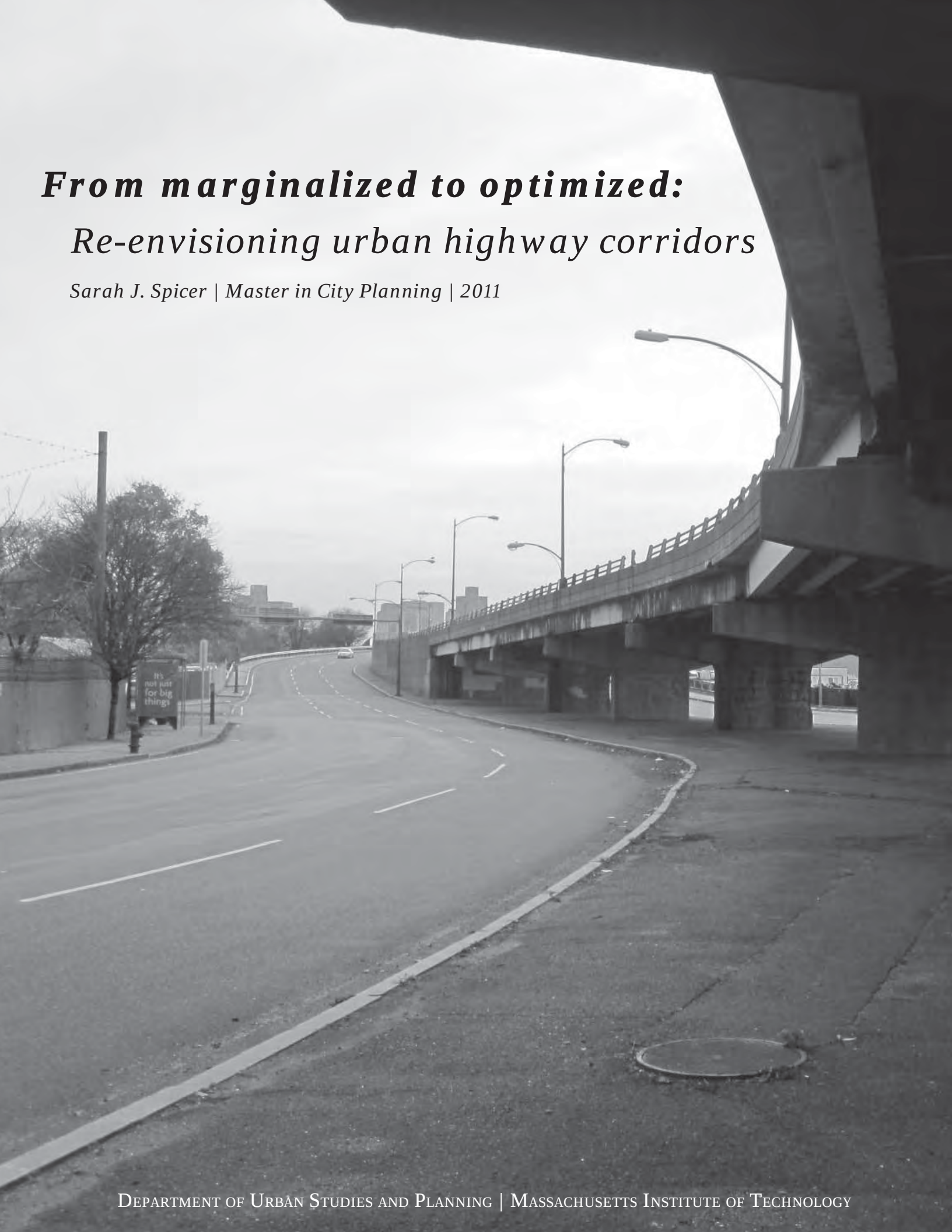

From marginalized to optimized:

Re-envisioning urban highway corridors

Sarah J. Spicer | Master in City Planning | 2011

Department of Urban Studies and Planning | Massachusetts Institute of Technology

From Marginalized to Optimized:
Re-Envisioning Urban Highway Corridors

By

Sarah J. Spicer

Bachelor of Arts
Colgate University
Hamilton, NY (2005)

Submitted to the Department of Urban Studies and Planning
in partial fulfillment of the requirements for the degree of

