Access Management: Past, Present, and Future

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ABSTRACT

The concept of access management emerged gradually over the last 150 years. Its origins lie in the boulevards of the late nineteenth century and the parkways of the early twentieth century. These designs, building on the grand boulevards of Europe's major cities, provided a means of accommodating traffic growth in urban areas. Federal law of the early 1900s also recognized the sovereign power of state's to engage in access control along higher speed routes.

In the years following WWII, the limited access highway became widespread and site access design concepts for major shopping centers were developed throughout the United States. During these years, several states and counties also introduced "expressways", which were, in effect, controlled access arterials. Some states, like New Jersey, built roads that prohibited left turns and provided grade separated cross roads, but still permitted frequent property access. Various planning guidelines and articles emphasized functional roadway classification and in 1962, the article "Operational Measures - Future" (ITE) was among the first publications to suggest controlled access arterials.

In the 1980's, Colorado forged new ground by establishing the first systematic statewide access management policy. This was followed by statewide codes in Florida, New Jersey, and Oregon, and increased efforts in about a dozen states (usually falling short of comprehensive codes). Around this time, growth management laws were also advanced in several states, encouraging local governments to manage development and transportation in a more rational and sustainable way.

In the last several decades, the concept of access management has gained broad acceptance. It has been the topic of expanded discussion in the AASHTO Green Book and a national TRB manual. Several national conferences, research projects, and papers have been completed. As the practice of access management continues to evolve, it is fostering greater understanding of land use and transportation interactions and placing access management at the center of an ongoing dialogue over good urban form and sustainable transportation.

INTRODUCTION

Access management has grown dramatically in the last several decades. It has steadily evolved from its origins in the boulevards of the late 19th century, to the comprehensive systemwide programs that define contemporary practice. Throughout this evolution, states and local governments have gained growing insight into the need for and methods of land use and transportation management.

This paper explores the past, present and future of access management. It begins with an overview of the key transformational periods in the evolution of access management practice — the boulevard era, the parkway era, the freeway era, and the current access management era. It concludes with a look at how the practice of access management is becoming increasingly interrelated with the design of areas abutting highways and proposes a future transition to coordinated corridor land use and transportation management actions.

I. The Boulevard Era (approximately 1870-1910)

The decades following the Civil War saw major growth of cities as the long term migration from rural to urban areas began. This was also a period of advances in building and transportation technology. Electric railways replaced horse and cable cars, bicycles became popular, and automobiles were introduced. During the 1890s, cyclists and motorists launched a concerted movement for better roads. Accordingly, the Congress established the Department of Agriculture in 1893. The agency eventually became the Bureau of Public Roads and the Federal Highway Administration.

As automobile travel grew, so did congestion and the need to control traffic. As Demosthenes noted in a historical analysis of access management,

> "One of the first access control state statutes was enacted by the state of New Jersey in 1902. It authorized county boards to establish "speedways" for horses and light vehicles. The legislation provided that after the location of the speedway was determined, "no public streets or other highway shall cross or intersect the speedway at grade without the consent of the county." In 1906, the U.S. Supreme Court deemed that states should determine the property rights of access by their own laws. This meant that access control along highways was within the sovereign power of the states."[1]

During this period, boulevards were being developed in many large American cities. Patterned after Haussman's boulevards in Paris, many were designed by Frederick Law Olmsted and Calvert Vaux. They provided landscaped median areas. Examples included Ocean and Eastern Parkway extending outward from Brooklyn's Prospect Park, Ward Parkway in Kansas City, Monument Avenue in Richmond, Boston's Emerald Necklace extending south through the Fens to Franklin Park, and San Francisco's Presidio. Direct property access was limited to one or both sides of main roadways and, where provided, was limited to right turns.

Olmsted helped plan a comprehensive boulevard system for Chicago in 1869 that linked a semi-circular bank system on the perimeter of the built-up area (Figure 1). Drexel Boulevard on Chicago's south side had two roadways that were separated by a wide median area (Figure 2). The Midway Plaisance was the jewel of the system providing

[1] P. Demosthenes, "Access Management: An Historical Perspective." Presented at the International Right of Way Association Conference, June 23, 1999. Albuquerque, New Mexico.

two central roads and two service roads, flanked by city streets on a 660 foot right of way (Figure 3).

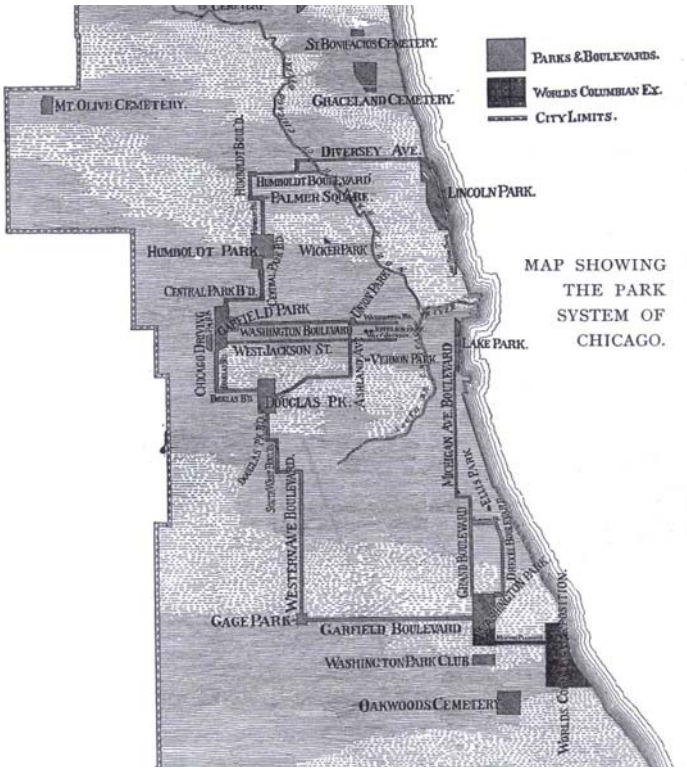

Figure 1. Olmsted's Chicago Boulevard System Plan
Source: Jenks, Tudor. *The Century World's Fair Book for Boys and Girls*, The Century Co., New York, 1893, p. 157.

