Planning for Cars in Cities

Planners, Engineers, and Freeways in the 20th Century

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Many of the attendees at the First National Conference on City Planning would have arrived at the proceedings in horse-drawn vehicles, but these were rapidly being replaced by automobiles when it met in 1909. By 1912, traffic counts in New York showed more vehicles powered by internal combustion engines than by horses for the first time (McShane & Tarr, 1997). Thus, as the conference delegates gathered in Washington, urban transportation problems like manure in the streets, horse carcasses clogging the roads, slow and unsafe vehicles, and frequent biting and trampling, were rapidly giving way to the seemingly limitless promise of the motorized era (Morris, 2007). Unable to foresee a future of sprawl, oil dependence, congestion, and smog, many contemporary observers, undoubtedly including many conference participants, considered the private auto the savior of urban transportation.

Problem: When the First National Conference on City Planning took place in Washington, DC, 100 ago, the delegates failed to foresee the consequences of mobility and suburbanization, but in other ways they were remarkably prescient. They stressed the importance of the linkage between transportation and land use, understood that transportation facilities must be harmoniously embedded in the urban fabric, and viewed transportation investment as a way to direct growth, revitalize flagging areas, and link jobs and housing. Since transportation planners in subsequent decades kept this vision alive, envisioning a network of context-sensitive urban freeways fully integrated into the urban milieu, why is this not what was built?

Purpose: We consider the history of U.S. urban transportation planning over the past 100 years, to explain the evolution and legacy of the single most important transportation development of the past century save automobility itself: the emergence of the urban freeway.

Methods: We reviewed primary and secondary material, including plans, manuscripts, newspaper accounts, and scholarly articles and books.

Results and conclusions: We argue that the method used to fund interstate highway development put federal and state highway engineers in charge, and this affected highways’ location and design. State highway engineers imposed a narrow, traffic-service-oriented vision on metropolitan freeways that focused on maximizing vehicle throughput and largely ignored other urban concerns. With too little advance thought, overbuilt, sparse, ring-radial networks were routed through neighborhoods in cities around the country, often at great social and environmental cost. Though the system has undeniably conferred great benefits in terms of enhanced mobility, the costs have been high as well. Recent years have seen a return to the early planners’ perspective, stressing the social, environmental, and aesthetic impacts of transportation facilities and interactions with land use.

Takeaway for practice: A century-old vision of coordinated transportation and land use planning has resurfaced in practice, but in the meantime politically expedient decisions about public finance have had unanticipated, but profound and long-lasting effects on projects, travel, and urban form.

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Yet, in the space of a century, the automobile went from being the darling of planners to being their bête noire. In this article, we consider the history of U.S. urban transportation planning over the past 100 years and focus on the single most important transportation development of the past century, save for the advent of automobile itself: the emergence of the urban freeway. The freeway has exerted tremendous influence both on travel patterns and on urban form. Yet, surprisingly, those charged with freeway development often ignored the effects their creations were to have on land use, city form, and the other facets of the urban environment.

It needn’t have been this way. The planning principles that could have guided a socially aware process for building contextually integrated freeways were well known to the 1909 conference attendees and other like-minded planners of the day. Accordingly, we begin our discussion with their vision: transportation planning in which transportation facilities are not merely a means of facilitating movement, but also a tool for reshaping urban form. This view informed efforts to adapt the city to the automobile and vice versa and was most evident in plans for urban freeways in the 1920s and 1930s.

Yet, during subsequent decades these farsighted and imaginative freeway plans were largely abandoned. Because cities lacked the ability to pay for urban freeway development, their planning staffs ultimately lost control over the process, ceding power to state and federal highway agency engineers, most of whom shared a very different outlook and set of values. The engineers focused primarily on maximizing traffic throughput and secondarily on increasing safety, giving little consideration to most other concerns. These were very different objectives than those of the early planners and dramatically affected the freeways ultimately built in cities. The Dwight D. Eisenhower System of Interstate and Defense Highways has unquestionably brought tremendous increases in mobility, productivity, and prosperity. But these benefits also came at great cost to cities and their residents.

Reaction to the era of freeway construction brought modern planning thought and practice full circle. Since the 1990s, planners, and their vision of the transportation network as an integrated circulatory system embedded in the larger urban organism, have become more influential again. It has taken the better part of a century, but we may finally have come to appreciate the transportation planning wisdom of those at the first planning conference 100 years ago.

The Overarching Vision of Early Transportation Planners

The proceedings from the 1909 conference reveal that early planners underestimated and misunderstood the future impacts of the automobile (Committee on the District of Columbia, United States Senate, 1910/1967). The proceedings contain surprisingly few references to the auto as a distinct mode; if participants realized they were standing on a fault line between two eras of urban transportation, they betrayed no sign of it. The automobile came up just once at the 1909 conference, in a trivial aside noting that motorists enjoyed access to Washington’s Rock Creek Park that other residents lacked (Committee on the District of Columbia, United States Senate, 1910/1967).

Had conference attendees foreseen the revolutionary effect autos were to have on urban form, accelerating ongoing trends of deconcentration and decentralization, they would almost certainly have welcomed it. Participants in the 1909 conference focused not on checking suburbanization and revitalizing center cities, but on the planning problem of the day: severe crowding in central portions of large cities. Suburbanization was seen at the time not as a problem, but as a strategy for allowing people in congested cities to escape to areas where they could enjoy higher quality housing, healthier lifestyles, and parks and open space.

