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Frank M. Covey Jr., *Freeway Interchanges: A Case Study and an Overview*, 45 Marq. L. Rev. 21 (1961).

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FREEWAY INTERCHANGES: A CASE STUDY AND AN OVERVIEW

FRANK M. COVEY, JR.*

THE INTERCHANGE PROBLEM¹

President Kennedy's 1961 Message on Highway notes :

... a trunkline network of modern controlled access highways is only as efficient as its connections to home, office, factory and farm.²

And, in fact, the 41,000 mile National System of Interstate and Defense Highways,³ expected to be completed about 1975, will be only as efficient, in one sense, as its interchanges and feeder roads are. The Interstate System, which will link 90 per cent of all United States cities with a population over 50,000, will only comprise 1.2 per cent of the nation's highway mileage but will carry 20 per cent of the nation's traffic.

The Interstate roads, as all of the modern through roads, will be designed as freeways with full control of access. Only interchanges—between 10,000 and 14,000 on the entire system—will provide access to these highways. There will be no direct access from abutting land. On the 453 miles of Interstate roads in Wisconsin there will be 122 interchanges. The efficiency of these 122 interchanges as safe, dependable and permanent traffic carriers will determine the usefulness of the 453 miles of Interstate road.

These feeder roads and interchanges will serve as capillaries to the Interstate roads. If they choke up with unrestricted roadside development, the I-System will be severely crippled and new feeder roads and interchanges will ultimately have to be provided.⁴ The safety, efficiency

*B.S., Honors, 1954; J.D. cum laude, 1957, Loyola University (Chicago); S. J. D., 1960, University of Wisconsin; Automotive Safety Foundation Fellow in Graduate Law, 1957-1958, University of Wisconsin; Teaching Associate in Law, 1958-1959, Northwestern University; Law Clerk, Illinois Appellate Court, 1959; Sometime Lecturer in Political Science, Loyola University; Member of the Illinois bar; Associate, McDermott, Will & Emery (Chicago).

¹ The author would like to acknowledge the cooperation given him by the State Highway Commissions of the fifty states and the District of Columbia, the Kentucky and Tennessee state planning agencies, and in Wisconsin, the county and town clerks in Racine and Kenosha counties, the State Planning Division and the District 2 State Highway Engineer.

The author would like to express his special appreciation to the Wisconsin State Highway Commission and, in particular, to Mr. N. M. Margetis, Chief of Roadside Control for the Commission, and Mr. A. J. Feifarek, Assistant Attorney General assigned to the Commission, for the extremely able and freely given assistance without which this study would have been impossible.

² President Kennedy's Message on Highways, February 28, 1961, H. Doc. No. 96, 107 Cong. Rec. 2663.

³ See Levin, *Federal Aspects of the Interstate Highway Program*, 38 NEB. L. REV. 377 (1959).

⁴ Enfield, *The Law and Highway Modernization*, 205 HIGHWAY RESEARCH BOARD BULLETIN 18, 27 (1958).

and permanence of the Interstate roads, to this extent, will depend on the safety, efficiency and permanence of the interchanges.

Moreover, the land use patterns which will dictate the form and structure of America's future cities are being determined, perhaps irrevocably, by today's physical improvement programs and especially by the Interstate highway program. Because the interchanges on this—and all other freeway systems—will become the new focal points of accessibility patterns, there will be intense pressure for land development in the vicinity of these interchanges.⁵ These development patterns will not only have their impact on the interchanges and the freeways but also on the whole development of the urban centers. Interchange protection looks towards not only preserving the usefulness of the interchanges and freeways but also to the planned and orderly development of the adjoining areas. A thorough development study of the Monroeville, Pennsylvania toll road interchange concludes:⁶

On the other hand, some results of highway improvement cannot be classed as benefits. These are of concern to community planners and highway officials. The uncontrolled growth of ribbon business and housing site developments tends to decrease the carrying efficiency and capacity the highway was designed to provide. This process of slow strangulation brings demands for new highway improvement, a continuous congestion problem, and the mushroom type of high risk, sporadic, and unstable business development.

* * * * *

From the standpoint of those who use the highways for rapid inter-city travel, public investment in the highway facility is diverted from its original purpose as these changes take place. From the standpoint of the community, undesirable developments grow without the order and purpose that good planning could provide.

Finally, there is the highway user himself; the federal statutes⁷ prohibit any commercial activity on the Interstate right-of-way. This aspect of Interstate operation, which differs from the toll roads, will require the highway user to leave the highway to satisfy his travel needs—auto service and fuel, food and rest. The services will be provided of necessity near the interchange areas and on the feeder roads. Without some control of development in these areas and planned provision of necessary services, the highway user can become completely frustrated in his search for roadside services and lose much of the time he gained on the Interstate road in an attempt to secure fuel or food.⁸

⁵ Stanhagan, *Highway Interchanges and Land Use Controls* (Bureau of Public Roads, 1961, Mimeo) 1.

⁶ Pennsylvania State University, *The Economic and Social Impact of Highways*, PROGRESS REPORT 219, June 1960, pp. 1-2.

⁷ 72 Stat. 895 (1958), 23 U.S.C. §111 (1958).

⁸ This conclusion is based, in part, on the author's experience during the summer of 1960 while travelling on rather extensive completed portions of the Interstate System in Texas.

A comprehensive review of interchange problems concludes that the interchange area is significant in several respects:⁹

- Effecting smooth and continuous traffic flow on the expressway.
- Avoiding undue congestion on the feeder roads.
- Influencing land use characteristics in adjacent areas.
- As an important variable in the economic development of the surrounding area, particularly if it is relatively undeveloped at the advent of interchange construction.

The overall role and importance of the interchange is well summarized in the *Highway Capacity Manual*:¹⁰

The efficiency of traffic movement on freeways or expressways and the extent to which their potential capacities can be realized depends directly on the adequacy of the facilities that are provided for entering or leaving these highways.

THE INTERCHANGE CAPACITY-TRAFFIC BALANCE

Three variables, in unequal degree, contribute to the balance or imbalance between interchange capacity and interchange traffic or use. These same variables are present in any highway capacity-traffic balance. They are (1) the design characteristics of the roads involved, (2) the access characteristics of the roads involved, and (3) the land use characteristics of the area served by the roads.¹¹

The design characteristics of the roads play a major role in determining their traffic capacity. In an interchange area there are generally two roads of radically different design. The Interstate road or freeway and the structures that comprise the interchange itself can be varied within wide limits, while still in the planning stage, to provide a greater number of lanes, better entry-exit facilities and other factors affecting capacity.¹² The crossroad, however, is generally a pre-existing road, and often a state trunk highway. Its capacity was determined long ago and close-in roadside development may make widening or other design alterations prohibitively expensive.

The access characteristics of the roads are somewhat related to their design characteristics. The access points on Interstate roads or freeways will be confined to interchanges. On the feeder roads the access pattern may be closely controlled or it may be completely unrestricted. The volume and flow of traffic on the crossroad, and to some extent the free-

⁹ Allaire, *Expressway Interchanges*, A.S.P.O., Planning Advisory Service, Information Report No. 137, August 1960, p. 5.

¹⁰ Highway Research Board, *Highway Capacity Manual* 1950.

¹¹ The author is particularly indebted to William C. Pendleton, Agricultural Economist, Land and Water Research Branch, Farm Economics Research Division, Agricultural Research Service, U.S. Department of Agriculture, for his help in working out the factors involved in the highway capacity-traffic balance and on whose writings the following paragraphs are based.

¹² It is here assumed that the only limits are those of engineering feasibility and economic efficiency. Budgetary and legal problems are ignored at this point.

way, will be influenced by the access pattern on the crossroad. To the degree that it is possible to limit the number of access points or to control the type of access, this threat to the traffic carrying capacity of the road will be lessened. Access control on the new freeway will be considerably easier than on the pre-existing crossroad. The presence of the property right of access¹³ in the property owners abutting the pre-existing road will severely limit the feasibility of changing the pattern of access existing on the crossroad.

The land use characteristics, present and future, of the area adjoining the interchange and the crossroad are the third variable in the capacity-traffic balance. While the inter-relationships of traffic and land use are only imperfectly understood, it is clear that the number of vehicular movements at a given point bears a direct relationship to the use made of the land and the approach.¹⁴ The highway agency, however, has little if any control over the changes in land use which occur after the facility is constructed. While this subsequent change in land use can destroy the usefulness of an interchange,¹⁵ direct public control over land use change lies primarily with agencies other than the highway agency. While some indirect controls are exercised on the state level, the regulation of land use is almost exclusively a function of county and municipal governments.

The safety, efficiency and permanence of freeway interchanges and their supporting secondary roads will depend on a proper balance between the capacity of these crossroads and the kind and volume of traffic on them. This traffic will be of two types—traffic entering or leaving the freeway via the secondary road and traffic travelling on the secondary road itself.

The particular problem in the interchange areas is to provide an appropriate capacity-traffic balance considering the dual-purpose nature of the secondary road, *i.e.*, feeder to the interchange and a traffic carrier in its own right. This becomes especially important when it is borne in mind that, on the Interstate System roads, highway services will be provided only in the interchange areas, since they cannot be provided on the right-of-way of the Interstate System roads themselves.¹⁶ This requirement thrusts a third role on the interchange—service area for the Interstate System.

The gigantic investment of manpower, money and material that will

¹³ See *Royal Transit, Inc. v. West Milwaukee*, 266 Wis. 271, 63 N.W. 2d 62 (1954); *Heimerl v. Ozaukee County*, 256 Wis. 151, 40 N.W. 2d 564 (1949); *Neenah v. Krueger*, 206 Wis. 473, 240 N.W. 402 (1932).

¹⁴ *Enfield & McLean, Controlling the Use of Access*, 101 HIGHWAY RESEARCH BOARD BULLETIN 70 (1955).

¹⁵ Lubar, *Interchange Ahead*, *Fortune*, October, 1958, pp. 131-34, 216-19.

¹⁶ See Taylor, *Service on Limited Access Highways: Organized Pressures and the Public Interest*, *Land Economics*, February 1959, pp. 24-34 and Covey, *Reply and Taylor, Rejoinder*, *Land Economics*, November, 1959 pp. 368-73.

be the Interstate System will be protected from roadside development along its whole route by the federal requirement of complete control of access. But there will be no requirement of protection in the interchange areas and the feeder roads except for the short distance where the crossroad enters the right-of-way of the Interstate road and generally for a short distance beyond.¹⁷ If these interchange areas choke up with unrestricted roadside development, the Interstate System will be severely crippled and new feeders and interchanges will have to be provided.¹⁸ Moreover, the destruction of these roads as efficient and safe Interstate System feeders means their simultaneous destruction as efficient and safe secondary roads or local traffic carriers.

Allowing unrestricted development around an interchange during the natural burst of growth generated by the highway can create a burden on the interchange which outstrips its capacity in a short time.¹⁹

The need for interchange protection on the Interstate System and other freeway-type roads becomes even more acute when it is noted that most commercial development, even on a conventional highway, is concentrated in the interchange or crossroad areas.²⁰ This trend will be greatly stimulated by the design of the Interstate System.

How then can a proper balance between traffic and capacity be achieved for the interchange areas? Of the three variable factors in this balance previously mentioned, access controls and the pattern of surrounding land use are means of roadside protection peculiarly adaptable to the interchange area. These devices are part of the much broader area of the law known as land use controls.

