (g) Section 19, of Article IV (Area Districts), as follows:

> "In any use district, except a residence district, where provision is made for parking or unloading within a building, the area of such parking or unloading facilities may be added to the area permitted to be occupied by the first floor of the building. Except for the first floor, the building shall be otherwise limited by the restrictions set forth in this article."

Under other sections of the proposed amendments to the zoning ordinance, new building construction would have to be confined to not more than 65 percent of the area of an interior lot or 80 percent of a corner lot. Fuller land use would have been permitted, however, to buildings providing off-street parking or loading facilities, under the subsection quoted above.

On April 27, 1945, the New York Supreme Court, Special Term, New York County, refused to declare subsection (g) invalid, in 431 FIFTH AVENUE CORPORATION v. CITY OF NEW YORK, 184 Misc. 1001, 55 N.Y.S. (2d) 203.[20]

Upon appeal, the Appellate Division of the Supreme Court modified the order of the lower court, on December 20, 1945, in 431 FIFTH AVENUE CORPORATION v. CITY OF NEW YORK, 270 App. Div. 241, 59 N.Y.S. (2d) 25.

In accordance with the requirements of Section 200 of the New York City Charter, within thirty days after the filing of the above amendatory resolution, there were filed with the New York Board of Estimate, protests against the said amendment, signed and acknowledged by the owners of more than twenty percent of the area of land in all the various retail use districts contained in "B" Area Districts throughout the City. The plaintiff alleged, inter alia, that, despite the filing of these protests, the Board of Estimate took proceedings which in effect approved the amendment. The vote of approval, however, was by less than a unanimous vote which is required in such cases.

The New York Supreme Court accordingly held subsection (g) to be invalid and ineffective. The court

[19] See Memorandum No. 11, July 1947, Committee on Land Acquisition and Control of Highway Access and Adjacent Areas, Highway Research Correlation Service, Cir. No. 17.

[20] In New York State, the Supreme Court is not the court of last resort.

indicated that however worthy a judicial tribunal might deem a proposal for further control of the density of the use of land in certain areas of the city, its duty is to enforce the law as written and unless that law has been complied with, in the adoption of a proposal, it must hold the proposal illegal. There were dissenting and concurring opinions.

The Court of Appeals of New York, on July 23, 1946, affirmed the judgment and order of the Supreme Court, without comment, in 431 FIFTH AVENUE CORPORATION v. CITY OF NEW YORK, 296 N.Y. 588, 68 N.E. (2d) 877.

This litigation does not affect the height and set-back reforms which the amendments embody. The decision invalidates subsection (g) and thereby fails to provide any incentive for the provision of off-street parking facilities by private owners under the zoning mechanism. It should be noted, however, that the decision here summarized is not an adjudication on the merits of the requirement for the provision of off-street parking facilities. Rather, it concerns a collateral procedural matter that may be unrelated to the merits of the fundamental issue.

INFORMATION DISSEMINATION

The Committee has continued its practice of facilitating a systematic and timely interchange of current practices and legal techniques with respect to the subjects with which it is concerned. In pursuance thereof, ten committee memoranda have been issued during 1947, as follows:

Memorandum No. 6, January 1947
Memorandum No. 7, February 1947
Memorandum No. 8, March 1947
Memorandum No. 9, April 1947
Memorandum No. 10, May, 1947
Memorandum No. 11, July 1947
Memorandum No. 12, August 1947
Memorandum No. 13, September 1947
Memorandum No. 14, November 1947
Memorandum No. 15, December 1947

CONCLUSION

The basic function of the Committee is to render research and informational service concerning the legal and administrative aspect of highway land acquisition, express highways, and the roadside problem. The Committee urges the respective States and other interested organizations to propose projects of current importance in these fields of endeavor.

A PLANNER'S VIEW OF EXPRESS HIGHWAYS

Paul Oppermann, *Urban Planning Officer*
Federal Works Agency

In this paper the important place of the express highway in the planning, building, and rebuilding of our urban communities and some of the principal evidences of ways in which cities are changing and the relation of expressways to these changes are discussed. The question of whether urban traffic congestion is correctible in cities as they are now and in cities as they may be later is considered. In discussing this question some possibilities in the relation of expressways to urban redevelopment are reviewed.

EXPRESS HIGHWAYS IN URBAN REORGANIZATION. The express highway is a major instrument for the physical reorganization of cities needed today. It is no longer news that the expressway is a highly efficient mover of traffic, assisting large volumes to flow at high speeds with maximum safety. These results are obtained from sound principles of engineering design brought to bear upon modern traffic characteristics and requirements.

The expressway is well adapted to penetrating the chaotic mass which present-day cities have become and separating this mass into proper functional divisions, for residence, business, industry, government, and other purposes. Our cities, inherited in large measure from earlier times, were built to serve other conditions. They may be redesigned and rebuilt, utilizing the expressway principle, so that they will better serve today's requirements, as well as tomorrow's, to the extent that they can be foreseen.

Expressways are appropriate boundaries of the major elements of which cities are composed. They act as separators for these elements, helping to fit each to its place and as insulators, to assure proper separation of urban functions. Expressways provide both scope and physical definition, at the same time linking up the parts. Functional interdependence of the urban community or metropolitan region is recognized and assisted.

Uses and practical services performed by the modern expressway in physical organization and applicable in reorganization of cities will be indicated by the following elements of urban areas. Residential portions take up the most urban space. We spend most of our lives in them. These areas today are increasingly exhibiting an improved layout. Unified plans for large subdivisions, sometimes for whole neighborhoods, with grouped community facilities, are a trend.

Industrial sections are changing. The mass production factories are often too large to fit the crowded older sections. Most of them today are built outside central cities.

Urban transportation is changing the urban scene. The physical pattern of transportation is altering the appearance of cities. Local and intercity bus lines, inter-city and interstate trucking are increasing. These activities require terminal space in accessible loca-

tions. Air terminals present another aspect; cities have water transportation to consider in many cases.

Then there is the central business district. This shows the impact of the automobile, in an extent and volume of traffic congestion scarcely under control anywhere. As parking facilities off-the-street have been established, however, a little light has appeared in downtown sections, a new "openness" here and there suggesting possibilities, but so far lending very little encouragement that there will come about any real and lasting reduction in congestion from this source.

URBAN RESEARCH ADVANCING. The complexities of the modern city have been recognized in recent years. From small beginnings urban research has grown to large dimensions. Highway, housing, urban, and regional planning research today are contributing to better adjustment of the city's physical plant to its social and economic purposes.

Highway planning surveys begun a number of years ago, the origin and destination technique, are the research foundations that have given us the superior traffic instrument of the express highway, to provide major relief from urban traffic congestion, and radical improvement in inter-city highway travel.

Housing research, applied to operations in recent years, has had an effect upon the pattern of residential sections. Land planning studies, housing cost and housing market research are sharpening up the approach to lower cost and technically improved housing. Mistakes have been made but there unquestionably has been some real progress.

The recently published *Community Builders' Handbook* of the Urban Land Institute; FHA's earlier *Handbook on Urban Redevelopment;* FPHA's publication *Public Housing Design* should be mentioned as evidences of housing research.

Urban research has included studies of highways, housing, population, finance, health, welfare, and taxation. City halls, state capitals, private governmental research bureaus, and Federal agencies have participated in this important and useful activity. Cities have been dissected as never before. Holding up the mirror to themselves has already had its constructive effects.

NEW FORM OF THE CITY NOW FORESEEABLE. The chaotic mass-city is yielding to new design and engineering principles. There is a visible expression in cities of these principles in the new physical structures of many kinds.

