

**Building Autopia:
The Development of Urban Freeway Planning in the Pre-Interstate Era**

Jeffrey Brown
Assistant Professor
Department of Urban and Regional Planning
Florida State University
Tallahassee, FL 32306-2280
E-mail: jbrown2@fsu.edu

Working Paper
Version 1.3

Draft: April 5, 2005
Do not cite

11715 Words

Key Words: Transportation planning, transportation engineering, freeway, urban history

Building Autopia:

The Development of Urban Freeway Planning in the Pre-Interstate Era

Abstract

In the summer of 1956, President Eisenhower signed legislation that provided the money to build Interstate Highways across the United States. For five decades, Americans have been living with the consequences of this policy moment. Nowhere have these consequences been more significant than in America's cities, where the legislation led to the construction of thousands of miles of urban freeways.

This paper uses the 50th Anniversary of the 1956 legislation as an opportunity to reflect on the history of pre-Interstate era urban freeway planning. For more than three decades preceding 1956, city planners and engineers prepared freeway plans for cities around the country. They foresaw the freeway's usefulness not only in the war against congestion but also in the fight against slums, for downtown revitalization, and for control of urban decentralization. These ideas shaped their plans, which tended to have a broad focus on the role of the freeway in shaping the direction of urban development. Alas, a lack of local resources prevented most plans from being implemented, except on a very limited scale.

When money finally appeared to build urban freeways through the Interstate program, it came with strings attached. These strings transformed freeway development. The result was the abandonment of many ideas embraced in early freeway plans and the deployment by state highway departments of high-speed Interstate freeway facilities designed simply to serve the most traffic at the lowest possible cost. The consequences for America's cities and citizens have been profound.

Building Autopia:

The Development of Urban Freeway Planning in the Pre-Interstate Era

Introduction

Few pieces of legislation have had such significant effects as 1956's Federal-Aid Highway Act (PL 84-627) that led to construction of the Interstate Highway System. In the fifty years since the Act's relatively uncontroversial passage, state highway departments have used billions of federal tax dollars to build more than forty thousand miles of freeways across the United States. The freeways in turn reshaped the economic, physical, and social landscape of an entire country. They helped create the long-distance trucking industry, unleashed a wave of suburbanization in America's urban areas, and put a virtual end to the long-noted problem of rural isolation.¹ They have also been blamed for destroying the physical fabric of America's cities, devastating inner-city minority communities, increasing dependency on foreign oil, and polluting the nation's air and water.² Whether for good or for ill, the Interstate program's effects have been profound.

The 1956 legislation ushered in a short-lived golden age of freeway construction as state highway engineers poured concrete and laid asphalt on a scale they had only dreamt of in the past. Much of their work occurred in cities, where freeways were seen as the answer to the traffic congestion problem. State highway engineers brought to their task a long track record of building rural highways. They knew how to build safe roads to enable high-speed, long-distance travel. They were well versed in the techniques of traffic surveying and had experience using motorists' desire lines to assist in the determination of facility alignments. But they lacked experience working in built-up urban settings, and regrettably failed to take advantage of thirty years of freeway

planning by city engineers and planners when they decided what (if anything) should be built, how it should be built, and where it should be built.

For the freeway predates the 1956 legislation. Its origins lie in the 1920s when transportation engineers and planners began to adapt the design features of the suburban parkway to the urban environment. The facilities proposed during the first three decades of freeway planning are quite different from those that were built in the decades since 1956. They are smaller, often multimodal facilities, and were explicitly designed to support the particular city's broader planning goals—not solely to move traffic. They reflected a different philosophy about freeway construction and decades of experience with trying to adapt the automobile to the city, and the city to the automobile. This paper offers a retrospective of those first three decades of urban freeway planning, and offers lessons from that retrospective for today's urban planners and transportation engineers.

Throughout the roughly thirty years from the first urban freeway plan to passage of the 1956 Act, city engineers and planners viewed the freeway as a cure-all for a variety of urban ailments, ranging from uncontrolled decentralization to inner city decline to slum clearance, because it represented the latest contribution of scientific transportation planning to the battle against urban traffic congestion, which was seen as the underlying cause of these urban afflictions. But the focus on curing the disease of traffic congestion was not a singular one. Many planners and engineers were also concerned with how the new facilities would relate to the surrounding urban environment and contribute to broader planning goals about good urban form. This prompted them to adapt the freeway to specific local conditions, and led to significant variation in facility design. Most plans were prepared for municipal governments who would make the planning, design, and

construction decisions. This was a very different vision of freeways than that contained in the interstate program.

In the postwar period an important shift in the locus of decision making took place. Gradually, state and federal highway engineers took control of the urban freeway program. But cities were a willing participant in the shift. Cash-strapped cities surrendered planning control in exchange for state and federal highway dollars. Local engineers, planners, and public officials were left to make the occasional modification in alignment, but could not change the overarching logic that propelled the Interstate program. State highway engineers were free, at least for a time, to impose their freeway vision, and their vision in turn became the most important factor shaping the growth, form, and quality of life of modern cities.

Literature on Freeways

The freeway has been the subject of a large body of both scholarly and journalistic investigation. In the late 1960s and early 1970s, the urban freeway revolts and the emergence of the environmental movement prompted the development of a body of literature that strongly criticized the freeway, and its proponents, for its negative effects on the environment, inner city neighborhoods, and public transit (Buel 1972, Burby 1971, Hebert 1972, Kay 1997, Kelly 1971, Leavitt 1970, Lupo et al 1971, Mowbray 1968, and Schneider 1971). More recent writers have examined the freeway within the larger context of America's relationship with the automobile (Foster 2003), its influence on postwar social life (Lewis 1997), and its contributions to urban sprawl (Kay 1997). Scholars have also examined the development of federal policy toward freeways (Rose 1990), the roles of state and federal engineers in deploying the freeway and other

important highway systems (Seely 1987), and the link between freeways and philosophies of architectural design (Ellis 1990).

This paper differs significantly from these other works. Its focus is the evolution of urban freeway planning over the three decades preceding 1956. The study draws on ideas about urban freeway development in California by Jones (1989) and Taylor (1995, 2000), and broadens the investigation to a national focus. The investigation is not comprehensive, for scores of plans were prepared during the three decades between the first freeway plan and passage of the 1956 legislation, but instead highlights plans that illustrate the changing nature of urban freeway planning over these years.

Traffic Congestion and Early Efforts to Address It

The chief basis for decentralization, it is generally agreed, is congestion, the inability to move freely in and out of the areas. Here again, the only solution offered is the development of adequate highway facilities by way of freeway construction.

- Commonwealth Club 1946: 117-118.

The freeway emerged as the latest in a series of “permanent cures” for the disease of urban traffic congestion.³ As focal points of human activity, cities had experienced congestion for centuries. Pedestrians, horse-drawn vehicles, and later streetcars had all clogged the traffic arteries of cities. Beginning in the 1910s, a new source of congestion was added to the mix: the motor vehicle. Motor vehicles took up more space, on a per-person basis, than other means of conveyance, and their arrival in large numbers increased congestion by orders of magnitude (Bottles 1987, Brown 2005a). Because motor vehicles were capable of high speeds, motorists were intolerant of delays that precluded their taking full advantage of the vehicle’s speed potential. As vehicle use grew, congestion intensified—and so did demands that someone alleviate it.

Traffic congestion was worst in the central business districts of most cities, and it was there that its negative consequences were first felt (Bartholomew 1924, Longstreth 1997). Traffic congestion diminished downtown's accessibility, while the higher speeds of which the motor vehicle was capable, coupled with suburban road construction, increased the accessibility of previously less accessible suburban locations. Residences had been decentralizing for decades (Warner 1962). Now business activity began to decentralize as firms abandoned downtown for less congested suburban locations (Longstreth 1997, Wachs 1984).

The decentralization of business activity was one way to alleviate downtown congestion, but permitting it ran counter to the interests of powerful interest groups and of cities themselves (Commonwealth Club 1946, Wachs 1984). Downtown business groups feared a decline in customers and property values. City officials, whose governments were dependent on downtown property tax assessments, feared the loss of tax revenue. Both groups wanted to preserve downtown's economic viability, and they viewed traffic congestion as the cause of their collective problem. Solving the congestion problem was thus one of their top priorities.

Cities tried a number of approaches to solve the congestion problem. First, they widened local streets to provide more lanes for vehicle movement (Brown 2005a). But street widening provided only temporary relief and proved to be enormously expensive. Second, a few cities turned their eyes to the lines of vehicles parked along streets in congested areas, and enacted parking bans to return street space to vehicle movement (Bottles 1987, Longstreth 1997). These bans proved unpopular both with motorists and with business owners who worried that bans would chase away their customers.

City officials and downtown business groups soon engaged the services of trained professionals to find the elusive solution to the congestion problem. These men, who saw themselves as practitioners of scientific transportation planning, employed newly developed analytic techniques to gain a better understanding of the causes of traffic congestion (Brown 2005b). They then used this understanding to develop an increasingly sophisticated array of strategies to remedy the problem.

