The Third Option: Removing Urban Highways

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Removing Urban Highways

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“In favorable locations, the new facilities, which as a matter of course should be designed for long life, will become more and more useful as time passes; improperly located, they will become more and more of an encumbrance to the city’s functions and an all too durable reminder of planning that was bad” [1].

- *Interregional Highways, 1944*

### Introduction

The objective of quickly transporting people and goods from one part of a city to another is a desirable one and many highways successfully do this. However, judging such highways solely on their ability to do so has lead to many drawbacks and negative effects from current highways. As they are set within the urban framework, their influence profoundly shapes the urban form as well as the actions of those inhabiting it. Furthermore, while there are arguments made against streets and that they negatively affect cities, these arguments are based on certain perceptions of what many of today’s streets are. What are not typically considered are the true political and social basis of streets and their millennia old function of forming the urban public framework. During the time of the Roman Empire 2,000 years ago, the street as something political and social in nature was exemplified in the process of building new cities. In the formation of every new Roman city, two streets were dedicated. These streets were the Cardo and the Decumanus, which crossed each other at right angles forming a plus sign. It was based off of these two streets that the rest of the roads and lots related to. Not only were these streets the main thoroughfares through the city, they were the symbol of order. Freeways do not serve the same purpose as streets, yet the two are both part of a modern transportation network and are closely related in the network’s function. This paper is neither anti-automobile nor anti-highway, but rather suggestive of a way to deal with current urban downtown highways once their function has been rethought.

The American highway building age is over and we are now living with the consequences of design decisions made for the single purpose of maximizing traffic throughput. As Americans move back to cities there is a trend of rethinking our urban places and undoubtedly the infrastructure supporting them. This paper provides those questioning the role of some of our urban highways with a framework for rethinking urban highways, specifically the removal of the highway, which provides an impetus to redesign urban downtown freeway right-of-ways as part of a larger coordinated multi-modal transportation network.

This paper examines six case studies of urban downtown freeways which have been successfully
removed. Five of the cases are from American cities, the sixth is from Seoul, South Korea. Furthermore, it will provide an understanding of the challenges and benefits of removing such highways and offer those considering highway removal a guide of what to consider.

Seoul’s mayor at the time of their highway removal, Lee Mung-bak, in support of removing the freeway said, “We want to make a city where people come first, not cars” [2]. Cars should be there to serve people, not people serving for the cars. While removing urban freeways is seen by some as risky and detrimental to the downtown’s success and economic well being, this is not necessarily the case as the following case studies demonstrate. Robert Cervero, Professor of city and regional planning at U.C. Berkeley, describes removing highways in a different way, as “a re-ordering of municipal priorities” from high mobility towards, “economic and environmental sustainability, livability, and social equity” [2].

Instead of viewing freeways as conduits for moving vehicles, thinking about their original purpose as a component of a modern transportation network to be coordinated with adjacent land use to adapt cities to the changes of the 19th and 20th centuries may help in getting over the initial shock of considering removing a highway. Just as the Interstate Highway System was about to change the face of the American city in 1957, Lewis Mumford already was weary of the consequences. “The goal of improving our cities could be achieved only if ‘we are prepared to apply our intelligence to the purposes of life instead of applying them merely to the means of life. That means eventually we will put the motor car in its place. We will cast off the mistress and live with our wives instead’” [3].

The First National Conference on City Planning took place in 1909 in Washington D.C. and transportation planning was one of the topics discussed. While the automobile itself was mentioned just once and not at all the focus of the conference, transportation and its ability for reshaping urban form were discussed [4]. Transportation planning at the time was considered a holistic endeavor having a strong relationship with land use [4]. Furthermore, these early planners understood the importance of multi-modalism. While wanting to provide facilities for private vehicles, these were to be part of a larger, more comprehensive system including streetcars and pedestrian facilities [4].

The history of urban freeways is one that dates to the turn of the twentieth century. At that time, urban transportation problems were similar to those experienced today, most notably congestion. Other problems included slow and unsafe vehicles, manure in the streets, and horse carcasses clogging the streets
Contrary to popular thought, the pre-automobile city was not one of picturesque un-crowded streets, but one with its own transportation related problems. To the planners of the early 20th century, the private automobile may have seemed to be the solution to the urban transportation issues of their time [4]. However, future automobile congestion was substantially different from the prior congestion of people, horses, and wagons [4]. The automobile took up more space per-person than most other means of transportation [5].

The urban highways we have come to know and are now rethinking do not portray these holistic views promoted during the early twentieth century. What happened between then and now? Before discussing the challenges and potential benefits of removing downtown urban highways, it is important to understand why and how our present-day highways developed in the manner that they did.
A Brief History of American Highways

Congestion on urban streets has been a problem long before the advent of the automobile and planners have tried continuously to eliminate it. Near the beginning of the twentieth century, planners began to accommodate the city for the car. Their first attempt was to impose order on the chaotic existing street systems [4]. William Phelps Eno was one of the earliest to address street reform and traffic control in a manner similar to what we now consider traffic engineering [6]. In 1900 he wrote Reform of Our Streets Urgently Needed [4]. In 1909 he then developed the world’s first traffic plan for New York City. He helped to invent and popularize the stop sign, the pedestrian island, the traffic circle and the taxi stand [4]. In 1921 he chartered and endowed the Eno Transportation Foundation to study transportation [6].

Around the same time, Harvard University’s Erskine Street Traffic Research Bureau developed survey techniques to better understand traffic flows. From that research, Miller McClintock in 1925 wrote Street Traffic Control which proposed traffic regulations for the movements of both pedestrians and motorists [4].

Traffic congestion was notably most severe on the routes connecting to the central business districts [5]. This congestion led to motorist groups demanding solutions from the city government [5]. Also alarmed by the ever-increasing congestion were the downtown business and property owners who worried about the negative economic impacts this may have. Even early on, businesses began moving to suburban locations, which in turn did reduce downtown congestion but also decreased the tax base [5]. Both the business associations and local governments, however, wanted to avoid the decentralization of business and to maintain the CBD as the economic and business hub. Local governments largely depended on tax revenues from downtown business and so the economic viability of the CBD became a leading concern [5].

As traffic in urban downtowns continued to increase, a better understanding of the situation was sought. What developed in turn were major traffic street plans which were developed for individual cities by private consultants [4]. These plans advocated infrastructure improvements to connect and widen streets as well as eliminating jogs and dead ends. The plans also proposed traffic signaling systems and the classification of streets into hierarchies depending on speed limits and road widths to direct traffic away from residential streets [4]. Additionally, these major traffic street plans supported the separation of streetcars and automobiles to increase the speed of both [4]. The Major Traffic Street Plan for Los Angeles (Figure 1)
called for better coordination between land use and transportation systems and a hierarchical system of street
types with some grade separation. This plan was prepared in 1924 by Olmstead [4].

In the early twentieth century another type of roadway was being built in suburban and rural
America, the parkway. These roads, with their gentle curves and park-like surrounding landscape, were
developed as recreational facilities; the traffic-service capability of the road was secondary to its recreational
function [5]. Prime examples of such roadways are the Long Island Parkways designed by Robert Moses in
the 1920s and 30s. The parkway also introduced the concepts of limited access and grade separation, two
design features which would be employed by planners and engineers in the parkway’s urban cousin, the
freeway.

![Major Traffic Street Plan for Los Angeles, Olmstead 1924](image)

As traffic congestion continued to prove stubborn a new idea was developed to hopefully provide a
solution, the urban freeway. What separated this new roadway design from all previous urban roads was its
limited access and grade separation [4] which were design ideas taken from the parkway [5]. Limited access
and grade separation allowed for the freeway to carry larger volumes of traffic more safely and at higher
speeds due to the removal of numerous slower vehicles entering and exiting the freeway from adjacent
properties and the removal of intersections [5]. Similar to the earlier major traffic street plans the freeways were initiated by cities or other local groups and were designed to serve urban trips made by urban residents [4]. It is important to discuss the envisioned role of these early urban freeway proposals within the city.

Most importantly, the plans took into consideration the interaction of the freeway with surrounding land uses and how the freeway fit into the larger transportation system. These freeways were also designed to form with the existing urban fabric [4]. The size of the proposed highways ranged from 4 to 6 lanes total with speeds up to 50 miles per hour [4]. While much smaller and slower than present day urban freeways, they tended to be planned as a somewhat dense network to disperse traffic throughout the city rather than concentrate it along a single link as well as to limit large volumes of traffic exiting the freeways at just a few locations [4]. The smaller scale of these freeways allowed them to better integrate into the existing urban fabric. Additionally, these plans tended to include other means of transportation along with the private vehicles within their right-of-ways, including rail lines, rapid transit, and busways [4]. Connecting the infrastructure to land use were proposals to purchase right of ways and to construct real estate projects along the highway to capture the value produced by the improvement to help offset its cost [4].

These early freeway plans exhibited the characteristics of the planner’s approach to highway design. Freeways were not viewed simply as conduits for vehicular traffic, but as just one part of an urban transportation system. Instead of focusing on a few very large highways cutting through the urban area, planners proposed dense networks of smaller freeways strategically located throughout the urban area to encourage certain types and forms of growth in certain areas and to better distribute traffic. The freeways were not viewed as the sole solution to traffic congestion, but as a part of a complete transportation system solution. The planner’s view of freeways can be summarized as viewing them, “as a peculiar kind of land use that could have significant positive or negative effects on adjacent land uses” [5].

The 1923 superhighway plan for Detroit (Figure 2) was the first large-scale proposal of the new urban freeway [5]. This plan included 225 miles of superhighways throughout Detroit to be part of a larger transportation plan including rail rapid transit. The superhighways were to have a 300 foot right-of-way with through traffic lanes, rail transit in the median, landscaped strips between the roadways, and frontage roads to provide access to adjacent properties [5]. Incorporated into the design were the use of limited access and grade separation.
One of the most prolific traffic consultants of the time, as well as planner-engineer, was Harland Bartholomew. Bartholomew was a strong proponent of the planner’s vision of the urban freeway, that freeways could and should be used to guide urban growth by linking transportation with land use planning [5]. His early plans were usually tied to proposals for rapid transit systems and large-scale urban development projects [5]. Bartholomew’s plans and ideas are representative of freeway design by traffic consultants in the 1920’s and 30’s.