The negative aspects of decentralization have been over-emphasized, opportunities and positive benefits overlooked, as Commissioner MacDonald of Public Roads Administration has pointed out. He has used the term "de-densify" to describe some of the urban changes taking place, and has pointed to the need for more space in the centers of cities. Public open space is needed for the increased public business of expanding and still growing cities. Structural changes to accomodate traffic pressing upon the restricted street channels, to provide the commercial enterprises located in central areas with work space and circulation necessary for greater business efficiency are urgently needed.

The hit-and-miss business center that "just growed" like Topsy, is where up-to-date planning and engineering techniques have so far been found least effective. The business district is a major traffic target of the vast majority of motorists and motorized cargo.

The city built by our grandparents and their forebears, for their day and way of life, is changing. Most of what we see was built in two or

three generations, mostly by hand. It can be replaced, the obsolescence we mistakenly call "urban blight" removed, the job done this time mostly by machines. Much of the new city is already outlined, some of it built. Every obsolete section, block, and structure is an engineer's, architect's, and builder's potential commission.

What is this outline of the new city now foreseeable? "Seeds" of new urban growth already planted, and "sprouting," today include the modern health facilities. These range all the way from complete medical centers to neighborhood clinics.

Education facilities begin with the great university of several colleges, covering a span today that includes the pre-school or nursery school.

Shopping facilities should be included. These are taking on the character of a neighborhood trade center, with grouped stores and built-in parking. These shopping centers are all-of-a-piece in their design.

Housing projects, privately financed, for sale or rent, public housing low-income projects; the large-scale subdivision or residential communities are examples of the trend. Parks, playgrounds, parkways; air, rail, streetcar, bus, truck, and off-street parking terminals - these are some of the pieces of the mosaic or urban picture puzzle of today.

What role is played in the changing urban pattern by highways? The new urban expressways are leading the transformation. Radials centering on the city's hub will increasingly take on an expressway character; circumferential inner ring, intermediate, and outlying rings will do likewise.

What kind of development, as building or rebuilding takes place, will fill the spaces between express highways?

Chicago, Detroit, and other cities are among those having overall city plans well along. The design principles for their residential sections are conforming to a cellular neighborhood concept, adjusted to the land and other controlling factors. Serving these neighborhood communities, Detroit proposes to place branch offices of local government in these "neighborhood units." In future Detroit, you may pay your taxes, bawl out your neighborhood "mayor" and clerks presumably, in these "next door" offices.

IS URBAN TRAFFIC CONGESTION CORRECTIBLE? It is difficult and even painful to imagine metropolitan cities today minus their express highways; New York without the Pulaski Skyway, the tunnels, the Westside Highway; Chicago lacking the Outer Drive.

Greatly increased construction of expressways doubtless will, in a visible and measurable degree, reduce urban traffic congestion. Probably it will eliminate it over the principal extent, over the bulk of all urban and urbanizing territory, except for driver or mechanical failure which causes congestion not attributable to the design factor.

There seem to be some grounds for reasonable doubt that express highways will solve central business district traffic congestion without fundamental surgery, perhaps radical redesign applied to that part of the present-day city's anatomy, and control of building of a type nowhere yet attempted in our cities. Ignoring a time when traffic converging on business centers will double or triple, will maximum feasible use of expressways, assuming engineering and finance questions settled, provide uncongested street channels throughout central business districts, as these are now laid out and built?

Expressways may be expected to

deliver and take away efficiently the tremendous load of traffic they are so well equipped to handle. Once the traffic unit, car, bus, or truck, is off the expressway and enters the old gridiron street system, it is in traffic trouble, or so it seems to some of us. The problem first is how to store present (to say nothing of future) quantities of vehicles of all descriptions, seeking to come to rest in reasonably convenient business district locations; second, how will vehicles in this area get in from the expressway, and back to an expressway, at a pace somewhat faster than a man walking, over existing restricted street space, across street and alley intersections, past the innumerable pedestrian, loading, taxi, bus, street car, and other frictional movements and interruptions which now exist there. We would have a better answer if we knew how much expressways will reduce central business district traffic.

Every private lot and block, including the private parking lot, is potentially buildable, if not already built, to the lot lines and to the cornice line, x-hundred feet aloft. While the gridiron street plan remains, while central business district zoning is so liberal as to constitute no real regulation of land use and occupancy, no specific limits of buildable area of the site, bulk, or intensity of building, the central business district does not seem to be a candidate for genuine traffic relief.

RELATING PLANNING THEORY TO PRACTICE IN CITIES. The generalized fields have been with us a long time in civil and military affairs and administration. The military has long had its "generals." The city manager, the mayor, are "generals" in this sense; "administrative generals."

There is a type of generalist, relatively new in public administration, the generalist in the physical planning sense. The city planner, regional or state planner, is primarily a generalist in relating physical parts of urban communities or regions or states. In reconciling these often competing and conflicting physical elements of cities in space, as in the case of public and private land or building sites, he must work with and lean heavily upon specialists: the experts in highway and transportation planning, for example. Express highways serving the whole community, not just the householders on a single local street, obviously must be planned with community development and community requirements as a whole in mind.

Measured by actual results, the achievements to date of the physical planning "generalists" —city planners, state planners, regional planners—are not particularly impressive. But the record here, as elsewhere, is improving.

Chicago, Philadelphia, Detroit, and Los Angeles, are a few of the leaders in general planning of urban areas. These cities have city planning staffs very large by standards of only a few years ago. Speaking generally, the overall planning work that is being conducted by the municipal governments of these cities is in conformity with the planning theory somewhat sketchily outlined in these comments. These city plans depend in basic ways upon the express highway.

The prospect for really fundamental changes of the type needed to afford real traffic relief, speaking frankly, does not seem very bright. While there is recognition that obsolete and blighted blocks and whole areas of these central sections offer opportunities for rebuilding, for providing better arranged space, for private functions and for public ones, the specifics of these changes are so

far lacking. We do not yet know, for example, what areas, expressed in acres or square miles, are needed to serve central business and administrative uses, either to serve the present size and population of the city or some estimate of future size.

The basic changes in layout, in engineering structures and architectural design, appropriate zoning of building area-height-and-bulk to reduce traffic congestion, as obsolete buildings are removed and as new construction procedes, require a stronger and broader research base. This may be the place -the central business district research need and opportunity -where highway planners, city planners, and other officials and private groups, can join their efforts and work more closely together.

Decentralization and urban blight have focused attention upon this problem of the central area. Municipal authorities have become interested. This is where public costs remain high while tax-paying business, industry, numbers of house-holders, owners, or occupants of residential property, take flight to the suburbs. Institutional and private owners of properties which have lost their market see themselves threatened with financial loss or ruin as their holdings are jeopardized by blight. These private and official groups have joined hands. Public housers interested in slum clearance are also on the urban redevelopment bandwagon.

Twenty-four states have enacted urban redevelopment laws. These new statutes permit, for the first time, large scale condemnation of blighted and slum areas. They permit broad area, unified building plans to go ahead. They offer hope that something can be done about central sections.

Clearance and underlying structural changes, as in street patterns, as in new and better grouping of buildings on a single block or combination of blocks, will be possible, in theory at least, under urban redevelopment. With the removal of the legal frustrations which have prevented private groups and public authorities from cooperating in planning and building on the scale which conditions today suggest, and modern building techniques and organization make possible, that part of traffic congestion which now appears insoluble to such pessimists as the writer, when urban redevelopment really gets under way, may take on a more cheerful color.

Recognition of the mistakes made and present inadequacies of the city's layout is found in these laws. Redevelopment schemes under most of this legislation must fit into a general guiding plan or city plan. It remains to be seen how well prepared cities will be, how much determination they have and they direct toward putting central sections in better shape. This is the most complex and costly of undertakings. The laws so far emphasize housing, which is difficult enough.