Master in City Planning

at the

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ABSTRACT

The past century of highway construction has assumed relentless growth of vehicular traffic capacity. Yet today is an era of highway rationalization, aging facilities, strained finances, peak oil concerns, climate change, and urban regeneration. It is a prudent time to re-examine the place of highways within the urban fabric. The elevated structures associated with the urban highway model were for the most part constructed over 40 years ago and are nearing the end of their functional lives. This fact means that cities must decide whether to rebuild or redesign, and how. The increasing numbers of projects and multiple proposals for highway removal or shrinkage speak to a larger trend of right-sizing and quality of road design rather than a sole focus on throughput. This trajectory has been complimented by new and more context-appropriate guidelines for transportation planning and increased cross-pollination between urban planning and traffic engineering disciplines. This thesis finds that roadway capacity reduction is a successful traffic management strategy, with numbers from case studies in worldwide supporting the concept of traffic network flexibility and demand elasticity. This, in turn, may be able to better define how best to encourage mode shift from single occupancy vehicles to other modes.

This thesis is an exploration of highway removal and redesign, and a proposal for context-sensitive transformation of the urban environment's lost spaces. It explores the underlying trends and methodologies of highway removal, examines several case studies, and then applies these findings to the case of McGrath/O'Brien highway in Massachusetts. This may serve as a precedent for future reexaminations of similarly degraded roadways and reveal implications for the future form of infrastrucure-burdened urban areas.

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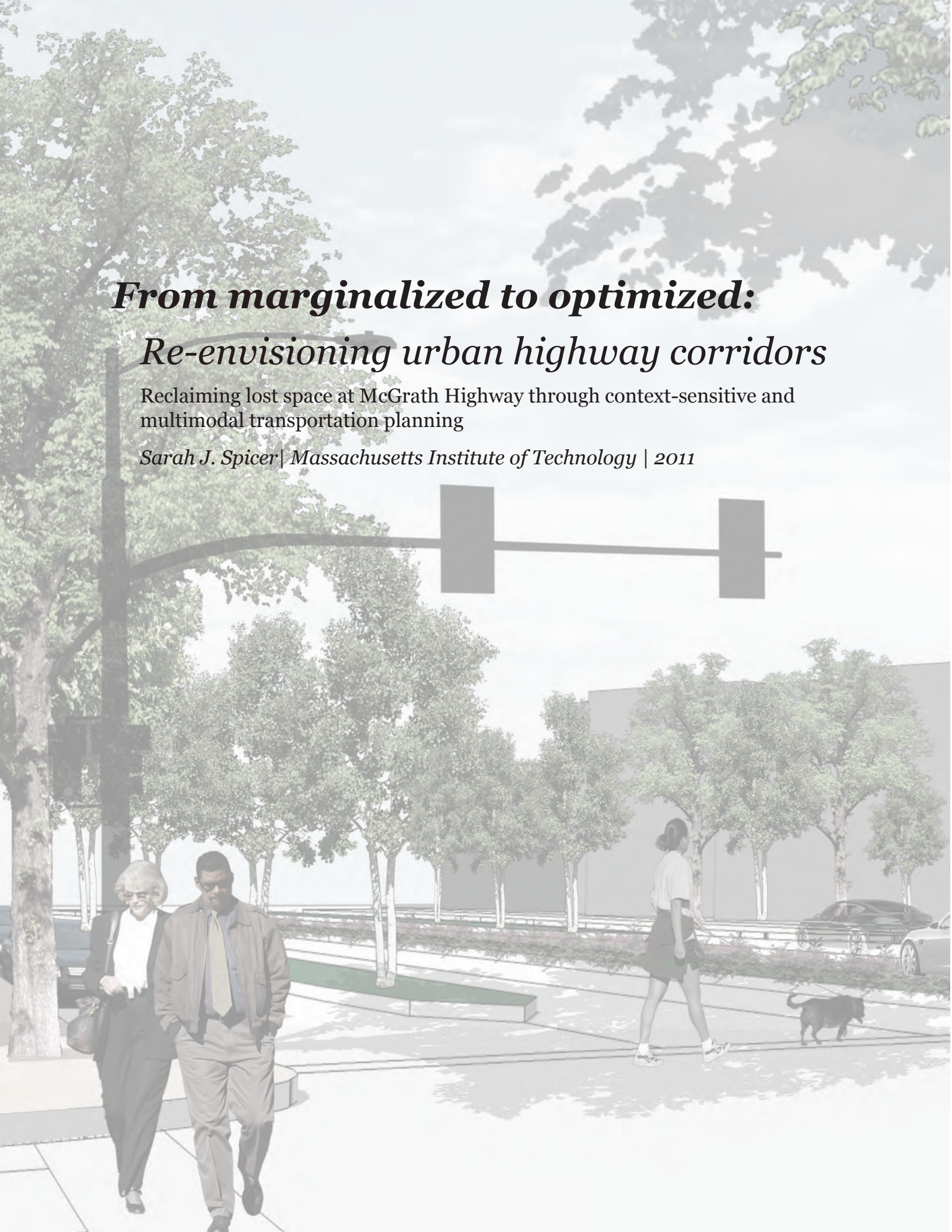
From marginalized to optimized:

Re-envisioning urban highway corridors

Reclaiming lost space at McGrath Highway through context-sensitive and multimodal transportation planning

Sarah J. Spicer| Massachusetts Institute of Technology | 2011



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Illustrations

1. Introduction and Outline

Every American city encompasses districts made increasingly complex and inaccessible by layers of infrastructural development: areas which bore the brunt of the industrial age, the machine age, the highway, and of urban renewal. While these districts may now be ripe for redevelopment, they pose particular planning challenges given the intricacies of their layered circulation networks, obsolete infrastructures, environmental considerations, and economic development needs.

Urban highway corridors encompass these challenging factors. They present a tight bundle of negatives that administrators, planners, and residents alike have longed to rectify. These multilane, limited access, often elevated routes built throughout the 20th century instigated four classifications seriously harmful side-effects upon the downtowns and inner suburbs they invaded. These fall into four major categories: socio-economic, circulatory/spatial, environmental, and aesthetic.[1] Their construction required property demolition for wide rights of way, which destroyed homes, businesses, and neighborhood economies.[2] Physically, their limited access and barrier-like viaducts, ramps, and access roads blocked circulation, limited local accessibility, and truncated visual connectivity. In environmental terms, the highways brought massive numbers of vehicles into neighborhoods, often aggravating congestion rather than dispersing it, degrading air quality and increasing noise pollution.[3]

The past century of American road building has assumed relentless growth of vehicular traffic capacity. Yet today is an era of aging facilities, strained finances, peak oil concerns, climate change, and urban regeneration. In light of these global trends, it is a prudent time to re-examine the place of highways within the urban fabric. The elevated structures associated with the urban highway model were for the most part constructed over 40 years ago and are nearing the end of their functional lives. This fact means that cities must decide whether to rebuild, or redesign, and how. What should be the guiding principles for planners in these often controversial situations? This examination must come from multiple perspectives, including functional, economic, environmental, and aesthetic viewpoints.

1 Robert Cervero, "Freeway Deconstruction and Urban Regeneration in the United States" (Paper prepared for the International Symposium for the 1st Anniversary of the Cheonggyecheon Restoration, 2006), accessed January 2011, http://www.uctc.net/papers/763.pdf.

2 John D. Fairfield, *The Public and its Possibilities: Triumphs and Tragedies in the American City*, (Philadelphia: Temple University Press, 2010).

3 Chang-Hee Christine Bae, et al, "The exposure of disadvantaged populations in freeway air-pollution sheds: a case study of the Seattle and Portland regions," *Environment and Planning B: Planning and Design* (2007: volume 34, 154 – 170).

This thesis is an exploration of highway removal and redesign, and a proposal for context-sensitive transformation of the urban environment's lost spaces. It explores the underlying trends and methodologies of highway removal, examines several case studies, and then applies these findings to a proposed redesign of McGrath/O'Brien highway in Massachusetts.

Trends and Trajectory

Trends in transportation planning and the results of these case studies indicate the increasing acceptance of highway removal as an option and as a prerogative for quality of life in urban sectors detrimentally impacted by infrastructures over the past half-century. Highway removal can be seen as part of a larger trend of roadway right-sizing that is gaining strength as cities confront the unsustainable nature of expanding highway networks and instead look towards multi-modal solutions.