The massive urban revolution of the past two centuries has had a profound impact on traditional concepts of land law and private property. With the development of modern urban life, the collection of rights and privileges with respect to land that the law will protect has tended to dwindle; or perhaps it would be better to say that the rights and privileges of the community in private land have been increasingly recognized. Accordingly, the field of land use law, *i.e.*, the legal, community control over the use, disposition and function of privately held land, has grown up within the field of general land law.

Since 1900 measures relating to zoning, subdivision controls, official mapping and urban development and redevelopment have been devised and adopted widely over the country. These new public land use con-

¹⁷ The interchange ramps themselves will be provided with full control of access.

¹⁸ Enfield, *The Law and Highway Modernization*, 205 HIGHWAY RESEARCH BOARD BULLETIN 18, 27 (1958).

¹⁹ Note, *Pressures in the Process of Administrative Decision: A Study of Highway Location*, 108 U. PA. L. REV. 534, 555 (1960).

²⁰ Covey, *Highway Protection Through Control of Access and Roadside Development*, 1959 WIS. L. REV. 567, 600 n. 190.

trols take the form of an imposed and generally non-compensated governmental decree.²¹

Legal action to control land use must fall within one of several constitutional classifications: eminent domain, police power, taxation, conditional grant or advance of credit. The tax power and the conditional grant, potent but little used tools in roadside protection, will not be considered in this discussion. All other legal actions to control land use fall into one of two basic constitutional classifications: police power (the power of the state to regulate reasonably the use of property without compensation) and eminent domain (the power of the state to take property on the payment of just compensation). In this discussion, the power of eminent domain is considered to apply both to voluntary sales of property to a public agency and to acquisition through condemnation. Most of the kinds of acquisition considered below either are currently backed by the power to condemn or would need such backing to be useful.

Beyond the clear cases where a regulation is arbitrary or discriminatory, several modes of distinguishing, on the conceptual level, between exercises of the police power and the eminent domain power have been suggested: purpose of the regulation, the nature of the condition sought to be remedied, varying concepts of property, and impact on the landowner.²² Without entering into that discussion here, police power regulations will be defined as those which the courts have allowed without the payment of compensation to the affected landowner, and conversely, where compensation has been required by the courts, the devices will be treated as exercises of the eminent domain powers.

The desirability of the police power tools, particularly in the interchange areas, is threefold: cost, effect on the landowner, and flexibility. The only direct cost of the police power tools is the cost of administration since their application does not require compensation to the landowner. This makes the police power tools particularly attractive for the state trunk highways and interchange areas where substantial funds will not be available for protection measures. Police power measures are by their very nature less restrictive than a complete taking under the eminent domain powers. Finally, the police power devices are more flexible than eminent domain powers; they allow specific consideration of local differences and can make allowances for future local growth.

In turn, the police power controls are subject to certain disadvantages. The most important in this concern is that they are almost exclusively prospective. Police power controls are little more than pallia-

²¹ See HAAR, *LAND USE PLANNING* (1959) for a general discussion of the growth of land use controls.

²² A brief in support of this last mentioned mode of distinguishing the powers can be found in COVEY, *ROADSIDE PROTECTION THROUGH ACCESS CONTROL* 11-17 (1960).

tives with respect to established uses.²³ It is only with respect to future development that the police power tools may be fully effective.

THE TECHNIQUES OF INTERCHANGE PROTECTION²⁴

Once the design of the road in an interchange area is fixed, the roadside protection for that area must be achieved through control of the access to that road and control of the pattern of surrounding land use. Control over access is concerned with the dangers resulting from entry, exit and storage of vehicles. Control over land use is concerned with the dangers resulting from the volume and nature of traffic generated by the surrounding land. Accordingly, the protection devices available will be discussed in terms of the dangers to the interchange with which they are primarily concerned. The controls over access include driveway regulations, restriction of access and subdivision controls. The controls over land use include the restriction of the use of access, the acquisition of development rights and zoning.

This dichotomy is far from complete. Zoning regulations relating to the provision of parking space are an access-oriented device since they are concerned with the storage of vehicles; subdivision controls relating to minimum lot size are a land use-oriented device since they are concerned with the volume of traffic generated. In spite of this overlapping, to avoid duplicating the discussion of the control devices, each one will be treated only under the problem with which it is chiefly concerned.

A final classification will treat other tools, such as official mapping and nuisance doctrines, which are potent but auxiliary interchange protection devices.

A. Controls Over Access

The controls over access are a frontal assault on the problem of interchange protection. They seek to solve the problem by regulating or restricting the access of abutting land onto the road. They are aimed at the problem of entry-exit-storage and at the strain that such activities, if unregulated, place on the traffic carrying capacity of the roadway.

1. Driveway Regulations

A reasonable regulation of access through a system of driveway per-

²³ Comment, *The Elimination of Non-Conforming Uses*, 1951 WIS. L. REV. 685.

²⁴ The following discussion treats the legal problems involved in each control device briefly. Citations are given only to the leading cases and available periodical literature. For a more specific treatment of the problems involved in these control devices see the following publications by the author: *The Control of Highway Access*, 38 NEB. L. REV. 407 (1959); *Highway Protection Through Control of Access and Roadside Development*, 1959 WIS. L. REV. 567; *Impact of Police Power Controls in Wisconsin*, 232 HIGHWAY RESEARCH BOARD BULLETIN 84 (1959); *Roadside Protection Through Access Control* (Automotive Safety Foundation; Washington, D.C. 1960); *Roadside Protection Through Access Control: A Comparative Study*, an S.J.D. thesis for the University of Wisconsin (Mimeo. 1959). For most recent developments see 1960 Report of Committee on Condemnation and Condemnation Procedure, Municipal Law Section, American Bar Association.

mits is an exercise of the police power.²⁵ Through such a control device some check can be maintained over the entry onto the road. Standards of driveway cut, vision, and angle of intersection should be required as a condition to the issuance of a permit. By this method all of the access points onto the secondary road can be made to comply with the basic standards of safety. Further, there is some authority that, under such a system of regulation, access can be denied completely.²⁶

The minimum requirement for interchange protection should be a set of driveway regulations which provides that all points of entry onto the road shall comply with the basic standards of safety.

2. Partial Control or Restriction of Access²⁷

A partially controlled access road is one planned to give preference to through traffic but still allows some private access onto the road at selected points. This preference allows some access in those areas and for those uses which do not create an undue hazard to the roadway. The controlled access road presents a flexible approach to the control of access.²⁸ This approach makes it especially suitable for the interchange roads where the need is not for complete extinguishment of access, but rather for control and regulation.

An effective controlled access program involves three steps: (1) freezing all existing access points on the highway and allowing future access points only under specified conditions as to number, use, location and construction; (2) restricting existing access points to their current use; and (3) eliminating access altogether in those areas (*e.g.*, curves, vision triangles) and under those uses (*e.g.*, heavy commercial) which constitute an undue hazard to through traffic.

In those states where the right of access is limited to reasonable ingress and egress, existing access can be frozen and future access points allowed only where they are reasonable in light of all the circumstances—namely, location, design, intended use of access, public safety, and the nature and use of the road—under the police power.²⁹ In those states which require condemnation even to limit existing access points,³⁰ the damages will be nominal if the restriction leaves the abutter reasonable access.³¹ Such a step will prevent further unregulated development of access points along the highway.

²⁵ Village of Elmhurst v. Buettgen, 394 Ill. 248, 68 N.E. 2d 278 (1946).

²⁶ Alexander Co. v. City of Owatonna, 222 Mich. 312, 24 N.W. 2d 244 (1946).

²⁷ All discussion of freeways or access-free roads is eliminated because of the necessity of providing roadside services in the interchange areas for the users of the freeways or Interstate roads.

²⁸ In Finks v. Department of Public Works, 10 Ill. 2d 20, 24, 139 N.E. 2d 242, 245 (1956) the court justified the selective elimination of access by pointing to modern traffic conditions.

²⁹ State v. Ensley, —Ind.—, 164 N.E. 2d 342 (1960); State Highway Commission v. Smith, 248 Iowa 869, 82 N.W. 2d 755 (1957).

³⁰ *In re* Appropriation of Easement for Highway Purposes, 93 Ohio App. 179, 112 N.E. 2d 411 (1952).

³¹ Department of Public Works v. Filkins, 411 Ill. 304, 104 N.E. 2d 278 (1946).

Following this action, the restriction of all existing access points to their current use will prevent the uncontrolled conversion of existing residential and agricultural access points into commercial or industrial ones. This action should also constitute a police power regulation. This step will prevent further unregulated roadside development in the existing roadside pattern.

Finally, existing access points in those areas or under those uses which are unreasonable or dangerous to the highway should be extinguished. The denial of existing access, if it merely restricts the existing access to reasonable access is a police power regulation;³² but, if the regulation completely denies existing access or destroys its total usefulness, the access rights must be either purchased or condemned.³³

The controlled access road is well suited to the interchange area. It leaves the access points on the highway which are necessary to provide roadside services to the users of the freeway roads, but it effectively regulates the location, number and use of such points.

3. Subdivision Control

The subdivision of land abutting on a highway intensifies the use of that land and generates more traffic. In turn, the regulation of the subdivision process presents a means of requiring a satisfactory relationship between the subdivision layout and the abutting highway. Only in recent years have such regulations specifically considered the needs of the highway system. The police power of the state extends to the regulation of the subdivision of land in order to provide for orderly development and easy description of land.³⁴ The criterion used by the courts to determine the validity of subdivision regulations has been their reasonableness.

Subdivision regulations, to provide protection for the interchange area, must provide: (1) restriction of direct access from the subdivision by requiring service roads or reverse facing lots for all uses, residential, commercial or industrial; (2) establishment of set-back lines; and (3) requirement of enforced dedication of land for road improvements.³⁵ Such a pattern of regulation would provide great protection for the interchange area. The subdivider would thereby be required to provide a satisfactory relationship between the subdivision layout and the abutting highway. The courts have upheld, as valid police power measures, subdivision regulations restricting direct access,³⁶ establishing set-back

³² *Hillerege v. City of Scottsbluff*, 164 Neb. 560, 83 N.W. 2d 76 (1957).

³³ *Simmons v. State Highway Commission*, 178 Kan. 2d, 283 P. 2d 392 (1955); *Boxberger v. State Highway Commission*, 126 Colo. 526, 251 P. 2d 920 (1952).

³⁴ *Melli, Subdivision Control in Wisconsin*, 1953 Wis. L. REV. 389.

³⁵ See for example Wis. Stat. §236.01 (1959) and Wis. Adm. Code §Hy. 33.01. See also *Mullins, Subdivision Controls Applied to Highway Problems*, (U.S. Bureau of Public Roads, 1961, Mimeo.).

³⁶ *Ayres v. City Council of Los Angeles*, 34 Cal. 2d 31, 207 P. 2d 1 (1949).

lines,³⁷ and requiring dedication of land for future highway use.³⁸ In some areas, these results are being achieved by requiring the subdivider to encumber the lots bordering the highway with restrictive covenants. In all of these cases, the justification for placing these additional burdens on the subdivider who abuts the highway has been the fact that the subdividing of land abutting that highway itself creates traffic problems which must be controlled.

Subdivision regulations, if enacted and applied to all land divisions in the interchange area, would provide a great degree of protection from future deterioration in the roadside pattern.

The foregoing devices—driveway regulations, restriction of access and highway oriented subdivision controls—are the major tools available to control the access onto the interchange road. They are the means of controlling the second variable in the highway traffic-capacity balance.