The experts began by devising techniques for data collection that coalesced in the form of the community traffic survey. The survey, pioneered by Harvard University's Miller McClintock, substituted *scientific facts* about traffic flows and street conditions for *guesswork* in the development of transportation solutions (McClintock 1926). The surveys provided a wealth of information about all aspects of local street conditions: from the number of travel lanes to the width of sidewalks to the volume and type of traffic. Engineers and planners used these surveys to identify a number of causes of congestion over which cities had some form of control: inconsistent or non-existent traffic regulations, the at-grade mixing of autos, trucks, and pedestrians, antiquated street design, and inadequate off-street parking facilities (Bartholomew 1924, McClintock 1926). These factors had combined with the growing use of the automobile to make conditions on many city streets unbearable.

Armed with this knowledge, the experts developed their solutions. First, they sought to impose order on the flow of traffic through the use of traffic regulations and the adoption of traffic control devices (Brown 2005a, McShane 1999). Shortly thereafter, they devised techniques of street classification to segregate different modes and streams

of traffic from one another to smooth the flow of vehicle traffic (Bartholomew 1924, Olmsted, et al 1924).

The battery of techniques came together in the Major Traffic Street Plans prepared during the 1920s (Brown 2005b). As devised by Harland Bartholomew, Charles Cheney, John Nolen, and others, these documents contained a comprehensive program of street classification, targeted street widening, new street construction, and advance right of way acquisition to enable cities to cope with current congestion, minimize future congestion, and better coordinate transportation investments with future patterns of urban development (Olmsted, et al 1924, Nolen 1930). A few plans included proposals for major thoroughfares or motorways—super boulevards that are forerunners of the modern freeway—that were designed to move especially large traffic flows (Bartholomew 1927, Bartholomew 1928). Scores of cities engaged the services of transportation consultants to prepare these plans, and in many cases the experts' recommendations were adopted.

Most cities experienced some congestion relief, but soon the ever-increasing tide of automobiles brought a return of congested conditions. In Los Angeles, for example, the city's population tripled between 1920 and 1940, but the number of automobiles quintupled (Bottles 1987). Other cities experienced similar magnitudes of automobile growth. Millions of Americans abandoned public transit for the automobile (Jones 1985). Local street systems were quickly overwhelmed, again. Congestion remained a major urban problem even as the Depression struck. Americans sacrificed a great deal to get through the Depression, but few sacrificed their use of the automobile (Highway Statistics summary to 1945). A new transportation solution was desperately needed, and it soon appeared: the freeway.

The Freeway as the Answer

The freeway was an urban, utilitarian adaptation of the suburban parkway (Brown 2005a, Swan 1931). The parkway was designed as a purely recreational facility (Orlin 1992). Its origins lie in the 19th Century and Olmsted's designs for New York's parks. The facilities that served as immediate forerunners of the freeway were the parkways surrounding New York City, which were built largely during the 1920s (Ellis 1990, Orlin 1992). The Long Island and Westchester County parkways were designed specifically for the automobile.⁴ They provided American motorists with the opportunity to take leisurely drives on roadways routed through a heavily landscaped environment (see **Figure 1**).

(Figure 1: The Suburban Pleasure Parkway as Model)

The parkway included two design features that were of interest to urban engineers and planners: all at-grade crossings were eliminated and the number of entry points was limited (Orlin 1992). These features made parkways radically different from a typical local street or even a major city thoroughfare, and enabled them to carry motor vehicles more safely and at much higher speeds than either of these urban facilities (Orlin 1992). The freeway adapted these design features to an urban environment. It was a new kind of *urban* thoroughfare that eliminated all at-grade crossings and limited vehicle access to a very small number of entry points. These design features meant that freeways could carry *large volumes* of traffic at high speeds safely into and through America's cities—and at what was then seen as a relatively modest cost.

Efficiency, economy, and safety were the buzzwords employed by freeway proponents (Brown 2005a). Freeways were designed to be efficient traffic conduits. In 1947, Bureau of Public Roads Commissioner Thomas MacDonald observed that “(t)he

service efficiency of a traffic lane on an express highway is from eight to ten times that of a traffic lane on an ordinary city street” (MacDonald 1947: 93). Because of this increased carrying capacity, freeway proponents observed that their facilities were more economically efficient than conventional street widening programs (MacDonald 1947, McClintock 1937, Whitten 1932). Freeways were also promoted as being safer than local streets (Ellis 1990). On an accident per vehicle miles traveled basis, freeways enjoyed a dramatic safety advantage over roads that lacked their design features (Jones 1989).

Proponents identified many important beneficiaries of freeway development. Motorists would enjoy the benefits of reduced travel time, savings in fuel costs, and savings from reduced accidents (McClintock 1937). Suburban developers would enjoy increased accessibility to their new subdivisions (Whitten 1932). Downtown interests would enjoy increased accessibility to downtown and the revitalization of areas that had become or were in danger of becoming slums (MacDonald 1947, TEB 1939). Planners believed freeways would reduce traffic congestion, revitalize downtown, and help them direct the shape of urban development (Brown 2005a, Bartholomew 1942). Everyone appeared to be a winner—or so freeway proponents implied.

Early Urban Freeways of the Pre-War Era

The freeways contemplated by early transportation engineers and planners were quite different from Interstate-era freeways (Taylor 2000). They were typically smaller facilities, often with no more than two travel lanes in each direction separated by a landscaped median strip. They were typically planned as part of denser networks that would disperse traffic among many smaller facilities rather than concentrate it on only a few large roads. They had lower design speeds, typically forty miles per hour versus

today's seventy miles per hour, and simpler interchanges, which meant they took up less physical space than their modern counterparts. Most planners recognized the potential for using the freeway to shape or reshape land use patterns, and freeways were often tied to plans for downtown redevelopment (Bartholomew 1930, MacDonald 1947). Many freeways were conceived as important elements in multi-modal transportation plans that encompassed highways, rapid transit, local streets, and parking garages. Finally, engineers and planners who were familiar with local conditions, either through years of experience or intensive on-site study, designed them. This meant their designs were adapted to specific local conditions.

Engineers, planners, and consultants prepared a number of freeway plans in the three decades preceding passage of the 1956 highway legislation. The plans included those for single facilities, highway-only network plans, multimodal highway-transit plans, and comprehensive transportation-land use plans. Some plans were implemented by the cities that commissioned them, while others served as blueprints for the later interstate highway networks developed in the regions. Many plans are discussed below, starting with the very first urban freeway plan: Detroit's.

The Detroit Superhighway Plan and Its Importance

The Super-Highway is unique. It is a new and necessary departure in transportation planning for the modern city. Not only does it provide for a cheaper form of rapid transit on rails and for the ordinary highway motor-traffic of today, but it will also do something never before proposed—it will furnish an express motor traffic highway upon which automobiles can travel continuously at a maximum speed with safety, because all grade-crossings will be eliminated. In other words, the Super-Highway will become the major traffic artery of the future city, for both rail and automobile rapid transit services.

- Daniel Turner 1925: 373

The first large-scale urban freeway plan was, fittingly, prepared for the motor city in 1924. The Detroit Superhighway Plan was crafted in response to increasing congestion in the central business district (CBD), which local officials feared would lead to uncontrolled decentralization and the spread of slum conditions (Rapid Transit Commission 1924). The planners' solution was a combined grid-radial system of 217 miles of Superhighways extending more than 15 miles outward from the center of the city that would increase accessibility to the CBD (Rapid Transit Commission 1924). The superhighways would require a 204-foot right of way in the outer parts of the region and at least a 120-foot right of way in the downtown district. In the outer sections, the right of way would include a reserved 84-foot center for rapid transit lines flanked by planting, two 20-foot express roadways surrounded by 5-foot plantings, two 20-foot local roadways, and two 15-foot sidewalks (see **Figure 2**).⁵ The express roadways would have no at-grade crossings, and access points would be limited—as in the case of parkways. Travel speeds were expected to be 30-35 miles per hour, in contrast to then-current speeds of 6 miles per hour (Rapid Transit Commission 1924). The plan's authors intended that their superhighway program be coordinated with land use planning throughout the region so that transportation and land use could work in harmony to achieve a more desirable urban form (Rapid Transit Commission 1924).

(Figure 2: The Detroit Superhighway Plan)

The Detroit Superhighway Plan was adopted but never fully implemented (Brown 2005a). The financial resources and political support necessary to develop all of the plan's elements proved to be lacking, especially for the rail rapid transit components (Foster 1981). Still, the plan generated significant interest in the transportation

engineering and city planning communities, including notice in the pages of *American City* and the speeches of US Bureau of Public Roads (BPR) Commissioner Thomas MacDonald, who championed its ideas. The plan inspired other engineers and planners to develop their own urban adaptations of the parkway. Edward Bassett soon coined a word to describe this new traffic artery. He called it a freeway.