Figure 2. Drexel Boulevard.
Source: Mayer, Harold M. and Richard C. Wade, *Chicago: Growth of a Metropolis*, University of Chicago Press, Chicago and London, 1969/1973, 146.

Figure 3. Chicago's Midway Plaisance
Source: Courtesy of Chicago History Museum

The idea of a "Grand Boulevard and Concourse" in the Bronx, New York, dates back to the 1890s when Louis Risse, a civil engineer first proposed a roadway to connect newly acquired parklands in North and Central Bronx. Inspired by the work of Baron Georges Hausmann in Paris during the mid-nineteenth century, he envisioned a roadway that would rival the finest European Boulevards (Figure 4).

Figure 4: Grand Boulevard and Concourse.
Source: Department of City Planning, Grand Concourse – Special Zoning District, New York, NY, 1986. Figure, Clarence Davies Collection, Museum of the City of New York.

The boulevard follows a series of ridges and connecting land bridges at heights exceeding 100 feet. The four and one-half mile boulevard is 182 feet wide and runs from 161st Street to Moshulu Parkway. The Concourse opened in November 1909 and included an express dirt and cinder roadway for horse drawn carriages, and paved service lanes for local traffic.[2] A series of underpasses were built at major intersections to permit east-west traffic to pass under the ridge, making the Grand Concourse one of the nation's first grade separated highways. The semi-rural character began to change, especially after the Jerome Avenue IRT elevated line was completed in 1917.

The Concourse underwent several changes since the late 1920s. The boulevard was extended south to East 138th Street. The cinder section of the roadway was paved. The tree-lined malls were narrowed both to accommodate more automobile traffic, and as a result of building the IND subway under the Concourse. An underpass carried the main travel lanes under Fordham Road.[3]

II. The Parkway Era (approximately 1910-1940)

The decades between 1910 and 1940 saw continued growth in population, urbanization and motor vehicle travel. Paved roads were increasingly developed, and federal legislation established federal-state cooperative highway development. Parkways were developed in several urban areas, and a few freeways were built toward the end of the period.

The Federal-Aid Roads Act of 1916 provided the basis for cooperative federal-state partnerships and established the principle of federal-state cost sharing. The 1921 Act defined the primary, secondary and urban systems eligible for federal aid.

Access controls emerged during this period in several ways. They included the development of parkways and the enactment of state statutes pertaining to access requirements. In 1937, the states of New York and Rhode Island established specific statutes that authorized state highway agencies to design and build "roadways that included the full or partial acquisition of abutting access requirements."[4]

Parkways were built in large metropolitan areas such as New York City, Chicago, and Los Angeles in the first four decades of the twentieth century. They were usually limited to passenger car travel and generally served as extensions of parklands or connections to major parks or beaches. These parkways were progressively upgraded to better serve commuter traffic and were precursors of modern freeways and modern interstate highways. All property access was via interchanging or intersecting roads.

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[2] New York City Department of City Planning, "Grand Concourse – Special Zoning District Proposal," April 1986.
[3] K.A. McAuley, *The Grand Concourse Main Street of the Bronx 1909-1984*. Bronx County Historical Society, NY. Undated.
[4] P. Demosthenes, "Access Management: An Historical Perspective." Presented at the International Right of Way Association Conference, June 23, 1999. Albuquerque, New Mexico.

Many early parkways had some grade crossings, and a few of these intersections remain. Lanes were as narrow as nine feet and opposing travel directions were not physically separated. The basic design concept was to develop the parkway from the interior outward. This allowed freedom in locating the highway to take maximum advantage of the landscape for scenic visitors, and to preserve the parkway environment by suitable planting and screening.

The need to preserve highway operations was also recognized by providing access only at long intervals. Special attention was given to developing interesting alignments with long easy curves fitted to the natural contour of the land. Special emphasis was given to the landscaping treatment so that the completed road became a part of the natural countryside.[5]

Most of the early parkways (except sections of the Taconic State Parkway) were initially undivided and had occasional at-grade intersections. However, private access was eliminated, usually by acquiring parkway strips. A carefully landscaped, undulating alignment was a main feature of their design.

The Bronx River Parkway, the first limited access road in the United States, was conceived in 1906 when there were only 105,000 automobiles registered in the United States. The Parkway was an incidental feature of a comprehensive scheme of conservation, reclamation, and park development, triggered by the need to protect animals in the Bronx Zoo from water pollution.[6]

Construction on the 15-mile Parkway began in 1916, and the parkway was opened to traffic incrementally between 1921 and 2004. Because the road mainly traversed an elongated park, abutting property owners had no right of access. The Parkway had many curves and at-grade intersections. The curvature permitted safe speeds up to 35 miles per hour. It is mainly one undivided roadway, although two divided sections were eventually built.

The success of park development in the Bronx River Valley led to the creation of the Westchester County Commission in 1923. The Commission embarked on a $90 million program of park acquisition and construction of the Saw Mill River, Hutchinson River, and Cross County Parkways.