However, while 1909 conference participants’ thinking on suburbs and sprawl would differ from that of planners in 2009, in many ways the ideas expressed in Washington a century ago matched those of planners today. In particular, participants a century ago often expressed a holistic vision of transportation planning that recognized its symbiotic interaction with land use (Committee on the District of Columbia, United States Senate, 1910/1967). Transportation facilities were viewed not as ends in themselves but as tools for providing access between cities and suburbs, work and home. Their power to shape growth was appreciated. Conference participants valued these effects of transportation investments as much as, if not more than, the role the facilities played in carrying traffic. And the linkage cut both ways. Conference participants argued that land use would determine the size and kinds of transportation facilities needed. For example, participants in the 1909 conference expressed concerns about large buildings crowded onto narrow, congested streets. They advocated hierarchical road networks that would concentrate through traffic on major boulevards and arterials rather than uniform street grids that would distribute traffic through residential neighborhoods (Committee on the District of Columbia, United States Senate, 1910/1967). Zoning, pioneered in Germany, was held up at the conference as a model. Many
attendees argued that German transportation planning would dovetail with the new zoning schemas to effectively guide both development and travel.

The conference foreshadowed modern planning thought in another way: It stressed multi-modalism. Attendees advocated weaving facilities for private vehicles, streetcars, and pedestrians together into a coordinated system to provide access to healthier living, especially recreational facilities (Committee on the District of Columbia, United States Senate, 1910/1967). Few of the general transportation problems discussed and the solutions espoused at the 1909 conference would be out of place at an APA conference today.

Yet, as the conference concluded, the delegates dispersed with a false sense of optimism. In the succeeding decades, planners and engineers would lose their focus on the transportation/land use nexus. In the period immediately following World War II those who did retain this vision became marginalized as a narrower focus on traffic service and traveler safety supplanted the broader transportation/land use vision. The interstate highway system would represent the triumph of a set of values far different from those expressed at the 1909 conference and by like-minded early planners.

**Transportation Planning Encounters the Automobile**

The shift in focus was not immediate. During the 1910s and 1920s, transportation planners stayed largely faithful to the principles of the 1909 conference (Brown, 2006). By and large they embraced multimodalism and they viewed the integration of transportation and land use as critical to successful planning outcomes (Bartholomew, 1924; Harland Bartholomew and Associates, 1928; Nolen, 1930; Olmsted, Bartholomew, & Cheney, 1924). Planners retained these beliefs even as they confronted the spiraling automobile congestion that resulted from the auto’s becoming a mass-market good. Automobile congestion was qualitatively different than what came before. Automobiles consumed a large amount of street space and, even more importantly, they traveled at speeds considerably higher than the other types of traffic with which they shared the road. These factors caused large traffic tie-ups, particularly in dense downtown areas. The situation was exacerbated by narrow streets, inadequate parking, and what literature at the time called the promiscuous mixing of local and through traffic on the same streets, and irrational street plans that featured jogs, dead-ends, uncontrolled intersections, and abrupt changes in width and paving (Bartholomew, 1924; Knowles, 1925; McClintock, 1927).

Planners pursued their ultimately unsuccessful efforts to eliminate the scourge of traffic congestion by deploying an increasingly sophisticated array of technological, regulatory, and design solutions that matched their guiding principles (Bartholomew, 1924; McClintock, 1925, 1927). They began by attempting to impose order on chaotic street conditions. In 1900, William Phelps Eno authored *Reform of Our Streets Urgently Needed* (Eno Transportation Foundation, 2008). Nine years later he put his ideas into practice when he devised the world’s first traffic code for New York City. Among the traffic control measures he invented or popularized are the stop sign, the pedestrian island, the traffic circle, and the taxi stand. He also penned the first enforcement manual for traffic police, again for New York, and he created the Eno Foundation for Highway Traffic Control dedicated to the study of traffic and its regulation (Eno Transportation Foundation, 2008). By the early 1920s, Miller McClintock and his staff at Harvard University’s Erskine Street Traffic Research Bureau pioneered survey techniques that led to a better understanding of traffic flows. This knowledge in turn informed the seminal work *Street Traffic Control*, in which McClintock (1925) proposed a comprehensive set of traffic regulations to govern the movements of pedestrians and motorists. Cities around the country rushed to implement these regulations, improving traffic flows and reducing collisions. Planners next advocated the use of signaling systems to govern the movement of traffic through and between intersections (McShane, 1999), and these systems began to appear in cities throughout the United States. These strategies brought relief, particularly at previously gridlocked intersections, but the respite was brief due to the increasing number of automobiles. Between 1918 and 1925, the year McClintock published his book on traffic regulation, the number of registered motor vehicles in the United States increased more than threefold, from 6.2 million to 20.1 million (Office of Highway Information Management, Federal Highway Administration [FHWA], 1995).

Confronted by rising numbers of automobiles that swamped their regulatory efforts, planners began to collect traffic data to better understand the underlying causes of congestion (Bartholomew, 1924; McClintock, 1925). These analyses led them to strategies set out in documents called *major traffic street plans*. Planners such as Harland Bartholomew, Charles Cheney, and John Nolen pioneered the development of major traffic street plans during the late 1910s and 1920s. Los Angeles, Portland, Sacramento, Saint Louis, San Diego, and scores of other cities hired these and other consultants to prepare them. The work was generally undertaken at the behest of downtown commercial interests who believed central business district (CBD)
Traffic congestion was driving customers to the suburbs. Their concerns were echoed by city officials who feared the effects declining CBD property assessments would have on municipal coffers.