B. Controls Over the Use of Abutting Land

The controls over the use of abutting land are an oblique but very effective assault on the problem of interchange decay. They seek to solve the problem by regulating and locating the uses of land in the interchange area. They are aimed at the volume and nature of traffic generated by surrounding land and the strain that such land uses, if unregulated, place in the traffic carrying capacity of the roadway.

1. Restricted Use of Access

The restriction of the use of access is a control device auxiliary to zoning or access restriction. It is concerned with the restriction of the use made of the access rather than the use made of the land itself. The regulation of the use of access as well as the regulation of the use of land can provide a great degree of interchange protection since the number of vehicular movements at an approach to a highway bears a direct relation to the use made of that approach.

The use made of an access point can be controlled through eminent domain, either on an existing highway or in the acquiring of additional land through condemnation.³⁹ Such access use restrictions can also be imposed under the zoning power.⁴⁰ This restriction is less severe than general zoning since it will not prevent the use of the land for other purposes so long as other access is available.

2. Developmental Rights

The separation of certain rights, called development rights, from the remaining rights in land in the interchange area would provide a means of controlling the land use in that area. The development rights—the

³⁷ *Bouchard v. Zetley*, 196 Wis. 635, 220 N.W. 209 (1928).

³⁸ *Newton v. American Securities Co.*, 201 Ark. 943, 148 S.W. 2d 311 (1941); *Ridgeland Co. v. Detroit*, 241 Mich. 468, 217 N.W. 58 (1928).

³⁹ *State ex rel. Eastrold v. Superior Court*, 47 Wash. 2d 335, 287 P. 2d 494 (1955).

⁴⁰ *San Francisco v. Safeway Stores*, 150 Cal. App. 2d 327, 310 P. 2d 68 (1957).

right to develop for subdivision, business or industry—would be transferred, by purchase or condemnation, to an appropriate public agency.⁴¹ All remaining rights in the land, including agricultural, would remain in private ownership. In some aspects such a program would be similar to the early Minnesota experiments in zoning under the eminent domain powers.⁴²

Little use has been made of the development rights approach to controlling land use along the highways. However, the use in Wisconsin of a "scenic easement" offers some interesting comparisons. The state can acquire through purchase or condemnation, all easements necessary to protect the scenic beauty of a parkway through the Mississippi Valley.⁴³ The land remains in private ownership but is subject to development restrictions.

The acquisition of development rights in the interchange areas would allow the control of the nature and location of uses permitted along the road. While it would require expenditure of funds in acquiring those rights, this cost would be recaptured in the public sale of these rights—subject to restrictions—for the location of necessary highway services.

In states where the power of excess condemnation exists, another technique is available for the acquisition of development rights in interchange areas. They could be acquired through the purchase of excess land, which could then be sold encumbered with restrictions on the uses to which it might be put. Such a procedure would provide great flexibility in controlling the pattern of development in interchange areas.

3. Zoning

The basic zoning powers and purposes include regulation and location of land uses, restriction of the density of land use, and provisions for yards, parking, and building set-backs. The basic principles of zoning law are well established. Use district location and regulation and set-back requirements have been upheld as exercises of the police power so long as they are reasonable. Highway safety has been specifically recognized as a valid end of zoning.⁴⁴

When an interchange is located in a zoned urban area it falls under the metropolitan comprehensive zoning pattern. Certain areas abutting the highway will be zoned for industrial or commercial uses; other areas will be divided into various classes of residential uses. When an interchange is located in a rural area it is generally subject to no zoning or to a loose form of agricultural or recreation-forestry type zoning. For

⁴¹ Some of the ramifications of such a program are discussed in Solberg, *Open Space Control*, 1960 Highway Research Board Meeting (mimeo.).

⁴² See *State ex rel. Twin Cities Bldg. Co. v. Houghten*, 144 Minn. 1, 174 N.W. 885 (1919) and 176 N.W. 159 (1920).

⁴³ Wis. Stat. §84.105 (1959). See Sawtelle, *Scenic Easements for Great River Road* (A.A.S.H.O. mimeo. 1957).

⁴⁴ *Jefferson County v. Timmel*, 261 Wis. 39, 51 N.W. 2d 518 (1952).

zoning to be effective as a highway protection device it must be based on a functional differentiation of the land abutting a highway and must be concerned with the intimacy and relation between the traffic way and the abutting land use. Both the use district classifications and the set-back requirements should not be confined to the zoned commercial or industrial districts but should apply to all structures adjacent to the highway in both urban and rural areas.

Zoning, to be an effective form of interchange protection, must seek these basic objectives: (1) restriction of commercial uses to designated commercial areas in which the road would be specifically designed to handle safely the added problems of commercial access through additional lanes, service roads, better sight distances, and designed angle of entrance; (2) requirement that roadside buildings be adequately set back from the road to prevent overcrowding and to preserve sufficient clear land to allow future road improvement at moderate cost and minimum disruption of the roadside development; and (3) control of the appearance of roadside commercial development relating to safety, health and the general welfare.

The foregoing devices—restricted use of access, acquisition of development rights and highway-oriented zoning—are the major tools available to control the use of land surrounding and influencing the interchange. They are the means of controlling the third variable in the highway traffic-capacity balance.

C. Other Controls

The remaining control devices—official mapping and nuisance doctrines are concerned with different aspects of interchange protection. The former is concerned with the reservation of right-of-way for future streets or widening of existing streets; the latter is concerned with the abatement of activities on the abutting land—whether these activities relate to access or land use—which substantially interfere with the use of the highway.

1. Official Mapping

The official map, a legally effective layout of the future highway pattern, is both one of the oldest and one of the simplest control devices. Among the uses of the official map are fixing building lines, platting existing streets, and protecting the path of future streets from encroachments. The principal advantages of the official map in this context are the assurance the land needed for future improvement of the interchange area will be available at bare land prices, the setting of widening lines or set-backs on existing roads, and the providing of direction and pattern to future growth of the interchange area.

A number of states have some form of effective official mapping act,⁴⁵ and a number have a form of future highway right-of-way reserva-

⁴⁵ *E.g.*, Wis. Stat. §62.33 (6) (1959).

tion similar to, but less effective than, official mapping.⁴⁶ The official map presents two legal issues: (1) does the act of mapping alone constitute a taking and (2) may a building permit be refused or compensation denied for building without a permit on the basis of the official map's projection of future streets.

There is little question any longer that the act of mapping alone does not constitute a taking requiring immediate compensation but is merely a plan for future development.

The other question, whether a building permit or compensation may be denied for structures in the bed of the mapped street is more difficult.⁴⁷ The better result would seem to be that so long as a fair return can be earned from the property as mapped that neither a building permit should be issued nor compensation granted for unauthorized improvements in the bed of the mapped road when the land is finally condemned.⁴⁸

Official mapping is not a roadside protection device as such. It does not protect the road once built, but it is an effective auxiliary control. Its advantages, from the point of view of the interchange area, are as follows: (1) future road use and traffic-carrying design can be integrated by reserving right of way for future use; (2) widening lines can provide for adequate sight distances, particularly at access points, and can prevent highway strangulation; (3) location of widening lines can encourage the placement of buildings and access ways on subordinate, rather than on principal streets or roads; and (4) future intersecting street locations can be designed with access onto main streets as a major consideration.

2. Nuisance Doctrines

Another means of interchange protection is through the laws of nuisance. This promising means of control has not had much use up to this date.

The common law early recognized that a roadside use or condition which interfered with the "ready and early passage" on the road was a nuisance, and this concept was applied to American roads during the horse-and-buggy period.⁴⁹ Nuisance, rather than being a separate body of law, is merely a short-hand way of saying that the public's *interest* in passage is being wrongfully interfered with either by intentional or negligent action or inaction. Nuisance is a way of describing the interest which the law is protecting. Normally the protection will be accorded through the remedy of injunction.

⁴⁶ *E.g.*, Ind. Acts. 1957, ch. 148, §12.

⁴⁷ Kucirek and Beuscher, *Wisconsin's Official Map Law*, 1951 WIS. L. REV. 176.

⁴⁸ State *ex rel.* Miller v. Manders, 2 Wis. 2d 365, 86 N.W. 2d 469 (1957).

⁴⁹ Beuscher, *Roadside Protection Through Nuisance and Property Law*, 113 HIGHWAY RESEARCH BOARD BULLETIN 66 (1956).

Control of either access or abutting land use can be justified on three lines of case law. (1) the abutting owner has violated his duty as the owner of a "servient tenement" not to interfere with the "dominant estate" of the public; (2) the access or land use is a nuisance; and (3) the abutting owner has violated his duty to permit free and safe passage on the highway. All three lines of approach are based on the reasoning that substantial interference with the safety and free passage on the road will be enjoined even though it originates on privately owned land abutting the highways.

This area of the law has not been explored by the courts in the light of modern road conditions. At least one case, however, has relied on these principles, along with other, to allow abatement of such a nuisance through selfhelp.⁵⁰

3. Urban Renewal

A final incidental control that could be used to secure some degree of interchange protection would be through urban renewal programs or federally aided land development programs.⁵¹

The foregoing devices—official mapping, nuisance doctrines and urban renewal—are the remaining tools available for interchange protection. They are means of protecting land for future improvement in the design of the interchange roads and for suppressing land uses or access points that create an undue danger to the interchange road.

Summary

The safety, efficiency and permanence of the interchange as a freeway feeder, as a secondary road and as a roadside service area will depend on a proper balance between the road's design, the access controls applied and the surrounding land uses. The various devices discussed above are the tools available to control the access to the road, to fix and regulate the pattern of land use and to provide additional area for later improvements in the design of the road itself. They are the means at hand to assure that the traffic-capacity balance will be achieved.

A discussion of these protection devices would be incomplete if it did not include some mention of the problems resulting from the dispersion of these powers over the three levels of state government—state, county and municipal—and among various agencies on each of those levels of government. An appreciation of the interaction among the various governmental units is essential in evaluating the impact of the tools on the interchange areas.

Roadside protection powers are vested on one or more of three levels of government—state, county and municipal.⁵² Certain variations

⁵⁰ *Perlmutter v. Greene*, 259 N.Y. 327, 182 N.E. 5 (1932).

⁵¹ Stanhagen, *Highway Interchanges and Land Use Controls* (U.S. Bureau of Public Roads, 1961, Mimeo.) 39 ff.

⁵² See Feifarek, *Administration of Highway Protection Laws*, 140 HIGHWAY

exist from state to state, but generally control of access and some planning and subdivision review authority (where such exists) are located on the state level. Zoning and planning powers are located on the county level. Official mapping and zoning and planning are vested on the municipal level. These agencies, however, constitute a hierarchy in form only; there is no pattern of responsibility or line of authority in the protection process. Powers are exercised by city councils, town and county boards, city, county and regional plan commissions, and the state highway commission. There is generally no established flow of information and cooperation among these various units.

The major problem is a mutual lack of responsiveness between the agencies responsible for road-building and those authorized to use the various techniques for protection discussed above.⁵³ The local protection devices are often not responsive to the needs of highway protection, and the highway location process is often not responsive to the advantages of the local protection devices.

Generally on the local level there is a failure to enact roadside protection devices, and those that are enacted are purely local in orientation. Frequently on the state level there is a failure to take advantage of those local protection devices that are effective and a neglect to have a program of active leadership in encouraging the enactment of such measures on the local level. Overall, there is a failure to provide a method of integrating these diversified powers and activities into a unified and a coherent pattern of roadside protection.