The Hutchinson River Parkway was planned in 1923. The initial 11.2 mile section (from the Boston Post Road, US-1, to Westchester Avenue) was opened to traffic on October 27, 1928. The road had four 9-foot travel lanes and no medial division. Sections of the Parkway from the Boston Post Road to the New York City line (0.20 miles) and from Westchester Avenue to the Connecticut State line were built in 1937. The initial section

[5] Federal Highway Administration, *America's Highways 1776-1976, A History of the Federal Aid Program*. U.S. Department of Transportation, Washington DC, 1976.
[6] C. Tunnard and B. Pushkarev, *Man-Made America: Chaos or Control*. Yale University Press: New Haven, CT, 1963.

of the parkway was widened in 1938 to provide two 23' 4" areas of pavement with a four-foot curbed center island. Within the last decade, the four-lane parkway was rebuilt to modern design standards.

The Cross County Parkway was also developed in stages. The first section opened in 1932; it terminated in a traffic circle at the Hutchinson River Parkway, and a grade intersection with Yonkers Avenue. In 1941, it was extended to the Saw Mill River Parkway, and a new viaduct was built over the Bronx River and New York Central Railroad. In the 1960s, the Parkway was widened, rebuilt, and coordinated with the New York Throughway development.

Additional parkways were built by the Long Island State Park Commission starting in 1926, and by New York City starting in 1929. The Northern and Southern State Parkways opened in 1929. By 1934, some 114 miles of parkways were completed in Queens, Nassau, and Westchester Counties.

A five-mile section of the Meadowbrook Parkway to Jones Beach that was built to freeway standards opened in October 1934. The Grand Central Parkway, West Side Highway, Henry Hudson Parkway and 32 miles of the Belt Parkway in Brooklyn and Queens were completed by 1940.

The concept of national parkways under the authority of the National Park Service came about in 1928 when an act of Congress authorized a highway between Mount Vernon and the Arlington Memorial Bridge. The 17-mile Mount Vernon Parkway was built between 1929 and 1932.

The DuPont highway in Delaware built in 1924 was probably the first divided all-purpose road in the United States. The "super-highway" between Detroit and Pontiac followed in 1925; its 70-foot central mall carried electric railway tracks. These, and other divided highways that followed, had no grade separations and abutting property owners had unlimited right of access. The first cloverleaf interchange was built in Woodbridge, New Jersey in 1928. In 1929, Milwaukee County, Wisconsin rebuilt a part of the Blue Mound Road as a "split slab" highway with a "neutral ground" between opposing lanes of traffic.[7]

Chicago's Lake Shore Drive was progressively improved to freeway standards. The northern 1.5 mile eight-lane section with cloverleaf grade separations was completed in 1933. In 1941, two miles of new construction incorporated hydraulic *fins* that permitted reversible lane operations to serve the peak tidal flows.

An initial six-mile section of Los Angeles Arroyo Seco Parkway opened in 1939. Two 35-foot 3-lane roads were separated by a curbed median. This was the year that the State of California passed legislation that made freeways possible.[8]

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[7] Editorial. *Engineering News Record*. Volume 163, No. 20, November 14, 1929, p. 752.
[8] R. Banham, *Los Angeles: The Architecture of Four Ecologies*. Penguin Books, New York, 1982.

The most significant parkway development in pre-war America was the Merritt Parkway. Construction, which began in 1934. The first 17 miles between New York State and Norwalk, CT opened in June 1938. By 1940, the parkway reached its terminus at the Housatonic River, a distance of 37 miles; it formally opened on Labor Day.[9]

The Merritt Parkway featured 69 showpiece bridges designed to frame the view. This is the North Avenue Bridge in Westport.

The entire Merritt Parkway from the Connecticut-New York border, shown here, to the Housatonic River was completed in 1940.

Figure 5. Merritt Parkway.
Source: Connecticut Department of Transportation, *Managing Travel in Connecticut: 100 Years of Progress*, July 1995, 32.

[9] Managing Travel in Connecticut: 100 Years of Progress. Connecticut Department of Transportation, July 1995.

Some 18,000 passenger cars used the facility. A 300-foot park strip was acquired as a means of obtaining full control of access. The center median was 22 feet wide but narrowed down at underpasses (Figure 5). Landscaping was lavish. Eventually the roadway was extended to Meriden, Connecticut as the Wilbur Cross Parkway.

The Pennsylvania Turnpike, designed in 1937 and opened in 1940 was, perhaps, the first intercity highway to resemble a modern Interstate freeway. It became a model that the federal government used for the national Interstate system.

The growth of motor vehicle travel during this period brought both highway and traffic engineering to the fore. Traffic signal controls – including coordinated signal systems – arrived on the scene. One-way street systems, and turn controls were common in many cities and traffic sign standards were developed.

During this period, the adverse effects of unplanned roadside development also became apparent. In 1930, planner and conservationist Benton MacKaye warned of the advent of "roadtowns instead of centers…with no beginning and no ending" and advocated "townless highways and highwayless towns," as an antidote to strip development.[10] He proposed focusing development in town centers and separating towns from highways with a bypass for through traffic, protected from strip development by a wide greenbelt with recreational paths (Figure 6).

