Planning for Cars in Cities: Planners, Engineers, and Freeways in the 20th Century

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Problem:
One hundred years ago the First National Conference on City Planning took place in Washington, DC. While in some ways the delegates failed to foresee future trends (such as the consequences of automobility and suburbanization), in other ways they were remarkably prescient. They stressed the importance of the transportation/land use link, understood that transportation facilities must be harmoniously embedded in the urban fabric, and viewed transportation investments as a tool that could be used to shape the city as a whole—directing growth, revitalizing flagging areas, and linking jobs and housing. This vision was kept alive by transportation planners in subsequent decades, who envisioned a network of urban freeways which would be context-sensitive and fully integrated into their urban milieu. However, due to a lack of local funding and control, these roads were never to be built and this vision was to be abandoned.

Purpose:
In this paper, we consider the history of U.S. urban transportation planning over the past 100 years. In particular, we focus on the evolution and legacy of the single most important transportation development of the past century save for the advent of automobility itself: the emergence of the urban freeway.

Methods:
The paper relies on an historical review of primary and secondary material, including plans, manuscripts, newspaper accounts, and scholarly articles and books.

Results and conclusions:
The paper argues that financial arrangements placed state and federal highway engineers in charge of interstate highway development, which affected highways’ location and design. State highway engineers imposed a narrower, traffic service-oriented vision on metropolitan freeways that focused on maximizing vehicle throughput; other urban concerns were largely ignored. After a desultory planning process, overbuilt, sparse, ring-radial networks were routed through neighborhoods in cities around the country, often with great social and environmental costs. 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 a more urban planning-oriented view of transportation that stresses the land use interaction and the social, environmental, and aesthetic impacts of transportation facilities. It is a vision with which the founders of what became the American Planning Association (APA) would have sympathized.

Takeaway for practice:
The paper highlights 100 years of transportation planning practice, and provides an accounting of ideas that have resurfaced in transportation planning since the early 1990s. The paper stresses a century-old vision of coordinated transportation-land use planning that has returned to the fore in practice today. The paper suggests that political expediency in public finance can have profound, long-lasting, frequently unanticipated effects on projects, travel, and urban form.
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Keywords: urban freeway, planning, history, transportation

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Introduction

The event the special edition of this journal celebrates could not have come at a more portentous moment. Many of the attendees at the First National Conference on City Planning, the 1909 gathering that is considered a key steppingstone on the path to the foundation of the American Planning Association (APA), would have arrived at the proceedings by horse-drawn vehicle. But the tide was rapidly turning in favor of the automobile. By 1912, traffic counts in New York showed more internal combustion vehicles than horse-powered ones for the first time (McShane & Tarr, 1997). Thus as the conference delegates gathered in Washington, the urban transportation problems of yesteryear—streets awash in manure, methane gas pollution, 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.

How, in the space of a century, did the automobile go from being the darling of planners to their bête noire? In this paper, we attempt to shed light on this question by considering the history of U.S. urban transportation planning over the past 100 years. In particular, we draw on a wide array of primary, secondary, and tertiary sources to focus on the single most important transportation development of the past century save for the advent of automobility itself: the emergence of the urban freeway. The freeway has exerted tremendous influence on both travel patterns and urban form. Yet, surprisingly, this influence was only intermittently recognized by those charged with freeway development. The men and (and, very occasionally, women) who
built the freeways often ignored the effects their creations were to have on land use, city form, and the other facets of the urban environment—with enormous societal consequences.

It needn’t have been this way. The planning principles that could have guided an integrated, contextual, and socially-aware freeway-building process were no mystery; in fact, they were well-known to the 1909 conference attendees and other like-minded planners of the day. Accordingly, we begin our discussion with their vision: a multimodal form of transportation planning that viewed transportation facilities not merely as a means of facilitating movement but also as a tool for reshaping urban form. This worldview informed their efforts to smoothly adapt the city to the automobile and vice versa. It is most evident in their 1920s and 1930s plans for urban freeways.