Since these control devices are vested not only on different levels of government but also in various units on the same level of government, there is at least potential conflict between these units of government in the administration of a highway protection program. The basic trouble spots are: (1) the failure of one unit of government to approve action of another unit where the approval of both is required before the control can be legally binding; (2) the failure of units with independent land use control powers to cooperate; and (3) the failure of a unit to continue a protection device when jurisdiction is shifted from one governmental unit to another.

THE OVERVIEW

To what extent are these control devices being used in the interchange areas? To secure an adequate overview, questionnaires were sent to the State Highway Commissions of the forty-nine states (since Wisconsin was separately studied it was excluded) and the District of Columbia in January 1961. All of the Commissions responded with the ex-

RESEARCH BOARD BULLETIN 72 (1956) for a discussion of this dispersal in the Wisconsin situation.

⁵³ Covey, *Impact of Police Power Controls Along the Wisconsin Trunk Highway System*, 232 HIGHWAY RESEARCH BOARD BULLETIN 84, 95-102 (1959) outlines this lack of integration in terms of the Wisconsin experiences.

ception of Louisiana, so that the results are virtually complete. Before reviewing these results some mention should be made of two earlier surveys.

A survey of Highway Commissions conducted in late 1958 with thirty-two states responding indicated that little roadside protection had been encouraged or provided for the interchange areas.⁵⁴ At that time most Commissions indicated they were not seeking to locate the interchanges in those areas where some form of effective protection then existed nor to influence local units of government to provide additional protection in those areas chosen for interchange location. There was generally no protection contemplated beyond general access control at the point where the interchange or feeder road entered the Interstate right-of-way and for a short distance back from this point along the feeder road.

Another survey of Highway Commissions conducted in early 1960 by the Pennsylvania Department of Highways with thirty-six states responding, while not drawing any express conclusion, indicated that little protection—beyond extending access control for a distance of from 100 to 1,000 feet from the Interstate right-of-way by sixteen states—was being provided.⁵⁵ Some states indicated various other control devices were also in use: seven used set-backs and access restrictions and eight incorporated state level planning. The survey concludes:⁵⁶

All thirty-six (36) respondents are in concurrence over the fact that control of access beyond ramp terminals should be extended as though part of the ramps themselves, but here is identified the crux of the problem, just how far? The distances recommended and/or suggested vary considerably from 100 to 1,500 feet, and some special cases being even greater.

* * * * *

The most distressing fact of all is the reluctance of local municipalities to accept the challenge presented by the location of Interchange Areas in their districts. Instead, there is a growing tendency to take a wait and see approach and to look for ways and means to capitalize out of them regardless of the overall effect on safe traffic movement and the injurious effect upon the amenities of the Interchange Areas.

The survey of the Highway Commissions conducted by the author in early 1961 and upon which this overview of interchange protection is based sought to elicit by means of questionnaires, information on (1) the current and planned interchange programs within the several states, (2) the means to be used to implement such programs and (3) the co-

⁵⁴ COVEY, *ROADSIDE PROTECTION THROUGH ACCESS CONTROL* 35 (1960).

⁵⁵ Pennsylvania Department of Highways, *Protection for Interchange Areas* (Mimeo. 1960) p. 6.

⁵⁶ *Ibid* at 8.

operation in such a program with and from local governmental units.⁵⁷ The results of the survey will be analyzed under those broad classifications.⁵⁸

All of the Commissions answered the first question. Twenty-two states, or 44%, indicated that no program of interchange protection was planned or in effect.⁵⁹ Many of these twenty-two states indicated that they felt the nonurban or rural nature of their state excused the lack of interchange protection.

Thus, twenty-eight states, or 56%, indicated that some program of interchange protection was planned or in force. Twenty states have driveway permit systems coupled with an interchange protection program.⁶⁰ Sixteen indicated an awareness of local zoning,⁶¹ and fourteen

⁵⁷ The questions asked were as follows:

- (1) In the Interstate Highway System roads in your state do your plans call for providing any roadside protection or land use control measures in the areas surrounding the freeway interchanges or along the roads that will serve as feeders or crossroads to the Interstate System Roads?
- (2) If so, is this done or will this be done through
 - (a) driveway permit system on the feeder road?
 - (b) access controls on the feeder road?
 - If so, for what distance?
 - (c) zoning the surrounding area?
 - If so, by what level of government?
 - (d) subdivision control?
 - If so, how?
 - (e) condemnation or purchase of development rights?
 - (f) condemnation of excess land in the interchange area?
 - (g) other devices? If so, what?
- (3) Have you tried to influence county or municipal governments to provide any of the foregoing protection devices for the interchange areas?
- (4) If so, how was this done and with what result?
- (5) Please attach copies of any Commission policy statements or regulations governing interchange areas.
- (6) Comments on the Interchange Problem:

⁵⁸ In most cases the answer given was accepted as accurate. However, in some cases it was clear from the remainder of the answers that a particular answer was inaccurate. In those cases the whole questionnaire was interpreted and the answer which seemed correct in that light assigned to the question in spite of the contrary answer given by the Highway Commission.

⁵⁹ Responses to questionnaire by Highway Commissions of Alabama, Arizona, California, Colorado, Florida, Indiana, Maine, Minnesota, Mississippi, Missouri, Montana, Nevada, New Mexico, New York, Rhode Island, Tennessee, Texas, Vermont, Virginia and West Virginia. Alaska and Hawaii responded but noted that the Interstate roads were in their infancy in Hawaii and not yet appropriated in Alaska and, therefore, no plans had been made.

⁶⁰ Responses to questionnaire by Highway Commissions of Arkansas, Delaware, Georgia, Illinois, Iowa, Kansas, Kentucky, Maryland, Michigan, Nebraska, New Hampshire, New Jersey, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee and Washington. It is interesting to note that while the following states have a driveway permit system they neither have nor plan an interchange protection program—Colorado, Indiana, Missouri, Rhode Island, Texas, Virginia and West Virginia.

⁶¹ Responses to questionnaire by Highway Commissions of Arkansas, Delaware, District of Columbia, Florida, Georgia, Kansas, Maryland, Massachusetts, Nebraska, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Utah and Washington. Colorado, Indiana and Rhode Island indicated an awareness of local zoning, but do not have or plan an interchange protection program.

indicated an awareness of local subdivision controls.⁶² Two others used condemnation or purchase of development rights,⁶³ and four others used condemnation of excess land in the interchange area.⁶⁴

The most common interchange protection program, since a driveway permit program is not necessarily an interchange protection program, is that of access controls on the feeder road for some distance beyond the end of the Interstate road right-of-way or the end of the interchange ramps. Seventeen states employ such control measures.⁶⁵ The distance from the end of the interchange ramp for which access control is maintained varies but the median distance is 250 feet or the distance a car travelling 60 miles an hour would cover in slightly more than three seconds. A valid question is presented in just how far should this control extend.⁶⁶ Much of the interest in restricting access in the area immediately adjacent to the interchange ramp is motivated, not only by protecting the interchange from adverse roadside development, but by preserving sight distances.

Even where a control device, such as a driveway permit system, is used it does not necessarily guarantee any interchange protection. A review of the published driveway permit regulations of six states,⁶⁷ chosen at random, or 30%, of those who reported that they had a state driveway permit system, shows little uniformity of approach or pro-

⁶² Responses to questionnaire by Highway Commissions of Arkansas, Delaware, Florida, Georgia, Kansas, Maryland, Massachusetts, Nebraska, Ohio, Oklahoma, Oregon, Pennsylvania, Utah and Washington. Indiana and Rhode Island indicated an awareness of subdivision controls but do not have or plan an interchange protection program.

⁶³ Responses to questionnaire by Highway Commissions of Iowa and New Jersey.

⁶⁴ Responses to questionnaire by Highway Commissions of Arkansas, New Jersey, South Dakota and Washington. Colorado indicated use of excess condemnation but does not have an interchange protection program.

⁶⁵ Responses to questionnaire by Highway Commissions of Connecticut (200 feet from end of interchange ramp), Iowa (300 to 500 feet), Kansas (varies), Maryland (150-300 feet), Nebraska (600-800 feet), New Hampshire (1,000 feet), North Carolina (150 feet), North Dakota (250 feet), Ohio (600 feet), Oklahoma (250 feet), Oregon (150-350 feet), Pennsylvania (250 feet), South Carolina (500-1,000 feet), South Dakota (250 feet), Utah (300 feet), Washington (110 feet) and Wyoming (varies).

The 1960 study conducted by the Pennsylvania Department of Highways shows 44% of the responding states thought such a program desirable (the instant study shows 34% have adopted it) and a median limitation distance of 200 feet (the instant study shows 250 feet).

⁶⁶ For example the reply of the North Carolina Highway Commission asks "What should be the limits of control of the feeders or crossroads to the Interstate System—200'—400'—600' beyond ramps?"

⁶⁷ These regulations were the Arkansas State Highway Commission, Regulations for Access Driveways to State Highways (1957); Idaho Department of Highways, Standard Approach Policies (1956); Illinois Department of Public Works and Buildings, Policy on Permits for Access Driveways to State Highways (1955); Maryland State Roads Commission, Policy and Standards for Commercial Entrance Channelization (1960); Pennsylvania Department of Highways, Regulations Governing Access Driveways for Gasoline Service Stations Fronting on State Highways in Pennsylvania (1954); Texas Highway Department, Regulations for Access Driveways to State Highways (1960).

tection provided. Of the six, only four seek to control all driveways; of the other two, Maryland regulates only commercial or industrial entrances onto the state highways⁶⁸ and the Pennsylvania regulations cover only gasoline service station driveways.⁶⁹ The Arkansas regulations, the only ones to treat specifically Interstate interchanges, show, in the diagrams of suggested location layouts accompanying the regulations, commercial driveways joining the feeder road immediately outside of the Interstate right-of-way.⁷⁰ In only three of the regulations, those of Arkansas, Illinois and Texas, is any provision made for limiting or restricting the driveways or the use made thereof.⁷¹ Some, such as Idaho, also require set-back lines. In the remaining states, only regulation of essentially engineering, mechanical and drainage factors are involved. Of the six only two, those of Arkansas and Illinois, specifically provide for Freeway interchanges and the provisions of the Arkansas regulations, as noted above, are not fully satisfactory. As noted in these regulations: "Commercial areas, to best serve Interstate Highway Traffic, may be developed along the crossroads adjacent to or near an interchange but beyond the limits of access control."⁷² The Illinois regulations only provide that no driveway to a feeder road which enters a freeway at grade shall be closer than 100 feet to the near edge of the freeway.⁷³

All of the Commissions also answered the question relating to the encouragement of and cooperation with county or municipal governments in providing protection in the interchange areas. Thirty-two states, or 58%, indicated that there was no encouragement by the State Commissions of protection devices by the local governments.⁷⁴ Six other states, or 12%, indicated that "some" or "a limited extent" of encouragement existed.⁷⁵ Twelve others, or 24%, indicated that they ac-

⁶⁸ Maryland State Roads Commission, *supra* note 67, at 4.

⁶⁹ Pennsylvania Department of Highways, *supra* note 67, at 1. It should be noted, however, that the Pennsylvania Department of Highways has statutory authority to regulate all driveways to state highways and promulgated in 1952 regulations covering all driveways—including a permit procedure. Specific regulations, including angle of approach, frequency of cut, etc., herein considered to be meaningful driveway regulations, have been promulgated for gasoline service stations only.