These issues have long been discussed in planning and environmental circles. Given the highway's mobility constraints and rigid design requirements, however, comprehensive solutions have been slow in forming and opportunities for intervention have been few. From an urbanist's perspective, the highway has largely been considered an untouchable realm of traffic engineers. This rhetoric has slowly been changing and in recent years the field of transportation engineering has initiated a different approach through context sensitive design, traffic calming, and alternative travel modes –devices long promoted by urban planners.[4]

Now, as many highways built in the mid- 20th century are at an age where their reconstruction must be considered, there are opportunities for rethinking these corridors and attempting to rectify the negative effects imposed on cities by this infrastructure.[5] Today numerous removal proposals are circulating, with some of them garnering funds for further study or project initiation. (See Precedents and Proposals, at the end of this section.)

4 Donald Appleyard, *Livable Streets*, (Berkeley: University of California Press, 1981).

5 Francesca Napolitan and P. Christopher Zegras , "Shifting Urban Priorities? Removal of Inner City Freeways in the United States," *Transportation Research Record: Journal of the Transportation Research Board, No. 2046* (Transportation Research Board of the National Academies, Washington, D.C., 2008) DOI: 10.3141/2046-09.

Figure 1: Intervention site locus: McGrath/O'Brien Highway corridor, Somerville/Cambridge, Massachusetts

Intervention Site: McGrath/O'Brien Highway

One site presenting the opportunity for place-sensitive redesign is the McGrath/O'Brien Highway which runs through Somerville and Cambridge, Massachusetts. This thesis proposes its de-elevation and reorientation as a representative project for right-sizing highways within urban transportation networks. There are several major reasons for selecting this project site:

- The deteriorated condition of the highway, particularly its viaducts, raises safety concerns and provides the opportunity to revisit the design
- Funding made available through MassDOT's accelerated bridge program may be leveraged for the project if it is implemented before 2016
- The previous regional function of the McGrath and O'Brien highway is now largely provided by I-93; existing data supports the hypothesis that traffic on the highway is local in origin and destination
- The potential for success is strengthened by the state's commitment to extend the Green Line beyond its current terminus at Lechmere to Union Square and Medford
- The inherent capacity constraints of the at-grade intersections both north and south of the viaduct (at Medford Street, Third Street, and Lechmere) create capacity constraints that make the utility of the viaduct questionable.
- The expected increased pedestrian crossings required by the new Green Line station location at Lechmere places a priority on increasing ease of crossing
- The density of the surrounding neighborhood, its lack of transit access until current plans
- Somerville's history of infrastructure burden without benefit and its status as an environmental justice community make such improvements a priority, including:
    - Reduction of exposure to mobile-source emissions from surrounding highways
    - Enabling the development of [affordable] housing
    - Improving accessibility to a host of isolated and underserved areas
    - Lack of green space in this area currently

Other substantially degraded roadways in the Boston metropolitan area may benefit from the a precedent project at McGrath, such as Revere Beach Parkway and Routes 1A and 16; these pose difficult challenges and lack the redesign trigger provided by the aging elevated structure. The successful redevelopment of boulevards replacing elevated structures may develop a prototypical approach to re-humanize the degraded parkway networks that characterize many cities and their older suburbs.

Figure 2: Streetside View of McGrath/O'Brien Highway (near intersection with Washington Street)

As an intervention site the McGrath/O'Brien corridor presents an opportunity for "right-sizing" roadway infrastructure and effectively shrinking the impact of a highway on an urban neighborhood. Given that transportation models normally assume a percentage increase of congestion each year, this requires an important break with established methodology in transportation planning.

Outline

This thesis explores the underlying trends and methodologies of highway removal, examines several case studies, and then applies these findings to a proposed redesign of McGrath/O'Brien highway.

- I will first examine the history of highway construction and removal in American downtowns and their immediate suburbs to determine the larger context for such projects.
- Next, I will broadly examine how this history has informed some of the guidelines for transportation planning have changed as a result of new attitudes towards mobility.

- I will then look at the current planning context has changed for roadway design in the 21st century, paralleled by changing guidelines in planning and engineering literature. This is followed by a discussion on the underlying principles of traffic calming and latent demand that inform this literature. The results of these changes in attitude towards roadway design are then discussed by a brief survey of current highway removal plans, supported by an appendix of related projects.
- The next part of the thesis looks in more detail at the case of the McGrath/O'Brien Highway, discussing why it is a prime candidate for removal in light of its history and context. This includes research on plans for adjacent large-scale development.
- After a baseline description of current conditions in the corridor, I then turn to other precedents to see what may be learned from them, firstly in terms of traffic shift and then in terms of neighborhood change.
- Returning to McGrath, I outline my analysis and proposal for the future planning and design of the corridor.