There is a serious problem ahead in financing urban redevelopment. The cities have not yet found ways to get more revenue than the real property tax brings in. That is not sufficient now to permit them to become partners in redevelopment with private enterprise. While the facilities of city centers serve whole metropolitan populations, whole metropolitan populations do not yet support them. Big money is needed for urban redevelopment. So far federal aid is not available. A few cities, also a few states, are putting up funds which are only token funds considering the magnitude of the operation. The easiest jobs in a number of places are being undertaken as starters.

Express highways are of the utmost importance in urban redevelopment. They are, as has been said, natural boundaries, logical separators and insulators. They divide

the urban area into manageable physical divisions. Highway planners, housing planners, urban redevelopers, and city planners must pool their research data on city functions and requirements. Their technical and administrative resources combined offer more than the sum of their separate parts. Urban redevelopment is a team proposition. Local, state, and federal officials and private groups, it seems reasonable to claim, are going to be associated as never before. There should be substantial benefits to the local communities and to the country as a result.

CONCLUSION. In this discussion, the functional aspects of cities have been stressed. Highway planning and all the other major components of the planning of the city need to be seen clearly, relationships of general and specific kinds of planning, engineering, and other types of special skills must be more effectively associated for community benefits.

In this functional sense emphasized, the core of the traffic difficulty seems to be the central business district. While the view expressed here sees no early solution, if highway planners, housing planners, community facilities, and public building planners can get together, for example around the urban redevelopment table, there would seem to be good reason for believing that agreement on research, technical and administrative approach, understanding of what each of them has to contribute, would advance the planning and building of better cities considerably, and relief of traffic congestion would be a part of that picture.

The business district either will have to occupy more land area or make better use of its present area, probably both, if metropolitan cities are adequately to maintain the purposes and uses of these districts now and in the future, with or without metropolitan area population and urban area expansion. At the least, existing space must be gradually reorganized, buildings and the traffic they generate better distributed. That calls for de-densifying the load on some land and spreading it to other land that can receive it. A functional approach such as this, I realize, runs head on into the financial and political hurdles to rather drastic change. But should we not at least face the functional inadequacies which have become so familiar? The obsolete street grid and the land use control that is lacking are the root of the difficulty.

The number of intersections, the absurdly narrow dimensions of the old gridiron street system, unchanged from the days when even metropolitan cities were little rural trading centers for an agricultural Nation, are clamped like a vise around the necks of our cities.

The most we have been able to do about central area traffic in most localities so far is to install an elaborate system of traffic "valves" at the intersections. These open and close at short intervals, permitting a small segment of the traffic stream to clear the intersection, first in one direction, then in the other.

While the present gridiron pattern of the business center presents an almost unsurmountable obstacle to change, it is a fact that cities are changing at a fairly substantial rate. Maps which show territorial changes, by time periods, and data giving building types and volumes by building permit years, do not leave one with a sense of complete frustration. I have heard it said that Chicago's Loop, in terms of building volumes, was built three times over in about three-quarters of a century. Buildings do become obsolete; they even wear out. It

seems they also are taken down and other buildings put in their places.

Perhaps a beginning, a kind of pilot study, can be made in the next few years under urban redevelopment powers. Cities of rather moderate size probably should be selected where advanced stages of urban ossification, such as found in the largest metropolitan cities, will not be present, at least not to the same extent. To illustrate: in such cities an attempt might be made to design business district super-blocks, combining existing blocks, with at least two long sides created by closing streets with dead end or loop streets for interior local traffic. This would be an adaptation of the principle of the residential super-block to commercial sections in instances where it might be found both structurally feasible and economically possible.

What the realtor or building owner calls a 100 percent location is probably not the place to begin. Some experts on the business district say that solid unbroken business frontages, with no parking lots permitted between buildings, are a necessity. In such high value districts the possibility of using a portion of the block, say the rear third, for off-street parking might be considered, either under municipal leasing and operation, or under private auspices. If possible a long term commitment not to remove the needed parking facility might well be a condition imposed in the public interest.

A principal difficulty in finding a permanent solution of an area's parking problem is the always present possibility that a privately-operated parking lot will be eliminated for a more profitable private use of the land. The critically needed parking then is done away with, the parking problem intensified, the responsibility to handle the old traffic and the new traffic generated is placed elsewhere.

The parking problem must be faced if the central business district is to survive, and if excessive and illogical decentralization is to be combated. But parking alone is no panacea: there is in fact no panacea as we all know. Parking is a problem that lends itself to solution only by reference to the overall needs of that particular size of business district which the community of a certain magnitude requires, and what that is we do not know. We are not on very scientific ground at this point it will readily be admitted. I believe the principle here put forward, however, is sound. Parking must be planned as a whole. The parking plan should be a corollary of an overall business district plan.

All this points both to the need and to the opportunity for city planning research and traffic planning research. Ideally they should procede together. It is true that we have not fully employed what existing research already tells us about land use, traffic, and transportation. Sometimes it is not research but simple observation which tells us. We know that first the elevated railroads, then the subways, then limited access ways including tunnels, did not solve the traffic congestion problem of Manhattan Island. All these admirable facilities only served to intensify the problem. It would be the height of folly for anyone to recommend to New York City that it take steps to reduce the number of people seeking to enter the small island which is the Borough of Manhattan, an island 12 miles long by 2½ miles wide. The fact is that as long as several million people and an enormous number of vehicles still do so, they will have to sacrifice at least some comfort, probably some peace of mind, and some of them will sacrifice their sanity also.

I am not suggesting that the rest of our metropolitan cities have

as virulent a form of trafficitis as New York. There is a germ of truth in this comment I think; if I am not mistaken there is also involved a principle. The principle has to do with the ratios of land and building bulk to traffic and transportation facilities of the various types. The zoning ordinance of New York City permits, in commercial zoning districts, sufficient building volume to accommodate 375 million people. You may lay that one squarely across the door of the city planners. That is where it properly belongs. But the rest of the citizens too share some responsibility for the absurdity.

General or overall planning, and planning of the important fields which I call "specialized" for want of a more descriptive term, have shown some signs of getting together, of recognition that there are both necessity and mutual benefits to be gained from "combined operations" in research and in local, state, and federal programs concerned with urban communities and their development. Let us have more teamwork so that, recalling Ben Franklin's sage remark, by hanging together, we can do our bit in preventing the cities from hanging themselves separately.

STATE ADMINISTRATION OF THE HIGHWAY RIGHT-OF-WAY FUNCTION

G. E. Strauss, *Right-of-Way Engineer*
Ohio Department of Highways

Within the past decade highway administrators have been forced to change their concepts of design fundamentals in order to meet the needs of present day traffic. The time has arrived, and in many instances passed, when these concepts must include a properly conceived, organized, and efficiently administered right-of-way function.

This function may be organized along the lines of a somewhat independent real estate unit; it may be administered as a legal unit, or it may be an integral part of highway design, and particularly is this true if only easement title legally may be taken upon the basis of a set of plans for a specific highway improvement.

A few of the States have chosen the first method of organization and were probably able to do so by virtue of adequate bond issues, legislative grants, current revenues, or a combination thereof, but reinforced by laws granting the broad powers of excess condemnation and disposal of surpluses, a right to rent or lease and with few restrictions placed on the widths of rights-of-way which might be acquired. Certain other States not quite so generously endowed with funds but whose legal powers were reasonably adequate, have chosen to administer this function along legal lines, no doubt on the premise that property acquisition is, fundamentally, concerned with law.

A majority of the States, being haunted both by lack of funds and wholly inadequate laws, have been forced to adopt a different concept of the function which might be defined as a specialized unit of highway design, based upon engineering, property economics, and law.

Irrespective of how this function is conceived and operated in the

several States, one thing is certain; it can no longer remain the stepchild of the overall highway organization.