Urban Freeway Plans of the 1920s and 1930s

Shortly after the appearance of the Detroit plan, freeway-like facilities began to appear as minor elements in the Major Traffic Street Plans prepared by men like Miller McClintock and Harland Bartholomew (Bartholomew 1927, Bartholomew 1928, Brown 2005a). By the end of the 1920s, a series of freeway-centered plans began to appear, as the congestion reduction benefits of the Major Traffic Street plans began to dissipate under the rising tide of automobility. Cities throughout the country commissioned freeway plans, including New York, Chicago, Boston, San Francisco, Saint Louis, and Los Angeles (see **Table 1**). Most plans' underlying philosophy was that the key to solving the congestion problem was to provide for high-speed vehicle movement into downtown. By doing so, planners believed that the trend toward urban decentralization could be arrested (Bartholomew 1930). Engineers were frequently skeptical of this claim, but nevertheless championed the facilities as traffic carriers par excellence.

(Table 1: Urban Freeway Plans of the Pre-1944 Era)

Among the many cities that were engaged in freeway planning in the 1930s, New York stands out for its accomplishments in translating planning into the construction of facilities. Between 1928 and 1933, *American City* reported that nearly 103 miles of express highway were open to traffic or about to begin construction in the region

(American City 1933). These facilities were part of a planned 253-mile regional highway network that had first appeared in 1929's *Regional Plan of New York and Its Environs* (Regional Plan Association 1929).⁶ One of the primary reasons for New York's successful translation of plans into facilities was the ability of Robert Moses to find money—typically from state or federal grants or by leveraging toll revenues to issue new bonds—to build highways (Caro 1974). Moses had a shelf of highway plans ready to be built if only the money were made available to build them—and on many occasions the money materialized (New York Mayor's Committee 1938, Moses 1938).⁷

The facilities proposed and built in New York during the 1930s bear little resemblance to modern Interstate freeways. Moses usually proposed facilities with a maximum 35 miles per hour speed and two traffic lanes in each direction (Moses 1938). The roads looked more like parkways than modern freeways. In the 1940s the pressure from motorists angry over continued automobile congestion compelled Moses and New York to change direction and build much more utilitarian facilities that were designed simply to move large volumes of traffic (Brown 2005a, Moses 1945).⁸

Most other cities had less success in moving from freeway planning to freeway construction. Chicago, for example, has nearly as extensive a history of freeway planning as New York but failed to implement its plans—primarily because of a lack of local resources.⁹ The earliest of Chicago's freeway plans called for construction of a single \$60 million ten-mile elevated road called the Avondale Highway (Young 1928). Shortly thereafter, city officials discussed possible development of a network of ten grade-separated superhighways to cross the city. They commissioned Miller McClintock, famous for his pioneering work on traffic surveys, to prepare 1932's ambitious *A Limited*

Way Plan for the Greater Chicago Traffic Area, which translated the network idea into more concrete form (McClintock 1932). Here, McClintock proposed the development of a 160-mile system of elevated, grade-separated, limited access Limited Ways (derived from Limited Access Motorway) to separate through and local traffic. The four-lane facilities would be designed for 40 mile per hour travel and be open to passenger vehicles only. McClintock emphasized the ability of his plan both to improve accessibility to the Loop and open new areas to residential development (McClintock 1932). The freeway's ability to increase accessibility to *both* CBD and suburbs was a theme of early plans.

Chicago failed to implement either McClintock's 1932 plan or its 1939 follow up, *A Comprehensive Superhighway Plan for the City of Chicago* (De Leuw 1939). The fact that yet another round of freeway planning followed in the early 1940s further demonstrates Chicago's lack of progress in moving from planning to construction (Chicago Plan Commission 1943).¹⁰ The primary reason for the failure was a lack of local money to build these facilities, as well as local officials' inability to convince the state to provide gasoline tax dollars to build urban freeway facilities (Chicago Plan Commission 1943, De Leuw 1939, McClintock 1932).

Boston and San Francisco were also early participants in freeway planning, and both had experiences similar to Chicago's. Boston's first regional freeway plan, the *Report on a Thoroughfare Plan for Boston*, proposed the construction of a radial combined parkway and freeway network whose primary purpose was to provide better access into and through severely congested downtown Boston (Whitten 1930).¹¹ The later infamous Central Artery was among the facilities that Whitten proposed to provide better north-south access through downtown Boston. A lack of local resources hampered

implementation of this plan, and most of the facilities had yet to be built when a second regional freeway plan was prepared after World War II.

Miller McClintock prepared the ambitious 1937 *Limited Ways Plan for San Francisco*, the first of the city's freeway plans, in response to concerns that congestion might negatively affect the dominant regional status of the CBD (McClintock 1937). McClintock's plan placed 84 percent of San Francisco's territory within one-half mile of a Limited Way (see **Figure 3**).¹² McClintock's facilities, with their 60 miles per hour design speed, were significantly larger than the lower-speed facilities proposed in other cities, and their potential negative effects on the neighborhoods in which they were placed would be nearly as pronounced as those of modern Interstate freeways. A lack of local resources prevented implementation of this plan, although it served as a starting point for postwar planning in the city.

(Figure 3: Limited Ways Plan for San Francisco, 1937)

Saint Louis's experience with freeway planning was slightly more successful. City officials commissioned Harland Bartholomew to prepare a series of street and freeway plans for his adopted hometown between the 1910s and 1950s. The first of the freeway plans was his *A System of Major Highways for Saint Louis County, Missouri* plan of 1930 (Bartholomew 1930). In Saint Louis, as elsewhere, congestion and uncontrolled suburbanization were the motivations for freeway planning (Bartholomew 1930). Congestion was particularly severe on the radial thoroughfares linking the city center to the outlying districts, and improving conditions on these routes was the top priority (Bartholomew 1930). But a second priority was to develop a highway grid to link outlying and crosstown districts to one another, and bypass the congested center.

Bartholomew's 1930 plan proposed a 42-mile multimodal express highway system consisting of six routes extending outward from the central business district (Bartholomew 1930, Brown 2005a).¹³ Within their 150-foot right of way, rail rapid transit would be provided within a 26-foot strip in the center, two 20-foot express roads would be provided on each side of the transit right of way, and two 20-foot service roads would surround the express roads (Bartholomew 1930). The grade-separated, limited access express highways would have the approximate traffic capacity of a 100-foot city street (see **Figure 4**).¹⁴ Supplementing these major radial routes was a grid system of twelve interconnecting routes to provide access from one end of the county to another without the need to enter the CBD. Bartholomew expected the proposed system to shape the future growth of the Saint Louis region. For example, he intended to use the plan to determine the locations of new suburban commercial centers and sub centers and thus to direct any future decentralization of economic activity (Bartholomew 1930).

(Figure 4: Grade Separation in 1930 Saint Louis Plan)

The plan was adopted after much delay in 1940, by which time Bartholomew was engaged in developing its successor (Bartholomew 1942). Undoubtedly inspired by his work on the Interregional Highways Committee, his 1942 *Report on the Comprehensive System of Highways for Saint Louis County, Missouri* proposes the development of a new class of highway, called interregional highways, to carry traffic between cities (see **Figure 5**). During the 1930s and the 1940s, Saint Louis made modest progress building a handful of the highway elements from its freeway plans.

(Figure 5: A New System of Street Classification)

The Transportation Engineering Board Plan of 1939

One of the most important plans was the 1939 plan for Los Angeles, which formed the basis for the first metropolitan freeway-only network built in the U.S. (Foster 1981, Taylor 2000).¹⁵ The plan's roots lay in a 1937 study by the Automobile Club of Southern California which argued that the solution to Los Angeles's congestion problems were to be found in a ring-radial system of limited access, grade separated freeways (Automobile Club of Southern California 1937). Such a system would double automobile travel speeds throughout the region while improving access both to downtown and the suburbs (Automobile Club of Southern California 1937, Foster 1981).

City engineer Lloyd Aldrich used the Auto Club report as the starting point for a city-sponsored Transportation Engineering Board (TEB) plan completed in 1939. The centerpiece of the plan was a proposed 612-mile freeway system that blanketed the region on a combined ring-radial pattern that facilitated both CBD to suburb and suburb-to-suburb travel (Transportation Engineering Board 1939). The proposed roads were of a limited access design with a 45-mile per hour design speed (see **Figure 6**). The plan was explicitly multimodal; the authors proposed the eventual construction of a rail rapid transit network in both separate downtown subways and in the medians of the proposed roads. Because of the difficulties of financing a rail transit system, express buses would fill the transit role in the short term (Transportation Engineering Board 1939). The plan's authors took care to consider the relationship of the proposed transportation system to adjacent land uses. This was especially true in the downtown area where the freeways (much smaller than today's high-speed freeways) were tightly integrated with existing and planned commercial development (Transportation Engineering Board 1939).

(Figure 6: Cross-Section of Facilities, TEB Plan)

The TEB plan found favor with many constituencies: CBD interests and transit users liked it because it promised uncongested downtown access; auto users liked the expansion of highway facilities around the region; land developers loved the expansion of developable land proposed in the plan; and the state and federal governments liked the lower cost and more practical orientation of the freeway *vis-a-vis* parkways (Jones 1989, Taylor 2000). Popular or not, the financial resources available to Los Angeles in the 1940s could not begin to finance a 612 mile freeway and transit system (Brown 2005a, Taylor 2000). Los Angeles was able to leverage state and federal funding for the Arroyo Seco Parkway in 1937 and the city was proceeding with the land acquisition and design for the Hollywood Freeway, but otherwise progress was slow. At existing funding levels, the 1939 plan would take a century to complete. During the Second World War, Los Angeles dutifully and periodically updated the 1939 plan—but with little hope of financing it, at least locally (Taylor 1995). Yet it served as the template for postwar freeway development in the region.