The 1930 plan for St. Louis County was produced by Bartholomew and his firm which proposed 42 miles of superhighways throughout the county, linking the suburbs to the CBD. The superhighways were to have 150 foot right-of-ways including separate roadways for local and express traffic as well as a rail rapid transit line in the center median [5]. As a superhighway, it had limited access and grade separation. The layout of the superhighways was based on present and projected land use and population distributions [5]. Similar to other contemporary plans, “Bartholomew treated the freeway as a particular kind of land use that had important effects on neighboring land uses and not simply as a road” [5]. Bartholomew also produced plans for Vancouver and Oakland as well as a 1942 plan for St. Louis County.

In 1939 the City of Los Angeles’s Transportation Engineering Board prepared a superhighway plan consisting of over 600 miles of freeways for the region (Figure 3) [5]. These proposed freeways consisted of
a maximum of 6 lanes total and were designed for speeds of 45 miles per hour [5]. The freeways, which contained few lanes, were to be densely spaced to disperse and distribute traffic [5]. Rail rapid transit was included in many of the freeways’ medians. The Transportation Engineering Board’s plan, “was to maximize the person-carrying capacity, as opposed to vehicle-carrying, capacity of the transportation system” [5]. Also important was integrating the freeways with the surrounding land use, especially so in the CBD, where the freeways were designed in conjunction with planned commercial development [5].

These plans of the 1920s and 30s were mostly prepared by a small group of traffic consultants and were usually commissioned by downtown business associations, although local governments occasionally hired the consultants [5]. However, even with the support of the businesses and local governments, these plans proved to be expensive and local governments did not have the resources to fully implement their freeway plans [4]. Without a source of funding, however promising these plans may have been, they were for the most part never built.

Bartholomew’s later plans, those after World War II, began to reflect more of the traffic-service vision of traffic engineering. His plan for Richmond, Virginia was meant to use freeway development to restrict residential decentralization and to save the central business district [5]. While the highways were
eventually constructed, it was only after years of alignment adjustments and the results originally sought
were not achieved [5]. His 1947 plan for Alameda County (Figure 4), California included rail rapid transit in
the median of two freeways; the freeways were constructed, but without the rail. However, by the time of his
plan for Atlanta, Georgia in 1954 his work mostly reflected the concept of the freeway as a conduit for
moving traffic. While Bartholomew still expressed that freeway design needed to relate to surrounding land
uses and potential social consequences, those ideas became side notes to design of moving as many cars as
quickly and as safely along the highway as possible. The change in Bartholomew’s plans is a direct parallel
to the overall evolution of highway design from that of the comprehensive transportation and land use plans
of the early transportation planners in the first several decades of the twentieth century to that of the traffic
engineers, with the clear objective of safely maximizing traffic flow above all else.

Figure 4: 1947 Freeway Plan for Eden Township in Alameda County, California by Harland Bartholomew [5]
The urban freeways we are familiar with today are largely based on the traffic-service only vision and designs of traffic engineering [5]. Traffic engineering often focused only on the freeway’s function of carrying traffic. The main objective was to get as many cars as quickly as possible through the highway in a safe manner. Freeway routes were based off of travel desire lines from surveyed motorists [5]. While traffic-service is an integral aspect of highway design and the performance of all highways, focusing on this alone neglects the importance of transportation’s relationship with land use and the large effect the two have on a city’s development and growth. The engineer’s view of highways can be summarized as focusing, “on the facility’s traffic service capabilities” with the, “goal of moving the most vehicles at the lowest cost” [5].

The traffic engineering philosophy of freeway design is perhaps best exemplified by Robert Moses [5], who participated in roadway design for over forty years. Moses began his road building career in the 1920s and 1930s by constructing parkways, recreational roads connecting New York City to the parks and beaches on Long Island. He prepared an arterial highway plan for New York in 1930, which called for hundreds of miles of parkways focusing on the landscape and recreational aspects of that road type [5]. However, increasing traffic volumes at higher speeds caused him to switch his proposals to more utilitarian designs [5]. By the 1940s Moses was building modern freeways, engineering their design for high speeds and large volumes of traffic (Figure 5). The freeways were based on geometric design standards which became the fundamental basis of highway design regardless of the highway’s location in a rural or urban setting. Furthermore, their pathways through the urban area were not considered as part of a larger land use - transportation plan, but rather on traffic service desire lines and right-of-way costs. Examples of such highways are the Cross-Bronx Expressway and the Gowanus Parkway in New York City. Moses funded his projects mostly through state and federal grants. Federal gasoline tax revenue had become the primary means of highway finance, replacing property taxes, by the 1940s [5]. Since motorists were then funding the roads, any aspect of highway design that did not directly benefit them was perceived as a waste of taxpayer money [5].
While during the first few decades of the twentieth century most traffic consultants advocated the same freeway design principles, the rift between what became the planning vision and the traffic engineering vision began to widen in the 1940s and soon the two ideologies became competing forces. The development of the interstate highway system, starting at the end of the 1930s, played a large role in the growth of this division as well as the eventual victory of the traffic engineering philosophy over that of transportation planning. Largely contributing to this outcome was how building the freeways was funded as well as the traffic data supporting the engineer’s designs and the lack of data supporting the planner’s arguments.

In the 1930s the United State’s Bureau of Public Roads (BPR) worked with state highway agencies in collecting data of the conditions of existing highways and roads. The chief of the BPR was Thomas MacDonald and his top aide was Herbert Fairbank, both of whom were indispensable in the early development on the interstate highway system. After the extensive surveys were completed, the results showed that the rural routes did have traffic congestion, but that the problem lay in metropolitan areas [3]. Per Congress’s request, the BPR prepared the 1939 report, *Toll Roads and Free Roads*. Due to the results of the nationwide traffic survey, instead of focusing on a limited network of toll superhighways, the report described a master plan for a free interregional highway system [3]. This 1939 report focused on the issue of urban traffic congestion and the consequences of the population shift from the city to the suburbs. As cities
suffered from the loss of population, the report suggested that new urban freeways were necessary as part of the overall restructuring of city plans required to stop the decline of the central business districts [3]. “Such a revision will have to provide the greater space now needed for the unfettered circulation of traffic and will have to permit a reintroduction of facilities for the various forms of transportation – railway terminals, docks, airports, and the highway approaches to such – more consistent with their modern relationships” [3]. The report suggested that these urban highways be depressed, as shown in Figure 6, or possibly elevated and to be laid out in the fashion of a hub, spokes, and rim. The President at the time, Franklin D. Roosevelt accepted the report although he felt that cities should be responsible for their own roads. [3].

In 1941 President Roosevelt established the National Interregional Highway Committee to further the plan outlined in the 1939 *Toll Roads and Free Roads* report. The BPR was now the Public Roads Administration (PRA). The committee produced the report *Interregional Highways*. The report for the most part reflected the views of MacDonald and Fairbank, although the committee had other members including Harland Bartholomew [3, 5]. The report was mostly completed in 1941, but was not released by the President to Congress until 1944. This was done to tie in with the post war programs being developed by planners to employ the veterans and prevent another depression [3]. Again, President Roosevelt was not too interested in the urban sections of the freeways although the report highlighted such sections and their importance to urban revitalization [3]. The Interstate routes are shown in Figure 7.
Interregional Highways further described the system envisioned for urban areas, that of the hub, spokes, and rim. The freeways were seen as a way to prevent the continued decentralization of cities and to stop the spread of “ribbon” development, or sprawl, which had traditionally occurred along freeways extending from urban cores. Again, it was mentioned that the freeways should be located to connect with and benefit other modes of transportation. The interregional highways were presented as a possible solution to the problems cities were facing, namely traffic congestion, blight, and loss of capital investment, among others [3]. Most importantly, these highways were seen as a method to check or reverse the decentralizing forces inflicting cities and to preserve the central business district. The rural routes of the highway system were selected based on existing routes which connected various metropolitan areas. This use of existing routes overestimated the mileage of the interstate system since eventually direct line rural routes would be designated [7]. The report proposed a 40,000 mile limitation on the length of the highway system. No routes in or through urban areas were located or designated yet. Figures 8 and 9 show how urban routes might look. According to Francis C. Turner, who joined the BPR in 1929 and eventually became the Federal Highway Administrator, they did not yet have a way to select the urban routes. “What actually we did was measure the rural mileage and up to the 40,000 miles we said whatever it is in between, that should be left reserved for urban mileage, which we have not been able to really measure and make an intelligent report on” [7].
In 1944 President Roosevelt signed the Federal-Aid Highway Act of 1944 into law. This legislation’s purpose was to continue developing the concept of a national network of express highways [3]. It changed the name of the system from the National System of Interregional Highways to the National System of Interstate Highways. It also authorized the PRA to designate a 40,000 mile network of highways [3]. Not included was any focus on coordinating the highway network with other public or private facilities.
in urban areas, which was a key point made in the two earlier reports. At this time, Federal policy begins to become ever more favorable of the engineer’s traffic-service vision of freeways over that of the more comprehensive planner’s vision. Figure 10 shows how a freeway may relate to its surroundings. No dedicated source of funding was provided for the Interstate System at this point either. The highways were to be funded by the existing federal-aid primary system with a federal – state matching ratio of 50 – to – 50 [3]. As no special funding was provided, highway construction progressed at a relatively slow pace.

New sources of funding were developed at the state and federal levels, including the gas tax. Eventually, the funds collected through this tax were to be used for freeway construction [4]. Since this tax was administered by state and federal governments, they then gained control over the design and implementation of freeway projects which were oriented toward rural and intercity transportation [4]. The state transportation engineers focused on a more narrow aspect of freeway design, maximizing traffic flows while minimizing costs [4]. While this way of thought may be acceptable for rural freeways it is not sufficient for urban freeways.