⁷⁰ Arkansas State Highway Commission, *supra* note 67, at 36.

⁷¹ Arkansas State Highway Commission, *supra* note 67, at 7; Illinois Department, *supra* note 67, at 15; Texas Highway Department, *supra* note 67, at 9.

⁷² Arkansas State Highway Commission, *supra* note 67, at 35.

⁷³ Illinois Department of Public Works and Buildings, *supra* note 67, at 16.

⁷⁴ Responses to questionnaire by Highway Commissions of Alabama, California, Colorado, Connecticut, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Maine, Massachusetts, Michigan, Missouri, Minnesota, Montana, Nevada, New Hampshire, New Jersey, North Carolina, South Carolina, South Dakota, Texas, Vermont, Virginia, Washington and West Virginia. Alaska, Hawaii and the District of Columbia found this inapplicable in varying degrees.

⁷⁵ Responses to questionnaire by Highway Commissions of Arkansas, Arizona, Delaware, New York, Rhode Island and Wyoming.

tively encouraged such local protection devices. Of these twelve, six indicated that the local governments were cooperative or responded adequately.⁷⁶ The remainder found "little," "minor" or "unsatisfactory" results or felt that it was still too early to evaluate the results.⁷⁷

In addition to these essentially statistical results the survey also elicited some other interesting facets. The Iowa Commission has rejected zoning—often felt to be the best hope for interchange protection⁷⁸—because they "have not felt zoning would provide long range protection desired." In turn the Pennsylvania Commission, in order to guarantee room for future feeder road expansion, has increased the right-of-way width along the feeder roads to 120 feet for one-half mile from the end of the interchange ramps. To achieve a similar end, the North Carolina Commission is obtaining an extra width on the feeder roads for 500 to 1,000 feet from the ramp terminals.

Michigan is apparently the only state to adopt an express interchange policy.⁷⁹ The policy provides:

The development of a network of limited access expressways and arterial highways in Michigan, with the consequent elimination of the roadside services usually associated with rural trunkline highways, will result in a clustering of motorist service facilities and other commercial establishments on the cross roads, as close as possible to the interchanges with the limited access highway. One undesirable result of such a development would be the traffic operational restrictions and the potential hazards created by less than adequate vision and by the existence of driveways in close proximity to the interchange ramp terminals.

The policy is implemented by the following specific regulations:

1. *Diamond Type Interchange (Tee Ramps)*

Limited access right-of-way shall be established and acquired for a vision area as determined by the ramp centerline, the cross road centerline, and a line connecting points on these centerlines 300 feet respectively from their point of intersection. If the cross road is a divided highway the centerline of the near roadway shall be used in each case.

2. *Interchange With Accelerating or Decelerating Lanes on Cross Road*

Limited access right-of-way shall be established and acquired for any necessary clear vision area in any quadrant, and for

⁷⁶ Responses to questionnaire by Highway Commissions of Idaho, Kansas, Maryland, Nebraska, North Dakota and Utah.

⁷⁷ Responses to questionnaire by Highway Commissions of New Mexico, Ohio, Oklahoma, Oregon, Pennsylvania and Tennessee.

⁷⁸ Yanggen, Protection and Development of Areas Adjacent to Interchanges on the Interstate Highway System in Wisconsin (an unpublished thesis submitted for the degree of Master of Science of Regional Planning at the University of Wisconsin, January 1961.)

⁷⁹ Michigan State Highway Department, A Policy for Limitation of Access on Rural Highways Passing or Interchanging with Limited Access Trunklines (1960).

a distance along the cross road sufficient to include the full length of speed change lane.

3. *Grade Separation*

Limited access right-of-way shall be established and acquired in both directions on the cross road for a distance sufficient to provide eight seconds of sight distance at an assumed speed of 50 miles per hour where required by the cross road gradient or alignment.

4. *Future Interchange or Grade Separation*

In certain cases it may be necessary to postpone construction of a grade separation or an interchange. In these circumstances, limited access right-of-way shall be established, acquired and fenced in the initial stage, according to provisions (1), (2), or (3) above.

Further statements of interchange policy, while not express, are found in some of the questionnaire responses.

Oregon

We recognize the potential trouble spots and, through the control of access along the feeder roads [for] a certain distance, we are attempting to eliminate the access points near the ramp terminals. By doing this, we hope to protect these terminal areas at the feeder roads and to maintain the ultimate possible traffic capacity.

Rhode Island

The interference resulting from indiscriminate roadside development and uncontrolled driveway connections results in lowered capacity, increased hazard, and early obsolescence of the highway." Because of this principle the freeway was born and adopted as the fundamental design of the Interstate. This shows we learned something from the past, but how can we be so stupid to forget it immediately in relation to the Interchange. The Interchange is the valve of the Interstate—if this valve fails—the Interstate fails.

The Rules prohibit any services (gas, food, shelter, etc.) on the Interstate. These services will have to be available on the service road at the interchange. Further—this information has to be given to the motorist at the interchange. This means that we are promoting—yes begging—the deadly roadside development to locate on the service road causing the well-known obsolescence of that road and the failure of the valve.

Here are two suggestions for a possible solution :

1. Control of zoning and access on the service road.
2. Provide the services on the Interstate, suitably located in allocated areas.

Maryland

It has been our experience in Maryland that with the construction of new expressways and their attendant interchanges, both commercial and residential developments gravitate thereto, with the facilities acting as a focal point of attraction. Even though we limit access for several hundred feet from these areas, it

sometimes occurs in areas of heavy development and/or traffic movement that congestion results near these facilities. There is no quick and ready answer to this problem other than the development of an individual analysis for each projected interchange facility with a reasoned decision as to the areas required for the future protection of this interchange.

In spite of the recognition of the interchange problem by over half the commissions and statements of the problem or policy such as those of Michigan, Oregon, Rhode Island, Maryland, North Carolina and Pennsylvania, it must be concluded that, on the whole little if any steps are being taken to prevent, in the words of the Rhode Island Commission "the well known obsolescence of that road and the failure of the valve" to those roads.

THE CASE STUDY

An overview must, of necessity, generalize. It is only by means of an intensive case study of a limited area that interchange protection can be studied in detail. Accordingly, as a complement to the survey of Highway Commissions, a case study was made of the interchanges along Interstate 94 in Racine and Kenosha counties.

Interstate 94 was selected for a variety of reasons. For one, in these counties it replaces U.S. 41 between Chicago and Milwaukee. This segment of Route 41 was constructed as a four-lane highway during the early and middle 1930's. It passes over level and gently undulating land several miles to the west of Lake Michigan. It was the most heavily traveled road between Chicago and Milwaukee.⁸⁰ Because of this Interstate 94, completed in December 1959, is a vital link in the nation's and the state's highway net. Moreover, U.S. 41 was subjected in 1958 to a thorough roadside development study⁸¹ so that there is a standard by which to predict future development in the interchange areas. Finally, Wisconsin possesses the statutory authorization and an administrative procedure necessary to effect more of the interchange access and land use controls than any other state. However, the statutory authorization and administrative procedure alone provide no protection. It is only through the intelligent use of these controls that any protection will be provided, and it is only through a case study such as this that it can be determined if such controls are being so exercised. Since Wisconsin has such an advanced set of protection devices the results in Wisconsin should be more advanced than the average of all the other states.

⁸⁰ State Highway Commission of Wisconsin, Traffic Flow Map (1959) shows the route carried an average annual twenty-four hour traffic flow of 14,000 to 15,000 vehicles. This was also the heaviest traffic flow in the state.

⁸¹ Grotewald & Grotewald, *Commercial Development of Highways in Urbanized Regions: A Case Study*, 34 LAND ECONOMICS 236, 243 (1958). The authors concluded that "Within twenty years the through-way had been transformed into a local shopping and amusement district."

The 1958 study⁸² of U.S. 41 showed that commercial and roadside service facilities along the road were much more numerous in Kenosha, Racine and Milwaukee counties than any where else along the road. The study showed that auto-service (gas, repairs, etc.) and food-services (restaurants, drive-ins, etc.) were the most numerous service functions—together constituting 66% of all roadside establishments. Moreover, the study's map of roadside commercial establishments in Racine and Kenosha counties shows the development centered around eight east-west roads which connected with or crossed U.S. 41, *viz.*, County C, Wis. 50, County K, Wis. 43 and County E in Kenosha county and Wis. 11, Wis. 20 and County K in Racine county.

Interstate 94 in Racine and Kenosha counties extends 24.1 miles and was opened in late 1959. It connects on the south with the Illinois Tri-State Tollway (the southern continuation of Interstate 94) and Illinois U.S. 41. On the north it connects with Wisconsin U.S. 41 and will ultimately connect with the Milwaukee County Expressway System (the future northern continuation of Interstate 94).⁸³ This segment of road has 12 interchanges⁸⁴ located at the following cross or connecting roads north to south (future reference to these interchanges will be by the number preceeding them below) :

- (1) C.T.H. "V" Kenosha County, Towns of Bristol and Pleasant Prairie.
- (2) C.T.H. "C" Kenosha County, Towns of Bristol and Pleasant Prairie.
- (3) S.T.H. 50 Kenosha County, Towns of Bristol and Pleasant Prairie.
- (4) S.T.H. 158 Kenosha County, Towns of Paris and Somers.
- (5) S.T.H. 43 Kenosha County, Towns of Paris and Somers.
- (6) C.T.H. "E" Kenosha County, Towns of Paris and Somers.
- (7) County Line Road Kenosha County, Towns of Paris and Somers.

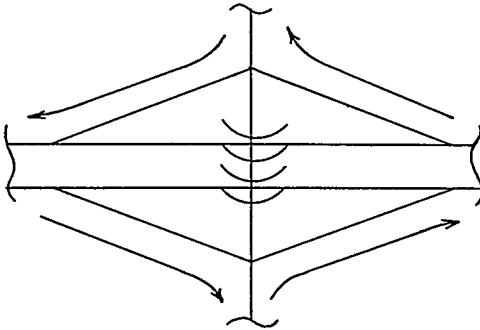
⁸² *Id.* at 239, 241 and Figure 1, at 240.

⁸³ State Highway Commission of Wisconsin, Official Highway Map of Wisconsin (1961), Segments I-10 and I-11.

⁸⁴ In addition access to the Interstate route is possible via the following roads by the use of the frontage roads and the listed interchanges. They will not be considered as interchanges for the purposes of this case study, nor are they so shown on the highway maps: in Kenosha county: C.T.H. "ML", C.T.H. "K", C.T.H. "N", C.T.H. "A"; in Racine county: Braun Road and Sylvania Road (actually part of the S.T.H. 11 interchange), Louis Sorenson Road C.T.H. "C", Kraut Road, Golf Road, Six and One-half Mile Road and Seven and One-half Mile Road. All of the foregoing data is taken from State Highway Commission of Wisconsin, Interstate 94 Entry-Exit Layout (n.d.).

- (8) S.T.H. 11 Racine County, Towns of Yorkville and Mt. Pleasant.
- (9) S.T.H. 20 Racine County, Towns of Yorkville and Mt. Pleasant.
- (10) C.T.H. "K" Racine County, Towns of Raymond and Caledonia.
- (11) C.T.H. "G" Racine County, Towns of Raymond and Caledonia.
- (12) Seven Mile Road Racine County, Towns of Raymond and Caledonia.