The speeds, volumes, and the problems of distribution and collection of traffic have forced into the discard previously recognized and accepted standards of highway design. We now think in terms of drainage systems, minimum curvatures and passing sight distances, divided lanes, separation of intersecting grades; in short, a facility designed for the next twenty years and at the end of that time, capable of expansion for a similar period.

In order properly to meet these requirements, aerial photography for preliminary studies, origin and destination traffic studies, geometrics of design, soils analyses, and many other factors have been developed.

These changes in design principles require even more far reaching changes in right-of-way procedure. The problem ceases to be one of bargaining for a more or less uniform strip of additional right-of-way and instead requires an intimate knowledge of design and construction fundamentals, property economics, and the ability to secure and apply broad interpretations of inadequate statutes from the legal advisors of the Department. Highway administrators quickly recognized the importance of the new concept of highway design and accorded it its proper functional status, but the acquisition of rights-of-way is still looked upon as a necessary evil; an operation which delays the processing of completed plans to sale status, or if the project is sold without completed right-of-way clearance, invariably ties up contract progress. Yet little has been done to rectify this condition.

The time has come to recognize that from an economic standpoint alone, any function, the cost of which runs from 30 to 300 percent of the cost of the basic facility of which it is a part, merits recognition of the highest order.

It is likewise time to realize its significance in the light of the public relations. The first direct contact with the public is made in the acquisition of rights-of-way and in a good many cases, the last contact, in bringing to conclusion necessary court actions and securing reimbursement for property expenditures from Public Roads Administration.

One solution only seems logical and that is to recognize the right-of-way function as a basic unit of highway design and to integrate its technical, economic, and legal fundamentals into the design picture, beginning with the preparation of the engineering report and carrying its varied activities through to the completion of the plans, and finally the construction of the project. Full utilization of the function, in design, is possible only when its fundamentals are predicated upon design and construction experience, since only upon that basis may knowledge of property economics and law intelligently be applied.

A prerequisite to this integration is complete acceptance upon the part of design ard construction engineers of the fact that these principles must be applied concurrently with the preparation of plans and that later, when the project is under contract, change orders cannot be initiated without first checking the legal conditions under which rights-of-way were acquired.

One may well ask for an illustration of the application of the fundamentals of this function. From the standpoint of design, the provision of drainage facilities in a highway plan may appear relatively simple, yet from a right-of-way viewpoint, easily proven economically and legally unsound. An increase in volume, or acceleration

of storm water, are legally compensable, if damage results therefrom. Such conditions are frequently overlooked, or discovered when it is too late to change the plans, or, if the project is already under contract, with a resulting cost entirely out of proportion.

The same observation may be applied to the design of driveway access to abutting property. Excessive grades, improperly selected locations, surfacing inferior to that which previously existed, also increase property costs, create ill will and bring about frequent law suits.

The increasing of vertical and horizontal curvature, along with changes in grade line, quickly pass from the technical to the economic aspect of right-of-way acquisition and one of the most costly phases arises from building relocations, costly in money and contract delays.

Right-of-way requirements for projects involving the flattening of curvature, ditch widening, or the replacing of narrow structures merit the same careful consideration as for a major highway improvement.

The application of property economics, illustrated in the preparation of cost analyses for the expansion of an existing facility into a specific type and design of highway improvement and its comparison with that of an entirely new parallel location. These analyses, combined with those of construction costs, provides the ground work for the final determination of line location.

The legal phase of the function, by rights, should be along negative lines; instead, it has assumed a positive character since in few States have statutory laws kept pace with highway design, and the courts, jealously and rightly, tend to protect private property, with the end result that property costs are approaching an economic maximum. There is a further tendency on the part of the courts to require justification of the design; hence, the problem ceases to be one of normal application of existing statutes, but becomes a struggle to secure a sufficiently broad interpretation of those laws to afford the legal right to construct the improvement.

A relatively recent development in design, at least for a majority of the States, is the construction of limited access facilities. It is a new field and present experience indicates it is one which requires the closest coordination of the right-of-way function with that of design in order that proper economic and legal consideration may be given to the selection of collection and distribution points of traffic and the extent to which service roads are required, and to evaluate the cost and effect upon community life in the area resulting from the improvement. The loss of access to abutting property can become not only costly, but introduces legal barriers which might prevent the full utilization of the freeway facility. To date, there have been few seriously adverse court decisions on the principle of limitation of access, and expansion of this principle to its desired limit will require careful planning and avoidance of test cases in the courts.

The development, in coming years, of the interstate system of highways with the problems it will evolve in property economics, offers another reason for close integration with design. Since the entrance of Public Roads Administration into the property field, as a result of the Defense Highway Act of 1944, experience would indicate the closer the integration of the two functions, the simpler becomes the problem of securing reimbursement for property expenditures.

The present Federal regulations relating to reimbursement for utility rearrangements should be revised to meet the basic legal principles of the several states in order that

they may be workable. Utilities also present a problem in their possible occupancy of freeways and the solution, while legal to a degree, is essentially an engineering problem which must be resolved in the design stage.

It might be well to define the limits of the right-of-way function. It is believed its duties should cover any phase of overall departmental operation which affects the design, construction, or maintenance of a highway, as long as it involves property or rights therein. This should include the issuance of all permits, except possibly those for vehicle overloads. By reason of the background of the staff, it is not unreasonable to assume the preparation of agreements and other legislative requirements of the department could be included. The centralization of contacts on utility rearrangements can produce results both economical and valuable from a public relations standpoint, and are within its sphere of activity. This same background can be utilized in negotiations with the Government in those areas in which flood control and other water conservation projects are under way.

Many more factors might be pointed out, indicating the need of design and right-of-way integration. Those States which have accepted this principle can testify to its efficiency. It is neither a cure-all nor is it the only manner in which the function can be operated, but under the financial and legal restrictions existing in a majority of the States, it appears to be a logical approach to a solution of this phase of highway administration.

Granting the acceptance of the principle of integration, problems in administration and operational procedure are immediately presented not necessarily pertinent were the function operated as a real estate unit.

In outlining an administrative organization, it is intended to do so theoretically and to incorporate as suggestions, those characteristics which, over the years, have proven to be desirable and efficient within the limits of that too seldom considered, but most vital characteristic, human nature.

The plan of organization must, of course, follow the overall pattern of the department and may be influenced by statutory requirements. Since the degree of success of any type of organization depends directly upon the degree to which it is policed, it is assumed adequate provisions for that control are available. The functional structure suggested is predicated upon central office administrative control by the chief engineer of design, with possibly three or four regional field representatives of the design bureau serving as a liaison unit between the central office and the divisions or districts which are the units of production.

The central office administrative unit should be relatively small in size, staffed with engineers having long and varied experience in the acquisition of rights-of-way. The chief of the function should be responsible for the determination of policy, procedure, both in field and office, and absolute control of all payments for property expenditures.

From a practical standpoint, this unit could operate directly under the chief engineer of the department, or the chief highway administrator. Greater efficiency and coordination will be possible if it is directly responsible to the chief engineer of design.

The duties of the regional unit are to instruct, advise and supervise, plan preparation in the several divisions or districts, and to this unit should be assigned a right-of-way engineer, especially qualified and capable of assuming the responsibility for the proper opera-

tion of the production units. These regional assistants should coordinate the duties of the right-of-way function with those of the regional design engineer, but they should be under the direct control of the chief of the function.

The negotiators, or real estate agents, should be under control of the regional right-of-way engineer for assignment within the area, in order to assure mobility of operation and proper control.

The division or district, because of the importance of its responsibility of production, should be adequately staffed. The design engineer, whose primary duty is the production of plans, should be in control within that unit, but be subject to regional authority, in order that coordination of design and right-of-way may be assured.

The division right-of-way engineer should be under the control of the design engineer and be responsible for all the detailed processing of the data required. He should have readily available proper technical help, charged with the preparation of descriptions, property plans, title searching, etc.