![Figure 10: Fitting in the urban freeway, 1944](image)

The initial 37,681 miles of the interstate system were designated on August 2, 1947 after discussion
between MacDonald and Fairbank with the states. Also involved in the designation process was the administrator of the Federal Works Agency, of which the PRA was part of, Maj. Gen. Philip B. Fleming [3]. Included in the designation were the main intercity routes and 2,882 miles of urban routes. The remaining 2,319 miles were set aside for designation as urban routes at a later date. The urban portions of the freeways as described were to be depressed or elevated, designed for speeds of 35 to 45 miles per hour. Segments that would be depressed would be paralleled by access roads and be crossed by bridges at intersections [3]. Even though the latest reports did not stress the importance of the interrelationship between various modes of transportation, MacDonald still believed strongly in this and made this point at meetings with highway officials [3]. Highways, according to MacDonald, connected all of the other modes of transportation [3]. Included in this mix of transportation modes was mass transit, which MacDonald felt was crucial to the function of cities. Referring to the trend of increasing private vehicle use and decreasing mass transit use he said, “Unless this reversal can be accomplished, indeed, the traffic problems of the larger cities may become well nigh insoluble” [3]. Even until this stage of the development of the interstate highway system, the highest ranking officials at the PRA and in the design of the highway network, MacDonald and Fairbank, believed that this system of highways needed to be part of a larger urban transportation system, otherwise the traffic problems plaguing cities would be unsolvable. While highways were receiving federal and state funds, or subsidies, at this time, mass transit was not [3]. Most mass transit systems were still owned and operated by private companies [3]. This trend of subsidizing highways and not mass transit would persist well into the future even as mass transit operation became a function of the public sector.

As time progressed, the more comprehensive view towards the interstate system as a land use tool to revitalize urban areas along with transit was eroded. Federal housing legislation at the end of the 1940s proposed slum clearance and replatting, but did not incorporate the proposed urban highway system. MacDonald and Fairbank had envisioned the highways and urban renewal as a single process with both aspects relying on the other in order to be successful. On April 20, 1949, President Truman denied Fleming’s request to integrate the federal housing program with the interstate highway program [3]. The Housing Act of 1949 separated the two programs which otherwise could have allowed for a single land use and highway plan in urban areas [5].

The final segment leading to the actual construction of the present-day interstate highway system
can be tied to President Eisenhower, who took office in 1953. Eisenhower was keenly intent on building a modernized highway network across the United States to reduce congestion, expand the economy, and for national security [8]. After a July 1954 speech by the President to the Governors’ Conference, the Governors formed a Special Highway Committee to develop a highway plan, supporting their ideas with studies from the BPR/PRA [8]. The Committee strongly supported the need for a modernized national highway network, the Interstate System, and wanted the Federal Government to be primarily responsible for such a system [8]. Of key importance to the Governors was the funding to construct such a large public works project [8]. The Committee presented its plan to the President in December 1954.

The same year, President Eisenhower formed a committee headed by General Lucius D. Clay to work with the Governors’ Committee in developing a proposal [8]. The Clay Committee’s report, *A 10-Year National Highway Program* was sent to Congress in February 1955. The report discussed the immediate need for the National System of Interstate Highways and that the rate of development must be increased [8]. The report also featured a cost estimate for such a system. Also included in the report was the need to upgrade other roads in general. Funding for this immense task was expected to come from the highway users. While the Clay Committee report did mention that other forms of infrastructure should be considered when laying highway routes it also said, “this Committee was created to consider the highway network, and other media of transportation do not fall within its province” [8]. The report gave three reasons why the highway improvements were needed [8]. The first was to reduce traffic congestion and to accommodate the increasing number of motor vehicles. The second was to improve roadway safety. The third was for the purpose of civil defense. Regarding the expense of tens of billions of dollars more than current funding offered, the report ensured that the system was crucial to sustain the growing economy and that construction of the project would itself contribute to the growth of the economy [8].

Senate hearings on the National Highway Program began in February 1955. The American Municipal Association (AMA) had a representative at the hearings to represent cities’ thoughts on the program [8]. The AMA was in full support of the interstate system and Federal funding. They believed that traffic congestion was the main reason for the decline in urban areas and if congestion could be relieved, the central business districts would once again prosper [8]. In 1956 the Assistant Director of the AMA had said, “There has been so little road construction in cities of the scope and magnitude contemplated in this new
program that there is little or no experience to guide officials”” [8]. The view that the highways were critically needed and that they would solve urban problems was shared by most at that time, including state and local officials [8]. Interestingly, what was not discussed by the AMA were the displacement of residents and businesses, air quality, noise pollution, and many other concerns we now see as obvious [8].

In January of 1955 a memorandum was issued by the Deputy Commissioner of BPR/PRA to the field offices about the designation of the remaining urban interstate miles [7]. The routes were to be selected by state highway departments and then sent to the BPR/PRA’s headquarters along with accompany data justifying why those routes should be included. Detailed studies were requested due to the complex nature of urban areas and the need to be able to select the final routes [7]. The BPR/PRA would make the final decisions on which routes would be selected [7]. The selections would be made in close coordination with the Department of Defense. The designation of the remaining miles occurred on September 15, 1955. At this point the Commissioner of the BPA/PRA approved the general location of the Interstate System [7]. The resulting system was published in General Location of National System of Interstate Highways Including All Additional Routes at Urban Areas Designated in September 1955, which became known as the Yellow Book and was sent to each State highway agency [7]. The book simply included the 1947 rural designation map, the 123 urban area designations, and a table of contents; there was no explanation of the route selection procedure [7]. The urban routes shown in the book were just diagrammatic to show that there would be a route designated there, final detailed locations were to be worked out later. However, many took the maps in the Yellow Book to be final designations [7]. Figures 11 and 12 show diagrams of freeway routes in Baltimore from 1939 and 1955 respectively.

The interstate highway system finally received a dedicated source of funding and truly began in earnest on June 29, 1956 when President Eisenhower signed the Federal Aid Highway Act of 1956. Geometric design standards for the Interstate System were included in this legislation as well as an increase in the mileage limitation by 1,000 miles. To fund the Interstate Highway system, the Federal Highway Trust Fund was inaugurated in 1956 and offered a 9:1 federal to state match for funding the highways. The Trust Fund derived its revenue from the federal gas tax. Thus, the state and federal governments’ highway plans were the ones eventually built in urban areas as funding for them was now plentiful. The previous, holistic urban freeway plans were largely ignored [4]. By this time, the influential MacDonald and Fairbank were no
longer in their leadership positions [3]. At this point, final designations of actual routes had to be made for

Figure 11: Baltimore freeway plan, 1939 [26]

Figure 12: Baltimore Freeway Diagram from the Yellow Book, 1955 [28]
urban areas in order to provide cost estimates [7]. In the late 1950s, the urban routes from the Yellow Book were turned into lines on the ground. According to Frank Turner this was done by looking at the Yellow Book maps, “‘and saying, ‘Well, the diagram, the desire lines traveled diagrams that we’ve got for each city indicate that this is the heaviest traveled route in here and it has X number of trips that had to be taken care of. And here is the location – here is where the desire line is.’ A straight line from point A to point B’” [7]. The lines often had to be adjusted around obstacles though [7]. The Federal-Aid Highway Act of 1956 did not mention the subject of developing the urban freeway network in conjunction with urban plans for each area, which was such a crucial factor to Fairbank and MacDonald [7].

Urban studies were continued throughout this period looking for changes in traffic and population distributions [7]. Methods of determining future traffic patterns were developed and implemented based on population size, density, income, land use, automobile ownership, and distance from the urban core [7]. By 1957 the BPR/PRA was using such predictive tools to design their highways based on predicted future needs [7]. While based on multiple factors, only the effects on vehicular traffic were considered. The highways were thus being designed based purely on car traffic and predicted future traffic. This does not take into account the underlying reasons for the trips or any other aspect of city function. No consideration was given to why different land uses generated certain traffic or how land uses could be altered to then influence traffic flow. It also assumed all current and future trip demand would be satisfied only by private automobile trips. So, while land use was considered in designing the urban freeways, it was only taken as a given constant to adjust the highway to. The original ideas of simultaneously changing land uses and designing complimentary highway networks was not achieved. Additionally, highways were viewed as the only method of transportation; providing some of the trips by mass transit was not considered. “Designation of the urban networks in 1955 and 1957 foreclosed the type of planning that might have defused some of the urban controversies that would surround development of the Interstate Highway System” [7].

Just over a year after signing the legislation into law, the highway program was facing severe criticism. In September of 1957 at a symposium on the new highway system, Lewis Mumford clearly articulated the flaws and future problems of the system [3]. He argued that the legislation was based on a study of highways, not transportation and that it had passed so quickly through congress due to America’s love-affair with the automobile [3]. Describing the engineering design of highways, “‘We are faced, it is
fairly obvious to me, with the blunders of one-dimensional thinking, or thinking very expertly about a single characteristic, a single feature that we are interested in, and forgetting the realities that surround us” [3].

The same design standards and practices were to be applied to freeways regardless of their context and thus created the Interstate Highway system of today. Initially urban legislators were against the system as they saw it benefiting rural districts over their own. This was overcome by 1956 when the legislation was passed. Cities were supposed to design the urban segments of the freeways as specified in the 1944 interstate highway system blueprint *Interregional Highways*. In order to gain the approval of the urban districts, the urban segments of freeways were planned for the entire system in just eight months between 1955 and 1956 and included little to no local consultation or control.

The urban sections were always considered the most important and needed of the national system, yet their selection and designation was not given due consideration. Much time and effort was spent planning and designing urban freeway routes throughout the years leading up to 1956, but once the Interstate Highway system was funded and actual routes needed to be selected, the earlier plans were for the most part ignored. Instead, routes were based on traffic and demand analyses performed by state highway agencies. Then the federal government, via the BPA/PRA, made the final decisions as to the Interstate Highway locations, notably based on desire lines. The urban segments of the Interstate Highways System ended up being purely designed by engineering principles. In the rush to select final routes for cost estimates, land use considerations and relationships with the larger urban transportation system were all but ignored.

The limitation of the Interstate Highway system to 41,000 miles also had a negative effect on urban areas. Since miles were scarce and had to be distributed over a large number of urban areas, the original idea of dense networks of smaller highways became poor candidates to be designated routes as they would have consumed many of the limited miles. Instead, urban areas were to have just a few Interstate routes each, which overtime have become large to accommodate increasing traffic. The consequences of this were predicted by the early planners and traffic consultants – congestion of freeways, disruption of surrounding urban areas, and extremely high traffic volumes at the few access points along the freeway at which the traffic concentrates.