Yet during the subsequent decades this vision was supplanted by another. Farsighted and imaginative freeway plans of the day were largely abandoned. Because they lacked the ability to pay for urban freeway development, cities and their planners ultimately lost control over the process. Power was ceded to state and federal highway agencies and engineers who possessed very different outlooks and values. Their focus was primarily on maximizing traffic throughput and secondarily on increasing safety, with little consideration of most other concerns. This led to a dramatic transformation of the nature of the freeways that were ultimately built in cities and the objectives they were designed to serve. The ultimate product of the engineers’ vision—The Dwight D. Eisenhower System of Interstate and Defense Highways—has unquestionably brought tremendous increases in mobility, productivity, and prosperity. But equally unquestionably these benefits came at great cost to cities and their residents.
Finally, we explore how reaction to the freeway era has led modern planning thought and practice to come full circle. Since the 1990s, the scales of power have tipped back toward the planners and their vision of the transportation network as an integrated circulatory system embedded in the larger urban organism. It has taken the better part of a century, but we may finally have come to appreciate the transportation planning wisdom of the men and women who helped found the APA 100 years ago.

The Overarching Vision of Early Transportation Planners

The proceedings from the First National Conference reveal how much early planners underestimated and misunderstood the future impacts of the automobile (ASPO, 1967). The minutes contain surprisingly few specific 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 did not betray any sign of it. The automobile came up as a trivial aside just once at the 1909 Conference, in the context of motorists enjoying access to Washington’s Rock Creek Park that other residents lacked (ASPO, 1967).

Conference attendees who did foresee the revolutionary effect autos were to have on urban form – the acceleration of ongoing trends of deconcentration and decentralization—would almost certainly have welcomed, not shunned, this phenomenon. In a mirror-image of modern planning concerns, First National Conference participants focused not on checking suburbanization and revitalizing center cities, but on the central planning problem of the day: severe crowding of people in the inner parts of large cities. Suburbanization at the time was seen
not as a problem, but rather 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 the thinking on suburbs and sprawl common among APA participants in 1909 would have differed from the 2009 vintage, in many ways the ideas expressed in Washington a century ago were strongly in concert with those of planners today. In particular, participants often expressed a holistic vision of transportation planning that recognized its symbiotic interaction with land use (ASPO, 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 non-transportation effects of transportation investments as much as, if not more than, the traffic-carriage role the facilities played. And the linkage cut both ways. Conference participants argued land use would scale the size and kinds of transportation facilities that were needed. For example, participants expressed concerns about large buildings crowded onto narrow, congested streets, and about the problems of uniform street grids that distributed traffic through residential neighborhoods; they argued that hierarchical road networks were needed to concentrate through traffic on major boulevards and arterials (ASPO, 1967). Zoning (as pioneered in Germany) was held up at the conference as a model; there, many attendees argued, transportation planning would dovetail with 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 private vehicles, streetcars, and pedestrians together into a coordinated system for providing access to healthier living, especially recreational facilities (ASPO, 1967). While the particulars varied, the transportation problems discussed and
many (though not all) of the solutions espoused at the 1909 conference would not 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. The period immediately following the Second World War would see those who did retain this vision marginalized. 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 First National 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; Bartholomew, 1928; Nolen, 1930; Olmsted, Bartholomew & Cheney, 1924). Planners retained these principles even as they confronted an increasingly difficult urban problem—the spiraling automobile congestion that resulted from the auto’s transition to a mass market good. Not only was the number of autos inexorably rising, but 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, the “promiscuous” mixing of local and
through traffic on the same streets, and “irrational” street plans which featured jogs, dead-ends, uncontrolled intersections, and abrupt changes in width and paving (Bartholomew, 1924; Knowles, 1925; McClintock, 1927).

As they pursued their ultimately quixotic efforts to eliminate the scourge of traffic congestion, planners deployed an increasingly sophisticated array of technological, regulatory and design fixes that meshed with their guiding principles (Bartholomew, 1924; McClintock, 1925; McClintock, 1927). They began by attempting to impose order on chaotic street conditions. In 1900, William Phelps Eno authored *Reform of Our Streets Urgently Needed*; 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 traffic police enforcement manual, 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 with positive effects on both traffic flows and collisions.