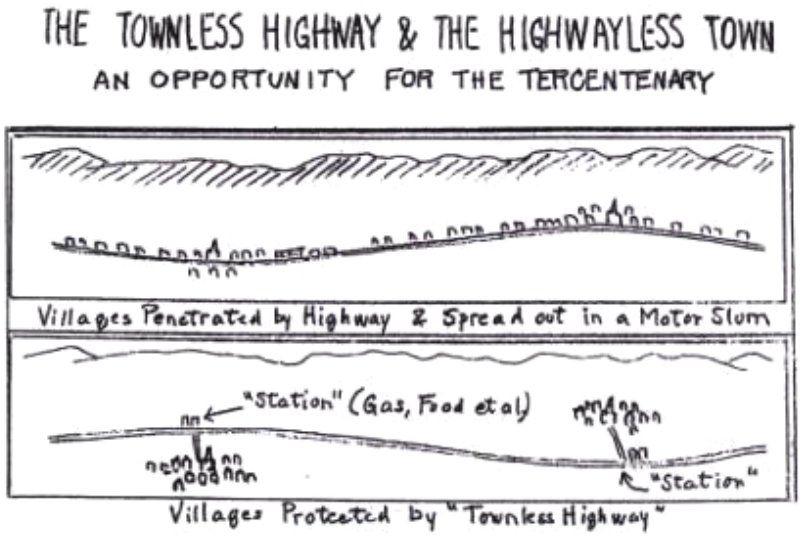


Figure 6. Mackaye's 1929 Concept of the Townless Highway and Highwayless Town. Source: Dartmouth College Archives, as reproduced in R. Arendt, et al., *Rural By Design*. American Planning Association, 1994, p. 130.

[10] R. Arendt, Rural *by Design: Maintaining Small Town Character*, Chicago: American Planning Association, 1994, pp. 129-130.

III. The Freeway Era (1946 – 1980 approx)

The years following World War II experienced rapid population and economic growth. Metropolitan areas expanded and motor vehicle travel increased. Developments proliferated in suburban areas, and freeway construction accelerated. Access control of state highways (freeways) grew substantially from seventeen states in 1945, to eventually include all states as the interstate freeway system developed.

The main impetus to freeway construction was authorization of the Interstate Highway System in 1956. The high (90-10) federal cost-sharing ratio gave rise to extensive freeway development in both urban and rural areas. The freeways served and contributed to suburban growth and also created new focal points for development almost wherever they interchanged with arterial roads. The freeways were fully access controlled, and property access was provided from interchanging streets. Sometimes, large traffic generators were able to get direct freeway access.

Historically along streetcar lines, strip commercial development continued its unrelenting expansion along arterial highways after WWII. With the increasing number of driveways, came a long-term decline in travel speeds and safety. Despite authority to plan and apply land use controls, local governments did little to counter these trends. As noted by Netherton, "The lack of experience in dealing with the problems of land use in areas of rapid growth often made both local government and the courts cautious in exploring the full potential of the 'police powers'."[11] Access connection spacing as a design element was given relatively little attention.

The effect of unplanned access on urban form and highway operations became a growing concern. In a classic 1958 essay, planner Lewis Mumford reiterated MacKaye's earlier notion of a "townless highway" and cautioned experts of the time for planning Route 128,

> "without the greenbelt and without public control of the areas adjacent to the highway [creating a highway] so successful in attracting industry and business from the center of the city that it already ceases to perform even its own limited functions of fast transportation…"[12]

Emergence of Access Planning

The suburbanization of metropolitan America brought new building forms and site plans onto the landscape. The new developments mainly relied on automobile access and included abundant on-site parking. Access planning studies became commonplace to assure both developers and public agencies that their sites "would work."

Transportation planners and engineers developed and refined many methods for improving traffic conditions along roadways, in relation to new development. New traffic

[11] R. Netherton, *Control of Highway Access*, Madison: University of Wisconsin Press, 1963.
[12] L. Mumford, *The Highway and the City*, London: Secker & Warburg, 1964.

access concepts emerged. *Ring roads* were built around large shopping centers to connect with dispersed multi-lane access points.

The left turning movements into and out of developments were recognized as potential problems. Accordingly, access plans attempted to separate those movements wherever possible. The original access plan for Shopper's World in Framingham, Massachusetts, for example, separated these movements (Figure 7). This was also the case for Green Acres, located along Sunrise Highway in Nassau County, New York; plans provided a four-lane exit, including a triple left-turn lane.