The consultants who prepared these reports were inspired by the City Efficient planning movement, which emphasized deploying science and expertise to devise concrete, functional, practical solutions to urban problems. This school of thinking was very much in evidence at the 1909 conference (Brown, 2006; Committee on the District of Columbia, United States Senate, 1910/1967; Peterson, 2003; Scott, 1995). Major traffic street plans typically advocated infrastructure improvements to make street systems more rational by connecting and widening streets and eliminating jogs and dead ends (see Figure 1).

The plans also called for installing traffic signaling systems at major intersections where they were still lacking. The authors of these plans also recommended classifying streets in hierarchies, using speed limits and different road widths to funnel through traffic onto the main thoroughfares and away from residential streets (see Figure 2). The plans also frequently sought to segregate types of traffic, particularly to separate streetcars from automobiles, in order to speed the flows of both modes.

So while they tended to emphasize obvious geometric and operational solutions to traffic conflicts in cities, the authors of the early wave of major traffic street plans frequently echoed the arguments for multimodalism and the coordination of transportation and land use heard at the 1909 conference, as A Major Traffic Street Plan for Los

Figure 1. Major traffic street plan for Los Angeles.

Source: Olmsted et al. (1924).
Figure 2. Street classification for Oakland, CA.

Source: Harland Bartholomew and Associates (1927, p. 50).
These, along with the more widely chronicled suburban parkways, were forerunners of the next major development between the late 1910s and the 1930s. Urban Freeway designed primarily to accommodate automobiles were at least partly implemented in many cities around the country from a coalition of downtown and suburban business and real estate interests and the automobile clubs, all of whom championed passage of a $5 million bond issue to help pay for some of the necessary street improvements (Bottles, 1987; Foster, 1981).

Such voter largesse stood in stark contrast to attitudes toward funding public transit. Streetcar systems at this time were mostly private, for-profit enterprises, and the public generally viewed operators as rapacious monopolists; hence measures to fund transit improvements usually failed at the ballot box (Barrett, 1983; Bottles, 1987; Foster, 1981; St. Clair, 1986), while the major traffic street plans designed primarily to accommodate automobiles were at least partly implemented in many cities around the country between the late 1910s and the 1930s.

A few particularly prescient major traffic plans, including those that Harland Bartholomew prepared for Oakland and Vancouver, also proposed grade separation at major intersections to achieve higher speeds, higher volumes, and more direct connections between important locations (Harland Bartholomew and Associates, 1927, 1928). These, along with the more widely chronicled suburban parkways, were forerunners of the next major development in urban transportation planning: the freeway.

Transportation Planners Devise the Urban Freeway

Major traffic street plans provided some congestion relief, but, as with the previous generation of transportation improvements, the rising tide of autos continued to swamp planners’ best efforts. Between 1925 and 1929, the number of registered motor vehicles in the United States increased from 20.1 million to 26.7 million, a 30% increase in just 4 years (Office of Highway Information Management FHWA, 1995). As automobile congestion rose, it became clear that street geometry and surface street traffic management measures alone would not be enough to smoothly circulate the growing numbers of private vehicles in cities. Thus planners and engineers hit upon a new strategy, which at the time was widely regarded as the permanent solution to metropolitan traffic congestion (McClintock, 1937; Transportation Engineering Board [TEB], City of Los Angeles, 1939; Whitten, 1930).

Adapting the form of recreational parkways, forward-thinking transportation planners like Lloyd Aldrich, Harland Bartholomew, Miller McClintock, and Robert Whitten began to devise plans for a new type of facility that they argued could cope with the increasing number of autos travelling at higher and higher speeds. Though it has been called by various names (the speedway, the limited way, the superhighway, and the expressway), in this article we call this new type of roadway the freeway.

The freeway borrowed two important design characteristics from earlier rural and suburban parkways: limited access and grade separation (Orlin, 1992). Limiting access from parcels along the route prevented slow-moving vehicles from unpredictably entering and exiting the traffic stream, thus reducing collision risk and allowing higher traffic speeds (Swan, 1931). Grade separation allowed uninterrupted, continuous movement of through traffic on the freeway, effectively doubling road capacity; it also minimized disruption on crossing routes, increasing speeds on these facilities as well and eliminating the possibility of accidents at intersections (McClintock, 1937). Deployed in tandem, limited access and grade separation promised to permit far greater traffic volumes at higher speeds and with fewer collisions.

The urban freeway was widely perceived at the time as an idea whose time had come. The issue was not whether they should be built, but how. Key questions remained about planning, routing, design, construction, and, crucially, finance. Early metropolitan freeway planners were steeped in the principles on display at the 1909 conference. They viewed transportation as just one part of the larger urban system. For example, famed early planning thinker Lewis Mumford saw limited access highways as suitable for connecting Garden Cities, provided that they were carefully coordinated with land use and urban design in order to minimize the auto’s potential negative effects; Mumford believed strongly that highways should stop at the city limits (Ellis, 2005).

Planners who focused primarily on transportation at this time prepared plans at the behest of cities or local civic and business groups and naturally tended to emphasize the
concerns of their clients. They proposed facilities designed to serve urban trips made by urban residents; the facilitation of intercity through traffic was a secondary concern. This focus on intrametropolitan travel was not entirely parochial; traffic counts showed that the vast majority of vehicle trips in metropolitan areas at that time were indeed local (U.S. Bureau of Public Roads, 1939).