Planners next turned to the use of signaling systems to govern the movement of the traffic through and between intersections (McShane, 1999). These systems soon began to appear in cities throughout the United States. These strategies brought short-term relief, particularly at
previously gridlocked intersections, but the respite was brief due to the ever-increasing numbers 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 (FHWA, 1995).

Confronted by an ever-rising sea of automobiles that swamped their best regulatory efforts, planners began to collect traffic data to better understand the underlying causes of congestion (Bartholomew, 1924; McClintock, 1925). Their data analyses led them to propose an array of strategies that came together in documents entitled “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 a decline in 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—a school of thinking very much in evidence at the 1909 conference (ASPO, 1967; Brown, 2006; Peterson, 2003; Scott, 1995). Major traffic street plans typically advocated the creation of “rational” street systems through infrastructure improvements that would connect and widen streets while eliminating jogs and dead ends (see Figure 1).

[Figure 1 about here]
Traffic signaling systems were to be installed at those major intersections that still lacked them. The authors of these plans also recommended classifying streets in hierarchies, using means like speed limits and varying 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 traffic types, in particular streetcars and automobiles, in order to speed the flow of both modes.

[Figure 2 about here]

So while they tended to emphasize obvious geometric and operational fixes for 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.

The 1924 A Major Traffic Street Plan for Los Angeles (Olmsted et al., 1924) is illustrative of these efforts. Throughout their report, the authors emphasize the need for better coordination between land use and transportation systems. The plan called for the creation of an interconnected street system characterized by a hierarchy of streets dedicated to specific traffic carriage or property serving functions (including through traffic streets and transit thoroughfares), grade separations at particularly busy intersections, and right of way acquisition in advance of future development in outlying parts of the community. The plan also called for the development of a regional parkway network to facilitate intra-regional travel and a truck “speedway” to connect the industrial areas near the CBD with the port.

Cities like Los Angeles had the technical means to implement the improvements proposed in their major traffic street plans, and thanks to property tax revenue, special
assessments, and bonding power they had the financial means during the 1920s as well (Brown, 2006). When additional funding was necessary, citizens, who were generally enthusiastic about automobiles and impatient with rising traffic congestion, were frequently willing to approve new taxes and/or issue new bonds to pay for street improvements. The Los Angeles plan enjoyed strong support 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 towards funding public transit. At the time, streetcar systems 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). However, consultant-prepared major traffic street plans designed largely to accommodate automobiles were implemented, at least partially, 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 the use of grade separation at major intersections to develop higher speed, higher volume, and more direct connections between important locations (Bartholomew, 1927; Bartholomew, 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 to stay above water. Between 1925 and 1929, the number of registered motor vehicles in the U.S. increased from 20.1 million to 26.7 million, a 30 percent increase in just four years (FHWA, 1995). As automobile congestion inexorably 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 “cure” for metropolitan traffic congestion (McClintock, 1937; TEB, 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 ever increasing number of autos and their ever higher speeds. At first called by various names—the “speedway,” the “limited way,” the “superhighway,” and the “expressway”—this new type of roadway was eventually christened 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 meant that slow-moving vehicles would no longer increase collision risk and reduce traffic speeds by unpredictably entering and exiting the traffic stream (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 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 very much steeped in the principles on display at the First National Planning Conference. Their overall philosophy viewed transportation as just one part of the larger urban system. For example, famed early planning thinker Lewis Mumford saw a place for limited access highways in his plans to create and connect “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 had similar outlooks. Their plans, prepared at the behest of cities or local civic and business groups, had local or, occasionally, metropolitan foci and tended to emphasize the concerns of their mostly local clients. Their facilities were designed to serve urban trips made by urban residents; the facilitation of intercity through-traffic was a secondary concern. This focus on intra-metropolitan travel was not entirely parochial; traffic counts of the day showed that the vast majority of vehicle trips in metropolitan areas were indeed local (U.S. Bureau of Public Roads, 1939). Freeways’ interaction with their surroundings and the larger transportation network were key considerations, and planners sought to design facilities that were sited and scaled to cut with, not against, the urban grain (Bartholomew, 1942; De Leuw, 1939; Mac Donald, 1947; RTC, 1924; TEB, 1939; Whitten,
1930). Accordingly, they devised metropolitan freeway plans in the 1920s, 1930s, and 1940s that minimized individual facilities’ footprints; roads had two, or at the most three, lanes of traffic in each direction. Design speeds were typically 40-50 mph, far faster than 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 minimize the disruption to surrounding areas that would result from large numbers of autos being dumped onto surface streets en masse. 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—over more miles of roadway—rather than concentrate it. This would have had important traffic service benefits; for example, with just a few large facilities, more drivers have to divert longer 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, 1939) (see Figure 3).