Viewing congestion as the main problem and that by relieving it, the urban problems would be solved. This thought was pervasive behind the passage of the 1956 Federal Aid Highway Act but has proved
to be unsuccessful. Traffic congestion in urban areas has yet to be solved by freeways, even with the massive freeways which traverse some cities today, such as the Downtown Connector in Atlanta, Georgia which has upwards of 16 lanes. The early planners of the Interstate System and the transportation planners before them recognized that freeways would not be the “magic silver bullet” solution to solve urban problems, but instead were a needed component of a larger transportation system including mass transit. They believed that passenger carrying capacity was more important than traffic capacity and that by using the highway’s influence on surrounding land use, the urban form of cities could be adjusted to the new demands of the ever increasing population as well as the flow between the urban core and the suburbs. Even Robert Moses eventually stated that traffic congestion could not be solved simply by building more and more highways, “he conceded that there was a practical, if not financial, limit to this approach. He recognized that ‘the only long range answer in these few periods of glut is to change the pattern of arrival and departure’” [5].

By the mid-1970’s freeway building under the Federal Interstate Highway system was reaching its end, due to increasing costs and opposition [4]. However, we are still left with the legacy of the highway building craze, notably large freeways slicing through urban cores with no regard to context. While it is undeniable that the Federal Interstate Highway system has had overall positive economic effects [4], could those same benefits have been achieved in a less damaging way? With all of the drawbacks of the urban Interstate Highway system, “Perhaps the greatest failure, however, was that the Interstate System did not relieve congestion” [8]. And because of that, “the interstate system would not reverse the urban problems that had inspired MacDonald and Fairbank to create it” [3]. Furthermore, were all of the downtown urban freeways necessary to begin with or were they built since federal funding was available or to give the city a certain perceived modern image? With money running low for infrastructure maintenance and the freeway having lost its image of progress, it may be time to reconsider the purpose and need of many of the existing freeways in urban settings, mainly in the downtown core areas. Which urban highways may be suited for removal?

Recently, movements to remove freeways from downtown districts have been gaining considerable attention and in several cases have been successfully implemented. This way of thinking about freeways and their purpose in cities has even been called a paradigm shift in highway policy [9]. While this may or may not be the case, as the following case studies demonstrate, removing a freeway from a downtown district is far
from impossible and does not have to lead to nightmarish traffic congestion or a downturn in the city’s economy. In fact, where such proposals have been carried out, the opposite effects have occurred.

There are many ways of rethinking urban freeways. In Rethinking Downtown Highways, Lealan LaRoche proposes seven urban design strategies gathered from case studies as conceptual alternatives for various highway situations [10]. These alternatives are bury, demolish, tame - highway to boulevard, partial capping / bridging, retain and ameliorate, and relocation. Each alternative has positive and negative aspects and may be best suited for certain conditions. This paper combines the two alternatives of demolish and tame into a single concept of highway removal. Further evaluation of the use and effects of this alternative are studied from case studies of six urban freeways which have already been demolished. A set of guidelines and considerations for evaluating a proposal to remove a freeway are then presented.

What conditions existed in the urban districts where freeways were successfully removed? How did the proposal initiate and how was it carried out? Who controlled the freeway and its right-of-way? These questions are among those considered and answered in the following section. When giving such proposals serious consideration, these questions must be asked and answered for the particular situation at hand. Just as it was unwise to view urban freeways as “the” solution to urban problems decades ago, it would be just as unwise to view the removal of these urban freeways as “the” solution to today’s urban problems. However, proposals to remove urban freeways deserve due consideration and should be taken seriously as part of plan to improve certain urban districts. After a careful study of the unique situation presented in an urban area, it may be found that removing the freeway can be beneficial and at which point its removal can offer the city unparalleled opportunities.
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Table 1: Summary of the Six Case Studies
Conclusions From Case Studies

In “Shifting Urban Priorities?” Napolitan and Zegras suggest that freeway removal will only occur given four conditions: 1. that the freeway’s structure is degrading or no longer safe; 2. that some event occurs to garner significant support for the idea of removal; 3. that mobility is valued less than other urban benchmarks; and 4. that officials in power see more benefit to not having the freeway than having it [9]. Based on their analysis and four conditions, a revised set of guidelines and considerations are developed from examining the six case studies of freeways which have been successfully removed. While each condition is important in its own way, it is only when combined with others as part of a larger plan that a freeway can be successfully removed. All of the removal cases have involved comprehensive plans for the entire area surrounding the freeway including traffic, transit, economic, social, environmental, and urban design considerations.

The case studies demonstrate that there are a multitude of reasons to rethink a highway and possibly even to remove it. The first, and perhaps most important reason, is to spur economic development. This was the main driving force behind the removal of the Park East Freeway and was considered to be one of the benefits of removing the highways in all the other cases. It has been shown in the case studies that once the freeways had been removed, land values increased and new development occurred at various levels. This is closely related to the improvement of the surrounding neighborhoods as well since, “A common way to gauge the economic benefits of public initiatives…is to study changes in land prices” [2].

There are other economic factors which may lead to a proposal to remove a highway. As many existing highway structures are reaching the end of their designed lifespan, maintenance costs increase and a decision must be made on whether to replace the highway repair the highway. Both of these options are extremely expensive. A third option at a much lower cost does exist, to remove the highway and replace it with an at-grade road. In many of the case studies, notably the Park East Freeway and the West Side Highway, the cost of this third option was a fraction of the cost to repair or replace the existing highway structure.

The highways’ right-of-ways are government owned and do not contribute directly to the tax base. Additionally, the highways consume large tracts of land which tends to be valuable in urban areas. Replacing the highway with an at-grade road, including boulevards, has allowed many of the cities to sell off excess
right-of-ways to private developers. The city can use the funds from the land sale and the newly generated
tax revenues to help cover the cost of the project.

Another reason to remove a highway is due to structural failure. While this is closely related with
the cost of repairing or replacing the structure, significant sudden damage to a highway structure may be the
catalyst for a plan to remove the highway. The two cases in San Francisco went through such an experience
in 1989 when the Loma Prieta earthquake cause significant damage to the elevated highways. In New York
City, the collapse of a large section of the West Side Highway led to its closure and eventual demolition. The
third reason for removing a highway is to reconnect the urban districts that are divided by the highway and to
beautify the city.

The origins of the proposals to demolish the freeways are varied from city to city. Most had been
ideas proposed or thought about long before they were implemented. Consistent across all the cities in the
case studies was that support from the local government was strong, notably the Mayors of the various cities
were proponents of the proposals to remove the highways. The proposals were usually initiated by the
Mayors as well. Although in Portland, Oregon it was the governor and citizen group which initiated the
proposal. The case of the West Side Highway did not have any clear support from the government at any
level as it was a long process with political and judicial controversies.

Once it has been decided that highway removal be considered as a proposal, there are a number of
considerations which seem to have enabled the examples in this paper to have been successful. One of which
is the physical location of the freeway. Each of the freeways analyzed in this study were located in the
downtown urban core of their respective city.

Freeways located along a waterway or cutting through a neighborhood make good candidates for
removal. As cities transition from the industrial era into the post-industrial era, the waterfront undergoes
significant changes; industry and shipping no longer line the downtown waterfront as they have moved to
locations further from the city center. This was the situation along the Embarcadero Freeway and the West
Side Highway. These elevated structures were originally put in place to facilitate through traffic adjacent to
the piers. Simultaneously, urban residents in post-industrial cities tend to value sustainability and
opportunities for recreation and leisure. More and more, waterfronts are being appreciated for their aesthetic
and ecological aspects. Together, the waterfront is no longer seen as a wasteland, but instead as a possible
amenity for the changing city. In Portland, Oregon the Governor and residents of the city viewed the river as an amenity and decided to replace the freeway along the river with a park. Instead of the freeway acting as the boundary between the industrial zone along the water and the rest of the city, it is now a barrier between the rest of the city and potential economic, ecological and recreational opportunity, even as the freeway itself is physically unchanged. Capitalizing on the possibilities of the waterfront is an important component of a plan to remove a freeway. The three waterfront case studies all included public access to the waterfront as parks or promenades once the freeway was gone. Along the waterfront in San Francisco, many private developments have occurred as well, including the San Francisco Giants Stadium. Capitalizing on the latent demand of a waterfront offers many opportunities for successful redevelopment of both public amenities and private projects.

The other freeway location favoring removal is that where the freeway directly cuts through a neighborhood or urban core instead of running along an existing boundary between districts or neighborhoods. Many urban freeways in such locations divide and disconnect the city, opposite of what freeways were actually intended to do. The early highway plans of the 1920s and 30s and even the beginning stages of the development of the Interstate Highway System clearly stressed the importance of the highway’s location within the city and its relationship with the surrounding land use. However, when the final urban segments of the Interstate were designated it was done based on traffic demand analysis and so the constructed routes did not conform to the existing urban fabric. This was the situation for the Park East Freeway and the Central Freeway. While removing a freeway in this location may not offer as many possibilities as a waterfront location, the cases where this has occurred were done to foster economic development and to reconnect and revitalize the neighborhood. Such projects also have the ability to give the city a new image. Strong arguments can be made for health and quality of life improvements to be had from removing the freeway. These may include less pollution, lower noise levels, and reduced crime.

Whether or not the freeway is part of a completed highway system is another condition which, based on the case studies, strongly influences the possibility of removal. The “freeway revolts” which occurred across the United States in the 1960’s and 1970’s halted the construction of many planned freeways and some which were already being built. This resulted in many downtown urban freeways being short spurs or part of incomplete systems. In most instances the built highways were designed and constructed with a capacity for
an anticipated traffic volume of the completed system. In turn, these urban freeways do not carry the volume of traffic which they were designed for and may not warrant such a large structures. The Park East Freeway in Milwaukee is a prime example. The freeway was originally designed as a segment of a highway network encircling the city. Construction began on the Park East before other segments and was designed to carry traffic volumes predicted for the completed system. Opposition towards many of the segments resulted in their cancellation at which point construction of the Park East Freeway also ended. As both the Park East Freeway and the rest of the network were never completed, the freeway was underutilized. In such incomplete freeway cases, the traffic congestion concern is more easily overcome. The amount of traffic actually using the freeway may be accommodated on an at grade road with no other necessary provisions. There is also a financial incentive in the United States to remove incomplete sections of freeways, the 1973 amendment to the Federal Highway Act, “which authorized withdrawal of unfinished segments of the Interstate highway system and their replacement with other transportation projects (Wiener 1999). This opened the way for federal financing of freeway teardowns as long as alternative travel means, including expanded surface streets and transit services, were available” [22].