The plans considered how freeways interacted with their surroundings and the larger transportation network and sited and scaled facilities to cut with, not against, the urban grain (Harland Bartholomew and Associates, 1942; De Leuw, 1939; MacDonald, 1947; Rapid Transit Commission [RTC], 1924; TEB, City of Los Angeles, 1939; Whitten, 1930). Accordingly, metropolitan freeway plans in the 1920s, 1930s, and 1940s minimized the footprints of individual facilities. Roads had two, or at the most three, lanes of traffic in each direction. Design speeds were typically 40 to 50 miles per hour, far faster than for surface streets, but much slower than modern urban freeways. Interchanges and ingress and egress points were designed simply and parsimoniously to keep the facilities compact and to avoid disrupting surrounding areas by dumping large numbers of autos onto surface streets. In addition, the proposed freeways were laid out in comparatively dense networks. These plans for smaller but more plentiful freeways were intended to disperse traffic rather than to concentrate it. If these plans had been built they would have had important traffic service benefits; for example, now that cities have just a few large facilities, more drivers must travel long distances on local streets just to access the freeway network, thereby increasing vehicle miles of travel. Also, a denser network would have balanced traffic flows between the freeway and surface street systems. The 1939 plan for Los Angeles reflects this vision; it proposed a dense grid pattern as opposed to a sparse ring-radial system in order to spread traffic across the city instead of concentrating it in and through the CBD (TEB, City of Los Angeles, 1939; see Figure 3).

Many early freeway plans had strong multimodal components, such as rail lines, busways, or even truck lanes in the median. The 1924 superhighway plan for Detroit proposed a 225-mile freeway network as part of a larger rail rapid-transit plan; all the superhighways included rail transit in their rights-of-way (RTC, 1924; see Figure 4). The 1939 freeway plan for Los Angeles also included an extensive regional rail and rapid transit component (TEB, City of Los Angeles, 1939). These plans would have conferred the speed and safety benefits of grade separation and limited access on transit as well as on the automobile.

Land uses surrounding transportation facilities were sometimes woven into the plans, occasionally in amb-

The authors were cognizant of the dynamics of urban growth and change. They saw roads, transit, and freeways as potential tools for urban renewal, particularly to revive flagging central business districts, facilitate slum clearance, direct growth into desired areas, and, over time, slow suburban sprawl. Many planners writing at the time expressed the view that suburban commercial development was largely a response to downtown inaccessibility, a problem freeways would rectify (MacDonald, 1947; U.S. Bureau of Public Roads, 1939). These early metropolitan freeway plans sometimes called for advance land acquisition along the rights of way to permit congruent real estate development adjacent to the new freeways, resale of which, together with property tax collections, would offset construction costs (TEB, City of Los Angeles, 1939). At times, area redevelopment projects were specifically included as part of the freeway construction plans.

These early proposed urban freeways were designed to accommodate short intraurban trips, to disperse traffic widely across a dense network of roadways, and to increase the speed of transit vehicles as well as autos (Jones, 1989), all while weaving through the urban fabric with the least possible disruption. The planners and engineers who assembled these plans believed that freeways would provide great benefits if sited and scaled properly, but they also believed the proposed systems could be highly disruptive if they were not. Freeways, in other words, were not viewed as somehow disconnected from land use, but as a particular type of land use that had to be planned carefully in order to shape and reshape the city in desired ways (Brown, 2005; Taylor, 2000).

Ambitious freeway proposals, such as the 1924 superhighway plan for Detroit and the 1939 Los Angeles plan, were popular with local officials, business groups, and motorists, but they carried very large price tags. The estimated cost of implementing the Los Angeles plan was more than $1 billion (over $14.5 billion in 2007 dollars; Brown, 2005). No U.S. city in the 1930s had the financial means to carry out such a plan. Similar stories can be told of ambitious freeway plans for Chicago, San Francisco, and many other U.S. cities. These municipalities had interesting and sometimes visionary ideas, but not enough money to implement them. Localities depended largely on the property tax for their revenue, and property tax proceeds were used to support a large array of other city services. Local officials occasionally sought state financial assistance, generally in the form of state gasoline tax proceeds, but their requests were rarely fulfilled (Chicago Plan Commission, 1943; De Leuw, 1939; McClintock, 1937). Thus, the early freeway construction that did occur, most famously under Robert
Moses in New York, took place on a piecemeal basis. Large-scale freeway construction would have to await the development of new funding mechanisms. While these were eventually found, the revenue they generated came at a price.

**Fiscal Politics Dictate a New Direction in Urban Freeway Development**

When metropolitan freeways were eventually built, they did not develop along the lines proposed by early planners and city officials. Why? The answer, as is so often the case, was money. Property taxes, bonds, and special assessment districts had been the workhorses of the transportation finance system into the 1920s. They were collected and administered locally, and decisions on how to deploy the revenue were made locally as well. Because they controlled the money, cities had the autonomy to shape their own road networks and to use them to guide development. The use of special assessment districts gave cities the ability to capture some of the appreciation transportation investments produced on adjacent property.

But during the Depression these mechanisms began to break down. First, plummeting real estate values meant that cities’ primary finance mechanism, the property tax, lost a great deal of its ability to generate revenue. Second, despite the catastrophic economic downturn, auto ownership and use continued to rise in the 1930s, meaning that the demand for additional roadway investment was stronger than ever. The number of registered vehicles in the United States increased from 26.7 million in 1930 to 32.5 million by 1940 (Office of Highway Information Management FHWA, 1995). While cities continued to be able to afford piecemeal street network rationalization and widening, they could not retrofit themselves with new networks of high-capacity and high-speed, limited-access roads. To implement these plans cities needed a new, more robust source of revenue.