An Assessment of Freeway Planning in the Pre-War Era

The freeway plans of the 1930s were developed in response to the problem of urban traffic congestion, although congestion-reduction was merely one of the many planning goals they embraced. The plans viewed the freeway as a tool that could be used to eliminate slums, revitalize downtown, and control the pace and direction of urban decentralization—as well as reduce traffic congestion. Freeways were seen as one piece in a coordinated transportation and land use planning strategy to reshape urban development along “more desirable lines.”

However, few plans were implemented by the cities that commissioned them. The primary obstacle to freeway development was a lack of local resources. Freeways were very expensive, and few cities had money to spare in the troubled fiscal environment of the Depression. Local governments were heavily dependent on property tax revenues for their support, and property tax revenues had collapsed. Local governments then lacked access to the state and federal gasoline tax dollars that might have funded these ambitious projects, because these revenues were still restricted to use on rural highways (Brown 1998). In fact, many plans called for a redirection of gasoline tax dollars to urban areas—to fund local transportation projects, including freeways.

Only in New York, where Robert Moses proved to be an expert in pursuing federal aid dollars and leveraging bridge toll revenue, was significant freeway mileage built. Los Angeles and Saint Louis were able to develop pieces of the networks proposed in their plans by assembling local resources and state grants. The lack of local resources hampered freeway-building efforts in Chicago, Boston, San Francisco, and numerous other cities. Thus, the freeway remained largely an idea that had yet to be tested on a large scale when the 1930s came to an end.

The Federal Government Takes Interest in Urban Freeways

One possible source of funding for freeway development was the federal government, and in the 1930s federal officials began to take an interest in urban highway issues. Prior to the Depression, the federal highway program had been limited to rural areas, but during the economic emergency the prohibitions against using federal funds in urban areas fell by the wayside (Brown 1998, Seely 1987). Federal public works funds were used to provide emergency employment to millions of unemployed Americans, and

road projects were frequently so employed. However, this early intervention was on a temporary, piecemeal basis.

By the middle and late 1930s, the elaborate new superhighway systems built in Italy and Germany became subjects of interest in the transportation planning and engineering fields, and a flurry of national superhighways made their appearance (Weingroff Undated). Interest in national superhighway systems soon merged with interest in reducing urban traffic congestion, at least within the BPR. The BPR's interest in urban issues was driven largely from the recognition that much of the traffic on the federal-aid highway system, and therefore most of the traffic on any envisioned national superhighway network, was bound for the city.¹⁶ The BPR began to accept the idea that the focus of the federal highway program should be broadened to include urban traffic congestion as well as inter-city and farm-to-market concerns (Seely 1987).

The link between urban freeway development and interregional superhighway development was made in the landmark study *Toll Roads and Free Roads* released in 1939 (Public Administration 1939, Rose 1990, Seely 1987). Congress had directed the BPR to investigate the financial feasibility of a toll-supported national superhighway system to consist of 14,400 miles. The first part of *Toll Roads and Free Roads* presented the results of the feasibility analysis (Public Roads Administration 1939). The BPR assumed that the envisioned network would cost \$202,000 per mile, for a total cost of \$2.9 billion.¹⁷ Their analysis found that only a small number of miles in the northeast and near other major population centers would recover the cost of the investment.¹⁸

Having addressed its Congressional charge, the BPR turned to the most historically significant part of *Toll Roads and Free Roads*, the Master Plan for Free

Highway Development. The BPR reasoned that the inability of the toll system to recover its cost did not mean that major upgrades of the nation's highways were not needed. In fact, the need was particularly severe in the nation's cities—because of traffic congestion. The BPR proposed the development of a 26,700-mile toll-free superhighway network that would penetrate the hearts of the nation's cities so as to both serve the needs of vehicle traffic *and* serve as a stimulus to urban redevelopment (Public Roads Administration 1939). The BPR's answer to the congestion problem was exactly that being proposed by local planners: the freeway to provide better access to the center city (see **Figure 7**).¹⁹

(Figure 7: Urban Depressed Expressway Design, circa 1939)

Apart from some grumbling by rural interests who were concerned that the federal farm-to-market roads program might suffer, both President Roosevelt and Congress received the *Toll Roads and Free Roads* report—and the important policy change that it encompassed—quite enthusiastically (Rose 1939, Seely 1987). Alas the war prevented the BPR from translating the master plan into concrete.

Interregional Highways and the 1944 Federal-Aid Highway Act

Two years later, President Roosevelt appointed a committee to pick up where *Toll Roads and Free Roads* left off, and chart a course for postwar highway development (Interregional Highways Committee 1944). The members included BPR Commissioner Thomas MacDonald, two state highway officials (G. Donald Kennedy and Charles Purcell), three famous urban planners (Harland Bartholomew, Frederic Delano, and Rexford Tugwell), and one politician (Bibb Graves). BPR's Herbert Fairbanks, appointed as Secretary, was responsible for drafting much of the committee's final report (Seely

1987). The mix of engineers and planners on the committee would be reflected in the report's mixture of engineering and planning concerns relating to urban freeways.

The Committee released its *Interregional Highways* report in early 1944. With eventual wartime victory in sight, most officials were fearful that the cessation of hostilities would bring a return of the Depression, and therefore the report voiced a new concern about providing jobs for the unemployed, in addition to congestion concerns (Interregional Highways Committee 1944). *Interregional Highways* proposed the construction of a 33,920-mile national superhighway network. The roads would be grade-separated and limited access where traffic levels warranted such treatment, rural areas would feature 75 miles per hour design speeds, urban areas would feature 50 miles per hour minimum design speeds, and the number of lanes would be provided in relation to the traffic flow (Interregional Highways Committee 1944). The Interregional Highways Committee proposed the expenditure of \$750 million a year, derived primarily from the federal gasoline tax, to build the Interregional System.

Most of the report was concerned with the selection and design of routes within urban areas, a relatively small share of total system mileage (4,470 out of the 33,920 miles), but in the committee's collective mind the most important parts of the system (Interregional Highways Committee 1944). And it is in the discussion of the urban freeways that the mix of engineering and planning philosophies makes its appearance. On the issue of route selection for example, the report emphasizes the use of traffic data as the primary determinant but it also emphasizes that:

Because of these two things--the permanency of the highways and the more or less planless form of the cities--the interregional routes must be so located as to conform to the future shape of the cities, insofar as this can

be foreseen, as well as to the existing pattern of urban centers (Interregional Highways Committee 1944: 53).

Because state highway departments were not accustomed to working in urban areas, “the selection of routes for inclusion in the interregional system within and in the vicinity of cities is properly a matter for local study and determination” (Interregional Highways Committee 1944: 56). State highway departments would take responsibility over the routes leading to the city, but once the roads reached the city, the committee felt that an authority quite similar to a modern Metropolitan Planning Organization (MPO) would take the lead role. “A metropolitan authority would avoid obvious mistakes in the location of the interregional routes and thus prevent distortions in the development of the area” (Interregional Highways Committee 1944: 56).

The committee was particularly eager for city planners and engineers to use facility siting to remove slums and redevelop slum districts near the CBD (see **Figure 8**). A close link between freeways and land use was thus critical. “The entire plan should be conceived in relation to a desirable pattern of future city development” (Interregional Highways Committee 1944: 70). And the report cautioned that: “The interregional routes, however they are located, will tend to be a powerful influence in shaping the city...It is very important, therefore, that the interregional routes within cities and their immediate environs shall be made part of the planned development of other city streets and the probable or planned development of the cities themselves. *It is well to remember in this connection that observations of the existing traffic flow may not be an infallible guide to the best locations*” (emphasis added) (Interregional Highways Committee 1944: 71).

(Figure 8: Elevated Urban Interregional Highway Design, circa 1944)

In a speech to the 1944 Annual American Society of Civil Engineers Meeting in the wake of the report's January release, BPR Commissioner MacDonald emphasized that: "the interregional system of highways has potentials for beneficial effects upon urban areas beyond any tools that have as yet been devised if the use is designed and directed by superior intelligence. But the same tool may be used to produce disappointing, if not actually bad, effects" (Weingroff Undated). But if they were used wisely, "if the plan is given effect, values in decadent areas will be progressively restored and those in the central business district will be preserved by the conversion of all urban land to its best use. Destructive and uneconomic decentralization will be checked and nucleated" (Weingroff Undated). The proposed highways were thus clearly envisioned as much more than mere traffic conduits.