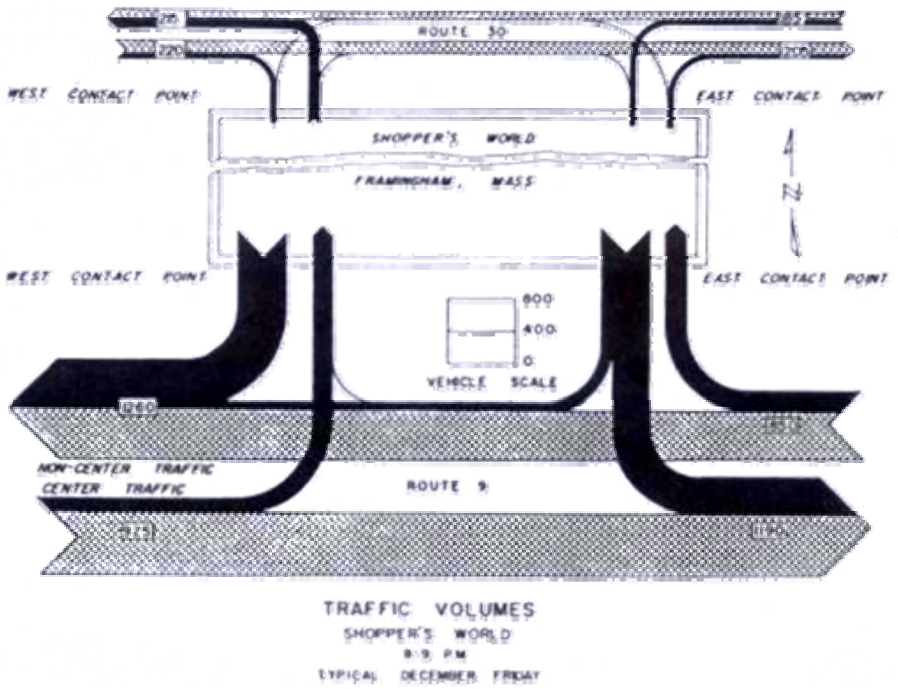
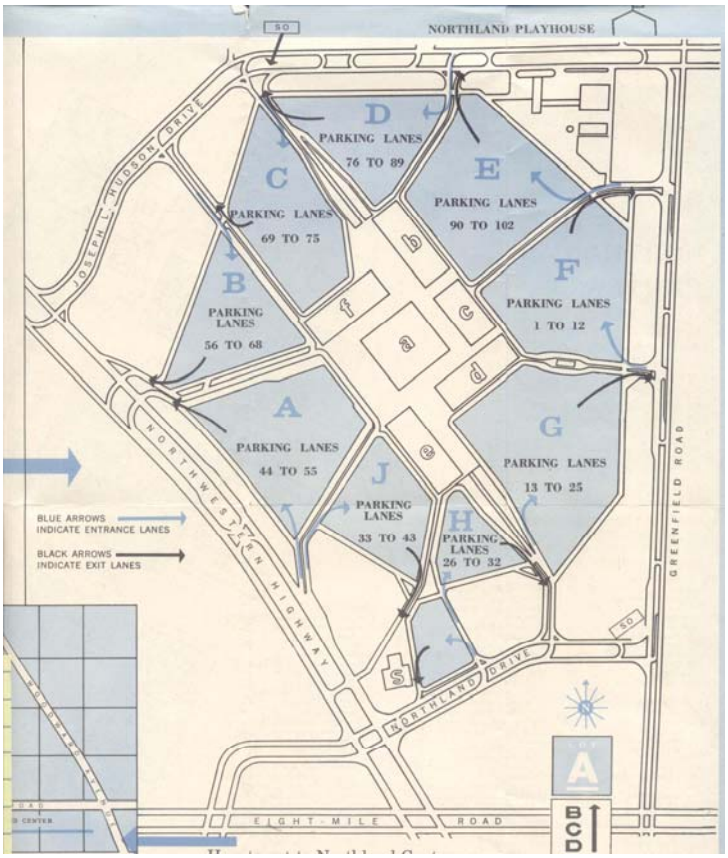


Figure 7. Initial Access Design for Shopper's World, Framingham, Massachusetts. Source: Levinson, H. S. et al, *Panel Discussion on Shopping Centers*, October 1955, 18.

Indirect left turns were an integral part of the access plan for the Northland Shopping Center that opened about 1954 in the Detroit Metropolitan Area (Figure 8). These indirect left turns were found to increase capacity, reduce delay, and cut crashes. They have become common in Michigan along "boulevards" with wide medians.

Aerial view of Northland Shopping Center in Detroit, Michigan.



Site plan of Northland Shopping Center

Figure 8. Northland Shopping Center.
Source: "Parking Facilities at Northland Center," Herbert S. Levinson.

It became increasingly recognized that a systematic approach to managing access was needed. The concept of a controlled access arterial had been suggested for many years. It was clearly identified in a 1962 paper.[13] The major streets were assumed to be located at half-mile intervals and access points were placed at quarter-mile points to achieve quarter-mile spacing of traffic signals and progressive of traffic signals and progressive speeds of 25 to 30 mph using 60 to 70 second cycles (Figure 9).

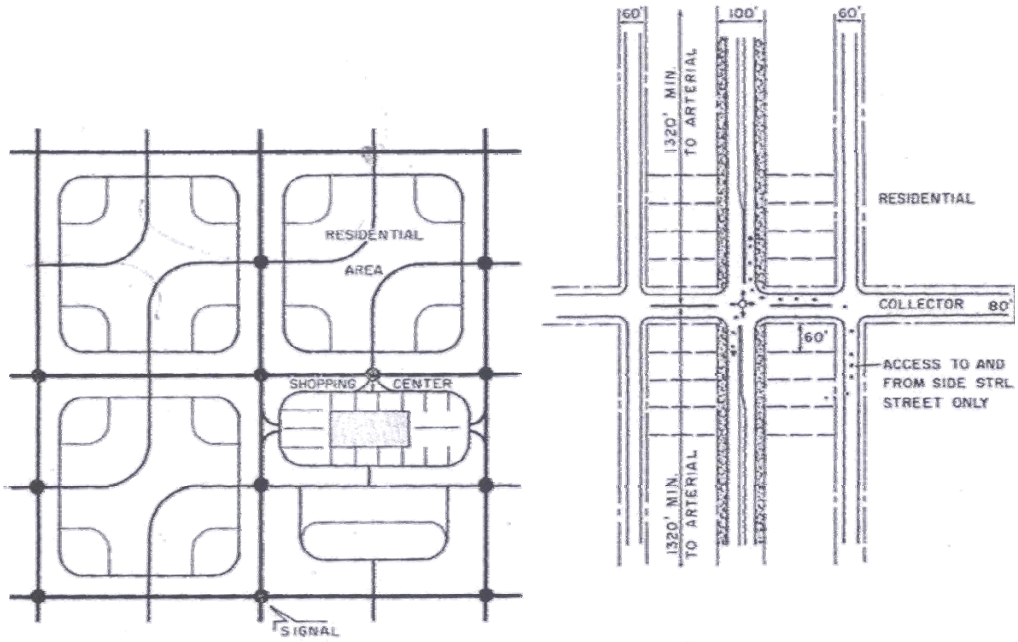


Figure 9. Limited Access Arterials.
Source: Levinson, Herbert S., *Operational Measures-Future*, Proceedings of the Institute of Traffic Engineers 32nd Annual Meeting, Denver Colorado, 1962, p. 119.