Such a finance mechanism had recently emerged. Beginning in 1919, states had begun to impose motor fuels...
(or gasoline) taxes, largely, though not exclusively, to finance rural road projects (Brown, 1998). By the end of the 1930s, all the states had adopted motor fuels taxes. The federal government levied its own gas tax in 1932 as a general revenue source for deficit reduction, but by the late 1930s there were calls to link the proceeds to funding federal highway projects.

Gas taxes were in many ways superior to the property tax as a form of finance for road construction and maintenance; they placed the tax burden directly on the users of the system, they were comparatively simple to collect, and fuel consumption proved surprisingly robust during the lean years of the Depression. However, from the perspective of cities, fuel taxes had two major drawbacks. First, when road finance was decoupled from property values, cities would no longer receive increased revenues when real estate appreciated due to publicly financed transportation investments. Second, and more importantly, fuel taxes were nearly always collected and administered at the state and federal levels. Thus, the locus of power began to shift from

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Figure 4. View of proposed Detroit superhighway (1924).
Source: Rapid Transit Commission (1924).
city officials to statehouses and to Washington (Taylor, 2000). City officials, planners, and engineers thus increasingly deferred to the wishes of their state and federal counterparts if they wished to receive a portion of the state and federal motor fuel tax revenue to fund urban projects.

With this transition in finance came a shift in perspective. State and federal governments had different outlooks and priorities for highway development than did the municipal planners and engineers who had developed the early urban freeway plans (Brown, 2005; Taylor, 2000). State and federal highway engineers, whose jurisdictions prior to the Great Depression largely excluded metropolitan areas, were steeped in the Progressive Era philosophy that made rural development a top priority; they focused on improving farm-to-market highways to get farmers out of the mud. State legislatures, which often disproportionately represented rural voters, were willing to allocate fuel tax revenues to fund rural highway improvements but resisted funding urban projects. By 1939, state priorities began to shift to include intracity travel, but intracity travel was still a low priority for states. Although some federal funding went to urban highway projects during the 1930s, travel within cities was still largely seen as a local responsibility. Indeed, federal Depression-era urban highway spending was undertaken more to create jobs than to provide urgently needed transportation facilities (Altshuler & Luberoff, 2003).

Urban traffic and transportation issues were initially considered beyond the purview of state and federal highway officials on the grounds that metropolitan areas had the financial wherewithal to manage their own transportation needs. Yet as the fiscal landscape changed, this became untrue. Municipalities came to need funds for congestion-relieving road projects desperately and hence lobbied their states to allocate fuel tax revenues for urban uses. After considerable initial resistance, one state after another acceded. Cities were included in state highway plans, and state responsibility for urban highway projects was eventually codified into federal funding programs. By 1956, there were 480 miles of urban freeway either completed or under construction in the nation’s 25 largest cities. Los Angeles was the first, but Boston, New York, and Detroit aggressively built freeways as well (Altshuler & Luberoff, 2003; Owen, 1966). City leaders around the country were elated with this metropolitan freeway building boom, but they had made a Faustian bargain.

With state money came state control, and priorities were set by state legislatures. State departments of transportation funded and planned urban highway projects oriented toward rural and intercity transportation. Urban trips were either tolerated as a necessary evil, since they would raise traffic volumes and help justify existence of the intercity highway network, or actually discouraged, since they would clog highways and slow intercity traffic (Taylor, 2000). The tail was wagging the dog; freeways were routed into city centers to attract enough traffic to justify constructing an intercity system primarily intended to serve rural areas.

This was a result of disproportionate rural representation in state legislatures, as well as of a philosophical tension between planners (whose outlook tended to be more comprehensive, integrative, and at times abstract) and engineers (whose outlook was narrower, more functional, and more focused on traffic service). This tension persists to the present day (Brown, 2005). During the first half of the 20th century many noted transportation planners held the former view. Planners like the young Harland Bartholomew championed a holistic view of transportation thinking; as outlined above, they were willing to sacrifice vehicular throughput in order to create context-sensitive facilities (Brown, 2005). Bartholomew paid particular attention to existing and planned land use patterns when he sited his facilities, and he took care to minimize their disruptive influence on surrounding areas, although minority communities tended to bear the brunt of displacements in his plans for cities like Atlanta and Richmond (Keating, 2001; Silver, 1984).

However, the highway engineers who dominated state departments of transportation espoused a narrower, more technical view of transportation planning. They aimed to maximize safe traffic flows and to minimize costs while adhering to uniform design standards. Shifting control over urban highways to the states imposed this perspective on metropolitan as well as rural freeways.

Those with the more technical, traffic-focused vision won the debate over urban highway development thanks in part to well-intentioned Progressive Era values that favored expertise and science in the management of urban affairs (Brown, 2006). The engineers were more readily perceived as experts than were the planners. Engineers could produce hard numbers, such as traffic counts and motorists’ desire lines to back their claims. They could deploy scientific mathematical and analytical techniques, while urban planners were far less likely to quantify their plans. Engineers were also widely viewed as impartial and above the corrupt political fray, though in truth their choice of questions and methods did reflect their own biases and preconceptions (Alchon, 1985; Altshuler, 1965a; Levin & Abend, 1971; McClintock, 1925; Rose & Seely, 1990; Seely, 1987).