The interchange locations are shown on the map on the following page.⁸⁵ All of these interchanges are diamond interchanges, *i.e.*, overpasses with certain characteristics such as ramps to provide a means of traffic interchange (diagrammatically)



except Wis. 158 (interchange 4) a trumpet interchange and Wis. 11 (interchange 8), which are modified cloverleaves with certain diamond characteristics, *i.e.*, they are not full cloverleaves.

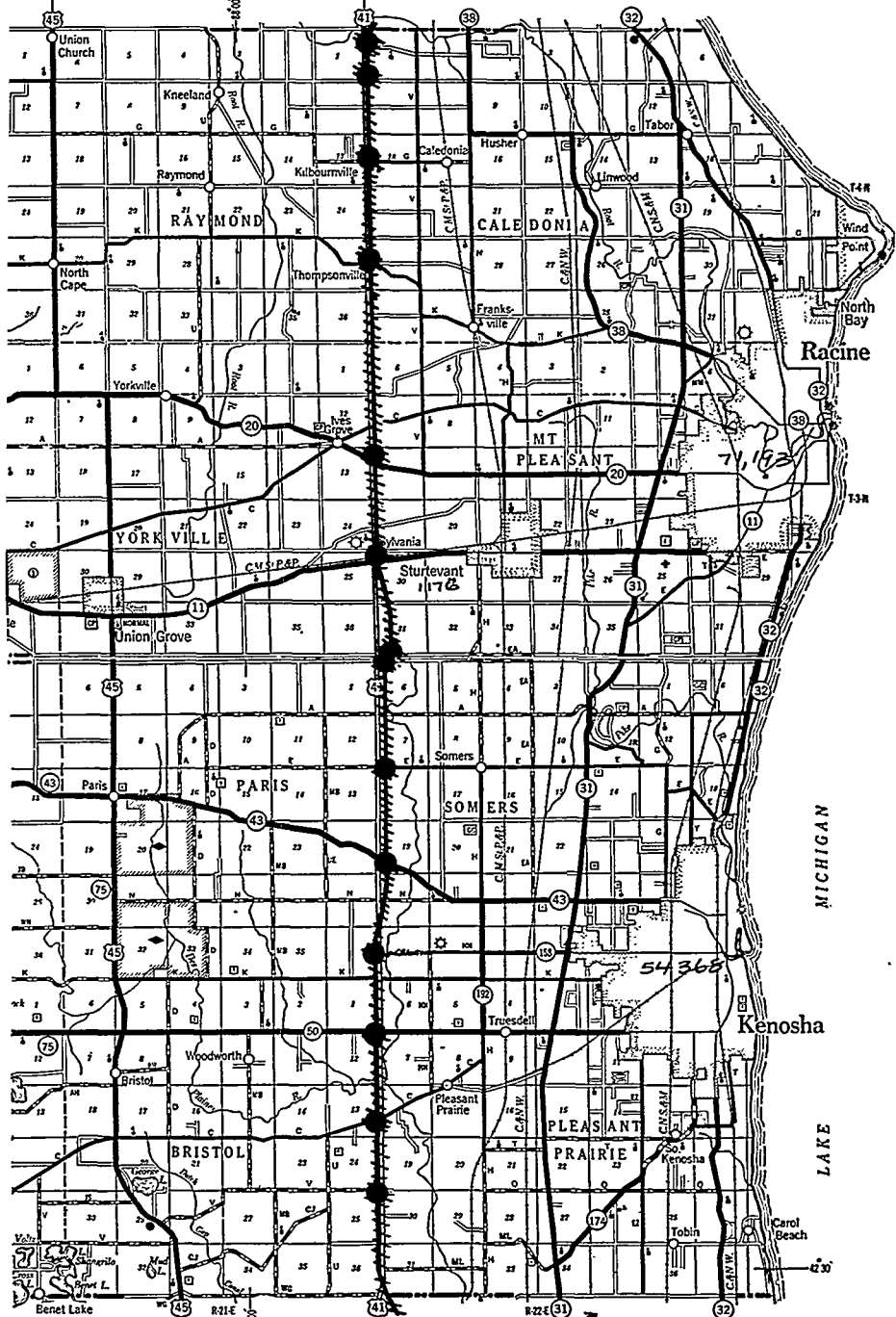
Before conversion of U.S. 41 to interchange standards, the 1959 annual average 24 hour traffic volume on Wis. 50 (future interchange 3) east of U.S. 41 was 4680 and west was 3710. On Wis. 43 (future interchange 5) it was 2730 east of U.S. 41 and 1250 west. On Wis. 11 (future interchange 8) it was 2400 east of U.S. 41 and 2570 west. On Wis. 20 (future interchange 9) it was 2890 east of U.S. 41 and 2570 west.⁸⁶

The 1975 projected traffic count for the road, to which standards the Interstate System roads are built,⁸⁷ shows projected traffic⁸⁸ as follows.⁸⁹

⁸⁵ Based on State Highway Commission of Wisconsin Maps of Racine County and Kenosha County (Corrected for Feb., 1959).

⁸⁶ See *supra* note 80.

⁸⁷ Geometric Design Standards for the National System of Interstate and Defense Highways, General, "All design features required to accommodate the traffic of the year 1975 shall be provided in the initial design; however, where justifiable the construction may be accomplished in stages." Federal Laws, Regulations, and Other Materials Relating to Highways (U.S. Bureau of Public Roads, 1960) p. 118.



INTERSTATE HIGHWAY INTERCHANGE

SCALE 0 1 2 MILES

Wis. 158 (interchange 4) :

Through traffic on I-94: N—17,850, S—17,850.

Through traffic on Wis. 158: E—0, W—0.

Traffic turning off I-94: S to E 2200, N to E 750.

Traffic turning on to I-94: W to N 2200, W to S 750.

Wis. 43 (interchange 5) :

Through traffic on I-94: N—18,850, S—18,850.

Through traffic on Wis. 43: E—1000, W—1000.

Traffic turning off I-94: S to E 2460, N to E 500, S to W 440, N to W 700.

Traffic turning on to I-94: W to N 2460, W to S 500, E to N 440, E to S 700.

County Line Road (interchange 7) :

Through traffic on I-94: N—22,000, S—22,000.

Through traffic on County Line Road: E—60, W—60.

⁸⁸ Traffic projections are always hard to make. "Traffic projection studies are by their very nature rather elusive concepts, and whereas, in general, they have proved to have a high degree of accuracy, they are definitely estimates and projections of current completed traffic studies." Letter, Chief of Roadside Control, State Highway Commission of Wisconsin, Madison, March 3, 1961.

The degree of flexibility can be illustrated by the following actual traffic count comparisons for the years of 1948, 1949, 1955, 1956, 1957, 1958 and 1959 on some of these same interchanges:

<i>Wis. 50</i>	<i>East of U.S. 41</i>	<i>West of U.S. 41</i>
1948	4,000	4,000
1949	2,700	2,010
1955	3,640	2,890
1956	3,830	3,000
1957	3,830	3,080
1958	4,540	3,130
1959	4,680	3,710
<i>Wis. 43</i>		
1948	1,560	740
1949	1,500	1,350
1955	2,020	1,130
1956	1,950	1,040
1957	1,950	1,040
1958	2,760	1,236
1959	2,150	1,250
<i>Wis. 11</i>		
1948	2,010	1,100
1949	1,930	1,380
1955	2,790	2,280
1956	2,910	2,350
1957	2,880	2,330
1958	2,430	2,400
1959	2,400	2,570
<i>Wis. 20</i>		
1948	2,460	1,050
1949	2,460	1,350
1955	2,310	1,600
1956	2,550	1,860
1957	2,720	1,860
1958	2,890	1,860
1959	2,890	2,810

All of the foregoing figures are taken from State Highway Commission of Wisconsin, Traffic Flow Maps for 1948, 1949, 1955, 1956, 1957, 1958 and 1959.

⁸⁹ State Highway Commission of Wisconsin 1975 One-Way Turning Movements (1960).

Traffic turning off I-94: S to E 370, N to E 100, S to W 130, N to W 100.

Traffic turning on to I-94: W to N 370, W to S 100, E to N 130, E to S 100.

Wis. 11 (interchange 8):

Through traffic on I-94: N—20,000, S—20,000.

Through traffic on Wis. 11: E—1720, W—1720.

Traffic turning off I-94: S to E 700, N to E 1810, S to W 650, N to W 690.

Traffic turning on to I-94: W to N 700, W to S 1810, E to N 650, E to S 690.

The relation of turning to through traffic at these interchanges under these projections, is:

Wis. 158:

Interstate: through 92.4%, turning 7.6%

Crossroad: through 0%, turning 100%. (road does not extend west).

Wis. 43:

Interstate: through 90.9%, turning 9.1%

Crossroad: through 34.5%, turning 65.5%.

County Line Road:

Interstate: through 98.5%, turning 1.5%.

Crossroad: through 14.7%, turning 85.3%.

Wis. 11:

Interstate: through 91.2%, turning 8.8%.

Crossroad: through 47.2%, turning 52.8%.

These traffic patterns and future projections lead to the conclusion that on the whole traffic on the feeder roads will be predominately traffic entering or leaving the Interstate road and somewhere between 5% and 10% of the Interstate traffic will be entering or exiting via these crossroads.⁹⁰ This emphasizes the importance of the protection

⁹⁰ This conclusion is further emphasized by the work papers compiled by Wayne N. Volk, Engineer of Traffic Services, State Highway Commission of Wisconsin, titled "Traffic Data, Interstate 94, Racine and Kenosha Counties," dated December 2, 1960. These underlying papers show that the actual through-turning ratio at these interchanges in February and March 1960 was as follows:

Wis. 158:

Interstate:	through 87.6%	turning 12.4%	volume 7969.
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Crossroad:	through 68.3%	turning 31.7%	volume 918.
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Frontage Road Traffic:	volume through 267,	turning 273.	
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Wis. 43:

Interstate:	through 93 %	turning 7 %	volume 7960.
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Crossroad:	through 64.5%	turning 35.5%	volume 1673.
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Frontage Road Traffic:	volume through 324,	turning 745.	
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County Line Road:

Interstate:	through 99.5%	turning .5%	volume 7588.
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Crossroad:	through 42.3%	turning 57.7%	volume 83.
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Frontage Road Traffic:	volume through 111,	turning 105.	
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Wis. 11:

Interstate:	through 93.5%	turning 6.5%	volume 8276.
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Crossroad:	through 62.1%	turning 37.9%	volume 2341.
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Frontage Road Traffic:	volume turning only 212.		
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of the intermediate interchange areas to the permanence of the road even where, as here, the road is primarily one between two large urban centers—Chicago and Milwaukee.

The protection for these interchanges will be examined in the same order as the preceding discussion of the protection devices: controls over access, controls over the use of abutting land and auxiliary controls.

A. Controls Over Access

1. Driveway Regulations

Wisconsin has statutory authority for the requirement of a permit before any driveway is connected to a state trunk highway.⁹¹ The State Highway Commission has issued a set of regulations governing the granting of driveway permits.⁹² These regulations cover only interchanges 3, 4, 5, 8 and 9—(state trunk highways) and, except for a provision that limits the driveways available to the minimum number deemed reasonable for the property,⁹³ provide little interchange protection.