A functional classification system for highways was also advanced.[14] It called for redesign of highway systems according to function – a function defined in terms of mobility versus access. The emphasis on highways for mobility led to the emergence of access control as a key principle of highway design, along with a range of policy tools to implement the concept. These tools included designation of controlled access highways, acquisition of land, acquisition of property rights of development or access, and a broad range of land use controls.[15]

[13] H.S. Levinson. "Operational Measures - Future" Proceedings of the 32nd Annual Meeting, Institute of Traffic Engineers, Denver, Colorado, 1962.
[14] D. Levin, *Public Control of Highway Access and Roadside Development*, Public Roads Administration, Washington D.C., 1947.
[15] R. Netherton, *Control of Highway Access*, Madison: University of Wisconsin Press, 1963.

IV. The Access Management Era (1980 – 2008 approx)

The *formal* development of access management begins around 1980. During this period, it became apparent that operational techniques alone do not offset the adverse effects of poorly located or poorly planned access to neighboring land, that excessive signals reduce travel speeds, and that the proliferation of curb cuts has both safety and visual impacts. It also was clear that the systematic planning of access is essential, especially in rapidly growing areas. Thus, the access spacing dimension was added to existing design standards.

Contemporary access management began with the Colorado State Access Code, adopted in 1981,[16] and with the publication of Flora's FHWA report on Access Management in June 1982.[17] With a declaration that all state highways are controlled access highways, the Colorado legislature gave the State authority over the grant of access to state highways. This was followed by the enactment of comprehensive access management regulations in Florida, New Jersey, Oregon, and several other states.

While the specifics of the regulations vary, they have several common features: (1) an access classification system that builds upon the roadway functional classification system; (2) permitted access for each access class; (3) signalized and unsignalized access spacing; (4) means of enforcement; and, (5) provisions for variances. Many also include procedures for state/local adoption of corridor management plans, which replace systemwide standards as a basis for permitting.

Traffic signal spacing is a key element of contemporary access control; it is governed by the location of major junctions along the arterial roadway. The goal is uniform spacing with a two-direction progression at desired travel speeds. Full intersections at access points are located to fit into the time-space (progression) pattern; where only one direction of travel is signalized, more leeway is available in the spacing.

Signal spacing is specified for each class of road in terms of distance, green band width, or some combination. Excessively long cycle lengths indicate a need for corrective actions, such as interchanges, rerouting of left turns, or improving the secondary street system to reduce arterial left-turn volumes.

Nontraversable medians are incorporated into roadway design and reconstruction as a way to reduce traffic conflicts on suburban arterials. Full-movement median openings are provided at signalized intersections and unsignalized median openings are selected based upon planned future signal locations. Directional median openings are often designed to accommodate midblock U-turns.

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[16] Colorado State Highway Commission. "The State Highway Access Code," State Department of Highways, 1981.

[17] J.W Flora and K. M. Keith, "FHWA 18-82-3 Access Management for Streets and Highways," U.S. Department of Transportation, Federal Highway Administration, 1982.

Unsignalized driveway spacing is based on access category and roadway speed. Driveway spacing standards are based on safe stopping sight distances, operating speeds, or overlapping right-turn requirements, and driveway design criteria are based on the size of traffic generators. Access permitting procedures, including procedures for review of deviation from spacing standards, are also enacted along with administrative fees to help offset the cost of access reviews.

The Transportation Research Board (TRB), with support from the Federal Highway Administration (FHWA), played an important role in developing access management research during this period. This occurred first through the TRB Committee on Transportation and Land Development, and then (since the mid-1990s) through the TRB Access Management Committee. A variety of studies were published on various aspects of access management, eventually culminating in the first national *Access Management Manual*, which provides a lasting benchmark for advancement of the practice.

Current practice and research consistently demonstrates that access management improves safety and operations where it has been implemented. Various studies have shown that application of spacing standards, installation of physical medians, and limiting left turns can improve travel times and safety.[18] Although economic concerns continue to arise, particularly with regard to raised medians, economic studies show little or no overall adverse impact of access controls on business activity or property values.

Nonetheless, some states remain reluctant to enact systemwide regulatory authority over access spacing, hindered in part by property rights and economic development concerns. Without a formal code, access decisions are made based on roadway design manuals and driveway permitting procedures with access guidelines of varying quality. Inconsistent access decisions – fueled by a lack of legally enforceable standards and poorly defined variance procedures – further undermine state authority to limit or deny access. The resulting uncertainty in outcome does little to overcome political resistance to increased regulatory authority in these states.

V. Future Access Management – 2008 to 2050

Access management improves roadway mobility and safety, but there are major issues of sustainability, energy, environment and walkability that it does not yet fully address. Therefore, broadening its scope from highway access management to integrated corridor management will be essential in the years ahead. In this effort, better site design and street networks that integrate neighborhoods and corridor businesses will be important elements, as will parallel relievers that help reduce traffic demand on major arterial roadways. Alternative funding strategies to support network development will be another growing component of these efforts.

[18] J. Gluck, H. Levinson, and V. Stover, *NCHRP Report 420: Impacts of Access Management Techniques,* Transportation Research Board, Washington, D.C.: National Academy Press, 1999.