It should be the responsibility of the division to apply all the technical, economic, and legal principles of the function to the design of the project in such manner, and at such time, as will assure the most favorable results.

Completion of the cross-sections makes possible the determination of right-of-way widths, writing of description, and the preparation of title papers. The property plan, by this time, should be finished. Concurrently, the parcel by parcel encumbrance, or pre-appraisal, should be undertaken. Negotiations should be commenced upon the basic completion of the plans and any changes determined in access or other minor details, resulting from negotiations, so that if the project is on the Federal program, a completely acquired right-of-way is available when the plans are sent to the central office for plan, survey, and estimate submission to Public Roads Administration. In the interim required by Federal processing, warrents in payment for property can be made available and released prior to, or concurrently with, the receipt of bids.

It is almost axiomatic that integration of design with the right-of-way function cannot operate successfully unless its staff has at least an overall engineering background. With the personnel essentially technical, the question arises as to whether or not the negotiators, or real estate agents, also should be engineers. It is certain that an engineering background is essential, since it is now necessary to negotiate for rights-of-way, whether rural or urban, in terms of engineering facts, and unless the negotiator is able to translate the plans into language the owner can understand, subsequent law suits are a distinct possibility.

One of the States, operating this function along the lines of a real estate unit, has inaugurated a very successful course of training for real estate agents. The idea might well be adopted elsewhere, particularly in those States which still look upon this phase of operation as a suitable resting place for the deserving.

These men are the first representatives of the department to come into direct contact with the public. Their ability to sell the department and the improvement, to abutting owners, constitutes a phase of public relations too long overlooked.

Given such an organization as has been outlined, its administration becomes relatively simple. To the determination of policy, procedure, and the control of payments for property expenditures now may be added policing and coordination with the overall operation of the

department. It might be well, again, to point out that the organization of the function and its administration are particularly applicable to those States in which the acquisition of fee title is not legally possible and rights-of-way must be acquired upon the basis of the effect of a specific improvement upon abutting property.

CONCLUSIONS

The present day type of highway improvement has made mandatory the recognition of the right-of-way function, if for no other reason than from the standpoint of economics. Integration with design through the use of a straight line, technical organization, and having the basic purpose of presenting a completed project for receipt of bids, complete both as to plans and right-of-way acquisition, would appear to afford a solution to a problem, the cost of which is rapidly reaching an economic maximum.

HOUSING DEVELOPMENT AND EXPRESS HIGHWAYS

Earl Von Storch, *Urban Studies Director*
Housing and Home Finance Agency

Punching practically any express highway through one of our cities is pretty certain to bring up housing questions. You are quite likely to find rights-of-way through residential areas relatively cheap to acquire. Extensive clearance of residential structures appears to be inevitably tied up with getting rights-of-way you can afford and with working out the approach systems at access points. But clearance means families to be rehoused and, as the routes approach central areas, they most likely will pass through slums and blighted districts where rents and family incomes are correspondingly low. The result is that you then have much more than a right-of-way problem on your hands. At this point the housing people come up with an equal or even more critical problem.

An express highway route running for any considerable distance is likely to involve clearance equivalent to a number of square blocks. In that respect, it would be roughly comparable to a good sized urban redevelopment project. As far as the families in the home to be torn down are concerned, there would be no difference. Practically all proposed Federal legislation for urban redevelopment contains provisions relating to the rehousing of displaced families. Just as a matter of information - as an expression of attitude on this question - it is interesting to look at the provisions of the Taft-Ellender-Wagner National Housing Commission Bill - S.866 of the 80th Congress. Section 802 (3) of Title VIII (the portion of the Bill dealing with land assembly for urban redevelopment) provides that, before Federal financial aid shall be given to a project:

> "...there be a feasible method for the temporary relocation of families displaced from the project area, and that there are available or are being provided, in the project area or in other areas not less desirable in regard to public utilities and public and commercial facilities and at rents or prices within the financial means of the families displaced from the project area, decent, safe, and sanitary dwellings equal in number to the number of such displaced families."

I have no idea of trying here to tell you how to solve this problem. We all know that it is a tough one at any time; in today's housing shortage it is likely to be all but impossible. Even though new housing construction is going forward in great volume, it is not removing the obstacles in your work. New housing construction today is generally at the middle and higher price levels, probably much higher price levels than many or most of the families in your rights-of-way can afford to pay. And evidence indicates that today's new construction is not opening up many vacancies in existing units. Undoubling and new family growth seem to absorb those.

This is really a problem which must be worked out locally, including the determination of when the time is ripe for going ahead and the development of a method for handling it. When the times do come, city by city, for going ahead with your operations, relocation of families will still be a job calling for a lot of "know-how" and one that creates an opportunity for mutually beneficial cooperation between housing and highway technicians.

Those who have undertaken large-scale clearance operations for housing developments, whether by private enterprise or public authorities, have found it necessary to take an active part in relocation, in finding places to which the displaced families can move and in helping many of them to make their moves. A considerable body of experience has been built up which you should be able to tap. There is likely to be a housing authority in your city which has had experience in relocation or knows where to get experienced help. If there isn't any authority there, quite likely there will be some not very far away that can help in working out your problems. I am sure they will feel it a privilege to work with you in advance appraisals of relocation prospects, in working out plans, and in the actual doing of the job.

The other side of the problem involves the type of residential development to be planned along the new rights-of-way in central areas. I have seen sketches of express highways and have heard proposals that might suggest high-quality apartment development along the routes as a means of recapturing the high costs of acquiring them. I admit this is an intriguing idea, seeming to have great possibilities because of the wide open spaces along the highway, with consequent light and air, and the obvious opportunities they seem to present for combining the conveniences of apartment living with ready escape to the amenities of the open country. The prospect, however, should be examined with considerable care, In the first place, that high-rental type of housing development draws from a very narrow segment of the total housing market. The fact is that it is a common error, indulged in by many besides highway planners, to overestimate the size of the upper price brackets in the housing market. Secondly, only a portion of that narrow market will find those particular locations suited to their needs or desires. So, whenever such proposals are under consideration, it would be very wise to resort to expert housing market analysis and competent real estate advice.

In moving outside built-up central areas, we confront the fact that the suburbs and the areas beyond are places where your rights-of-way may easily tangle with new housing development. A major proportion of new houses is now being built outside of towns - not only outside of the central cities but also outside the suburban communities. New subdivisions are being platted steadily and local street

and building patterns are being laid down. Rights-of-way for express highways should be established as rapidly as possible before new building fills them up or the new street systems set conditions that may require future adjustment to the expressways which will be burdensome, wasteful, and costly for everyone concerned. Given established routes and master plans for the highways, local subdivision control or project planning by developers can be applied in your interests as well as those of the locality, even though actual construction of your express routes may not be possible for some time.

This advance planning and official laying down of your routes, even though actual construction may be some time in the future, are of major importance, not only in housing in a broad sense, but to community development generally.

The question which I believe has larger significance in this discussion is the possibility of properly relating highway building and housing operations to make sense out of urban and suburban developments. I assume that you expect the construction of express highways to be a real thing in the coming years. I know that we hope and believe that there will be a continuing high volume of housing construction. Although estimates of housing needs vary, there is sufficient agreement to indicate that urban construction over the next decade or so to meet those needs will produce a volume of new housing equivalent to about one-third our present urban supply. That amount of new construction can reshape the form and character of urban areas and radically modify present situations in local government and finance, and in daily work and family life. If well located, it can be a boon and a blessing; if not well located, it can produce new and insupportable burdens or aggravate present problems past the crisis point.