Using the results of exploring the McGrath/O'Brien case, I will explore the idea that highway removal is part of a larger trend of roadway right-sizing that is gaining strength as cities confront the unsustainable nature of expanding highway networks and instead look towards multi-modal solutions. I hypothesize on a broader scale that the approach towards such infrastructural reorientation may have a profound impact on the future form

PRECEDENTS

Project	Description	ADT	Urban Design Context	Transportation Context	Year
McGrath/O'Brien Highway, Somerville/ Cambridge, MA Length: 1.7 miles Elevated portion: .85 miles	*Proposed removal of 1950s elevated local highway and redesign of at-grade sections.*	*35,000 – 65,000*	*Inner Suburb, non-waterfront, industrial, residential, and mixed use areas*	*I-93: Parallel, high-capacity route; Green Line Extension.*	*TBD Possibly 2013*
Octavia Boulevard San Francisco, CA .6 miles	Removed an elevated freeway spur and replaced with a multiway boulevard	93,000 before 45,000 after	Downtown/inner city mixed use	Nearby routes: Muni's F streetcar; Buses 16X, 71L, 6,21, 71; BART Civic Center station connectivity.	2005
Mandela Parkway Oakland, CA 1.3 miles	Removed and later relocated an elevated freeway; replaced with landscaped parkway	Before: 160,000 used old Cypress Expwy	Inner Suburb, non-waterfront, industrial, residential, and mixed use areas	#26 bus runs parallel; 31, 62 busses nearby; #800 trans-bay connection on new Freeway. BART West Oakland stop.	2005
West Side Highway New York, NY 4.7 miles	Replaced 1920s viaduct with at-grade boulevard; design speed of 40mph. Waterfront open space, peds and bikes.	Before:~80,000 After: 69,000 - 81,000	Waterfront – Hudson; industrial but also location of tourist attractions, event spaces, dense urban fabric	NYC MTA transit north-south connectivity nearby.	2001
Park East Freeway Milwaukee, WI 1.0 miles	Removed an elevated freeway spur and replaced with a surface boulevard	40,000 Traffic shifted to street grid	Downtown/mixed use/ waterfront (Milwaukee River)	Parallel connections I-794; Rte 43; Buses 57, 33, 15; Milwaukee Intermodal transportation center located to south.	2003
Embarcadero San Francisco, CA 1.6 miles	Removed an elevated freeway spur and replaced with a surface boulevard and LRT corridor	61,000 before 53,000 after[2]	Downtown waterfront	Muni F line parallel; Embarcadero BART stop; Muni's J, KT, N, S, M, and L; and 23 bus routes.	2001
Harbor Drive (US 99W) Portland OR 3.0 miles	Removed an at-grade highway and replaced with a boulevard and a riverfront park	25,000 Traffic shifted to Naito Pkwy	Waterfront	Parallel Interstate 5; Interstate 405 to the west; MAX green line a few blocks to the West, multiple bus lines along 6th Ave.	1974
I-93 Central Artery, Boston, MA 1.8 miles	Relocated elevated interstate highway in a tunnel and added surface boulevard	200,000	Downtown, some waterfront	Tunnels carry former Central Artery; connect to Airport, Mass. Turnpike.	2007
I-195/The "I Way" Providence, RI .5 miles	Relocated elevated highway and interchange out of downtown, waterfront	152,800	Downtown/waterfront (Providence River)	Intermodal Transportation Center; Multi-Use Path; relocated highway.	2010