Interregional Highways served as a starting point for Congress when it debated renewal of the federal highway program in 1944. When the new law was finally enacted at year's end, it created, but failed to fund, the national superhighway network envisioned in the report: now named the National System of Interstate Highways. Regrettably, the law made no mention about the need for states and local entities to cooperate in urban freeway planning decisions (Federal-Aid Highway Act 1944). The act also failed to include any of the numerous cautions about urban freeway planning contained in *Interregional Highways*. These were glaring omissions that resulted in a divergence between the vision of freeways embraced by both early freeway plans and *Interregional Highways* and the vision that found its way into the Interstate program. The act simply continued the long-running state-federal highway partnership and, over the long run, made the state highway departments the principal players in urban freeway development.

As time would tell, state highway departments would place the new facilities where travel desires were strongest, rarely taking into account land use patterns or even other parts of the transportation system (Altshuler 1965, Brown 2005a). The 1944 legislation prioritized the traffic service function of the Interstate System.

The AASHO Design Standards

The legislation prompted work by the American Association of State Highway Officials (AASHO) to develop design standards for the new highways. The first standards were published in August 1945. Facilities would be designed to serve the 30th highest hourly traffic volume in a year 20 years from the date of construction (AASHO 1945). Thus, the facilities would be designed to serve the maximum possible traffic at a point in the distant future. On their face, many other standards adopted in 1945 look not too dissimilar from the designs contemplated in the earlier locally prepared plans. In urban areas, the new roads would have 12-foot lanes, 12-foot medians, and 10-foot shoulders (AASHO 1945). The desirable design speed—50 miles per hour—was a little faster than many earlier plans contemplated, but not significantly so.

However, these standards were significantly upgraded in 1957 (AASHO 1957). In downtowns the minimum speed would be 50 miles per hour, with 60 miles per hour a desirable design speed. Suburban design speeds would be 60 miles per hour. These were both minimum speeds, and the evidence suggests that state highway departments designed facilities to exceed them. Seventy miles per hour design speeds became quite common. The higher standards made the facilities more difficult and expensive to site in built-up urban areas (see **Figure 9**). They also guaranteed that the facilities would be more disruptive of the surrounding urban environment.

(Figure 9: Example of AASHO Design Standards)

Transitional Plans of the 1940s and 1950s

We cannot afford to scrap great investments in built-up central districts and build substitutes somewhere else. The municipality derives much of its tax money from these central districts. We need radial express routes into them free from cross traffic and with limited access and all provisions for free flowing traffic.

- Commonwealth Club 1946: 103.

During the war, freeway planning continued to be linked with larger land use concerns, although a trend toward narrower-focused plans also emerged. In Portland, Oregon, freeway planning took place in the context of larger efforts meant to manage postwar growth (Moses 1943). In Baltimore, Maryland (1944) and Louisville, Kentucky (1944), on the other hand, freeway planning was focused strictly on trying to deal with traffic congestion (Lochner 1944, Moses 1944). Few wartime plans were actually implemented, although most served as a basis for postwar planning efforts.

The end of the war brought both a resurgence of freeway planning and a gradual shift in plan focus. The passage of the 1944 federal highway legislation, accompanied by later legislative enactments at the state level, had brought new state and federal interest in urban freeway planning. Plans were soon more likely to be prepared for state highway departments than for cities or civic associations, and this led to a narrower emphasis on designing freeways to solely be traffic conduits. Over the ten years from 1945 to 1955, most urban freeway plans were shorn of their non-freeway elements (see **Table 2**). By the time the 1956 legislation was adopted, the narrower vision of freeway development—with access to the full fiscal resources of the federal government—had taken center stage.

(Table 2: Urban Freeway Plans of the 1940s and 1950s)

At the beginning of the postwar period, freeway plans were still being prepared at the behest of local governments that frequently had non-transportation concerns as well as coping with traffic congestion in mind. This is certainly true of plans prepared for Detroit (1945, 1949), Alameda County (1947), and Cincinnati (1951), to cite just a few examples. The 1945 *Detroit Expressway and Transit System* plan is a typical early postwar plan (Andrews, et al 1945). It included both freeway and transit elements, and voiced a desire to reduce traffic congestion while also revitalizing the inner city.²⁰ The consultants were torn between simply following alignments dictated by motorists' desire lines as captured in origin-destination surveys and considering broader non-transportation effects of the roads, including their effects on adjacent neighborhoods. These tensions, coupled with growing frustration about the city's inability to address its transit needs, are also evident in a follow-up plan (Rapid Transit Commission 1949).

Conflicts between traffic service and broader planning concerns are visible in many postwar plans prepared for cities or other local entities.²¹ The *Expressway System Plan for Metropolitan Cincinnati* is certainly conflicted (City Planning Commission 1951). On the one hand, it argues that: "The Motorways Plan has as its objective the free, expeditious and safe movement of traffic... It is built around the concept of the expressway with its fundamental principle of uninterrupted flow of traffic" (City Planning Commission 1951: 1). On the other hand, it also states that: "It is not enough that such a plan be designed efficiently and economically from the standpoint of (traffic) engineering considerations alone. Because the basic system of motorways plays so important a part in shaping the character and location of development in a metropolitan area, it is essential that it be studied and planned in relation to the various types of land

use and to all forms of transportation” (City Planning Commission 1951: 2). Rhetoric aside, traffic concerns won out. The plan relies solely on a 1945 traffic survey to determine freeway locations (City Planning Commission 1951).²² Remarkably, cost concerns rarely appear in the document, except in terms of not letting cost considerations impair the facilities’ full traffic-service capabilities.²³

Some planners remained committed to developing more comprehensive freeway plans, but appeared to be going against the tide. Bartholomew’s plan for the Eden Township portion of Alameda County, California proposed the joint development of freeways and rail rapid transit (Bartholomew 1947). He felt that freeways alone could not address the area’s transportation needs but that a more multimodal system could. Alas, the freeways were built early on as part of the state’s freeway program, while the rail rapid transit system had to wait for several more decades until the creation of BART.

Officials in nearby San Francisco commissioned a series of freeway plans in the late 1940s and early 1950s, each of which point to the growing importance of traffic service. The first of these, the *Traffic, Transit and Thoroughfare Improvements Plan* of 1947 called for a relatively modest \$15 million in highway improvements and \$31 million in transit improvements (Technical Committee of the Council, City and County of San Francisco 1947). The authors did not want freeways penetrating the CBD, so they called for construction of a loop highway just outside it that would connect to any radial freeways. Presciently, the authors knew that the projects would generate substantial opposition from the neighborhoods, as happened when the state tried to build the freeway system years later, but they argued that it should not prevent the necessary construction.²⁴

During 1947, the California Legislature adopted the Collier-Burns Highway Act that gave the state highway department the lead role in the planning, financing, and construction of freeways in the state's urban areas (Brown 1998, Collier-Burns Highway Act 1947). In the wake of the legislation's passage, San Francisco commissioned a new plan that included many more freeways of the kind envisioned by the state highway department (De Leuw, Cather, et al 1948). The 1948 plan was, like its predecessor, multimodal, but the highway component was enlarged considerably to include a total of \$111 million in freeway construction. The alignments were based largely on motorists' travel desire lines as developed through an extensive origin-destination survey.

The freeways were developed primarily to provide high-speed access to downtown, which would be the primary beneficiary (De Leuw, Cather, et al 1948). The costs of freeway development, particularly in terms of community disruption, on the other hand, would be borne largely by the city's neighborhoods. The 1948 plan served as the basis for a similarly themed 1951 follow up prepared by the city itself. The stage was clearly set for the neighborhood versus downtown battles that characterized the city's well-chronicled freeway revolt only a few years later (Mohl 2004).

Rarely do tensions between broader planning concerns and traffic concerns appear in documents commissioned at the behest of traffic-focused state highway departments. Instead, traffic service dominates. The freeway plans for Providence and Tampa each rely solely on an origin-destination survey and motorist desire lines to determine alignments for facilities that might be part of the Interstate System (Maguire, et al 1947, State Road Department 1947). For Providence, a single \$50 million route, which would provide access to the CBDs of both Providence and Pawtucket, was proposed and designed to

permit 50 mile per hour travel.²⁵ In Tampa, the focus on traffic service was accompanied by a desire to minimize costs: the plan's authors sought the cheapest right of way that maximized traffic service (State Road Department 1947). The Tampa plan is, however, notable for the fact that the authors decided that traffic levels could not justify the cost of full grade separation, and therefore they proposed a system of expressways that were not entirely free from crossings at grade.²⁶

A desire to provide low-cost traffic service is also predominant in a pair of plans prepared for Milwaukee. The 1949 *Major Trafficways of the Milwaukee Metropolitan Area* plan contains a well-defined set of traffic service principles that the authors claimed to have followed in determining the alignments of the expressways.²⁷ City planning concerns were notable for their absence. Progress was evidently lacking, because the city commissioned a second freeway plan only a few years later (Ammann and Whitney, et al 1952). Downtown interests were particularly concerned about the lack of progress in dealing with the traffic congestion in the CBD, and addressing downtown problems were the motivations behind the report. The consultants claimed to have paid attention to non-traffic concerns in developing their plan, although traffic concerns are again dominant.²⁸

A narrow focus is also evident in the postwar work of Robert Moses. The use of motorists' desire lines led Moses to recommend a number of controversial freeway projects for New Orleans, including the never-built Vieux Carre Expressway along the waterfront (Moses 1946). They also determined the alignment for an expressway in his *Arterial Plan for Hartford* (Moses 1949). However, unlike many of his engineering colleagues, Moses placed some limits on freeway routing. He took great offense, for example, at the tendency of highway engineers to invade parks (Moses 1949).