So there are very serious questions involved in determining where this new housing is to go. In a broad sense, it will go where people want it to go. It will be the result of choices and decisions by thousands of builders - some large, some small, some by individuals building for themselves. Some housing will go within our presently built-up areas for the people who want to live near the center of things; but there is much to indicate that, with our present means of easy transportation and consequent fluidity, the strongest desire of city people is to disperse, even, in many cases, at some sacrifice to convenience of movement.

It seems to many of us that the development of express highway systems, particularly as they go into and through central city areas, will give added impetus to this trend toward dispersion. As it becomes easier to get from the suburbs or the country to the center of things - for business, work, shopping, and amusement - more people will seek the space and amenities of living to be found in the outlying areas. And the suburban development can be extended farther out, through express highways, with actual savings in travel time to the cities.

Others, as we know, take an opposite view; they believe that, given easier access to the country, people will reverse their outward movement for living space. I don't believe there is any question but that this will be true in some degree, but I do not believe that it will represent the dominant trend. It seems that a much more sound and sensible course would be to recognize that the automobile is an instrument of dispersion and that every improvement in highways and highway systems makes it just that much more so.

Indications are cropping up here and there of what high speed access

into cities will mean. I have been told that express highways built between Detroit and Willow Run have had a tremendous effect in pulling new housing construction out into previously undeveloped areas. Here in Washington we have the great Parkfairfax and Fairlington developments along the Shirley Highway, in the success of which the rapid and easy transportation to town is an important factor. There are now indications that an even larger development will go forward several miles farther out along the same highway but nearer in time to downtown Washington than many parts of the District itself. In another direction, the prices of land almost 20 miles out but nearer the route of a proposed expressway also are reported to be rising. And so on over the country as express highway plans shape up and go under construction.

All of our cities are evidence of the enormous influence highways have on where housing is built and on the consequent form of urban development. Once, when railways were the backbone of local transportation, the terms "central city" and "suburbs" had definite community meanings. The city was city and the towns were towns; you could see where each began and ended. With the advent of the automobile and the steady improvement of main traffic arteries, housing began to spread out along those arteries without break and without well-defined community character or focus. Today, the development in most urban areas can be diagrammed in something resembling a star shape, forking out from the central city along the main highways, and with pretty much random scattering of a variety of land use types in between them. The overall result is the well named "suburban sprawl."

This sprawl form of housing development brings many problems in its wake. There is no need of discussing them in any detail, for they are apparent to practically everyone. To mention only a few: increased cost in the provision of streets, public utilities, schools, and other community facilities; frequently, because of cost, absence of adequate sanitary and protective services; too rapid obsolescence and depreciation, with a consequent drain on investments, all resulting from inadequate planning, faulty land use, and the absence of standards and reasonable controls. Of course all of these do not occur everywhere, but in practically every locality one or more of them have become matters of serious concern.

Undoubtedly a contributing factor to this sprawl has been the fact that highways have been so continuously accessible to traffic. This in turn has encouraged the capitalization of highway frontage for business purposes, to such an extent that our major highway routes have taken on a dual character -avenues of heavy traffic flow and ribbons of largely commercial development. But express highways will be different. They will be planned to serve one purpose -to facilitate traffic movement. To that end the number of access points will be limited. Doing so will improve and speed up traffic flow; it may not help to relieve this trend toward unorganized sprawl. If access is possible at frequent intervals so that only a short hitch is necessary along a collector street to enter the express route, I am afraid housing development will stretch out along the new highways in about the same way it now does along the old-style major highways leading out of cities.

It seems to me that there are feasible alternatives if full advantage is taken of the opportunities express routes offer. It should be possible to work out plans over an area which will accomplish all that you are seeking and promote what we are seeking - namely more rational

grouping of housing development. The net result would be to counteract recent trends toward disorganization and confusion.

I mentioned the individual community character of suburbs which sprang up around railways before the automobile came along. These communities grew up, of course, because the trains stopped only at certain intervals, actually not very far apart but far enough apart to cause the communities to grow as separate entities. Wouldn't it be possible for expressways to be worked out so that they would do in this respect what the railroads did yesterday? It seems to me that they might, and also do it better. After all, railroads were few in number and, for many reasons, were fairly arbitrary in their routes. We now have a much more flexible instrument. We should be able to have both primary and secondary expressways and to design them into a network of easy and rapid traffic movement throughout an urban region, with relatively wide spacing of access points that could be the focal points around which residential development could organize itself.

Recently I saw such a plan, in which a few primary expressways led through and out of the particular city, while roughly concentric secondary express routes tied the main routes together at well spaced intervals. The access points occurred at intervals of two or three miles and the overall result was a sense of potential form for the entire urban area. From the housing point of view, we would welcome the opportunities thus given for localizing traffic within developed areas and channeling it in definite directions toward major routes. By such coordinated planning, both traffic movement and housing development can be bettered.

The thing I am essentially driving at is that the express highway, potentially, can be a major determinant of where new housing will go and what kind of urban development will be possible. The house builder or large project developer casts a very keen eye on transportation opportunities when selecting sites for his operations. But his is not usually the initial decision. I might cite one exception that proves the rule: the decision of the Van Sweringen brothers in initiating their Shaker Heights development to build a rapid transit line to downtown Cleveland. In that case transportation planning and highway planning went hand in hand. Although express highway planning and residential development may not enjoy this very close relationship as a general practice, there is a need for highways to be more than a means for getting from one place to another; for their planning to be equally concerned with the life-in-place that it conditions in order to avoid freezing development in undesirable land-use patterns.

Furthermore, decisions on housing development are made by many people acting independently, not by a few people working in concert as in the case of highway planning. Our land use regulations, such as zoning and subdivision control, can very definitely influence the manner in which land is developed for housing but they are weak in determining what land will be used and when. Perhaps it would be much better to take full advantage of the positive tools we might have, such as express highways, to guide the form of development into sensible channels than to rely on the negative and restrictive police-power type of control.

In this brief paper I have pointed out only a few of the relationships between express highway and housing development and I have tried to make clear that the answers to even these questions are not all known. Also I have endeavored to define an area of common interest where coop-

eration, locally and Federally, might be mutually advantageous. The name Highway Research Board obviously suggests investigation and exploration; locally, express highway builders, planning authorities, housing developers, and other interested groups might together turn out both ideas and accomplishments pointing toward form and order as against potential disorder and confusion in patterns of city growth and expansion. The opportunities seem tremendous; I hope they can be captured.

ESTIMATING DAMAGE CAUSED BY LOSS OF ACCESS RIGHTS

Frank K. Wall, *Appraiser*
Public Roads Administration

Estimating damages caused by the loss of access rights presents problems not ordinarily encountered in estimating the value of properties in their entirety.

Evaluation is not an exact science. The economic laws that govern value admit of too numerous exceptions. What is right today may be wrong tomorrow; what applies here does not necessarily apply elsewhere.

It is recognized that value is largely dependent on judgment, but the differences in judgment must not be due to a misunderstanding of the theories that govern value or of the formulas that are used in estimating them.

Much has been written on the theory of appraising but little on the application of these theories. It is practical appraising in which we are interested. However, a knowledge of the theories that govern value is necessary, so it is well that we hastily review some of the more important ones in order that there be no misunderstanding when reference is made thereto.

The purpose of an appraisal is the determination of an action. As the action to be taken by a right-of-way division is most generally the purchase of a property, the value to be estimated can be based upon but one concept of value, that is, market value or value in exchange, and our courts of equity have so held.

Property is the right of use. Anything that conveys rights and can be held under separate ownership is property. It is these rights which give it value and which we appraise. Destroy these rights and you destroy value; destroy value and you create damage. A damage is a reparation in money for an injury sustained.

These rights to have value must first have utility. Utility is the capacity to satisfy human wants. However, the number of the wants which a property is capable of satisfying and the importance of these wants do not set value.

Value is determined by the intensity of human desire for unsatisfied wants and is controlled by the relation of the demand to the available supply. When demand exceeds supply you have value and when supply exceeds demand you have no value.