Figure 3:Precedent Project Comparison

PROPOSED				
Project	**Description**	**ADT**	**Context**	**Status**
I-895/Sheridan Expressway Bronx, NYC 1.2 miles	At- grade highway /interstate connector	41,000	High density urban., waterfront (Bronx River)	EIS
Cleveland Memorial Shoreway /Route 6 (West) Cleveland, OH 8.0 miles	At grade highway spur	45,000	Waterfront	In planning
Gowanus Expressway Brooklyn, New York 3.8 miles	Elevated interstate highway	198,000	High density urban Near waterfront	EIS
Highway 99/Alaskan Way Seattle, WA 2.8 miles	Elevated highway; possibly to be replaced with a bored tunnel	103,000 After: 50% reduction estimate	Waterfront	EIS Ballot measure
I-84 Hartford, CT 1.0 miles	Elevated interstate highway	172,000	Downtown	Planning; TIGER funds approved
I-10/Claiborne Expressway New Orleans, LA 2.0 miles	Elevated interstate highway	69,000	Urban mixed use neighborhood	Planning
Whitehurst Expressway Washington, DC 0.6 miles	Elevated highway	42,000	Waterfront	Planning
I-83/Jones Falls Expressway Baltimore, MD 1.0 miles	Elevated interstate highway spur	55,000	Downtown	Concept
I-81 Syracuse, NY 1.4 miles	Elevated interstate highway	100,000	Downtown	Planning
Interstate 70 St Louis, MO 1 mile	Elevated interstate highway; proposed at-grate boulevard replacement	Current: 73,000[1] Proposed: 50,000[2]	Downtown waterfront	Unknown
Six Points Interchange Etobicoke/Toronto, ON[3] 15.5 acres	A “spaghetti junction” highway interchange	n/a	Inner suburb/satellite city residential neighborhoods	Environmental Assessment Study complete
Gardiner Expressway Toronto, ON 1.5 miles	Elevated eight-lane expressway	120,000 (expanded version: 200,000)	Between downtown and the waterfront	Environmental Assessment

Figure 4:Proposed Project Comparison

Project	Description	ADT	Context	Status
Route 29 Trenton, NJ 1.8 miles	Four-lane expressway; proposed redesign to at grade urban boulevard	60,000	separates downtown from the Delaware River	Recently lost funding from the NJ DOT
Route 34 Connector New Haven, CT 1.1 miles	Connector between Interstates 95 and 91 and extends on columns into downtown New Haven	73,900 -75,000 max	Downtown	Approved for construction w/ TIGER funds
Skyway / Route 5 Buffalo, NY 1.4 miles[5]	Elevated highway viaduct connecting Inner Harbor downtown and the Outer Harbor.	41,000	Industrial /waterfront south of downtown	Stalled[6]; EIS completed
Interstate 64 Louisville, KY 2 miles	Elevated 6-lane interstate highway; connects I-65, I-71, and I-64 in downtown Louisville	70,000 45,000 proposed	Downtown	Planning/debate/ studies
Bonaventure Expressway Montreal, QC .5 miles (first phase)	Elevated expressway	58,000	Waterfront, downtown	Under construction and further planning
Southeast Freeway / 11th St. Washington, DC 1.39 miles	Elevated freeway connects Interstate 395 to Interstate 295 with access ramps to 11th St.	90,000	Waterfront, downtown	EIS approved 2007; scheduled finish in 2013.
Robert Moses Freeway Niagara Falls, NY Length: 6.5 miles	Surface parkway; bypasses downtown.	n/a	Waterfront; City outskirts	Pilot project closing lanes underway
Inner Loop, Rochester	Downtown Interstate loop, mostly at-grade	5,300, 35,000, 55,000 depending on segment	Downtown	Study complete, but work ~10 years away
Scajaquada Expressway, Buffalo[9]	Divided highway with grade separated interchanges between I-190 and NY State Route 33	Between 37,600 and 65,000	Downtown; runs through the middle of Delaware Park.	Preliminary planning[10]

Data Sources:

- Al Vaughters, “Plans convert Scajaquada into parkway,” WIVB, accessed February 2011, http://www.wivb.com/dpp/news/local/Plans_convert_Scajaquada_into_parkway_20091104.
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- DC Roads, “Southeast Freeway - Historic Overview,” accessed February 2011, http://www.dcroads.net/roads/southeast/.
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- Philip Langdon, “Freeways Give Way to Boulevards-Slowly,” New Urban Network, 01 July 2008, 1, https://newurbannetwork.com/ad/redirect/13430/t85?url=node/6928.
- State of Rhode Island Department of Transportation, “The Iway: Relocating I-195 in Providence,” Accessed March 2011, http://www.dot.ri.gov/engineering/construction/195intro.asp
- Syracuse Metropolitan Transportation Council, “Case Studies of Urban Freeways for The I-81 Challenge,” February 2010, http://thei81challenge.org/cm/ResourceFiles/resources/CaseStudiesReport_3-02-10.pdf.