[Figure 3 about here]

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 rapid transit component (TEB, 1939). This would confer
the speed and safety benefits of grade separation and limited access on transit as well as the automobile.

[Figure 4 about here]

Land uses surrounding the facilities were sometimes woven into the plans, occasionally in ambitiously futuristic ways. As their proposals make clear, the authors were cognizant of the contours of urban topography and the dynamics of urban growth and change. Roads, transit, and freeways were seen 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 (Mac Donald, 1947; U.S. Bureau of Public Roads, 1939). These early metropolitan freeway plans sometimes called for advance land acquisition along the rights-of-way; this would permit congruent real estate development adjacent to the new freeways and would lower construction costs (TEB, 1939). At times, area redevelopment projects were specifically included as part of the freeway construction plans.

In all, the proposed urban freeways were designed to accommodate short intra-urban trips, disperse traffic widely across a dense network of roadways, and 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 professed the belief that freeways would provide great benefits if sited and scaled properly. But that 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 (Taylor, 2001; Brown, 2005).

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. In Los Angeles’ case, the estimated cost 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 implement such a plan, and the plan remained just that. 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 largely fell on deaf ears (Chicago Plan Commission, 1943; De Leuw, 1939; McClintock, 1937). Thus the early freeway construction that did occur took place on a piecemeal basis—most famously under the watchful eye of Robert Moses in New York. Large-scale freeway construction would have to await the development of new funding mechanisms. These were eventually found—but the revenue would come at a price.

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

When metropolitan freeways eventually did come to pass, 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, in turn, use them to
guide development. The use of special assessment districts gave cities the ability to capture some
of the appreciative effects transportation investments had on adjacent property.

But during the Depression these mechanisms began to unravel. First, plummeting real
estate values meant that cities saw their primary finance mechanism, the property tax, lose a
great deal of its revenue-generating power. Second, despite the catastrophic economic downturn,
auto ownership and use continued to rise in the 1930s, meaning the demand for additional
roadway investment was stronger than ever. The number of registered vehicles in the U.S.
increased from 26.7 million in 1930 to 32.5 million by 1940 (FHWA, 1995). While piecemeal
street network rationalization and widening remained largely within the means of cities,
retrofitting new networks of high-capacity, limited access, high-speed roads into urbanized areas
was not. To implement these plans the cities needed a new, more robust source of revenue.

Fortuitously, 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 was a growing chorus of calls to link the proceeds to
funding federal highway projects.

Gas taxes were in many ways a superior 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 capture the increased revenues that came 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 city halls to statehouses and Capitol Hill (Taylor, 2001). 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. The state and federal governments’ outlooks and priorities for highway development were quite different than those of the municipal planners and engineers who had been developing the early urban freeway plans (Taylor, 2000; Brown, 2005). 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 in these years often disproportionately represented rural voters, were willing to allocate fuel tax revenues to fund rural highway improvements, but resisted funding urban projects. By 1939 the scope of state involvement began to shift toward intercity travel as well as rural, but intra-city travel was still a low priority. 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 viewed more as a jobs-creation measure than a transportation one (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 the shifting fiscal landscape meant that this was increasingly a fiction. Municipalities were now in desperate need of transportation dollars to fund congestion-relieving road projects, and hence they lobbied the 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, unsurprisingly, was in the fore, 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 this was to prove a Faustian bargain.