Even freeway plans prepared at the behest of cities demonstrated an increasingly narrow focus on traffic service. *The Master Highway Plan for the Boston Metropolitan Area* relied solely on motorists desire lines to determine the alignments for \$322 million of urban freeways (Joint Board for Metropolitan Highway Construction 1948).²⁹ The authors argued that the provision of high-speed freeways was required to maintain downtown's economic supremacy. They also argued, rather unconvincingly, that freeways would benefit adjacent land uses.³⁰

Even Harland Bartholomew fell into the traffic-service focus in his 1954 Atlanta plan. His work followed a 1946 *Highway and Transportation Plan for Atlanta* prepared for the Georgia state highway department and the US Public Roads Administration that was the rare case of a plan prepared for state highway officials that considered both highways and transit (De Leuw, Cather, and Company, et al 1946).³¹ However, alignments had been determined using the desire line method. Bartholomew presented his proposals using his traditional rhetoric about needing to develop expressways in coordination with land use planning and needing to route facilities so as not to disrupt neighborhoods, but he also stated that: "The element of rapid and uninterrupted travel is the objective" (Bartholomew 1954: 6). The freeways would be designed to full interstate standards. There was nary a mention of transit and no in-depth discussion about the possible effects of the expressways on adjacent land uses (Bartholomew 1954).

Traffic-service concerns reigned supreme in freeway planning by the mid-1950s, by which time a feeling that Congress was about to finally fund the Interstate system had filled the air. Freeway plans became more ambitious as a result. Philadelphia's 300-mile freeway plan was a product of the heady freeway-building atmosphere (City of

Philadelphia Urban Traffic and Transportation Board 1955). Portland's plan of the same year is similarly ambitious, with its call for \$275 million in freeway construction (Oregon State Highway Department 1955). Motorists' desire lines were the primary if not sole determinants of route alignments in both cases. Neither region's network was fully built.

The 1956 Legislation

In 1956, Congress finally funded the construction of the 12-year-old Interstate Highway System, which it renamed the National System of Interstate and Defense Highways. Congress created a Highway Trust Fund, into which federal receipts on gasoline and other vehicle taxes were deposited, as a dedicated funding source for the Interstate and other federal-aid highway programs. To encourage states to give top priority to Interstate projects, the federal share of interstate project cost was set at 90 percent, and Interstate system mileage remained limited to 41,000 miles. Each of these decisions had enormous implications, as did the decision to leave State highway departments in charge of the program. The financial infusion allowed states to embark on a ramped-up program of urban freeway construction (see **Figure 10**). Cities were largely willing to accede to the routing and design decisions of state highway engineers—because they were desperate to build freeways to deal with traffic congestion.

(Figure 10. An Interstate-Era Freeway)

The Legacy of 1956

Over the 12 years from passage of the 1944 legislation that created the Interstate System to passage of the 1956 legislation that funded it, urban freeway planning lost its broader city planning focus and became narrowly focused on providing low-cost traffic service. Congressional decisions to ignore the freeway planning recommendations of the

Interregional Highways Committee in 1944, AASHO design standards adopted first in 1945 and then modified in 1957, and an array of Congressional decisions in 1956 combined to set a different course for freeway development. Federal and state policy decisions placed state highway departments, by virtue of the money they possessed, in charge of urban freeway development. The 1956 legislation's 90 percent federal cost share for Interstate projects biased state and local transportation choices in favor of Interstate freeway projects, as opposed to other highway or transit alternatives. Congressional decisions to limit the mileage of the Interstate System, but not the number of lanes on each facility, guaranteed that states would seek to build massive facilities in order to accommodate as much traffic as possible on each facility. High design standards then guaranteed that the massive facilities would have a significant negative effect on the communities they traversed.

The result of these decisions was the deployment of a national freeway program that failed to solve traffic congestion problems, failed to check decentralization, increased use of the automobile, increased pollution, and tore asunder many of the communities through which freeways were routed. The freeway revolts of the 1960s and the anti-interstate backlash of the 1960s and 1970s were the perhaps inevitable consequences. Only a few critics, most notably Lewis Mumford, raised even the possibility that these developments might occur when the crucial policy decisions were made in the 1940s and 1950s. The planning community, as represented by men like Harland Bartholomew, was noticeably silent, despite Bartholomew's own cautions that freeway planning needed to be handled very carefully by people who were familiar with local conditions.

For five decades, we have been living with the policy decisions that culminated in the 1956 legislation. As this paper illustrates, these decisions preempted an alternative path to urban freeway development that is most evident in the freeway planning documents of the 1930s. Although it is too late to turn back the clock to what might have been, it is important to reflect on the lessons of this story—many of which are now more widely voiced by those in the field and in legislative documents like ISTEA and TEA-21 that give shape to our national transportation policy. Perhaps the most important of these lessons are: 1) that the most important effects of transportation planning decisions often have little to do with transportation itself; 2) that those individuals with the most knowledge and experience of local conditions should take a lead rather than a subordinate role in planning and decision making; and 3) that seemingly innocent policy decisions can often have consequences that few would have thought possible. All three proved significant in transforming the direction of freeway development in the United States.

References

American Association of State Highway Officials. 1945. A Policy on Design Standards: Interstate System, Primary System, Secondary and Feeder Roads. Washington, DC: American Association of State Highway Officials.

American Association of State Highway Officials. 1957. A Policy on Arterial Highways in Urban Areas. Washington, DC: American Association of State Highway Officials.

Ammann and Whitney (Consulting Engineers) and Nathan Cherniack (Traffic Consultant). 1952. Milwaukee Expressway Plan. Prepared for the Commissioner of Public Works and the Director of Expressways, City of Milwaukee, Wisconsin. Milwaukee, WI.

Andrews, WE, DeLeuw, Cather and Company, and Ladislav Segoe. 1945. Detroit Expressway and Transit System. Prepared for the Detroit Transportation Board. Detroit, MI.

Author Unknown. 1933. "Extraordinary Development of Express Highways in the New York Region." *American City* 48 (7).

Author Unknown. 1947. "When to Build an Expressway." *American City* 62 (2): 72.

Author Unknown. 1948. "The Houston Expressway." *American City* November: 116-117.

Automobile Club of Southern California. 1937. Traffic Survey of Los Angeles Metropolitan Area. Los Angeles, CA: The Auto Club.

Bartholomew, Harland. 1924. "Alleviation and Remedy of Street Congestion," *Engineering News-Record* 92(18):766-767.

Bartholomew, Harland (and Associates). 1927. A Proposed Plan for a System of Major Traffic Highways, Oakland, California. Oakland: Major Highway and Traffic Committee of One Hundred.

Bartholomew, Harland (and Associates). 1928. A Plan for the City of Vancouver, British Columbia. St. Louis: Harland Bartholomew and Associates.

Bartholomew, Harland (and Associates). 1930. A System of Major Highways for Saint Louis County, Missouri. St. Louis: Harland Bartholomew and Associates.

Bartholomew, Harland (and Associates). 1942. Report on the Comprehensive System of Highways, Saint Louis County, Missouri. St. Louis: Harland Bartholomew and Associates.

Bartholomew, Harland (and Associates). 1947. A Report on Freeways and Major Streets in Eden Township, Alameda County. St. Louis: Harland Bartholomew and Associates.

Bartholomew, Harland (and Associates). 1954. City of Atlanta and Fulton County Georgia Major Thoroughfare Plan. St. Louis: Harland Bartholomew and Associates.

Bottles, Scott. 1987. Los Angeles and the Automobile: The Making of the Modern City. Berkeley: University of California Press.

Brown, Jeffrey. 1998. Trapped in the Past: The Gas Tax and Highway Finance. Unpublished Master's thesis. University of California, Los Angeles.

Brown, Jeffrey. 2005a. "A Tale of Two Visions: Harland Bartholomew, Robert Moses, and the Development of the American Freeway." *Journal of Planning History* 4(1): 3-32.

Brown, Jeffrey. 2005b. "From Traffic Regulation to Limited Ways: The Effort to Build a Science of Transportation Planning." Working Paper. Florida Planning and Development Lab.

Buel, R.A. 1972. Dead End: The Automobile in Mass Transportation. Baltimore, MD: Penguin Books.

Burby, J. 1971. The Great American Motion Sickness; or, Why You Can't Get There From Here. Boston, MA: Little, Brown.

Caro, Robert. 1974. The Power Broker: Robert Moses and the Fall of New York. New York: Knopf.

Chicago Plan Commission. 1943. Proposed Expressway Development Program (Initial Stage) for the City of Chicago.