The concerns of traffic congestion and reducing access to the city’s core may be the two most important and difficult issues when considering a proposal to remove a freeway. While some concerns may be over exaggerated or misconceptions, it is vital to maintain and even improve access to the city while not causing severe traffic congestion. However, Robert Cervero of UC Berkeley makes an argument in his paper for an international symposium for the Cheonggye Cheon restoration that, “It is also important to keep in mind that the aim of boulevards and roadway designs is not necessarily to accommodate displaced or redistributed traffic.” [2] While maintaining or increasing traffic volume capacity should not be a goal of freeway removal, otherwise it would be following the same logic behind the initial construction of the freeway, accommodating the change in traffic pattern and maintaining access and desired level of mobility must be part of the comprehensive freeway removal plan. In many cases, an at-grade boulevard is sufficient to meet traffic demand since, “A multiway boulevard is capable of handling large amounts of relative fast moving through-traffic as well as slower local traffic within the same right-of-way but on separate but closely connected roadways.” [2]

A crucial factor to review when considering a plan to remove a freeway is the maximum traffic
volume. The type of trips being made should also be studied. The case studies demonstrate that highways with a wide variety of traffic volumes, ranging from 25,000 vehicles per day (VPD) on Harbor Drive to 168,000 VPD on the Cheonggye Expressway, can be successfully removed when the highway removal is part of a larger comprehensive transportation plan. The second factor is how much of the traffic is local traffic and how much is through traffic.

What happens to the traffic which once used the highway once that highway no longer exists? All of the case studies replaced the highways with some other roadway, usually a boulevard. However, in most cases the replacement roadway was not designed to handle the same traffic volume as the highway. When the freeway is removed and the capacity of the corridor is thus reduced, surprisingly the case studies all show that there is not a correspondingly large increase in traffic congestion. So what happens to the rest of the traffic? Where do the cars go? The answer can be explained by the results of what happened in the case studies: change in demand, better traffic distribution, traffic management, and a switch to transit.

Some of the evidence from the case studies seems to show that the freeways induced demand and led to unnecessary trips, “if you build it they will come.” Conversely, once the freeway was removed, some of the traffic just seems to have disappeared. In a study of over 100 road-capacity reductions it was found that there was an overall reduction in motorized traffic of 25% [2]. Braess’ Paradox is a theory on this phenomenon that, “direct routes often function as bottlenecks, and so reductions in total capacity can reduce congestion” [11]. The project planner of the Seoul Cheonggye Cheon Restoration, Kee Yeon Hwang, is a proponent of this theory and this most likely had an effect on the decision to remove the expressway [11].

Induced travel is a phenomenon in traffic engineering and transportation planning which is a subset of generated traffic. It is gaining more attention amongst transportation professionals who are beginning to consider these phenomena in more accurate transportation forecasts and economic analysis [23]. Generated traffic is increased vehicle traffic brought about by road improvements that reduce the cost of travel [23]. Such traffic is made up of traffic from other routes, times, and modes as well as induced travel. Induced travel can be described as trips which would not have been made had the roadway not been improved and congestion reduced. It is the increase in total vehicle trips and distance traveled excluding diverted trips [23]. This phenomenon follows the economic “law of demand” [23]. When roads are congested, people tend to adjust accordingly by differing trips which aren’t urgent, traveling at a different time, or traveling by other
modes [23]. When congestion is reduced, the economic cost to travel is also reduced which can increase peak-period vehicle travel [23].

Generated and induced traffic function over two different time ranges in response to a highway improvement, the short run and the long run. In the short run, overall vehicle travel demand does not change; just the routes and times of travel adjust to the new, less congested conditions. In the long run, transportation and land use patterns change and new trips are induced, increasing the overall number of trips and total vehicle miles traveled.

Some major studies have shown an elasticity of vehicle miles traveled (VMT) with respect to lane miles of 0.5 in the short run and 0.8 in the long run, with urban roads having a higher elasticity than rural roads [23]. In other words, in the short run 50% of the added capacity will be used by generated traffic. Eventually, traffic generated due to the added capacity will consume 80% of that capacity. Another study found the elasticity of California state highway traffic. This study determined that for every 2 to 3% increase in highway lane miles, total vehicle traveled increased by 1% [23]. The U.S. Department of Transportation Highway Economic Requirements System model also includes a travel demand elasticity factor of -0.8 in the short run to -1.0 in the long run [23].

There is much data and research to support the traffic generating effects of adding road capacity and it is now a relatively excepted traffic phenomenon. However, is the opposite true as well? This is the question presented in “Traffic Impact of Highway Capacity Reductions: Assessment of the Evidence” a report from the University College of London (UCL) to see if, “reducing road space for cars (can) cut traffic” [24]. The UCL team studied almost 60 case studies where road space had been taking from automobile use and put to another use. The case studies were taken from locations in Europe, North America, Africa, and Asia. No matter what the reason for the removal of lanes from car use, predictions of major traffic congestion are often made yet, “examination of the evidence suggested that these predictions rarely, if ever, prove accurate” [24]. Reducing roadway capacity for cars, while not producing long-term gridlock does sometimes lead to short-term traffic issues and problems on some local roads [24]. What is most important for the argument of reducing highway capacity is that on average, 14-25% of the traffic which once used the affected route was not found after the reduction in capacity [24]. This finding of the study supports the concept of reduced traffic after reductions in capacity, which was evident in the six case studies presented in this paper.
Furthermore, road capacity reduction projects which included mass transit improvements resulted in a higher likelihood of drivers switching modes to mass transit [24].

The reasons for the simultaneous reduction in capacity and vehicular traffic were explained in the UCL report as follows. Initially, to adjust to the reduction in capacity drivers change their driving style to allow more vehicles to fit on the roadway, including driving closer together. When roadway conditions then deteriorate, drivers begin to use different routes or adjust the time of their trip to avoid the worst traffic. The next step in the reaction to reduced capacity explains the reduction in overall traffic along the corridor. This step includes more behavioral and long term changes to lifestyle including changing mode of travel or destination. Some may even move to a new home or change jobs if they were in the process of considering such drastic changes earlier on. Overall, the report suggests that flexibility by drivers allows for, “surprisingly large changes in traffic flows to result from a particular change to road conditions” due to the, “amount of variability which underlies apparently stable traffic flows, and which enables people to change their travel habits” [24].

The removal of a freeway can allow for a better distribution of traffic. The urban form, especially the street and block structure, surrounding the freeway has an important role in the ability of managing and distributing traffic if a freeway is removed. As each of the case studies is located in the urban core area, the surrounding urban form is based on a street grid system, although the scale of the street grid varies from city to city. The street grid provides flexibility in accommodating the traffic which once used the freeway due to its inherent flexibility in route selection. This was realized by Portland, Oregon when they removed Harbor Drive. To allow for better flow through downtown, some streets were converted to one-way streets and the traffic signals were coordinated.

The boulevard replacements allow more access to the city when compared to freeways as the traffic is not funneled onto a single corridor as is the case with highways. Instead, traffic is dispersed. More connections between the boulevard and side streets allow for more choices and options as to when to exit the corridor. In contrast, the freeways concentrate traffic at their limited access points, the ramps, which can create severe congestion at those locations. All the traffic going into the urban core must do so, on just a few streets from where drivers then disperse to their destination. Since these urban cores are primarily based on a street grid system, gridlock may occur due to the concentrating effect of the freeway. However, once the
freeway is removed, the grid is once again able to disperse traffic throughout the entire system allowing
drivers to dynamically decide the path of least resistance (least traffic) for the current conditions. This is a
much more complex system than a single freeway. Drivers are attracted to the freeway corridor even if there
are other routes available and, “In some situations adding capacity can increase total congestion by
concentrating traffic on a few links in the network and by reducing travel alternatives such as public transit
[23].”

An example of this is evident in Trenton, NJ’s Route 29, a limited access highway carrying 60,000
vehicles per day providing access to downtown Trenton [11]. Access to the downtown is provided primarily
at two interchanges. A proposed redesign into a boulevard would add 13 at-grade intersections between the
two existing interchanges with the goals of providing access to the Delaware River, improving safety, and
promoting economic development [25]. It is expected that these intersections would better distribute traffic
into downtown and through the street grid [11]. Traffic limits along the boulevard section would be reduced
from 40 - 50mph to 35mph [25]. Traffic models show that if implemented, travel times would remain
comparable to current conditions. Some segments would experience decreases in travel time while overall,
peak traffic travel time for the corridor as whole would increase by 90 seconds [11].

As mentioned previously, the aim of removing a highway is not to accommodate all previous traffic
on a replacement boulevard and surrounding streets. Instead, a more comprehensive view of the overall
transportation system must be taken. The focus should be on replacing and even surpassing the passenger
carrying capacity of the transportation system instead of maximizing the vehicle carrying capacity. The case
studies offer two methods to achieve such a goal: traffic management and transit. Perhaps the best example
of this is the Cheonggye Expressway replacement project in Seoul, South Korea. This case study had the
highest daily traffic volume, 168,000 VPD, traveling on 14 lanes. The replacement roadway, however, was
only four lanes total and still the project did not generate an increase in traffic congestion in the downtown.
This was possible due to the Transportation Demand Management measures implemented in the years
leading up to the project as well as the improvement of the local transit system. This improvement included
a rerouting of the bus routes and the addition of bus rapid transit (BRT).

A strategy to manage the transportation issues for when the highway is removed must be
comprehensive and view transportation not in terms of the traffic-engineering philosophies, but rather as the
traffic-planning philosophies which were so prevalent in the 1920s and 30s. The possibility may exist to test the developed strategy. In half of the case studies, the highways were closed due to sudden damage, the Loma Prieta earthquake in San Francisco forced the Central and Embarcadero Freeways to be closed and in New York City the West Side Highway partially collapsed. As a result, these cities were suddenly thrown into life without these freeways. The expected nightmarish traffic congestion however, never occurred. This suggests that once a transportation management plan is implemented, the freeway can be closed and the effects studied. However, it is important to note that any replacement roads might not yet exist. If it is shown that the freeway is not necessary to the city’s well being, the freeway can then later be removed and replaced with an at-grade street or boulevard and the new roadway may be perceived as an increase in road capacity. While not the intention of the long closure periods of the West Side Highway and the Central Freeway this was the result; the highways had been closed for so long that once their replacements were completed they were perceived as new, added capacity.