With state money came state control, and when state departments of transportation funded and planned urban highway projects their work divulged their rural and intercity orientation. Urban trips were either seen as a necessary evil to be grudgingly tolerated (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 the all-important intercity traffic) (Taylor, 2000). The tail was wagging the dog; routing freeways into the very centers of cities would supply needed traffic to justify the construction of an inter-city freeway system that aimed to serve largely rural objectives.
In addition to the macro political force of disproportionate rural representation in state legislatures, micro factors were at play as well. A philosophical tension between the outlooks of planners (more encompassing, integrative, and at times abstract) and engineers (more narrow, functional, and focused on traffic service) persists to the present day (Brown, 2005). During the first half of the 20th Century, the former worldview characterized the outlook of many noted transportation planners. 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, a narrower, more technical view of transportation planning was more often espoused by the highway engineers who dominated state DOTs. They thought in terms of maximizing safe traffic flows and adhering to rigid, uniform design standards while minimizing costs. With the shift in control over urban highways to the states, this rural-inspired vision for metropolitan freeways became ascendant.

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 touted expertise and science in the management of urban affairs (Brown, 2006). The engineers were in a better position to don the mantle of “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 indeed 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. Though 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 other interest groups such as business organizations, Keynesian economists, the federal departments of Agriculture and Interior, public utilities, local development and planning interests, and labor groups contested the engineers’ exalted position in order to have more of a voice in highway policy (Sealy, 1987).

Yet during the 1950s, the engineering “experts” managed to grasp the mantle once again. Aggravated by mounting traffic congestion, the public demanded immediate solutions, and highway user and building interests seconded this call. The auto industry was particularly influential. Fearing saturation of the auto market, Detroit noted low levels of car ownership in inner cities and began advocating urban freeways (deliberately driven through the heart of cities) to spur demand for cars from the 1930s on. The automakers used trade associations and lobbying to advance their cause, and they took advantage of a revolving door between auto industry executive suites and 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, incremental freeway development via annual political appropriations promised endless debate, squabbles over money, and policy paralysis; moving the problem from political channels to the control of the “experts” promised to break the deadlock (Sealy, 1987). Also, the engineers’ focus on improving access to the CBD, as well as using downtown-oriented freeway construction as a means of facilitating slum clearance, understandably resonated with powerful downtown business interests (Mohl, 1993), calling into question the extent to which the engineers were as apolitical as they frequently claimed. Finally, the sheer level of federal largesse the interstate program was to shower on states and cities quieted most local grumbling about state and federal highway engineers and their outlook (Sealy, 1987). Thus, the stage was set for a shift to a new and perhaps more myopic focus on congestion relief, higher vehicle speeds, and funneling traffic into and out of city centers as efficiently and safely 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. Unsurprisingly, by the late 1940s and early 1950s they were producing freeway plans that increasingly reflected a rural, intercity, engineering vision. Their plans typically adhered to one-size-fits-all national norms designed to accommodate high speeds (70mph), high throughput (wide facilities with elaborate interchanges), and increased safety (by moving to uniform geometric design regardless of local conditions; Ellis, 1990; Jones, 1989; Taylor, 2001).

The change was even felt in plans prepared by forward-thinking planners like Harland Bartholomew (Bartholomew, 1954). His 1954 plan for Atlanta, prepared at the behest of the state
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. And the unspoken social policy objectives of the Atlanta plan were more pernicious in that in some cases they 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. These were developed with a traffic-service-focused outlook (Brown, 1998; Jones, 1989). But while this new funding meant that metropolitan freeway development was finally underway in California in the late 1940s, the slow flow of revenues funded new construction 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 roundly 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 revenue and fiercely resisted proposed tax increases on fuel, tires, and heavy vehicles (Schwartz, 1976; St. Clair, 1986). Ironically, these initial, bitter opponents of the interstates later would later be widely viewed as charter members of the “highway lobby.”