Moreover, the proponents of this engineering vision of urban transportation planning had political backing. Early federal highway engineers like Logan Page and Thomas MacDonald had successfully manipulated the political system to press the engineering vision of freeways. In the
period after 1940, many others, including business organizations, Keynesian economists, the U.S. Department of Agriculture, the U.S. Department of the Interior, public utilities, local development and planning interests, and labor groups, sought to have more voice in highway policy (Sealy, 1987). But engineers exerted more influence than any other single group. Aggravated by mounting traffic congestion, several constituencies, including highway users and building interests, demanded immediate solutions. The auto industry was particularly influential. Fearing saturation of the auto market, Detroit noted low levels of car ownership in inner cities and from the 1930s on advocated for urban freeways designed to penetrate city centers as a way to spur demand for cars. The automakers used trade associations and lobbying to advance their ideas and benefited from former auto industry executives who came to hold influential positions in government and on official commissions (Mohl, 1993; St. Clair, 1986). Pressure was on urban officials to act, and laying asphalt as fast as possible was evidence of action (Brown, 2005; Mohl, 1993).

Given the vast scale and scope of freeway plans, using annual appropriations to build freeways incrementally seemed likely to yield endless debate, squabbles over money, and policy paralysis, while giving control to experts in the highway bureaucracy seemed to promise faster action (Sealy, 1987). The engineers’ focus on improving access to the CBD, and the potential for downtown freeway construction to facilitate slum clearance was also popular with powerful downtown business interests (Mohl, 1993), calling into question the supposedly apolitical nature of these decisions. Finally, the sheer level of federal largesse the interstate program was to shower on states and cities quieted most local grumbling (Sealy, 1987). Thus began a new and narrower urban transportation planning mission, focused on congestion relief, higher vehicle speeds, and funneling traffic into and out of city centers as safely and efficiently as possible.

Once city officials surrendered control over metropolitan freeway development in exchange for state and federal highway aid, most aspects of freeway planning, from design and routing to construction and operation, fell to the state highway engineers. Thus, it is not surprising that by the late 1940s and early 1950s they were producing freeway plans that reflected national norms: accommodating high speeds (70 mph), providing high throughput (by building wide facilities with elaborate interchanges), and increasing safety (by moving to uniform geometric design regardless of local conditions; Ellis, 1990; Jones, 1989; Taylor, 2000).

The change was even felt in plans prepared by visionary planners like Harland Bartholomew (Harland Bartholomew and Associates, 1954). His 1954 plan for Atlanta, prepared for the Georgia Highway Department, contained much of the cautionary language about coordinating transportation and land use that characterized his earlier plans, but the facilities he proposed were rather simple, large, high-speed, utilitarian traffic conduits that resembled countless freeways of the interstate era that was soon to begin. They also reinforced local desires to establish boundaries between black and white neighborhoods (Keating, 2001).

Urban Freeway Planning in the Interstate Era

California pursued the most ambitious state freeway development program prior to the funding of the federal interstate highway system in 1956. The state’s Collier-Burns Act (1947) significantly increased state fuel taxes and other fees to begin developing intra- and intercity freeway networks with a traffic-service perspective (Brown, 1998; Jones, 1989). This funding allowed metropolitan freeway development to begin in California in the late 1940s, but at a pace that would require many decades to fully implement the planned comprehensive freeway networks. Spurred in part by the actions of states like California, and by the glacial progress of an interstate highway system adopted, but not funded, in 1944, Congress and the White House began serious debate over the funding of what would become the world’s largest public works program in 1954.

The first attempt to secure funding for the interstate system was defeated in Congress in the 1955 legislative session. Though the auto industry was supportive, much of the opposition to the legislation came from the American Automobile Association (AAA) and the rubber, petroleum, trucking, and intercity bus industries, which sought to finance the system out of general revenues and fiercely resisted proposed tax increases on fuel, tires, and heavy vehicles (Schwartz, 1976; St. Clair, 1986). Ironically, after these groups bitterly opposed the interstate program initially, they eventually became important members of the highway lobby.

Urban legislators were lukewarm toward the initial legislation since it proposed an expensive program that appeared primarily to benefit rural areas. Thus, the 1955 defeat left supporters scrambling for a formula that would appeal to urban legislators. To do this, proponents decided to explicitly plan the urban segments of the system, which had previously been left to the discretion of cities, as specified in Interregional Highways, the 1944 blueprint for the interstate highway system (National Interregional Highway Committee, 1944). Furious negotiations over the course of
the subsequent year largely determined the scale, routing, and network density of the urban segments of the interstate highway system nationwide (Schwartz, 1976). The urban routes for the entire nationwide system were mapped out in a planning process that lasted just eight months, with very little local consultation and even less local control. The decades of careful planning which came before were largely forgotten (Brown, 2005; Taylor, 2000). When the legislation was passed in 1956, thanks to lobbying from the auto and highway construction industries as well as the new support of urban congressional delegations (Schwartz, 1976), most local officials had no choice but to agree or lose out on urban highway funding altogether (Altshuler, 1965b). Occasionally downtown business interests anxious to improve CBD access and demolish low-income housing near the core had an opportunity for input (Altshuler, 1965a; Keating, 2001).

Many important facets of early urban freeway plans that were not directly related to traffic flow maximization were cast aside. Sensitivity to the urban context was jettisoned. Routes were drawn with little concern for the configuration of existing neighborhoods. Land use considerations and the channeling of growth were largely ignored (Brown, 2005; Taylor, 2000). Plans for multimodal facilities were dropped, in part because of a prevailing view that since the system was funded by fuel taxes, motorists should be the only beneficiaries (Brown, 2005; Rose, 1990). A simplistic view of intraurban traffic, overly focused on the suburb-to-CBD trip, elicited ring-radial designs that ignored the complexity of urban travel patterns (Taylor, 2000).