A final consideration is the ownership structure of the highway and the responsibility of the removal and replacement project. None of the highways in the six case studies were part of the Interstate Highway System. Of the five US examples, initial ownership was a mix between State and Federal governments. Harbor Drive in Portland, Oregon was initially a US Highway, but was transferred to the State of Oregon before it was removed. The Central and Embarcadero Freeways were initially State highways but were transferred to the city after the earthquake. The Park East Freeway also was a State highway which was then transferred to the city. The West Side Highway was a state highway and still is, although the city was responsible for the removal and replacement of the highway. In all of the six case studies, the local government was responsible for the replacement project although not necessarily for the funding.

While there is no absolute set of conditions which guarantee that a freeway can or cannot be removed, the successful projects thus far have all been part of a larger plan, a comprehensive structure and plan for the entire urban district or city. Transportation is more than just highways; it is about the complete system to provide access to property and to connect people, ideas, and goods. Transportation is also closely related to land use and both significantly influence the other, an idea promoted by the early twentieth century traffic consultants. With careful planning it is evident that removing a highway in an urban downtown setting is completely feasible and can be a great improvement to the city.
Application – Calhoun Expressway

The urban cores of the cities in the case studies have changed dramatically from their industrial era into their current post-industrial forms. This change in economic structure and its physical manifestation relates to the success of highway removal as evidenced above. The city of Augusta, Georgia is currently undergoing similar transformations. Dividing the Harrisburg/West End downtown neighborhood in half is the Calhoun Expressway, connecting Washington Road to Greene Street.

The John C. Calhoun Expressway was built to bring people from West Augusta to downtown in an effort to revitalize the downtown. The expressway disrupts the street grid in the Harrisonburg neighborhood as there are only three connections across the expressway in the neighborhood. Throughout the length of the expressway there are five connections total. Additionally, the expressway’s route isolated an area between the canal and the expressway which is extremely awkward in shape and is unlikely to be redeveloped. In some areas, there is only room for a narrow street with house on one side to fit between the canal and expressway.

The structure is a combination of depressed and elevated sections as well as some areas at approximately the same elevation as the surrounding area. The elevated section crosses the canal and active CSX rail lines. Currently, the highway is owned by the Georgia Department of Transportation (GDOT).

The expressway was originally supposed to connect Interstate – 20 to downtown Augusta, but do to alignment problems it never did. The original plan was for the Augusta Canal to be drained with the
expressway running along the canal bed. However, in the 1970s the canal became a National Heritage Area and so could no longer be drained. Its route was then proposed to follow that of a creek, but as the creek cut across the Augusta National Golf Course this plan was not allowed either. After much difficulty with the alignment of the expressway, it was eventually built in its current location. The expressway was first constructed it ended at 15th Street for a period of time until it was figured out how it would be finished to connect to downtown. Later, the Riverwatch Parkway was built, eventually fulfilling GDOTs original goals intended to be accomplished with the expressway.

Figure 45: Aerial Image of Harrisburg neighborhood with the Calhoun Expressway slicing through the middle (2010) [29]

Figure 46: Calhoun Expressway looking west (2010)

Figure 47: Calhoun Expressway looking east (2010)
The Calhoun Expressway makes a good candidate for removal and replacement with an urban boulevard based on the conclusions derived from the case studies. Most important is that the expressway never achieved its intended goals and so is overdesigned for current traffic volumes. Additionally, the Riverwatch Parkway has a similar route, but does not bisect residential neighborhoods. Thus, the expressway has a relatively low traffic volume. The expressway runs parallel to the existing primary streets through the Harrisonburg neighborhood as it is situated in the location of a prior street. The combination of a replacement multi-way boulevard within the existing street grid is likely to be able to accommodate existing traffic; however a traffic analysis would need to confirm this.

The removal of the expressway and replacement with a boulevard would make a large quantity of right-of-way available for private development which will add to the tax base. However, current economic conditions may not support development in the short run. The boulevard replacement would allow a significant increase in the number of connections between the two sides of the neighborhood and instead of acting as a barrier between the two; the roadway could function as a seam, once again connecting the two areas.

Perhaps most challenging would be garnering enough political support for such a proposal. As demonstrated by the case studies, local political support is necessary for the success of the project even if the proposal is initiated by grassroots organizations. As an urban boulevard and for Augusta to make the best use of the expressway’s right-of-way, GDOT would have to transfer the ownership of the highway to either the county or city. While not an easy task, it has been done in the multiple cases described previously.

While the John C. Calhoun Expressway likely would be another successful highway removal story through the Harrisonburg neighborhood, the timing of the project would be very important. As the expressway reaches the end of its designed lifetime and major repairs or a replacement highway becomes necessary, the third option of removing the highway and constructing a multi-way boulevard in its place may prove to be most beneficial to the neighborhood, the city, and in terms of cost.
“Planning was the key. In essence, he (MacDonald) was warning city officials that the genie was only granting them one wish. Choose wisely. They would have to live with the consequences of their choice for many years to come” [3].

- Richard f. Weingroff
Appendix - Case Studies

1. Harbor Drive - Portland, Oregon

Harbor Drive freeway was the first urban highway in the United States to be demolished [11]. The ground-level four lane highway ran along the west bank of the Willamette River for three miles connecting the area south of downtown to an industrial neighborhood and Lake Oswego [11]. The highway was constructed in 1942 and carried 25,000 vehicles per day before being demolished. Originally, it carried US Route 99W [12] which in 1972 became OR Route 99. Additional freeways were planned for the area during the 1950s and in 1964 the first of these proposed freeways was completed by the State. This highway was I-5 and runs along the east bank of the Willamette River.

The State Highway Department proposed a widening and relocation of Harbor Drive in 1968 however, in the same year the city’s Downtown Waterfront Plan recommended removing the freeway and using the land as park space [11]. The purpose of the plan was to beautify the downtown riverfront [11] and to reconnect the city to the water [10]. To carry out this plan, a nine-member task force was created to evaluate three alternative plans. The first alternative was cut and cover, to bury the highway and construct a park on top. The second alternative was to straighten and widen the freeway and the third alternative was to relocate the freeway and increase its capacity to 6 lanes [11]. Interestingly, the idea of completely removing the freeway was not initially considered by the task force due to high traffic projections of near 90,000 trips per day for the year 1990 [11]. In July of 1969 the Riverfront for People, a citizen group supporting this cause, was founded [13]. Around the same time, the newly elected governor, Tom McCall, offered his support for the project [12]. This public pressure and pressure from the governor forced the task force to consider demolition as an alternative and eventually it was the alternative recommended. This recommendation was made because the task force concluded that if the public was forewarned, traffic would redistribute onto the road network. Additionally, Interstate 405 was completed in 1973 creating an alternative route by connecting I-5 to the Freemont Bridge. The freeway was closed and demolished in May 1974 [11]. In the same year, Portland decided against another freeway proposal and used the Federal funding
for transit projects [10]. Continuing the trend of progressive planning and investment in multiple means of transportation, the city developed a comprehensive land use plan in 1980, enacting an urban growth boundary and concentrating development near the mass transit system [10].

In 1974, the Downtown Waterfront Urban Renewal Area (DTWF URA) was established over an area of 309 acres, including 73 acres of land made available by the highway’s removal [11]. This along with the creation of Tom McCall Waterfront Park led to the successful redevelopment of the downtown waterfront area. After removal of the freeway, there was no large increase of congestion on the surrounding streets and in fact, there was a 9.6% reduction in vehicle trips on nearby roads and formerly connecting bridges [11]. To accommodate the traffic which previously flowed on the highway, the city implemented traffic management proposals to allow for a more efficient (in terms of vehicles) use of the street grid [11]. The downtown streets were converted to one-way streets and the traffic signals were coordinated to allow traffic to flow continuously through the downtown [11]. To compensate for the increased vehicles on the one-way streets, speed limits were reduced. This was done to help create a more suitable environment for pedestrians and bicyclists. Over the subsequent years, increased development occurred in the downtown waterfront area and property values increased greatly [11]. Additionally, from 1990 to 2008 crime has decreased by 65% in the waterfront area compared to a decrease of 16% citywide.

Figure 14: The RiverPlace Project along downtown Portland’s waterfront, 2006 [10]
Figure 15: Aerial Images of Downtown Portland, Oregon with North at the top [29].

Top: Before the highway (1952)
Middle: With the highway (1970)
Bottom: After the highway (2010)
2. Central Freeway - San Francisco, California

The Central Freeway was opened in 1959 as a six lane, elevated structure turning into a four lane, two-level structure which ran through a residential neighborhood [11]. The freeway was initially to be a part of a cross-town highway system consisting of two freeways connecting the Bay Bridge to the Golden Gate Bridge [11]. Due to a citizen “freeway revolt” only 1.75 miles of the freeway were constructed [11]. The Central Freeway carried up to 100,000 vehicles per day [11] and connected Highway 101 to northern and western neighborhoods. It was not, however, a bypass of the downtown core. Discussion of and the ultimate decision to demolish the freeway began after the Loma Prieta Earthquake in 1989. Damage to the freeway led to the demolition of a northern section and a plan by the California Department of Transportation to seismically retrofit the freeway [11]. The partial removal of the highway revealed promising benefits for the nearby residents and local officials and soon there were alternative proposals including a depressed freeway [11]. In 1996, another segment of the freeway was closed for four months so the upper level could be demolished. It was at this point that the idea to remove the freeway altogether gained momentum. The local residents enjoyed the conditions without the nearby highway traffic. Possibly the most important effect of this temporary closing was that the anticipated gridlock by the California Department of Transportation and others never came to be. Allan Jacobs and Elizabeth Macdonald had developed a concept of replacing the freeway with a surface boulevard and this idea became popular around the time of the temporary closure.

The mayor of San Francisco at the time, Art Agnos, and his successors also played a role in what would happen to the freeway. Their support for the various partial demolitions of the freeway ramps generated much political pressure as well as their position on the future of the freeway [14].
However, many of those in the city wanted to see the freeway stay and the next few years proved difficult in determining the fate of the freeway. Caltrans spokesman Jeff Weiss described the situation as, “half the city wanted the freeway restored, and half wanted it torn down, and it was difficult to find a solution” [14]. In 1997, 1998, and 1999, both the retrofit and demolish/boulevard alternatives were placed on the ballot for the decision to be decided by the citizens. Ultimately, the alternative to demolish the freeway and replace it with a boulevard won and in 2003 the Hayes Valley segment of the Central Freeway was closed for good [11].