Moreover, urban legislators were lukewarm about what appeared to be an expensive, rural-oriented program. The defeat of the legislation in 1955 left supporters scrambling for a formula that would bring urban legislators onboard. To do so, proponents decided to explicitly plan the urban segments of the system, which had previously, and quite consciously, been left to the discretion of cities in Interregional Highways, the 1944 blueprint for the Interstate Highway System (National Interregional Highway Committee, 1944). Furious, hasty 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 (Taylor, 2000; Brown, 2005). When the legislation was passed in 1956 thanks in no small part to furious lobbying from the auto and highway construction industries as well as the newly won support of urban congressional delegations (Schwartz 1976), local officials were nearly always given no choice but to accede to this fait accompli or lose out on urban highway funding altogether (Altshuler, 1965b). Federal and state money for urban freeways was thus contingent on the complete acceptance of the state and federal highway engineers’ vision for freeways in cities (Brown, 2005), though there was occasionally local input, particularly from downtown business interests anxious to improve CBD access and demolish low-income housing near the core (Altshuler, 1965a; Keating, 2001).
Many important facets of early urban freeway plans that were not directly related to traffic flow maximization were gradually cast aside. Urban context-sensitivity 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 intra-urban traffic, overly focused on the suburb-to-CBD trip, elicited ring-radial designs that ignored the complexity of urban travel patterns (Taylor, 2000).

Due to the fact that 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 multimodal networks were scotched due to the incentives created by the freeway funding mechanism. The federal government had previously matched states’ highway expenditures on a 1:1 basis. However, the Interstate Highway System was judged to have priority national importance which justified more generous funding; this had been sought by the auto industry and was recommended to the president by the influential Clay Committee (which was chaired by former WWII general and General Motors board member General Lucius Clay; St. Clair, 1986). Hence the 1956 legislation changed this ratio to 9:1 and created a federal highway trust fund, wherein 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 interests, and other key transportation-related industries (Schwartz, 1976). This remarkable opportunity to
leverage their state highway revenues at 10 cents on the dollar motivated most state and city officials to lose interest in funding smaller-scale, more urban-friendly companion facilities to the urban interstates; from the states’ perspective, these were far more expensive due to the much less generous federal match (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 for 90+ percent 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 powerfully shape the development of cities proved prescient. Unfortunately, the freeways that were ultimately built contained much that 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 of the state/federal highway bureaucracy, 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” (135). The effects of this approach on inner-city African-American communities were particularly severe (Mohl, 2004; Silver, 1984).
Those who championed the early, 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 seemed to accompany 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 the vision of Mumford and those like him would—for many years—be ignored. 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, with Womack & Pucher, 1979; Black, 1990; Taylor, 1995; Weiner, 1992). New environmental laws were passed that put municipalities, and their planners, into stronger political positions vis-à-vis their state and federal counterparts.

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).

On the other hand, revenues failed to keep pace with rising costs. Increasing fuel-efficiency from the mid-1970s onward slowed the rise in the amount of fuel sold and thus the rise in fuel tax revenue. Further, fuel taxes were not indexed to inflation, and Washington and the states lacked the political will (due in part to increasing popular and political ambivalence toward displacement for urban freeway projects) to pass frequent rate hikes needed to close the widening cost-revenue gap. In concert, these forces caused the buying power of fuel taxes to erode and eventually “sunset” over time. More than the groundswell of active political opposition, it was political inertia and benign neglect of the freeway system’s financial base that brought the freeway-building era to a close. As the coffers ran dry, even locally popular urban routes went unconstructed. With costs rising and revenue comparatively stagnant, freeway building slowed to a crawl – between 1966 and 1976 the number of miles of new freeway opened for traffic would be half that of the previous decade (Taylor, 1995). By the mid-70s the age of widespread freeway building had come to an end.

**Closing the Circle: The Consequences of Urban Freeway Development**

In one sense, the traffic service focus of the state highway engineers who built metropolitan freeways has been vindicated. The system has seen extraordinarily heavy and growing use, despite little increase in capacity for better than three decades. Urban freeways are indeed highly effective tools for moving very large volumes of traffic on limited road space. In the 37 largest urban areas in the United States, freeways account for a mere three percent of
roadway miles, yet they carry 40 percent of daily vehicle traffic (FHWA, 2006). Moreover, the traffic is moved at high speeds (at least when congestion permits) and with relative safety; in 2005 urban freeways experienced 0.57 fatalities per 100 million vehicle miles traveled, vs. 0.99 for other urban arterials, 0.81 for collectors, and 1.25 for local streets (USDOT 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 and 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 & Manumeas, 1996; U.S. FHWA, 1996). For example, Keeler and Ying (1988) find that between one-third and one-half the cost of the interstates can be justified just through the increases in productivity they have fostered in the trucking industry, though much of these estimated benefits stem from inter-metropolitan goods movements.