This calls for a variety of integrated transportation and land use actions. The nature and extent of these complementary actions will depend on the context in which access management is applied. Looking ahead, therefore, the likely next stage of access management will include the transition to coordinated corridor land-use and transportation management actions.[19]

Transportation Actions

The transportation actions include: a) better management, design, and operations of major public street intersections in the vicinity of developments; b) more continuous collector streets as alternative routes; c) better means of serving local trips; and d) multimodal streets with sidewalks, adequate pedestrian refuges, and provisions for public transport. Multimodal transportation impact analysis and developer mitigation requirements will also be needed, except perhaps in rural areas.

Continuous networks of arterial and collector streets should be provided in suburban settings. *Capacity*, *continuity*, and *connectivity* should be the key. Continuous roadways spaced at half mile intervals will avoid concentrating left-turning movements at major junctions and reduce delay. [Left turns could be as little as 25 percent of those with one-mile road spacing]. The local and collector street network could relieve travel along arterial roads by removing local trips.

Intersections between major roadways will benefit from capacity enhancement and creative handling of left turns. Indirect left-turn treatments can be used where space permits. In some situations, jug handles or grade separations may be desirable.

Complete streets integrating a variety of transportation modes are desirable in urban and suburban areas. With fewer points of access, streets can be landscaped and have sidewalks, provisions for public transport, and, in some settings, bicycles. Street medians should be wide enough to offer areas for landscaping and to provide adequate pedestrian refuge. Sidewalks should connect boundary roadways with development clusters and be ADA compliant.

Transportation impact assessment procedures will need to be multimodal. They should be expanded to address three basic concerns: can people reach developments conveniently and safely on foot, by public transport, and by car? Montgomery County, Maryland has established such a requirement.[20] The Florida Department of Transportation has enacted multimodal level of service analysis tools and is increasingly assessing the ability to serve developments by transit.

[19] Concepts in this section were adapted from 7th Armour College Distinguished Lecture, Herbert S. Levinson, Illinois Institute of Technology, May 7th, 2008.

[20]

Land Development

Planning actions include making certain developments contingent on the proximity and availability of high-capacity, high-speed off-street transit; fostering multi-use rather than single use developments, and orienting development along streets where practical. Transportation and land use coordination can be advanced by fostering development of mixed-use town centers along transit lines. These activity centers should be designed to maximize internal circulation and minimize vehicular and pedestrian conflicts on major arterial roadways (Figure 10).

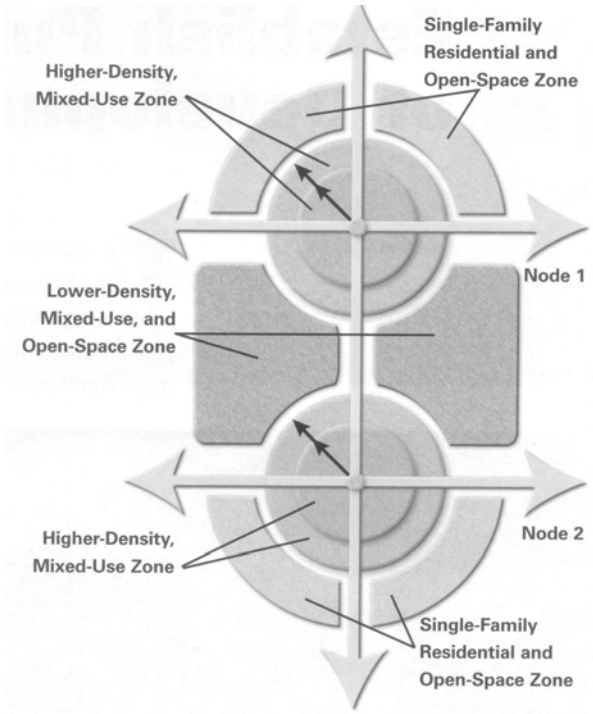

Figure 10: Activity Center Development along Major Corridors and Transit Lines
Source: Urban Land Institute, *Ten Principles for Reinventing America's Suburban Strips*, 2001.

Zoning ordinances should require large office and institutional developments (e.g. over 300,000 square feet) to locate within 400 to 600 feet of an express transit stop. Zoning could limit the amount of commercial land, and encourage it to be clustered at key nodal points with unified site access and circulation. Developments could be reoriented along streets to create a better sense of place and to improve pedestrian and transit access (Figure 11). Building setbacks and urban design standards could be established to improve roadside appearance.

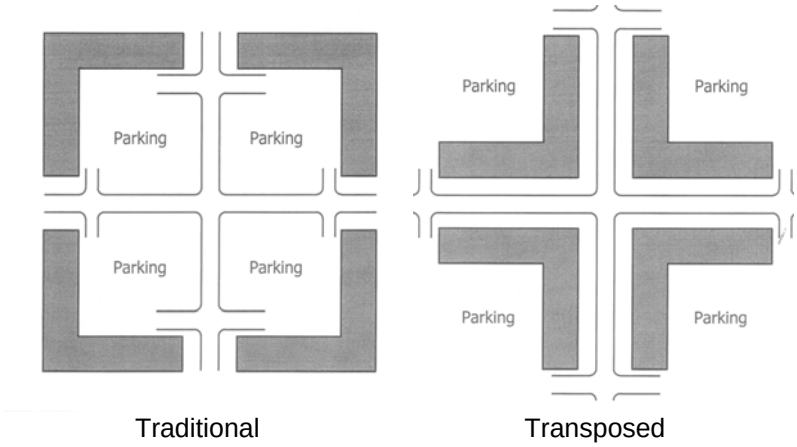

Figure11. Building orientation to improve transit access.