The highway was originally under the control of the State of California’s Department of Transportation, Caltrans, but authority over the highway and the right-of-way parcels were transferred to the city by state legislation in September 1991 [9]. Funding for the project came from the sale of newly available parcels which were part of the right-of-way [9]. Caltrans was responsible for rebuilding the remaining section of freeway up to Market Street and the city was responsible for the Octavia Boulevard section [14]. The replacement boulevard, Octavia Boulevard, opened in 2005 with four through traffic lanes, landscaped dividers, two local lanes on the sides and two lanes for on street parking [11]. Unlike the limited access of the prior freeway, the design of the boulevard is intended to disperse traffic [14]. Signal timings along the new boulevard were adjusted over several weeks until optimized. As not all of the freeway was demolished, Octavia Boulevard connects the remaining section of the freeway at Market Street to two larger east-west streets, Fell and Oak Streets. Additionally, a new park was created at the northern end of the boulevard. The total cost to both the city and state came to $62 million [14].

After the removal of the freeway and replacement with Octavia Boulevard, traffic volume in the corridor decreased to 45,000 vehicles per day with some of the other traffic on alternative routes [11]. While total traffic volumes were reduced, some congestion remained, but the surrounding street grid was able to
accommodate additional traffic not carried by the boulevard with little or no increase in congestion [11].

According to one analysis much of the traffic was redistributed. Six weeks after the highway’s closure, the traffic that once used the freeway was found to be 42% on three primary detour routes with other routes carrying over half of the closed freeway’s traffic [2]. A survey of 8,000 drivers who once used the Central Freeway allows for a more detailed look at what happened to the traffic that once was carried by the freeway. The results of the survey are shown in figure 18. Of those surveyed, 66% switched to another freeway, 11% used only city streets, 2.2% used transit, and 2.9% no longer made the trip [2]. Additionally, almost 20% of respondents made fewer trips altogether since the freeway closed [2]. It is important to note that the area served by the Central Freeway also was served by multiple transit services, including a light rail line [11].

The Market & Octavia Plan, a comprehensive land use and transportation strategy for 400 acres surrounding the highway, has helped to guide the transformation of the area once the highway was removed. The surrounding Hayes Valley neighborhood has experienced many benefits from the highway’s removal. Crime rates have dropped in the area while property values have risen [11]. Up to 900 units of housing will be constructed on the highway’s previous right-of-way as well as a new park funded with the revenue from the sales of the right-of-way properties. The neighborhood also is subjected to less noise and pollution now that the freeway no longer cuts through it. There have been some negative effects to traffic during peak-hours and some bus services have been delayed [11]. More seriously, perhaps, has been issues of safety. With the increase in traffic on the surface streets, Octavia Boulevard included, there has been an increase in injury accidents [11]. In fact, the intersection of Octavia Boulevard and Oak street was the most dangerous intersection in the city in 2006 [11]. Further design may help improve the safety of the intersections.
Figure 21: Aerial Images of Downtown San Francisco, California with North at the top [29].

Top: Before the highway (1946)
Middle: With the highway (1987)
Bottom: After the highway (2010)
3. **Embarcadero Freeway - San Francisco, CA**

The Embarcadero Freeway was finished in 1959 and ran along San Francisco’s downtown waterfront, disconnecting the urban core from the bay. Originally intended to connect the Bay Bridge to the Golden Gate Bridge, only a 1 mile connector was ever built due to public pressure against freeways. In fact, the city’s entire highway master plan was discarded in the 1960s due to San Francisco’s freeway revolt [15]. At that point the freeway was downgraded from an interstate to a state route, California 480, and so was no longer eligible for federal interstate funds [15]. The constructed segment was between the Bay Bridge approach, Chinatown and North Beach [11]. The Embarcadero freeway was elevated and double-decked at a height of 70 feet and a width of 52 feet [16], carrying over 60,000 vehicles per day [11]. The waterfront along the freeway continued its decline after the construction of the freeway; the piers were dilapidated and the shipping industry had since moved from San Francisco’s waterfront to the modern, more spacious Oakland facilities which were suited for the newer cargo vessels [16].

The freeway was put to vote on whether or not to remove it and replace it with a boulevard, jogging paths, bicycle lanes, and a streetcar in 1986 [16]. While this is what many in the city had wanted, there were fears in the 1980s in San Francisco that, “Big plans can’t be trusted. Just say no, because change might make things worse” [16]. The measure was rejected and so the freeway remained. However, in 1989 the freeway was damaged in the Loma Prieta Earthquake. This helped to bring about a change in popular opinion once the freeway was closed after sustaining damage in the earthquake. At this point, even those who once supported the freeway came to realize that its demolition may become the best option [15] although merchants in Chinatown still campaigned to keep the freeway to bring in Bay Area shoppers [16]. As residents became accustomed to not having access to the freeway, its negative impacts became more acute. The mayor at the time, Art Agnos, had strong support from both the Asian American community and environmentalists which placed him in a difficult position of whether or not to support the freeway’s demolition [16]. Five months after the earthquake, the mayor decided to support the removal of the freeway...
as to not, “squander ‘the opportunity of a lifetime’” [16]. The cost estimates to retrofit the freeway kept rising and eventually the city’s Board of Supervisors voted to remove the freeway in September of 1990 [15]. In 1991 the Embarcadero Freeway was demolished with a cost of $3.2 million [15]. The earthquake which damaged the freeway helped accomplish a goal shared by many in the community including former Mayor Dianne Feinstein who had worked against the highway during her time as mayor [15]. However, there will still highway supporters and not everyone was happy to see it go, especially those who felt they depended on it [15].

What replaced the freeway is a much more comprehensive collection of transportation modes including six lanes for vehicular traffic, a streetcar line operating in the median separate from traffic, bike lanes, and a large promenade along the waterfront. At the end of Market Street, the city’s main street, where it meets the water is located the Ferry Building which provides ferry landings as well as a food market. The Mid-Embarcadero project had a cost of $50 million [17]. Previously the historic structure had been cut off from the city by the elevated freeway. Additionally, a new park has been created south of the Ferry Building. The replacement boulevard, simply called the Embarcadero carries 26,000 vehicles per day while the streetcar serves more than 20,000 riders daily [11]. The remaining vehicular traffic has been absorbed onto the surrounding streets with no significant impact in congestion [11].

The area around the Embarcadero includes the major financial district as well as many tourist attractions. In the years since the freeway was demolished, downtown San Francisco has prospered, although not all neighborhoods near the highway benefited right away. The Chinatown merchants had objected to the removal of the highway both times as they feared it would reduce business. A New York Times article in 1991 described the neighborhood as failing and some reports suggested business had declined by 20% [11]. However, by 1998 the Chinatown Economic Development Group reported that business had recovered and that the Chinatown was still “bustling” [11]. Significant residential development has occurred in the neighborhoods south of the financial district after the freeway was demolished. Many of these new developments have been or are planned to be built on former rights-of-way where the freeway and its ramps once were [11]. After the highway was removed, real

Figure 23: Embarcadero Freeway – Aerial View of Embarcadero Freeway, 1978 [10]
estate values in the surrounding neighborhoods increased by 300% [10]. The reconnection of the downtown and its tourist attractions to its waterfront may have had a positive impact on tourism revenue for the city as well [11]. At the south end a new baseball stadium was built for the San Francisco Giants with breathtaking views [16]. Overall, the demolition of the elevated freeway along the waterfront and its replacement with a well designed boulevard has reinvigorated San Francisco’s waterfront attracted residents and tourists alike.

Figure 24: Embarcadero Freeway, circa 1960, as it once existed along San Francisco’s waterfront [30]

Figure 25: Embarcadero Before [11]  
Figure 26: Embarcadero After [11]
Figure 27: Aerial Images of Downtown San Francisco, California with North at the Top [29].

Top: Before the highway (1946)
Middle: With the highway (1987)
Bottom: After the highway (2010)
4. Cheonggye Expressway - Seoul, South Korea

Cheonggye Road and Cheonggye Expressway ran 6 km through the central business district of downtown of Seoul carrying about 168,000 vehicles per day, over half of which was through traffic [11]. That said, it was primarily a bypass for regional traffic [11]. The roads were constructed between 1958 and 1976 over what was originally and seasonal stream which was built over and enclosed. 10 lanes on a concrete deck were constructed over the waterway. A four-lane elevated roadway was later built over the existing highway to add capacity [18]. The stream began being covered in the early 20th century by the Japanese as they converted streams into covered sewers [10]. At the time of construction the center of Seoul was highly industrialized creating a large demand for vehicular access. However, by the 1980’s, industry started moving outside of the city center, reducing the need for the high capacity of the freeway [18]. In the post-industrial era of Seoul, three reasons emerged to remove the freeway: health risks due to the unsanitary conditions under the covered road; the air pollution caused by traffic; and the degrading condition of the structure itself due to age [18]. This corridor through central Seoul was considered to be the most congested in the city by the year 2000 [10]. However, the corridor, before demolition, already had other transportation options including several subway lines.

Both the road and expressway were demolished between 2003 and 2005 and the stream was restored [11]. In place of the expressway and Cheonggye Road is a Figure 28 (Top): A century ago the area lived up to its name of “valley of clean water” [18] Figure 29 (Bottom): Work started on building a 10-lane concrete road over the highly polluted river in 1967 [18] Figure 30: The highway in downtown Seoul, 1990’s [10]
new 3.6 mile, 28 hectare linear park focusing on the stream. The park area is designed to balance public access and ecology since the site is in an urban area where use by people is appropriate and even necessary to its success. The restoration project did not completely remove road access from the right-of-way. On each side of the park there is a two lane, one-way street, a condition stipulated through the community involvement program. To connect the city, 22 bridges were constructed over the river at all existing intersections and crossings [18].

Figure 31: Aerial Images of Downtown Seoul, South Korea with North at the top [29]
   Top: With the highway (2002)
   Bottom: After the highway (2008)
Figure 32: Aerial Images of Downtown Seoul, South Korea with North at the top [29]
   Top: With the highway (2002)
   Bottom: After the highway (2008)

Figure 33: Downstream Cheong Gye Cheon river in Seoul, (a) before and (b) after its restoration to a natural open watercourse [18]
Figure 34: Aerial Images of Downtown Seoul, South Korea with North at the top [29]
  Top: With the highway (2002)
  Bottom: After the highway (2008)

Figure 35: The restored Cheonggyecheon flows through the center of Seoul [10]
Figure 36: Aerial Images of Downtown Seoul, South Korea with North at the top [29]
Top: With the highway (2002)
Bottom: After the highway (2008)

Figure 37: Three of the elevated road piers were retained in the river as a reminder of its overdeveloped past [18]
The initial idea to remove the highway and restore the waterway was developed by academics and environmentalists in the 1990s and quickly gained widespread community support [18]. To implement this project the Seoul Metropolitan Government developed an organization in July of 2002. This consisted of a citizen’s committee, to establish principles for the restoration; a research center, for performing research and surveying public opinion; and a project office, to plan, design, and execute the project [18].