However, estimates of significant economic benefits do not necessarily mean that modern metropolitan freeways were the most efficient way to manage rising automobility in cities. Indeed, none of the many freeway benefits touted by Cox & Love (1996)—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 (e.g. 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 –
require metropolitan freeways in the current form; they arise for the most part from rising personal automobility 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, in other words, have built a better metropolitan freeway? This review of the many urban-focused, often multi-modal, and un-built expressway plans for cities around the country 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. The three post-interstate federal surface transportation acts – the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991, the Transportation Equity Act for the 21st Century (TEA-21) of 1998, and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) of 2005 – 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 enterprise 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. It is the sort of planning envisioned by the 1st generation of American planners a century ago. Cities are gaining greater control over their transportation destinies, and along with it increased responsibility for generating funding locally
What began as city-centered, multi-modal, and cash-strapped planning for expressways in cities, and evolved into a highway-centered, single-mode, and federal/state-funded engineering of freeways in cities, has come full circle (including the cash-strapped aspect) to a remarkable degree.

While far from perfect, there is no question that the recent rise of metropolitan control of transportation planning has resulted in better integration of transportation with both cities’ land use patterns and the wishes of their residents. And 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). This trend perhaps reflects an aspect of local control wherein a 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; Taylor, 2006). This collective ambivalence toward private vehicles has elicited many alternatives to freeway construction: a greater focus on controlling auto use, promoting alternate modes, seeking input from stakeholders like environmental groups and the general public, addressing congestion from the demand as well as supply side, and adapting transportation projects to their urban context.

While most in the planning profession today are likely to view the rise in metropolitan influence over urban freeway and transit planning as well advised, to date the results of this shift away from a freeway-centered metropolitan focus have been mixed. Some scholars (Goldman &
Deakin, 2000 and Wolf, Puentes, Sanchez, & Bryan, 2007) find the process piecemeal and far from complete. Public transit use is up in response to the recent ramp up in fuel prices, but at a pace that lags considerably behind the inflation-adjusted rise of public transit subsidies (Taylor, Miller, Iseki, and Fink, forthcoming). Metropolitan freeway development has slowed to a crawl, but travel on urban freeways has continued to rise dramatically, with worsening traffic congestion the predictable result (Taylor, 2006).

But few at the first APA conference in 1909 would have thought that weaving widespread private vehicle travel into cities would be easy, and they likely would have applauded the efforts of planners in 2009 to better link transportation to land use planning, manage congestion, and support non-automotive modes. With the interstate highway era officially at a close, perhaps the second century since the First National Conference will see competing visions for automobiles and highways in cities effectively reconciled. Absent such reconciliation, metropolitan transportation planning is likely to remain a largely ad hoc, project-focused affair, with nothing approaching the staggering scope and scale of U.S. metropolitan freeway networks on the horizon. Many would applaud this as a prudent, risk-averse path. But regardless of what forms new urban transportation systems take in the years ahead, the story of fiscal politics and metropolitan freeway development explored here suggests that planners today would be well-advised to pay close attention to how current fiscal politics shapes planning outcomes, as we are destined to live with the consequences of these choices for a very long time.
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Figure 1 Major Traffic Street Plan for Los Angeles

Figure 2. Street Classification from Traffic Highway Plan for Oakland, California

Figure 3. Freeways for the Central Part of Los Angeles from the 1939 TEB Plan

Source: Transportation Engineering Board (1939). *A transit program for the Los Angeles metropolitan area*. Los Angeles: Author. Figure 3.
Figure 4. View of Proposed Detroit Superhighway (1924)

Source: Rapid Transit Commission. (1924). *Proposed super-highway plan for greater Detroit.* Detroit, MI: Author. Figure 4.
Figure 5. Construction of Boston’s Central Artery, 1956-1959

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