To have the capacity to satisfy human wants, and thus have utility,

a property must have accessibility. Accessibility is a most important attribute in the development of value. In illustration of the point: What will you give for a square mile of the surface of the moon, or what would you pay for a square mile of the bottom of the ocean? There capacity to satisfy human wants is nullified by their inaccessibility. Accessibility is a fundamental right in the creation of value. Totally destroy accessibility and you totally destroy value; impair accessibility and value will be impaired. These conclusions will bear further investigation.

Our courts in rendering decisions in cases of eminent domain have not only stated that market value be used as a basis for estimating value and damage but are almost unanimous in saying that the damage caused by the partial taking of the rights of property can be best calculated by estimating the market value of the property before the taking and then estimating the value after the taking, and by subtracting the latter figure from the former, the difference between these two figures will show the value of the rights acquired and the damage to the remainder.

It is an excellent formula. If you make no mistake in the two estimates there is no question but what you have produced a logical answer. This formula, however, is not as simple to work as it is to state. The first estimate which is the value before the taking is no different from an ordinary appraisal assignment where the entire property is to be appraised. However, this estimate is very important for you cannot estimate damages to a property unless you know the value of the property before the damage occurs.

In reviewing appraisals it is not uncommon to find estimates of damages to remainder lands in excess of the value of the entirety. The appraisers who are guilty of such conclusions could avoid this error by first estimating the value of the entirety. The axiom in physics "The sum of the parts cannot exceed the whole" applies in appraising too.

The second estimate which is the value of the remainder after the taking is at times difficult, it is true, the reason being our lack of available data. Such data are often most difficult to acquire. There is no question but more research covering the effect of partial taking and the damage caused by loss of access rights on remainder lands would be of untold assistance to appraisers. Before-and-after appraising is an excellent formula but it can cost right-of-way purchasers much money unless properly applied.

In a recent condemnation trial covering the taking of a small amount of acreage and some access rights, a witness who appeared for the owner of the property, a rather homespun type of character with a high degree of the common touch (and this is said in the most complimentary way), was on cross examination asked if in making his estimate of the damage caused by the taking, he had used a before-and-after approach to value. He replied that he did. When asked to explain the procedure and how he arrived at his estimate, in his most inimitable manner, his words were to this effect:

"The place was worth $5000 before you took some of the land and the road that went with it. When you take the road the place is worthless because you cannot get to it. Deduct zero from $5000 and you still have $5000. Therefore the damage is $5000."

There was no question but what this appraiser had fairly estimated the value of the property. There was no question but what he had used a before-and-after method of approach, and he was logical in his

deduction as far as it went. The award of the jury was well below $5000. The Government proved that a new access could be established that was as serviceable as the one destroyed for about $1000.

The statement was made that to totally destroy access is to totally destroy value, but fortunately for economy's sake in the building of highways seldom is access totally destroyed and, when it is, it most often can be re-established at some other point. From the verdict of the jury in the case just recited, are we not safe in concluding that the cost of re-establishing an access at some other point tends to set an upper limit where the new access is as acceptable as the one destroyed?

Your attention is called to the fact that there are times when the cost of establishing a new access exceeds the value of the remainder land. In such an event it would certainly be erroneous to use such cost figures in estimating the damages. The following case is offered in point:

A parkway of limited access was to be built. The taking isolated some 10 acres on one side of a right-of-way. No outlet was to be provided for this 10 acres. The isolated area was contiguous only to large tracts which had access to other roads, but these roads were at a great distance from the isolated 10 acres. To have purchased an easement across the adjoining lands and constructed a roadway across same would have cost $4500. This would have been most impractical as the total value of the area being isolated before the severance was but $2000. The upper limit of damages in all cases is the value before the taking.

It is not conclusive that because an area of land has been isolated the damage equals the value of the property before the isolation.

In the case previously recited it was not necessary to pay $2000 for the 10 acres in question. This remainder still had a market value. Though not as great as before the taking, although its utility as farm land had not been impaired other than by accessibility, the fact that the owners of the contiguous lands were willing to purchase it and give it an outlet restored a portion of the damage that was caused by the isolation. The damage was estimated from the highest price these owners of the adjoining lands offered to pay for it. This amount, which was $1000, was subtracted from the value before the taking, left a remainder of $1000, which is the damage caused by the loss of the original access right.

The loss of an access right is not conclusive evidence of damage. It is necessary that such access right lend value to the property.

During the period of the War an appraisal was made of a property which was located some 20 miles from one of our large cities. It consisted of 500 acres. About 50 percent of this land was in cultivation, the balance woodlands. It fronted some 1500 feet along a modern highway and extended southerly to the right-of-way of a railroad. It was bisected at about the center by an all weather stream running from north to south. The cultivated lands, dwelling, dairy barns and stables were on the easterly side of the stream. At a point along the southerly border of the property contiguous with the railroad right-of-way and some distance to the west of the stream was a large sign marking a flag stop for the railroad. Starting at a point near this sign was a woodland road or trail leading through the westerly portion of the property across the stream to the easterly and improved side of the property. It was necessary that the water supply for a nearby Army camp be materially increased. A dam was constructed

across the stream at the most southerly line of the property. A reservoir covering some hundred acres or more was formed, extending from the southerly to the northerly lines and was from 300 to 500 ft. wide. It was necessary that the Government acquire title to the inundated area. When the right-of-way for the railroad was acquired in 1870 from the subject property, the railroad agreed to maintain into perpetuity a flag stop at the point mentioned, and had agreed that all passenger trains other than express could be stopped at this point on request. When the reservoir was formed the access road leading from the flag stop was made useless. Along with the claim for the area inundated was a claim for damages caused by this loss of access. On inspection of the property it was found that this roadway had evidently not been used for some period of time. The iron gateway at the entrance from the property into the right-of-way had almost rusted away; the roadway had largely grown up in brush; fallen trees in a high degree of decay lay across it at intervals; the manager of the farm stated that in the 17 years he had been in charge of the place this flagstop had not been used; this was confirmed by the railroad. There was no question but the right of access existed, but any value that it might have lent to this property at one time was not destroyed by the reservoir but rather by the development of the automobile and the modern highway. This case was settled but without payment for this portion of the claim.

Damages caused by the loss of access rights are largely dependent on the utility of the property. Let us take a particular example:

The street is one block long. Access is from only one direction. Three houses have recently sold in this block at prices comparable to sales of other comparable properties on adjacent streets that can be reached from four directions. The lots in the modern subdivision are most often reached by circuitous routes and cul de sacs are the common thing. These subdivisions are developed for the purpose of making profit and if cul de sacs and circuitous access were damaging, do you think these subdividers would have deviated from the old rectangular form of dividing land?

It is not meant to say that residential land cannot be damaged by the establishing of cul de sacs and circuitous routes. The effect of circuitous routes on dwelling properties depends largely on just how circuitous the routes may be.

Isolate a dwelling house of the better type from a neighborhood to which it is suited by the change of access and place it, figuratively speaking, on the wrong side of the railroad tracks and there is no question but what you will damage it. As to whether this damage is compensable will depend largely on the jurisdiction in which you are appraising. Our courts are by no means in agreement as to what is compensable.

The effect of the cul de sacs causes little damage to agricultural and other rural lands provided they do not create a too circuitous approach to the property.