City Plan Commission. 1951. Expressways of Greater Kansas City: An Engineering Report for the Missouri State Highway Department and the Bureau of Public Roads, Department of Commerce. Kansas City, MO.

City Planning Commission of Cincinnati. 1951. The Expressway System for Metropolitan Cincinnati.

Collier-Burns Highway Act of 1947. 1947. Sacramento, CA: California State Printing Office.

Commonwealth Club of California. 1946. "Metropolitan Freeways and Mass Transportation" from Transactions of the Commonwealth Club of California Volume 40 (4). San Francisco.

DeLeuw, Charles E. 1939. A Comprehensive Superhighway Plan for the City of Chicago. Chicago, IL: Department of Superhighways.

DeLeuw, Cather, and Company, with Ladislas Segoe and Associates. 1948. A Report to the City Planning Commission on a Transportation Plan for San Francisco. San Francisco: DeLeuw, Cather, and Company.

De Leuw, Cather, and Company. 1949. Major Trafficways of the Milwaukee Metropolitan Area.

Ellis, Clifford D. 1990. Visions of Urban Freeways. Unpublished doctoral dissertation. Department of City and Regional Planning, University of California. Berkeley, CA.

Federal-Aid Highway Act of 1944 (Public Law 78-521)

Federal-Aid Highway Act of 1956 (Public Law 84-627)

Foster, Mark. 1981. From Streetcar to Superhighway: American City Planners and Urban Transportation, 1900-1940. Philadelphia: Temple University Press.

Foster, Mark. 2003. A Nation on Wheels: The Automobile Culture in America Since 1945. Belmont, CA: Wadsworth.

Garreau, Joel. 1991. Edge City: Life on the New Frontier. New York: Doubleday.

Gifford, Jonathan. 1983. An Analysis of the Federal Role in the Planning, Design, and Deployment of Rural Roads, Toll Roads, and Urban Freeways. Unpublished doctoral dissertation. Berkeley, CA: University of California.

Hebert, R. 1972. Highways to Nowhere: The Politics of City Transportation. Indianapolis, IN: Bobbs-Merrill.

Interregional Highways Committee. 1944. Interregional Highways. House Document 379, 78th Congress, 2nd Session. Washington, D.C.: U.S. Government Printing Office.

Jones, David. 1985. Urban Transit Policy: An Economic and Political History. Englewood Cliffs, NJ: Prentice-Hall.

Jones, David. 1989. California's Freeway Era in Historical Perspective, California Department of Transportation. Berkeley, CA: University of California Institute of Transportation Studies.

Jones, John Hugh. 1961. The Geometric Design of Modern Highways. New York: Barnes and Noble.

Joint Board for Metropolitan Highway Construction. 1948. The Master Highway Plan for the Boston Metropolitan Area.

Kay, Jane Holtz. 1997. Asphalt Nation: How the Automobile Took over America, and How We Can Take it Back. New York: Crown Publishers.

Kelly, B. 1971. The Pavers and the Paved. New York: Donald W. Brown, Incorporated.

Leavitt, H. 1970. Superhighway-Superhoax. Garden City, New York: Doubleday and Company.

Lewis, Tom. 1997. Divided Highways: Building the Interstate Highways, Transforming American Life. New York: Viking.

Lochner and Company. 1944. Traffic Analysis and Expressway Plan for the City of Louisville, Kentucky. Prepared for the Department of Highways of the Commonwealth of Kentucky. Chicago, IL: Lochner.

Lochner and Company, with DeLeuw, Cather and Company. 1946. Highway and Transportation Plan for Atlanta, Georgia. Prepared for the State Highway Department of Georgia and the Public Roads Administration, Federal Works Agency.

Longstreth, Richard. 1997. City Center to Regional Mall: Architecture, the Automobile, and Retailing in Los Angeles, 1920-1950. Cambridge, MA: The MIT Press.

Lupo, A., F. Colcord, and E.P. Fowler. 1971. Rights of Way: The Politics of Transportation in Boston and the U.S. City. Boston: Little, Brown and Company.

MacDonald, Thomas. 1947. "The Case for Urban Expressways." *American City* 62 (6): 92-93.

(Charles A.) Maguire and Associates. 1947. A Freeway Plan for Providence (Rhode Island).

McClintock, Miller. 1927. "The Traffic Survey" in Planning for City Traffic. Volume 133, The Annals of the American Academy of Political and Social Science. Austin F. MacDonald, ed. Philadelphia, PA. Pages 8-18.

McClintock, Miller. 1932. Limited Ways: A Plan for the Greater Chicago Traffic Area. Chicago: Committee on Traffic and Public Safety.

McClintock, Miller. 1937. Report on Citywide Traffic Survey. San Francisco: Department of Public Works.

McShane, Clay. 1999. "The Origins and Globalization of Traffic Control Systems," from *Journal of Urban History* 25(3): 379-404.

Mohl, Raymond A. 2004. "Stop the Road: Freeway Revolts in American Cities," from *Journal of Urban History* 30(5): 674-706.

Moses, Robert. 1938. 1938 Construction Program: Arterial Parkways in the Metropolitan Area. Department of Parks, City of New York.

Moses, Robert. 1943. Portland Improvement. Portland, OR.

Moses, Robert. 1944. Baltimore Freeway and Expressway Plan. Baltimore, MD.

Moses, Robert. 1945. (NY) Arterial Highways and Major Streets.

Moses, Robert. 1946. Arterial Plan for New Orleans. New Orleans.

Moses, Robert (and Andrews & Clark, consulting engineers). 1949. Arterial Plan for Hartford. New York.

Mowbry, A.Q. 1969. Road to Ruin. Philadelphia and New York: J.B. Lippincott Company.

New York City's Highway System: Present and Future. Report of a Study by the Works Progress Administration Project, Sponsored by the Mayor's Committee on City Planning. 1938. New York City. Works Progress Administration Project 465-97-3-96.

Nolen, John (consultant). 1930. A Report on a Major Street Plan for the City of San Diego, California. San Diego, CA: City Planning Commission.

Olmsted, Frederick Law, Harland Bartholomew, and Charles Cheney. 1924. A Major Traffic Street Plan for Los Angeles. Prepared for the Committee on Los Angeles Plan of Major Highways of the Traffic Commission of the City and County of Los Angeles.

Oregon State Highway Department. 1955. Freeway and Expressway System, Portland Metropolitan Area. Portland, OR: Oregon Highway Commission.

Orlin, Glenn S. 1992. Evolution of the American Urban Parkway. Unpublished Ph.D. thesis, George Washington University.

Philadelphia City Planning Commission. 1949. Philadelphia's First Expressway. Philadelphia, PA.

City of Philadelphia Urban Traffic and Transportation Board. 1955. Expressway Plan and Program 1955. Philadelphia, PA.

Public Roads Administration. 1939. Toll Roads and Free Roads. Washington, DC: US Government Printing Office.

Rapid Transit Commission (RTC). 1924. Proposed Super-highway Plan for Greater Detroit. Detroit, MI: Rapid Transit Commission.

Rapid Transit Commission. 1949. Rapid Transit Plan for Metropolitan Detroit with a Suggested Plan for Financing Expressways and Rapid Transit. Detroit, MI: Rapid Transit Commission.

Regional Plan Association. 1929. Regional Plan of New York and Its Environs.

Rose, Mark. 1990. Interstate: Express Highway Politics, 1939-1989. University of Tennessee Press.

Schneider, K.R. 1971. Autokind versus Mankind: An Analysis of Tyranny, A Proposal for Rebellion, A Plan for Reconstruction. New York: Norton.

Seely, Bruce. 1987. Building the American Highway System: Engineers as Policy Makers. Philadelphia, PA: Temple University Press.

State Road Department. 1947. A Traffic Survey Report and Limited Access Highway Plan for the Tampa Metropolitan Area. Prepared by the Division of Research and Records of the State Road Department of Florida in Cooperation with the Public Roads Administration, Federal Works Agency.

Swan, Herbert S. 1931. "The Parkway as a Traffic Artery, Part 1," from *American City* 45(4): 84-86.

Taylor, Brian. 1995. "Public Perceptions, Fiscal Realities, and Freeway Planning: The California Case," *Journal of the American Planning Association*, 61(1): 43-56.

Taylor, Brian D. 2000. "When Finance Leads Planning: Urban Planning, Highway Planning, and Metropolitan Freeways," from *Journal of Planning Education and Research*. 20(2): 196-214.

Technical Committee of the Council, City and County of San Francisco. Traffic, Transit and Thoroughfare Improvements for San Francisco. Prepared for the Mayor's Administrative Transportation Planning Council by the Technical Committee of the Council. City and County of San Francisco, March 1947

Transportation Engineering Board, City of Los Angeles (TEB). 1939. A Transit Program for the Los Angeles Metropolitan Area. Los Angeles.

Turner, Daniel. 1925. "The Detroit Superhighway Project: A Unique Departure in Transportation Planning." *American City* 32 (4): 373-376.

Wachs, Martin. 1984. "Autos, Transit, and the Sprawl of Los Angeles: The 1920s." *Journal of the American Planning Association* 50(3): 297-310.