The design and arrangement of commercial activities can enhance access management. Multi-use activity centers that integrate retail, office, residential and recreational activities should be encouraged to provide opportunities for transit and pedestrian friendly design. Clustering activities can result in fewer more carefully designed access points, reduce vehicle trips between proximate activities, and encourage pedestrian and transit trips. The concept of *zoning envelopes* along new highways in rural and undeveloped areas could help to cluster activities and minimize strip development. Overlay zones are a means of retrofitting existing roads, especially in urban areas.

These concepts could be further coordinated through the application of form based codes that key street and block development to a regulating plan. Form based codes would offer clear guidance on access design and the "relationship between building facades and the public realm, the form and mass of buildings in relation to one another, and the scale and types of streets and blocks."[21] The appropriate coding would vary by context (e.g. district, neighborhood, corridor).

[21] Form Based Codes Institute, "Definition of a Form-Based Code"
Draft Date: January 29, 2008, http://www.formbasedcodes.org/definition.html

Table 1 Broadening the access management perspective

Feature				
Location	**Complete Streets**	**Street Frontage ROWs**	**Multimodal Planning/Design**	**Continuous Street Road Spacing**
Sequence	2	3	4	1
Rural Preserve	No	No	No	1 mi or greater
Rural	No	No	No	1 mi
Exurban	Possibly	No	No	½ mi
Suburban – New	Yes	Possibly	Generally	½ mi
Suburban – Old	Yes	Yes	Yes	½ mi
City – Outlying Areas	Yes	Yes	Yes	½ mi
City – Built Up Areas	Yes	Yes	Yes	¼ mi
City – Business Districts	Yes	Yes	Yes	1/8 – ¼ mi

When and where these concepts should be implemented will depend upon the size, type and density of developments, and characteristics of the street system. Table 1 provides illustrative guidelines. Figure 12 provides an illustrative example.

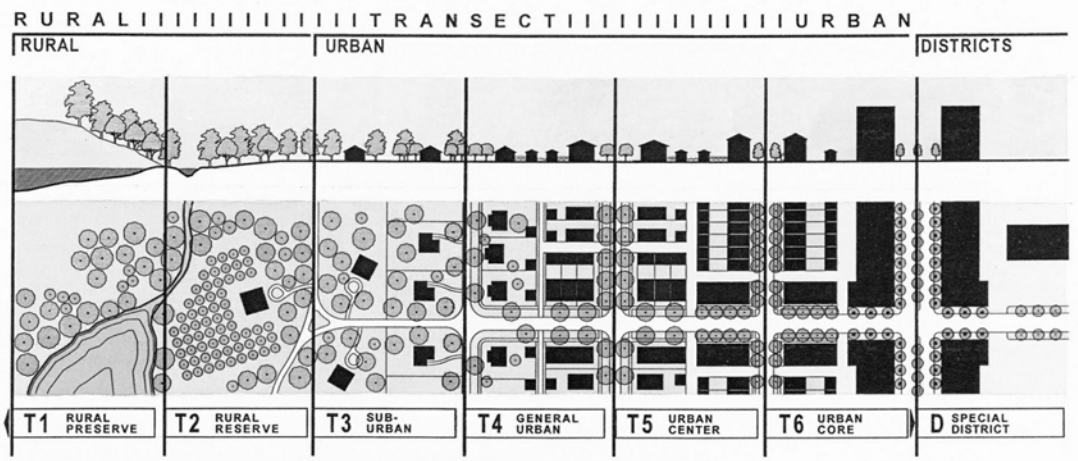

Figure 12: Transect. Source: "Form Based Codes: Implementing Smart Growth," Local Government Commission, Sacramento, CA, undated. http://www.lgc.org/freepub/PDF/Land_Use/fact_sheets/form_based_codes.pdf

Looking Ahead

Adapting and expanding access management activities to meet the needs of the twenty-first century is essential. This adaptation and maturation will help improve both mobility and livability. It calls for looking broadly and for achieving consensus among the many people and groups that are involved: these include the public and private sector;

highway, transit and planning agencies; and individual communities within urban regions.

As we search for new directions, we should learn from the past. The goal is a coordinated approach to transportation and community design – one that discourages unplanned roadside development and reinforces desired urban form.

In the transition to an increasingly multimodal transportation system, the practice of access management will continue to evolve. It will address not only vehicular conflicts, but will be a process for managing the access interface between auto traffic, the pedestrian, and various forms of public transport. It will also remain an impetus for local network development and improved network connectivity to support multimodal operations.

The foundation of access management, the functional hierarchy based on mobility versus access, will continue to drive transportation planning – although the nature of street types will continue to evolve, as it has through our nation's history. This functional classification system will require different approaches to access design on major corridors for public safety and operations. It will also require careful attention to urban context.

The role of state transportation agencies in managing access to state highways will become more complex. Integrated corridor management will require more effective intergovernmental coordination, technical assistance to local governments, and a stronger focus on coordinated state/local planning. Cooperative agreements may eventually be supplemented with stronger forms of regional governance to address regional transportation and development issues. Perhaps corridor management authorities will be established, combining land use and transportation authority under a single governing unit.

The cost of providing and maintaining multimodal networks will not be small. The private sector role in providing transportation systems will also likely continue to increase to offset limited public resources. Florida is already exploring a mobility fee concept as one way of funding both system development and operating costs – an essential need for transit systems. Oregon's system development charges are another example.

Access management in the years ahead calls for a coordinated approach to land use and transportation. Systemwide access management and integrated corridor management programs can reinforce other efforts to achieve more livable and walkable places. The time is now before important opportunities are lost. The goal is to transform our roadside environments and the communities they serve into attractive, accessible, and sustainable places in the years ahead.

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