2. The Control and Restriction of Access

Access controls can be divided into two phases: (a) on the rebuilt sections of the feeder roads or—as on Wis. 158 west of County trunk HH in Racine county—on the new construction on the feeder, and (b) on the pre-existing portions of the feeders.

(a) On rebuilt and new construction.

Where land must be condemned or purchased as part of the free-way right of way or to widen or improve the feeder road it is somewhat easier to acquire additional access rights to protect the interchange than it is at a later date. A review of the right of way acquisition plats for Interstate 94⁹⁴ shows that of forty-six situations in which addi-

⁹¹ Wis. Stat. §86.07(2) (1959).

⁹² Wis. Admin. Code Hy. §30.01 *et seq.*

⁹³ Wis. Admin. Code Hy. §31.03(2).

⁹⁴ State Highway Commission of Wisconsin, Plat of Right-of-Way Required, Project I-I(52) 101-1(2) and Project I 101-1(3).

Copy of Letter to the Pennsylvania Department of Highways from the State Highway Commission of Wisconsin, State Highway Engineer, March 7, 1960 states the policy as follows:

In such areas where interchanges are being provided with local roads . . . our effort to control development . . . is limited to about the extreme point of entrances or exit terminal. The control . . . is accomplished by the acquisition of access rights.

* * * * *

Where rural state trunks . . . are involved our controls are gradually being extended a short distance beyond the exit and entrance terminals by acquisition of access rights up to 1,000 feet or so. . . .

* * * * *

In this metropolitan area we would expect a reasonable degree of control at most interchange connections.

In turn, the sufficiency of even these controls is questioned in State Highway Commission of Wisconsin Interdepartmental Correspondence, Protection for Interchange Areas (Feb. 26, 1960) which states in part:

tional access rights could have been acquired in connection with the original land acquisitions in twenty-nine cases, or 56%, such rights were acquired. The additional access ran from 50 feet from the right of way line to 600 feet from the right of way line (it was impossible to determine the distance from the end of the interchange ramp taper, which might extend beyond the right of way line). The median extension of access control was 150 feet.

In the one instance of entirely new construction, interchange 4, which involved extending Wis. 158, the access control was extended beyond the right of way line for 600 feet. This was probably motivated by the fact that access to the newly constructed road could be limited without the payment of compensation to the abutting land owners.⁹⁵

(b) On the pre-existing feeder roads.

Limitation of access beyond the reconstructed portion of the feeder road would likely be accomplished under the Wisconsin controlled access statute⁹⁶ which is considered by the Highway Commission to be a police power control.⁹⁷ As this statute is applicable only to rural state trunk highways, the device would apply only to interchanges 3, 4, 5, 8 and 9.

In fact however, no portion of these interchange roads have been declared controlled access highways within three miles in either direction of the Interstate route.⁹⁸

3. Subdivision Control

The Wisconsin subdivision act requires that the approval of the State Highway Commission be secured before a plat of subdivision of land abutting a state trunk highway be filed for record.⁹⁹ The Highway Commission has issued regulations governing the standards of plat approval and seeks to limit access and provide widening lanes as a condition of such approval.¹⁰⁰ Since this control device applies only to subdivisions abutting state trunk highways (and connecting streets) it affects only interchanges 3, 4, 5, 8 and 9.

A review of copies of subdivision plats bordering these crossroads dating back to 1949 indicates that in only one case was the subdivision located on the crossroad and within the area of impact of the inter-

In general, then, access controls should be measured in thousands of feet from the interchange facilities, along approach roads, ramps, intersecting county or state trunk highways, rather measuring such distances of effective control in mere hundreds of feet.

⁹⁵ Carazalla v. State, 269 Wis. 593, 71 N.W. 2d 276 (1955).

⁹⁶ State Highway Commission of Wisconsin, Statement of Right-of-Way Organization, Policies and Procedures 9 (Sept. 12, 1957).

⁹⁷ *Ibid.*

⁹⁸ Letter, Chief of Roadside Control, State Highway Commission of Wisconsin, Madison, March 3, 1961.

⁹⁹ Wis. Stat. §236.01 *et seq.* (1959).

¹⁰⁰ Wis. Admin. Code Hy. §33.01 *et seq.*

change.¹⁰¹ In that case, however, within one-half mile of the Interstate route a residential subdivision of fifteen lots was restricted to one access point.

The subdivision control act, however, applies only to a division of land into five parcels of less than 1½ acres each within five years. Thus it would have little effect on commercial divisions which are not likely to carve the required five parcels of land out of a farm and thus come within the act.

Racine county, in addition, has a Subdivision Control Ordinance.¹⁰² For purposes of interchange protection, however, the Racine ordinance adds no protection beyond the state control act except the provision of off street parking for certain uses, and in applying the limitation regulations to "major streets" rather than state trunk highways.

B. Controls Over the Use of Abutting Land

1. Restricted Use of Access

In Wisconsin the restriction of access use is accomplished only in the course of condemnation or in the declaration of a controlled access highway as discussed above. As indicated above, there has been no controlled access declaration in the interchange area and the acquisition plats show no access use restrictions.

2. Development Rights

While there is general statutory authority in Wisconsin to acquire "other interests in land,"¹⁰³ development rights have been acquired only on the Great River Road under a special statute.¹⁰⁴ Thus no attempt has been made to secure such rights along the interchange areas. Excess condemnation has been used in these areas only to "clean up" remnants of land left land-locked after the highway is built.

3. Zoning

Both Racine and Kenosha counties have adopted zoning ordinances¹⁰⁵ pursuant to the Wisconsin County Zoning Act.¹⁰⁶ In Racine county the four towns abutting Interstate 94, Raymond, Yorkville, Caledonia and Mt. Pleasant, have all adopted the ordinance¹⁰⁷—an act which is necessary in Wisconsin to make the zoning ordinance effective within that town.¹⁰⁸ In Kenosha county two of the four towns

¹⁰¹ Copies of ten subdivision plats as approved by the State Highway Commission of Wisconsin in the area of this study supplied by the Chief of Roadside Control, State Highway Commission of Wisconsin.

¹⁰² Racine County, Subdivision Control Ordinance (1956).

¹⁰³ Wis. Stat. §84.09 (1959).

¹⁰⁴ Wis. Stat. §84.105 (1959).

¹⁰⁵ Kenosha County Zoning Ordinance (adopted Nov. 17, 1959); Racine County Zoning Ordinance (adopted June 28, 1949, revised to May 10, 1960).

¹⁰⁶ Wis. Stat. §59.97 (1959).

¹⁰⁷ Letter from the Zoning Administrator of Racine County, July 21, 1960.

¹⁰⁸ State of Wisconsin, State Planning Division, Rural Planning and Zoning (Bulletin No. 19, 1957); Wis. Stat. §59.97 (2) (d) (1959).

abutting Interstate 94 have adopted the county ordinance, Bristol and Somers; the other two towns, Pleasant Prairie and Paris have not adopted the ordinance.¹⁰⁹ Thus interchanges 1 through 7 are at least partially in unzoned areas.

A questionnaire to the town clerks of Pleasant Prairie and Paris indicates that the question of adopting the county ordinance has not been formally considered by the town board of either town and in neither town has the construction of Interstate 94 had any influence on the town's thinking on the county zoning ordinance.¹¹⁰ The town clerks also replied that no official of the Highway Commission had contacted them or the town board to suggest or recommend the adoption of the zoning ordinance.

A questionnaire to the county clerks of Racine and Kenosha counties indicates that in neither counties was any amendment to the county zoning ordinance contemplated in the area of the Interstate 94 interchanges nor had any encouragement for such changes been forthcoming from the Highway Commission or District Engineer.¹¹¹

A questionnaire to the Chairman of the Highway Committees of Racine and Kenosha counties indicates the County Highway Committees had taken no steps to provide additional protection for the interchange areas (except for changing signs), to influence the enactment or improvement of county zoning, to secure the adoption of the county ordinances by towns which have not already done so, or to make plans for the improvement of the roads now serving as feeder roads to the Interstate road.¹¹² The chairman also indicated that neither the Highway Commission nor the District Engineer had sought their cooperation in securing additional roadside protection in the interchange areas.

A review of the zoning ordinances and the use district maps for Bristol, Somers, Raymond, Yorkville, Caledonia and Mt. Pleasant indicates that the areas immediately surrounding almost all of the interchanges are zoned commercial. The following chart shows the applicable zoning:

<i>Interchange 1</i>	<i>West of I-94</i>	<i>East of I-94</i>
area immediately adjacent	— Commercial	Unzoned
area along the feeder	— Agricultural	Unzoned
<i>Interchange 2</i>		
area immediately adjacent	— Commercial	Unzoned
area along the feeder	— Agricultural	Unzoned

¹⁰⁹ Replies from town clerks of Pleasant Prairie and Paris, Kenosha county (n.d.).

¹¹⁰ *Ibid.*

¹¹¹ Replies from County Clerk of Kenosha County (n.d.) and Zoning Administrator of Racine County, July 21, 1960.

¹¹² Replies from Chairman of the County Highway Committees of Kenosha County October 14, 1960, and Racine County (n.d.).

	<i>West of I-94</i>	<i>East of I-94</i>
<i>Interchange 3</i>		
area immediately adjacent	— Commercial	Unzoned
area along the feeder	— Residential - Commercial - Agricultural	Unzoned
<i>Interchange 4</i> (Partially in towns of Raymond, Yorkville, Caledonia and Mt. Pleasant)		
area immediately adjacent	— Commercial Unzoned	Unzoned Agricultural
area along the feeder	— Agricultural Unzoned	Unzoned Agricultural
<i>Interchange 5</i>		
area immediately adjacent	— Unzoned	Agricultural
area along the feeder	— Unzoned	Agricultural - Residential - Commercial - Industrial
<i>Interchange 6</i>		
area immediately adjacent	— Unzoned	Agricultural
area along the feeder	— Unzoned	Agricultural
<i>Interchange 7</i> (Partially in counties of Racine and Kenosha)		
area immediately adjacent	Unzoned	Agricultural
area along the feeder	— Commercial B Unzoned — Agricultural	Commercial B Agricultural Agricultural
<i>Interchange 8</i>		
area immediately adjacent	— Commercial B Industrial	Commercial B
area along the feeder	— Agricultural	Agricultural
<i>Interchange 9</i>		
area immediately adjacent	— Commercial B	Commercial B
area along the feeder	— Residential - Agricultural	Agricultural
<i>Interchange 10</i>		
area immediately adjacent	— Commercial B	Commercial B
area along the feeder	— Residential - Agricultural	Agricultural
<i>Interchange 11</i>		
area immediately adjacent	— Commercial B	Commercial B
area along the feeder	— Residential - Agricultural	Agricultural
<i>Interchange 12</i>		
area immediately adjacent	— Commercial B	Commercial B
area along the feeder	— Agricultural	Agricultural - Residential - Commercial

Almost all of these interchange areas are either unzoned or zoned commercial. In the commercial areas—about 70%—at least some protection is provided: off-street parking, density control, front yard requirements (aiding vision), etc. In the unzoned areas—about 20%—

not even this protection exists. In neither case, however, is there a highway-protection conscious use pattern.

The supporting areas on the feeder roads—where zoned—are predominately zoned agricultural—about 90%—the other areas are zoned residential, industrial and commercial. This will reduce commercial development—except for farm sales of farm produce, a permitted use in an agricultural area under both ordinances.¹¹³ This should provide some roadside protection and reduce the traffic generating uses along the feeder roads.