However, the effect on commercial properties is another thing entirely. Commercial properties derive their value from their productive capacity which is dependent largely on their accessibility to the general public. Build a better mousetrap than your neighbor and the world will beat a pathway to your door may be true, but the fact remains that few can build the better mouse trap, and they are forced to compete for their share of business not only by price and service, but location, which is accessibility. Impair the accessibility of commercial properties to

TABLE 1. ESTIMATE BEFORE THE TAKING

INCOME			
Ground rental, 480,000 gallons at 1½¢			$7,200
Rental on improvements, $20,000 at 12%			2,400
Total gross annual return			$9,600
EXPENSES			
Taxes, $45,000 assessment at $30 per thousand		$1,350	
Insurance:			
Fire, $20,000 at 50¢ per hundred	$100		
Liability	115	215	
Management, 5% gross rent		480	
Total expense before depreciation			$2,045
NET INCOME BEFORE CHARGES FOR DEPRECIATION			$7,555
Charge for depreciation, 5% on building $15,000		$750	
Charge for depreciation, 10% on equipment $5,000		500	
Total			1,250
EFFECTIVE NET INCOME			$6,305
$6,305 capitalized at 8%			$78,812

the public on which they are dependent and unquestionably you impair their value.

Now, as to the yardsticks for measuring these damages. It is with regret that it must be admitted that on certain types of properties we are dependent largely on judgment. Some help can be had, however, by the study of the effect of such losses on other comparable properties, and by a process of analogy reach a reasonable conclusion. There is definitely a great need for a study of actual cases where partial rights of properties have been taken for right-of-way purposes to determine if, when, and how damaging they are.

As before stated, the cost of restoring a lost access can be used as control in making the estimate of such damages, such cost tending to set an upper limit of such damages where the access restored is as acceptable as the one destroyed.

Such damages to properties that derive their value from their rental income can be estimated with a high degree of plausibility by calculating the probable loss of rental and capitalizing it. The following is an interesting calculation along this line:

This property is located in the immediate southeasterly area of two intersecting streets; one running north and south which we will call "A" and one running east and west which we will call "B". It is a level tract of land containing an area of 10,000 sq. ft. with a one hundred foot frontage on each street. This corner is about five miles from the commercial center of a large city. Street "A" running north and south is the main artery from the center of the city north. It is largely used by transients and serves a large residential area to the north. This street carries a volume of traffic amounting to about

TABLE 2. ESTIMATE AFTER THE TAKING

INCOME			
Ground rental, 336,000 gallons at 1¼¢			$5,040
Rental on improvements, $20,000 at 12%			2,400
Total gross annual return			7,440
EXPENSES			
Taxes, $40,000 assessment at $30 per thousand		$1,200	
Insurance:			
Fire, $20,000 at 50¢ per hundred	$100		
Liability	115	215	
Management, 5% gross rent		372	
Total expense before depreciation			$1,787
NET INCOME BEFORE CHARGES FOR DEPRECIATION			$5,653
Charge for depreciation, 5% on building $15,000	$750		
Charge for depreciation, 10% on equipment $5,000	500		
Total			1,250
EFFECTIVE NET INCOME			$4,403
$4,403 capitalized at 8%			$55,037

30,000 cars per day. Street "B" running east and west is largely used for commercial purposes and by industrial workers who live in a moderate priced residential area to the west. This street carries a volume of 35,000 cars per day. This corner was developed as a gasoline service station and enjoyed a lucrative business. Just south of this corner at a distance of about 200 ft. was a railroad crossing serving the industrial area to the east. This spur track was at grade level and was heavily used. The congestion that existed in this section at times can readily be seen. It was decided to erect a viaduct running along street "A" across this spur track and across street "B". It was necessary that some 20 ft. be acquired along both sides of street "A" to provide a necessary outlet for those properties that would be left below the level of the viaduct and to permit a percentage of the traffic moving along street "A" to turn into street "B".

The subject property was developed as a gasoline service station. There was no question but what it was developed to its highest and best use, and it was necessary to base the estimate of value on this utility. The problem is what are the damages caused by the loss of the access rights in this case?

This service station was owner occupied. If this owner charged himself a rent for the property it is not known, nor is it important. The gasoline sales at this station average 40,000 gal. per mo. The rental for service stations is based on the volume of gasoline sold. Other sales tend to keep in ratio to this volume and it is not necessary in estimating a rental of this type to determine the volume of

other products and services sold. Rents on gasoline service stations start at about one cent per gallon of sales and extend to one and one-half cents. You will find this to be largely true in most sections of the country. As the volume of sales increases the rate increases. A station that can sell 40,000 gal. of gasoline per mo. is classed as a "Grade A" location and will usually rent for the top rate. This is ground rent. Additional rent is dependent largely on the type of improvements with which the property is developed. The improvements to this property, including equipment, cost $20,000. A fair rental on these improvements, let us say, is a gross return of 12 percent. (See Table 1, p. 40; Table 2, p. 41; Table 3.)

To estimate the damage to the remainder, the before-and-after approach is used, a capitalization approach being used for each estimate.

This service station before the taking enjoyed a sales volume of 40,000 gal. per mo. with a traffic volume moving in four directions of 65,000 cars per day. It is not reasonable to assume that this location could maintain this volume with 21,000 vehicles moving north and south no longer available. It is true that a percentage of the traffic moving north along street "A" which had always turned into street "B", would turn into the access road which had been provided along the easterly side of street "A." This volume was found to be about 7,000 cars per day. As the volume of traffic was to be cut approximately 30 percent it is reasonable to assume the volume of sales will be cut in like amount.

In conclusion it is wished to emphasize:

That when accessibility is destroyed it is seldom that it cannot be re-established;

That the cost of re-establishing such access tends to set an upper limit of damages where the re-established access is as acceptable as the one destroyed;

That before a damage can occur to a property because of the loss of an access right it is necessary that the access in question had lent value to the property as a whole;

That because a remainder land has been isolated it is not conclusive that the damage is equal to the value of such area before the taking of the access; it is probable that it has value to owners of contiguous property;

That the best method of estimating damages regardless of cause is the formula known as the before-and after approach to value.

TABLE 3. RECAPITULATION

Value before the taking	$78,812
Value after the taking	55,037
DAMAGE CAUSED BY THE LOSS OF LAND AND ACCESS RIGHT	$23,775
Cost of restoring concrete apron and moving certain items of equipment	500
TOTAL DAMAGE OF ALL KINDS	$24,275

NATIONAL RESEARCH COUNCIL

The National Research Council is a cooperative organization of the scientific men of America. Its members include, however, not only scientific and technical men but also business men interested in engineering and industry. It was established in 1916 by the National Academy of Sciences.

The Charter of the National Academy of Sciences, under a special act of the Congress approved by President Lincoln in 1863, provides that "the Academy shall, whenever called upon by any Department of the Government, investigate, examine, experiment, and report upon any subject of science or art."

DIVISION OF ENGINEERING AND INDUSTRIAL RESEARCH

OFFICERS AND EXECUTIVE COMMITTEE

Chairman.....FREDERICK M. FEIKER

Vice-Chairman.....HAROLD K. WORK

Executive Secretary.....LOUIS JORDAN

LYMAN J. BRIGGS, WILLIAM B. KOUWENHOVEN, THOMAS H. MACDONALD

HIGHWAY RESEARCH BOARD

The Highway Research Board is organized under the auspices of the Division of Engineering and Industrial Research of the National Research Council. Its purpose is to provide a national clearing house for highway research activities and information. The membership consists of 36 technical, educational, industrial, and governmental organizations of national scope. Associates of the Board are firms, corporations, and individuals who are interested in highway research and who desire to further its work.

The Board provides a forum for the discussion and publication of the results obtained by individual research workers; organizes committees of experts to plan and suggest research work and to study and correlate the results; publishes and otherwise disseminates information; provides a research information service; and carries on fact finding investigations. With the cooperation of the highway departments of the states and Territories and the Public Roads Administration, the Highway Research Board conducts a Highway Research Correlation Service, to aid the many highway research agencies to correlate their work through personal visits, conferences, committee work, and dissemination of pertinent information.

The Highway Research Board is not responsible for the statements made or opinions expressed in its publications.