Because the federal government limited the mileage of the interstate system, a sparse network of roads was built that concentrated traffic on relatively few, high-speed, high-capacity freeways, rather than dispersing it over denser networks of smaller roads and interchanges (Taylor, 2000). Local plans for these denser, smaller-scale, and sometimes multi-modal networks were scotched due to the incentives created by the freeway funding mechanism. The federal government had previously provided a 1:1 match for states’ highway expenditures. However, the national importance of interstate highway system was judged to justify more generous funding, as had been sought by the auto industry and recommended to the president by the influential Clay Committee chaired by former World War II general and General Motors board member Lucius Clay (St. Clair, 1986). Hence, the 1956 legislation changed this ratio to 9:1 and created the Federal Highway Trust Fund, where all revenue from fuel and other highway-related tax increases would be deposited and dedicated to the interstates. This helped to neutralize opposition by the AAA, the rubber industry, and other key transportation-related industries (Schwartz, 1976). This remarkable opportunity to leverage their state highway revenues at 10 cents on the dollar eliminated most state and city officials’ motivations to fund smaller-scale, more urban-friendly facilities (Taylor, 2000).

The funding system had other perverse incentives. While interstate mileage was limited by the federal government, there was essentially no limit on the amount spent per mile on approved freeway routes. Since the federal government was paying 90% of the cost of the projects, the roads designed and built by the state highway departments were often large, elaborate facilities whose complex interchanges had outsized footprints that were difficult to shoehorn into existing, built-up areas.

Early freeway planners’ beliefs that urban highways could shape the development of cities proved prescient. Unfortunately, the freeways were ultimately built in ways the early planners had hoped to avoid (see Figure 5). Many low-income neighborhoods were divided by the new highways, while their wealthier counterparts often got better treatment or were able to stop the proposed projects altogether (Brown, 2005). Local planners outside the state and federal highway bureaucracies, who tended to have more intimate knowledge of the neighborhoods and districts through which the urban freeways would run, could only recommend minor changes, subject to state and federal approval (Brown, 2005). As Lovelace (1993) observed, “this resulted in the preemption of park land (Balboa Park in San Diego, Forest Park in St. Louis), the division of neighborhoods, and the destruction of the fabric of historic districts” (p. 135). The effects on inner-city African-American communities were particularly severe (Mohl, 2004; Silver, 1984).

Those who championed the earlier, more integrative view of metropolitan highway planning were marginalized and sometimes bitter. Lewis Mumford decried both the sprawl on the periphery and the destruction of the urban core that accompanied the interstates. He believed that the concentration of traffic in the hearts of cities would destroy their delicate fabric, and specifically denounced engineers’ plans to appropriate prime urban land for rights of way (Ellis, 2005). But Mumford and those like him would be ignored for many years. Robert Moses, freeway builder extraordinaire and advocate of the engineering vision of city building, pejoratively referred to Mumford as “an outspoken revolutionary” (Caro, 1975, p. 471).

The freeway boom would not last forever. Interstate construction peaked in 1966, but by the late 1960s two forces united to end the era. The first was political dissent, often spearheaded by civil rights activists, city residents, and a nascent environmental movement (Altshuler, Womack, & Pucher, 1979; Black, 1990; Taylor, 1995; Weiner, 1992).
New environmental laws strengthened the influence of municipalities and their planners relative to state and federal highway bureaucracies.

The second was a financial vise that squeezed the freeway program, particularly in cities. On one hand, most of the costs involved with freeway building rose much faster than inflation from the 1960s onward. This was due to rising construction material and labor costs, higher design standards, and more costly and time consuming planning processes, such as new requirements for environmental review. Moreover, right-of-way acquisition costs rose, due both to the escalating displacement costs of building urban freeways on previously developed land and to the fact that land prices appreciate in outlying areas in anticipation of the coming of a freeway, making freeway construction to that area expensive and ironically reducing the likelihood that the freeway would actually be built (Taylor, 1995).

And revenues failed to keep pace with these rising costs. After the mid-1970s, increased fuel efficiency slowed increases in the amount of fuel sold and thus in fuel tax revenue. Fuel taxes were not indexed to inflation, and Washington and the states lacked the political will to pass
rate hikes, in part because of popular ambivalence toward urban freeway projects. Political inertia and benign neglect of the freeway system’s financial base were more important than active political opposition in bringing the freeway-building era to a close. As funding dwindled, even locally popular urban routes were not constructed. Between 1966 and 1976 the number of miles of new freeway opened was half that of the previous decade (Taylor, 1995). With costs rising and revenue comparatively stagnant, by the mid-1970s the age of widespread freeway building had come to an end.

Closing the Circle: The Consequences of Urban Freeway Development

The highway engineering approach of building metropolitan freeways to serve demand has been partly vindicated. Urban freeways are indeed highly effective tools for moving very large volumes of traffic on limited road space and have seen extraordinarily heavy and growing use, despite little increase in capacity for over three decades. In the 37 largest urban areas in the United States, freeways account for a mere 3% of roadway miles, yet carry 40% of daily vehicle miles of travel (Office of Highway Information Management FHWA, 2006). Traffic on urban freeways moves at high speeds when there is no congestion, yet with relative safety; in 2005 urban freeways experienced 0.57 fatalities per 100 million vehicle miles traveled, versus 0.99 for other urban arterials, 0.81 for collectors, and 1.25 for local streets (U.S. Department of Transportation/Research and Innovative Technology Administration, Bureau of Transportation Statistics, 2008).