In addition to use restrictions, both the Racine and Kenosha county zoning ordinances provide for set-backs from the highway.¹¹⁴ The Racine ordinance provides a set-back of 50 feet from the right of way line, and the Kenosha ordinance provides a set-back of 100 feet from the highway centerline or 67 feet from the right of way line—whichever is greater. These set-backs do not apply to the western feeders to interchanges 1, 2, 3 and (partially) 4 or the eastern feeders to interchanges 4 (partially) 5, 6 and (partially) 7 because of the failure of the towns of Bristol and Somers to adopt the Kenosha county ordinance.

In summary the zoning does not apply to all the interchanges, but where it does apply the degree of protection is fairly uniform. In almost all the zoned areas, the land immediately adjacent to the interchange is zoned commercial, the land further removed from the interchange on the feeder is zoned agricultural with occasional residential, commercial or industrial uses (depending on the degree of urbanization), and a moderate set-back exists on all the feeder roads.

C. Other Controls

1. Official Mapping

In Wisconsin the official mapping power is granted only to municipalities.¹¹⁵ None of the interchange areas here studied falls within any incorporated areas, the official map has provided no interchange protection. If the area does urbanize rapidly, however, this device will be of use.

2. Nuisance Doctrines

No use has been made of the nuisance doctrine in Wisconsin to secure roadside protection in spite of the fact that the most vocal advocate of the use of this device is Professor J. H. Beuscher of the University of Wisconsin Law School.¹¹⁶

¹¹³ Kenosha County, *supra* note 105, at III (36), VIII (6); Racine County, *supra* note 105, at §7.013 (a) (19).

¹¹⁴ Kenosha County, *supra* note 105, at XI; Racine County, *supra* note 105, at §7.022.

¹¹⁵ Wis. Stat. §§62.23 (6) (a), 61.35, and 60.29 (13) (1959).

¹¹⁶ Beuscher, *supra* note 49.

3. Other Incidental Controls

Since these interchange areas are essentially rural they have not come under any of these other incidental controls, such as urban renewal.

D. Evaluation

In summary only two control tools have been actively exercised in the interchange areas: access restriction in the area immediately adjacent to the interchange and county zoning of the surrounding land. Access restriction is limited almost entirely to an area immediately adjacent to the Interstate right of way. The zoning generally provides a fair degree of protection further back along the feeder road and by way of set-backs but almost universally abandons the interchange area to commercial uses, with some limitations on off-street parking, density, etc.

RECOMMENDATIONS

The discussion of interchange protection devices indicates some areas where improvements in the existing procedure could be made. In the following discussion some further recommendations are set forth, applicable generally to all the states and specifically to Wisconsin. Some of them involve changes in existing procedures and others call for new statutory enactments.

Within the Existing Statutory Framework

Within the existing framework two major recommendations can be made: one calling for the assumption of active leadership in obtaining interchange protection by the State Highway Commission and another calling for the adoption of new highway-oriented zoning patterns at the local level.

Effective Leadership. As noted earlier, many of the protection measures are essentially local controls, concerned with local problems and interests. When an Interstate system interchange is located in an area, however, a new state-level interest arises and more than purely local interests are involved. But the local interests frequently conflict with the state interests and the local governmental unit has little interest or, perhaps more important, little incentive to consider other than purely local matters.

If there is going to be effective interchange protection, it will have to emanate from the state level. Within the present statutory framework such state action should take the form of consideration of existing local protection measures in the location of interchanges, attempts to secure the enactment of such measures on the local level and a continuing attempt to integrate the protection devices on all three levels of government into one coherent pattern. Only with effective and intelligent intergovernmental relations and a full flow of information

and cooperation in both directions under a program of active leadership by the State Highway Commission can these diverse links be forged into a chain of highway protection. The leadership must come from the state level.

Highway-Oriented Zoning Patterns. Zoning is the most potent, currently available tool for interchange land use control. Zoning and access controls together present a broad base of operation over the state highway systems and have a broad enough base of acceptance to constitute the major factors in interchange protection. Other devices can play important auxiliary roles. Official mapping and subdivision controls have useful features, but their scope of operation is small. Development rights and nuisance doctrines have not as yet met adequate acceptance to prove effective control devices. Finally, driveway regulations are at best a minimal form of roadside protection.

Zoning, however, to reach its full potential must be highway-oriented. A program of highway-oriented zoning would provide, in addition to its normal pattern, three zones along the highways covered by the ordinance. The specific provisions—size of set-backs and frequency and location of the various districts would vary according to local conditions and the projected traffic count for the interchange area.

The basic zones would be noncommercial, roadside service, and general commercial.¹¹⁷ The noncommercial or roadside conservation zone would exclude all commercial activities for a specified distance from the highway and the area's normal or general land use would be permitted. In the roadside service zone, traffic service facilities would be permitted with specific provisions for set-backs, parking facilities, etc. In the general commercial zone, commercial activities of both a traffic-service and local-service nature would be permitted. The design of the roads themselves could be integrated with such zones so that additional traffic carrying facilities could be provided in the roadside service and commercial zones.

One goal for the roadside service zone that deserves further consideration is concentrating service facilities in a single compact area. The area could be organized in much the same way as the concentration of retailing facilities in the modern regional shopping center. As an alternative to the narrow roadside service zone generally existing along conventional roads, this service zone would provide for development in depth, with only one or perhaps two points of access to the crossroad. In this area, the highway user would find restaurants, motels, automobile service facilities, and perhaps other commercial establishments.

¹¹⁷ Solberg, *Safe, Efficient and Attractive Highways*, 1958 Land 537, 540. See Stanhagen, *Zoning and Traffic Congestion* (U.S. Bureau of Public Roads, mimeo., 1960).

These concepts of use zone classifications are based on recognition of the peculiar character of the land abutting a highway. Since the general use classifications normally used do not grant this recognition, they offer no substantial protection to the interchange area. To constitute effective interchange protection, zoning should provide use district classifications based on a functional differentiation of the land abutting a highway and adequate set-back lines for highway use and improvement.

Statutory Revision

Passing beyond the existing framework the two major recommendations for statutory revision call for the more general enactment of roadside protection enabling acts and the adoption of a system of state-local cooperative zoning.

Enactment and Broadening of Protection Measures. The first step toward statutory revision should be a general enactment of enabling statutes for roadside protection measures and broadening of the existing enabling statutes. Few states have statutes authorizing the full panoply of protection devices. Even in those states that have such authority, a broadening of the enabling acts may be desirable.¹¹⁸

Once authority for such devices is granted, the controls themselves must be enacted and administered by the local governmental units. A zoning enabling act with no zoning by a specific county or town can provide no interchange protection in that area. Finally, a general declaration of state legislative policy favoring interchange protection would be helpful.

State-Local Cooperative Zoning. The most desirable new statutory enactment would be state-local cooperative zoning. To obtain truly effective land use control in the interchange area the state must be brought into the zoning process as it now is in access control.¹¹⁹ This is necessary not only because of the general failure on the local level to enact such controls but also because of the narrow self-interest conception of the purposes of zoning on the local level, when enacted. A cooperative state-local zoning device for land immediately adjacent to the interchange (and possibly the state trunk highway system as well) is an effective means of overcoming these shortcomings and providing the necessary interchange land use protection.

Such cooperative zoning should include these basic requirements:

1. The grant of zoning powers to local governments—both to establish use districts and require set-backs.

¹¹⁸ In Wisconsin this could include the removal of the 1500 mile limit on the controlled access statute, Wis. Stat. §84.25 (1959) and the expansion of the subdivision control act to cover all subdivisions of land instead of only those into five or more parcels, Wis. Stat. §236.01 (1959).

¹¹⁹ A proposal to grant such powers was introduced in the 1949 Wisconsin Assembly, Bill 43S (Wis. 1949).

2. The grant of authority to the State Highway Commission to request any local unit (depending on the location of the highway) to zone the land abutting an interchange road or trunk highway as well.

3. If the local unit does not act within a specified period of time or if its action does not provide adequate roadside protection (*e.g.*, zoning the whole road for commercial use), the Highway Commission should be able to zone a 500 foot strip (or some other reasonable width) on either side of the center of the highway and should be empowered to impose both use and set-back requirements.

The nature of the use districts could follow the classification already suggested. The periods of time and standards of adequacy should be set by the enabling statute.

4. If the local unit does act and provide satisfactory protection, an annual zoning grant-in-aid might be paid to that unit to help administer the zoning controls.

5. The Highway Commission should be empowered to police and enforce the zoning, whether the ordinance is ultimately adopted on the local or state level.

Through such a method or some variation of it, local interests would be preserved as fully as possible and would only be overridden where they were incompatible with broader statewide interests. The Wisconsin subdivision control act is an example of the possibility of such a state-local control device.¹²⁰ Under this act, while subdivision plat review is essentially a local level function, where a possible conflict arises between the intended subdivision and a trunk highway, the Highway Commission reviews the plat to minimize or eliminate such conflicts.

Other Recommendations

A number of other suggestions have been made within the recent past to solve the interchange problem. The creation of special interchange protection districts has been suggested¹²¹ and a bill embodying this idea was introduced in the Kentucky Legislature.¹²² While the form has varied, the proposals all plan to vest land use control powers—either cooperatively or solely—in the state for the areas surrounding a freeway or Interstate interchange. Another suggestion is to grant certain land use control powers to the state.¹²³ These would be applied to the interchange areas as well as rivers, etc.

¹²⁰ Wis. Stat. §236.01 (1959).

¹²¹ See Yanggen, *supra*, note 78, at 61 ff.

¹²² Proposed Limited Access Highway Interchange Planning and Development Act (mimeo., n.d.).

¹²³ Tennessee State Planning Commission, Memorandum on Comprehensive Land Use Planning and Development Act (1959).

CONCLUSION

The interchange roads will serve a dual function—traffic carriers in their own right and feeders and traffic-service areas to the Interstate roads. On these roads, unlike the Interstate System roads, there is no federal requirement of roadside protection. Nevertheless, there is a practical requirement of such protection; it is essential to the safety, efficiency and permanence of both these roads and the Interstate System which they serve and complement.

The balance between the traffic and capacity of these roads will depend primarily on the access controls employed and the pattern of land use surrounding the road. The impact of these factors on the road will depend upon whether effective use has been made of the tools discussed above. Since the greater number of these tools are police power devices and, hence, only effective prospectively, it is essential that action to protect these interchanges be taken now.¹²⁴

¹²⁴ This is particularly essential in view of the fact that as of February 2, 1961, the American Association of State Highway Officials had not yet formulated an interchange policy. It was then working on one but "It may be a year or so before there is a completed policy draft." Letter, Secretary, Committee on Planning and Design Policy, A.A.S.H.O., Feb. 2, 1961.

Levin, Land Use Development and the Highway Interchange (address to the 46th Annual Road School, Purdue University, April 20, 1960) in stressing the need for action now analogizes the unprotected interchange to the unprotected bypass—originally built to replace a route cluttered with roadside enterprises—which becomes itself cluttered with such development (witness the LaFayette, Indiana, by-pass) and ultimately ". . . a bypass would be built to by-pass the by-pass. . . ."

N.B. This study is an outgrowth of a chapter prepared by the author for a study entitled "Economic and Legal Aspects of Land Use at Freeway Interchanges" prepared by the U.S. Department of Agriculture in cooperation with the U.S. Department of Commerce, Bureau of Public Roads.