Warner, Sam Bass. 1962. Streetcar Suburbs: The Process of Growth in Boston (1870-1900). Cambridge, MA: Harvard University Press.

Weingroff, Richard. Undated. Designating the Urban Interstates. Available from the Federal Highway Administration website:
<http://www.fhwa.dot.gov/infrastructure/fairbank.htm>

Whitten, Robert (consultant). 1930. Report on a Thoroughfare Plan for Boston. 1930. Prepared by the City Planning Board. Boston, MA.

Whitten, Robert. 1932. "The Expressway in the Region." *City Planning* 8 (1): 23-27.

Young, Hugh. 1928. "Ten-Mile \$60,000,000 Motor Express Highway Proposed for Chicago." *American City* 38 (3): 91-92.

Acknowledgements

I would like to thank Brian Taylor and Greg Thompson for their many helpful comments. I would like to acknowledge the assistance of Myungjun Jang in helping to obtain and prepare the images used in this paper.

Notes

¹ See, for example, Bottles 1987, Foster 2003, Garreau 1991, and Lewis 1997.

² See, for example, Buel 1972, Burby 1971, Hebert 1972, Kay 1997, Kelly 1971, Leavitt 1970, Lupo et al 1971, Mowbray 1968, and Schneider 1971.

³ I use the term freeway throughout this paper to refer to a fully grade-separated, limited access highway or network of highways. This is the same definition embodied in the AASHO standards (AASHO 1945, AASHO 1957).

⁴ It is not surprising that one of the most important figures in the development of these parkways, Robert Moses, was also an important figure in later freeway development (Brown 2005a).

⁵ In the downtown district, the rapid transit lines would run in a subway, and thus the necessary right of way was reduced accordingly. The rapid transit system would feature stations located at half-mile intervals (Rapid transit Commission 1924).

⁶ The Regional Plan contained a blueprint for extensive region-wide development of a 253-mile network of radial highways, outer and inner beltways, and metropolitan bypass routes (Regional Plan Association 1929). Advance acquisition of right of way in the outer areas was a particular theme of this document, so roads could be built in advance of development.

⁷ One of Moses' few significant failures in the financial realm was his unsuccessful quest to obtain a larger share of state gas tax revenues for urban parkway construction in New York City, which was itself one of the primary rationales for his 1938 plan (Moses 1938).

⁸ Moses's 1945 plan of *Arterial Highways and Major Streets* included a combination of arterials, bridges, parkways, and expressways, including the never-built Cross-Manhattan Expressways, but reads more like a laundry list of projects designed to respond to a crisis (traffic congestion) than a document with an underlying vision (Moses 1945).

⁹ Chicago completed work on the Lake Shore Drive, which was financed largely with federal public works funds, but otherwise accomplished little in the way of freeway or express highway construction during the pre-war period.

¹⁰ The 1943 plan was based on earlier work, but included the new proviso that route selection would be made in order to preserve communities by following their boundaries. Perhaps out of the concern for neighborhood effects, this report favored depressed freeway construction, as opposed to earlier efforts that had proposed significant mileage of elevated construction (Chicago Plan Commission 1943).

¹¹ Ironically for a plan that contains one of the most infamous examples of freeway planning gone dreadfully wrong, the Central Artery, Whitten spent significant attention on the aesthetics of the parkways, as being an exceptional combination of beauty and utility that could improve the physical landscape of the city (Whitten 1930). Indeed, discussions of the beauty of freeways fill many of the planning documents of this period (Schweitzer 2004).

¹² Elevated highways were a particularly sensitive point in San Francisco, and McClintock called for 34 miles of his network to be elevated (McClintock 1937).

¹³ Bartholomew's plan called for the stage development of the rail rapid transit system, with stations at half-mile intervals, and the existing streetcar and motorbus routes serving as feeders to the rail rapid trunklines (Bartholomew 1930).

¹⁴ Bartholomew hesitated to increase capacity beyond that because of the congestion that would occur at junction points with the local street network (Bartholomew 1930).

¹⁵ By contrast, New York's freeway network consisted of a combination of freeways, expressways, and parkways.

¹⁶ The Federal-Aid Highway Act of 1934 authorized states to use some of their aid funds for planning and data collection, and the data painted a picture of traffic patterns that ran counter to the then-conventional wisdom. Most people then believed that a lot of the traffic on the federal-aid highway system wished to bypass congested urban centers; it turned out that the overwhelming majority of traffic was actually bound for the city (Public Roads Administration 1939).

¹⁷ The BPR felt that the facilities would need to be grade separated, access points needed to be limited, and travel speeds would need to be high in order to attract toll-paying motorists, and hence the facilities were quite expensive (Public Roads Administration 1939).

¹⁸ The BPR's toll assessment proved to be severely flawed. The opening of the wildly successful, in financial terms, Pennsylvania Turnpike in one of the corridors BPR had judged unable to recover costs certainly proved this case. See Gifford (1983) for an extensive critique of BPR's toll feasibility assessment.

¹⁹ "In the larger cities generally only a major operation will suffice—nothing less than the creation of a depressed or an elevated artery (the former usually to be preferred) that will convey the massed movement pressing into, and through, the heart of the city, under or over the local cross streets without interruption by their conflicting traffic" (Public Roads Administration 1939: 93).

²⁰ Slum clearance was a major theme. "With no natural open spaces to follow, the new expressways must be located largely through solid development. It is fortunate that the general pattern of traffic flow coincides with belts of depressed property cheap enough to acquire for wide traffic arteries" (Andrews, et al 1945: 8).

²¹ One plan openly acknowledged the tension between traffic service concerns and broader city planning concerns. The 1951 plan for Kansas City emphasized that its recommendations were the result of a joint effort by planners and engineers. The authors observed that a traffic survey was consulted at the beginning of the planning process, but that alignments were altered so as to link the freeway plan with the land use goals of the city's master plan (City Plan Commission 1951).

²² The only limitation on freeway location is the decision to place the CBD routes along the perimeter of the central business district, so as not to necessitate the taking of valuable downtown land (City Planning Commission 1951).

²³ "Although cost is an important consideration in the location of expressways it must not be permitted to cause sacrifice of their functioning with maximum efficiency" (City Planning Commission 1951: 12).

²⁴ "Some of the projects recommended here may meet with opposition, narrow though it may be. Probably none will receive unanimous endorsement by every citizen of San Francisco, for among a population as large and as diverse and complex as that of San Francisco there are some persons who are bound to have their toes stepped on in any advance forward, and there are others who reject the idea of advancing at all, despite the fact that such a do-nothing attitude is tantamount to a retreat. But for the overwhelming majority of San Franciscans who are looking for a way forward, and who are yearning for decisive action, it is felt by the Technical Committee that the program it now recommends will answer, substantially, the present day problems of transportation and traffic" (Technical Committee of the Council, City and County of San Francisco 1947: 2-3).

²⁵ The \$50 million expense was justified solely on the basis of motorist time savings, which the authors valued at one cent per minute saved (Maguire, et al 1947). Typical of many plans of this period there was

extensive discussion of the need for parking facilities to serve downtown traffic, and proposals for 1700 off-street parking spaces were included at an estimated cost of \$1.8 million.

²⁶ Early freeway planning in Houston made other kinds of modifications to the original conception of the interstate system. In Houston, as in Vancouver, British Columbia, the expressways were originally planned not to bisect the downtown but rather to merge into the local street system (American City 1948).

²⁷ The consultants had followed the traditional engineering technique of conducting a travel survey, compiling desire lines, and placed the facilities as close as possible to the largest traffic flows (DeLeuw, Cather, and Company 1949). This was modified only slightly to allow the facilities to be placed in areas with low property values, so right of way costs could be minimized.

²⁸ “In preparing plans for the Milwaukee Expressway System, thorough consideration has been given to factors of traffic needs, land use, and other phases of economics. The expressways will provide access from all parts of the city to the central district, remove traffic from congested streets throughout the city, and provide additional crossings of the Menomonee River Valley. They will be convenient to traffic generators inside and outside of the downtown area, and thus serve the largest possible volumes of traffic” (Ammann and Whitney, et al 1952: 27).

²⁹ The expenditure of such enormous amounts of public money was justified on the basis of savings to motorists in time, accident costs, and frustration and economic benefits to business interests in the central business district (Joint Board for Metropolitan Highway Construction 1948).

³⁰ The authors claimed that: “Landscaping of side slopes, medial dividers, and marginal strips will give the expressways a park-like appearance and absorb the hum of highway traffic. Adjacent property will be desirable for new buildings of all kinds, residential, industrial, and institutional, because of the superior transportation facilities afforded and the attractive view provided” (Joint Board for Metropolitan Highway Construction 1948: 51). But the facilities proposed were not the slow-speed parkways of the 1920s with their generous landscaping and numerous recreational features. They were modern stark, utilitarian interstate-style freeways.

³¹ The transit component of the plan was concerned with the replacement of the city’s streetcars with a system of local buses and freeway express buses. The consultants paid no attention to land use patterns or any other city planning documents in their efforts (De Leuw, Cather, and Company, et al 1946).