While some of the research examining the economic impacts of highways has been criticized for overestimating their effects (Boarnet, 1997; Forkenbrock & Foster, 1990; Seskin, 1990), most studies have estimated substantial economic benefits from freeways due to the system’s effects on the speed, safety, and convenience of travel (Cox & Love, 1996; Friedlaender, 1965; Nadiri & Manumaeas, 1996; FHWA, 1996). For example, Keeler and Ying (1988) find that between one third and one half the cost of the interstate system could be justified by the resulting productivity improvement in the trucking industry alone, though this is due largely to intermetropolitan goods movement, not to urban portions of the system.

However, estimates of significant economic benefits do not necessarily mean that modern metropolitan freeways were the most efficient way to manage rising automobile in cities. Indeed, none of the many freeway benefits touted by Cox and Love (1996) require metropolitan freeways in the current form; they stem for the most part from rising personal automobile and cheap, fast, intercity goods movement. Thus, given a century of rising incomes, relatively low energy costs, and increasing private vehicle use, the more salient question is whether the many significant benefits of freeways in cities could have been achieved in less damaging ways. Could we have built better metropolitan freeways? This review of the earlier plans for facilities that were context sensitive and often multi-modal suggests that the answer may well have been “yes.”

Today, the political pendulum in most large cities has swung back toward the vision of the earlier freeway planners as urban issues other than enhancing mobility have come to the fore. Three post-interstate federal surface transportation acts have gradually shifted the federal highway planning paradigm. The new focus is no longer on highway development in partnership with state departments of transportation, but on a more collaborative and, at times, contentious multi-modal effort involving the federal government, the states, metropolitan planning organizations, and local governments (Taylor & Schweitzer, 2005). Moreover, environmental legislation from the 1970 National Environmental Policy Act (NEPA) forward has forced transportation planners at all levels to grapple with the local environmental and land use consequences of their plans and projects. This is the sort of planning envisioned by the first generation of American planners a century ago. Cities are gaining greater control over their transportation destinies, but are also increasingly responsible for generating funding locally (Goldman & Wachs, 2003). What began as city-centered, multi-modal, and cash-strapped planning for expressways in cities, and evolved into highway-centered, single-mode, and federal-and-state-funded engineering of freeways in cities, has come full circle. Cities are back to searching for ways to pay for facilities they want.

While far from perfect, returning to local control of metropolitan transportation planning has resulted in transportation that is better integrated with urban land use patterns and that does a better job taking the wishes of residents into account. Along with increased local control, metropolitan transportation planning today is more ad hoc than at any point since the Great Depression. Some argue that long-range metropolitan transportation planning and programming, begun with the early metropolitan freeway plans reviewed here and codified in the 1960s with the rise of metropolitan planning organizations, is on the wane as regions scramble to cobble together increasingly project-specific funding sources (Sciara & Wachs, 2007). And this may be true; perhaps lack of consensus among planners, elected officials, and voters over whether to accommodate or discourage the use of automobiles in cities has inhibited
long-range planning (Taylor, 1995, 2006). The collective ambivalence toward private vehicles has elicited many alternatives to freeway construction, including efforts to control auto use, promote alternate modes, seek input from stakeholders like environmental groups and the general public, address congestion by managing demand as well as supply, and adapt transportation projects to their urban contexts.

While most professional planners see these developments as positive, some scholars find the current metropolitan transportation planning process piecemeal, and are not sanguine about what it will produce (Goldman & Deakin, 2000; Wolf, Puentes, Sanchez, & Bryan, 2007). Public transit use is up in response to the recent fuel price increases, but still lags considerably behind inflation-adjusted increases in public transit subsidies (Taylor, Miller, Iseki, & Fink, 2009). Though few miles of metropolitan freeway are under construction travel on urban freeways has continued to rise, worsening traffic congestion (Taylor, 2006).

But those attending the 1909 conference would have understood the difficulties of accommodating widespread private vehicle travel in cities, and applauded planners’ efforts to link transportation to land use planning, manage congestion, and support non-automotive modes in 2009. With the interstate highway era at an end, perhaps now the competing visions for accommodating automobiles and highways in cities can effectively be reconciled. This may mean that metropolitan transportation planning remains ad hoc and project-focused in the future, which many would applaud as a prudent, risk-averse path. But at whatever scale transportation is conducted, fiscal politics will shape planning outcomes as they have in the past. Overlooking this is dangerous, as we are destined to live with the consequences of transportation planning choices for a very long time.

Notes

1. The plan called for a variety of street types, each dedicated to a specific traffic-carriage or property-serving function, including through-traffic streets, transit thoroughfares, a regional parkway network to facilitate intraregional travel, and a truck “speedway” to connect the industrial areas near the CBD with the port (Olmedo et al., 1924).

2. Desire lines represent the shortest paths between traveler origins and destinations. They were a product of the earliest origin-destination surveys and were frequently used as an aid in making transportation facility planning decisions (Brown, 2006).

3. These include: reducing time and vehicle operating costs for users, improving flexibility in trip scheduling and making, lowering product prices due to reduced shipping costs, improving business productivity and reducing prices by cutting shipping and storage costs, increasing retail competition, enabling more trips with net private benefits per trip for the travelers, improving destinations (by providing access to better stores, health care, and social, leisure, and recreational facilities), expanding residential freedom of choice, expanding employment opportunities, and improving access for emergency vehicles.


References


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