The demolition of the highway and replacement with the park was part of a larger, more comprehensive plan which included a bus rapid transit system and Transportation Demand Management measures. There was also a major reconfiguration of bus service. Many of the policies have been implemented in Seoul since the mid 1990’s to reduce congestion in central Seoul and to increase mass transit use. These include: a toll for vehicles entering the CBD with less than three occupants, regular fee increases for public parking; overall reduction in the number of parking spaces, both private and public; increased gas taxes; and a voluntary “No Driving Day.” The “No Driving Day” program offers those who leave their vehicle home one day per work week a group of incentives including reduced tolls and gas taxes among others. In total, the number of vehicles traveling through downtown after the comprehensive project decreased by 9.1% while during the same time period overall traffic in the city decreased by 5.9% [11]. Meanwhile, improvements to the bus system have increased rider satisfaction to 90%, increased bus speeds, and increased ridership [11]. To deal with the concerns of traffic congestion and economic loss to business due to construction, a new transportation policy focusing on mass transit was introduced and a stability fund and measures to facilitate relocation were implemented. Two historic bridges were restored as part of the project, but there was a lawsuit claiming that the fast pace of the project’s implementation resulted in the loss of archeological assets [11]. The cost of the entire project was officially given as $385 million (US) although it was been estimated to have cost more than $900 million (US) [11].

The demolition and restoration project was part of a much more comprehensive economic development strategy. The aim of the strategy was to revitalize the historic downtown to help it gain back market share as it competes with other sections of the city. On a larger, global scale, the strategy was to change the international view of Seoul to one of a 21st century city [11]. The Seoul Development Institute projects benefits of the strategy over the long term to reach between $8.5 and $25 billion (US) and to create upwards of 113,000 new jobs [11].
After 15 months of the park opening it attracted 90,000 visitors each day, 30% from outside the metropolitan area [11]. Soon after the completion of the park, land values of the adjacent parcels increased by 30% on average [11]. The corridor is attracting large scale reconstruction and redevelopment projects as well as restaurants and cafes [18]. Another benefit of the park is that it reduces the effect of the urban heat island. Temperatures in the park are up to 7 degrees Fahrenheit cooler in the summer than at locations one quarter-mile away [11]. A negative commercial affect of the project was the removal of about 1200 street vendors from under the highway to another location [11]. The residents of Seoul view sustainability highly as part of their culture. The mayor of Seoul during the time of the Cheonggyecheon project was elected partly due to his position on restoring the stream and removing the elevated highway [11]. In total, there were around 4000 meetings between the project team and residents [18]. Furthermore, in the Civil Engineering Journal an article written by two of the directors of the project makes clear the importance of the community’s understanding of the project, “maintaining community interest in the scheme to help complete the process of the river’s naturalization is well understood” [18].
5. Park East Freeway - Milwaukee, Wisconsin

The Park East Freeway was a one mile-long elevated spur connecting I-43 to downtown which opened in 1971. This freeway was not initially part of Milwaukee’s freeway plan, but it became a key part in the final 1950s and 1960s plan [19]. It was part of a plan to encircle Milwaukee’s central business district with a ring of freeways. However, strong opposition by city residents and elected officials left the freeway as only the spur. The first opposition came in September 1965 at a public hearing for the Lake Freeway, which was to connect with the Park East Freeway [19]. In 1971, there was a court injunction against the project and eventually the project was canceled [19]. The Park West Freeway met a similar fate and was not built even though its right-of-way had been cleared; by 1977 this project was officially canceled [19]. Since the other planned and connecting segments were never constructed, the Park East Freeway remained underutilized [11]. Only part of the planned Park East Freeway was constructed. The un-built part of the freeway was officially removed from the State Trunk Highway System in 1981 in a process called “de-mapping” [19]. The remaining cleared right-of-way was sold off for redevelopment [19].

This elevated structure formed a barrier between northern downtown and the rest of the central city [11]. The highway carried 54,000 vehicles per day, over half of which was through traffic [11]. In 2003, the highway was demolished and replaced with a six-lane boulevard, McKinley Avenue [11]. Efforts to remove the freeway were supported by John Norquist, the Mayor of Milwaukee, in 1988. To convince residents and businesses that removing the freeway would not cause devastating traffic congestion, a traffic study was performed in 1995 by Milwaukee’s metropolitan planning organization. The results showed that demolishing the freeway would not lead to a, “significant increase in traffic congestion” [20].

The Park East Freeway was controlled by the State as STH-145. Thus, support from the Wisconsin Department of Transportation (WisDOT) was necessary to replace the freeway with a boulevard. An agreement of transportation initiatives between the governor, the county, and the mayor was reached in April 1999 which included the freeway [19]. The proposal gained momentum on June 17th 1999 when the county Board of Supervisors passed a resolution in favor of demolition [11,19]. The Wisconsin governor withdrew his initial...
opposition to demolition due to the freeway’s relatively low traffic volume [11]. Three levels of government, local, county, and state cooperated to implement the plan. State jurisdiction over the right-of-way was also altered. The State Route was rerouted south on 6th Street instead of following the freeway’s right-of-way eastward [19]. This gave the city control over the replacement boulevard.

The main purpose of the project was to stimulate development and redevelopment in the surrounding area [11]. Several of the urban renewal areas had their boundaries realigned to be consolidated near the land surrounding the highway [20]. This was done to make the area more attractive to developers. The total cost of demolishing the freeway and replacing it with the boulevard was $25 million, $75 million less than it would have cost to rebuild the freeway [11]. The Federal government covered 80% of the total cost via ISTEA funds [9, 10]. Additional funds came from a tax increment finance district created by the city to help pay for upgrades to the local roads and facilities [9]. Included in this cost were funds to modify the surrounding street grid. Additionally, a new bridge over the Milwaukee River was required to take traffic across the river once the freeway was gone.

With the boulevard in place, traffic volume per day was predicted to be 52,600 in the corridor by 2020, less than the projection of 60,600 if the freeway was to remain. Of the traffic not carried by the replacement boulevard, about 24,000 of the trips were expected to use other surface streets while up to 11,000 trips were expected to move to other, more congested freeways [11]. Overall this would lead to a reduced level of service for some motorists. The city acknowledged this negative aspect, but found the expected benefits to far offset this inconvenience. However, later studies showed that the impact on traffic congestion would be less than originally thought due to the improvement of the street grid offering more connections [10]. This same study suggested that the street network should easily be able to accommodate the traffic which once used the elevated freeway [10]. Once the freeway was removed, 26 acres of previous right-of-way became available for development. The total redevelopment area now comprises 28 traditional city blocks on 64 acres. Streets once bisected by the freeway are once again connected. Just after four years of the plans implementation, $340 million of development was in the works [11].
Figure 39: Aerial Images of Downtown Milwaukee, Wisconsin with North at the top [29]
Top: With the highway (2000)
Bottom: After the highway (2005)
6. West Side Highway – Manhattan, New York

The West Side Highway was part of a comprehensive freeway network built throughout New York City by Robert Moses. The highway had 6-lanes and stretched along the Hudson River for 5.7 miles [21]. The highway was a state route, initially designated NY 9A north of the Holland Tunnel and NY 27A south of the Holland Tunnel [21]. At one point, the highway was designated to be an interstate, I-478, but by 1986 this was dropped and the route simply became NY 9A [21]. The highway was built to allow trucks to travel between the piers on the Hudson River and the factories and warehouses to the east with automobile traffic elevated above to be out of the way [21]. Not only were the streets in along the Hudson River crowded with trucks and automobiles, but the New York Central Railroad’s West Line also shared the roadway leading to many accidents between the different users and their needs. This was the world’s first elevated highway and its design was experimental for the time. As such, it was later considered unsafe due to its sharp curves and narrow lanes and entrance ramps [10]. The segment of freeway between Canal Street and 72\textsuperscript{nd} Street was built between 1929 and 1936 and connected with the Henry Hudson Parkway at its northern end. Another segment built between 1938 and 1948 connected the southern end of the freeway to the Battery. This was later extended to the Brooklyn Battery Tunnel in 1950 [10]. Traffic volume had reached 140,000 vehicles per

Figure 40: West Side Highway [31]
day by 1957 [21].

Structural trouble for the highway began in 1969 when a segment of the highway collapsed requiring the freeway to close for repair. The freeway south of 57th Street was closed again, this time for good, in the fall of 1973 when a 60 foot northbound section collapsed due to a cement truck that was traveling to make repairs on the highway. Over the next decade the fate of the freeway was discussed. Cost estimates to repair the freeway were near $88 million [10] and these repairs would only improve the highway’s structure, not its capacity or safety [21]. Demolition began in 1977 and continued for 12 years while replacement proposals were discussed [21]. A proposed new interstate, the Westway, was met with much citizen opposition. However, the Army Corps of Engineers received a permit for the Westway in 1981 but was then sued. The next year, the legislature stopped work on the Westway due to environmental concerns. Work was halted for the next three years over the issue. By 1985, plans to replace the freeway with a new interstate were discarded due to multi-billion dollar costs and the fact that the city was able to operate for over ten years without a freeway along the Hudson River [10]. Demolition was finally completed in 1989 [21]. It was not until 1993 that a final decision was made and an alternative chosen [10]. This was the West Side Highway Replacement Project. $1.7 billion in federal highway funds was given to the city for the Westway project which was then redistributed to transit on the new highway replacement project which was capped at a cost of $811 million [10]. The chosen alternative was to improve the existing West Street which was the street under the West Side Highway. Construction began in April 1996 and was completed in August 2001 [21].
The improvements included 19 foot wide landscaped medians, a bicycle path, and a park along the river [10]. Each direction has 4 lanes of traffic. West Street connects to what was originally the West Side Highway at 57th Street. The street now carries about 95,000 vehicles per day (AADT) [21]. The riverfront park and the bikeway are planned to connect with existing parks to run the length of the island. While the new road is still wide, it provides a much stronger connection between the city and the waterfront due to pedestrian friendly design and amenities offered in the park space.
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