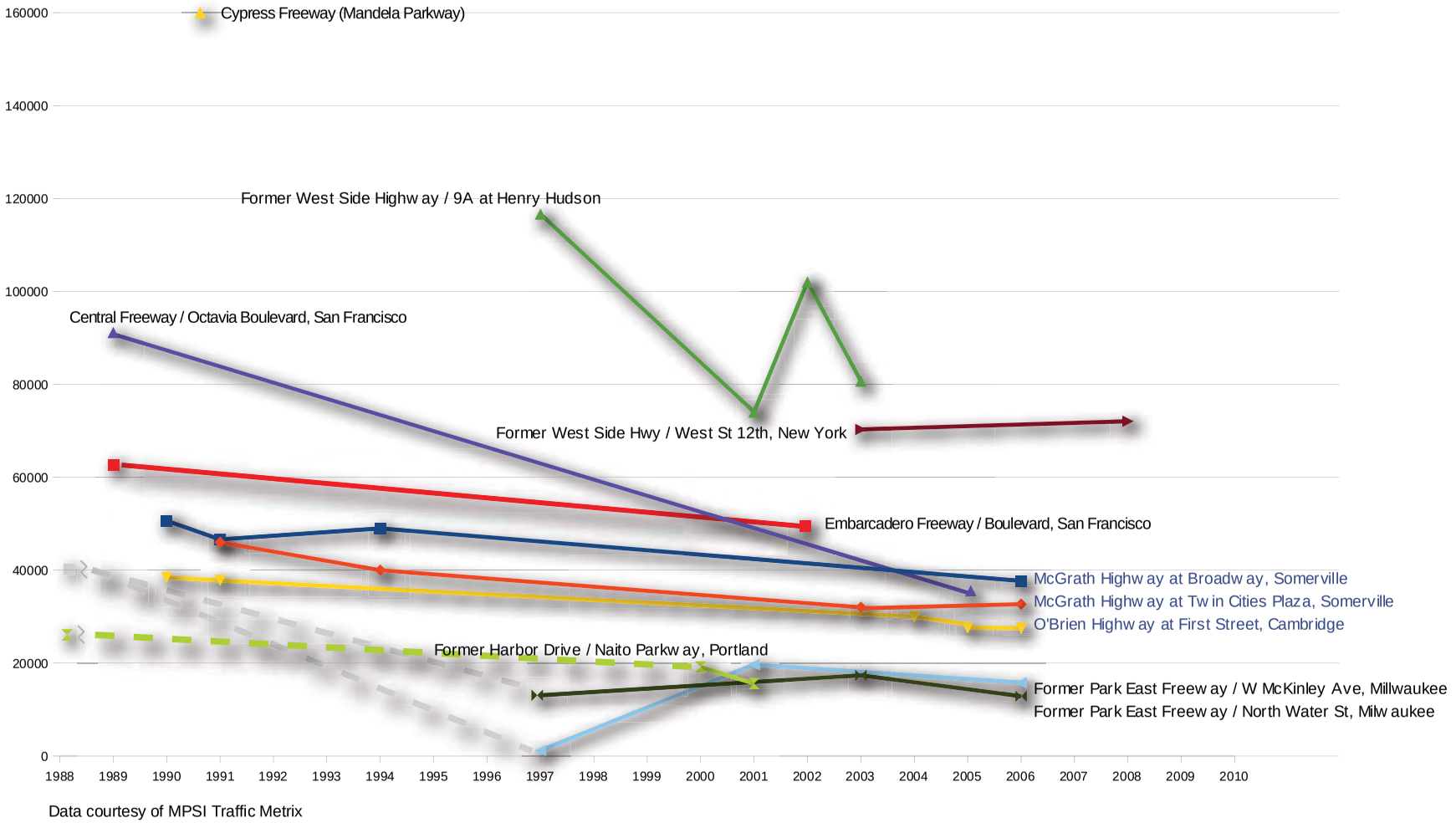

Figure 5: Diagram of precedent traffic counts, showing pre- and post - intervention counts from a variety of sources and locations. Intervention dates and number of measurements vary. This chart indicates how McGrath/O'Brien is actually already lower in volume than many of the "after" measurements of the precedents, and well with the range of the pre-intervention counts of all examples.

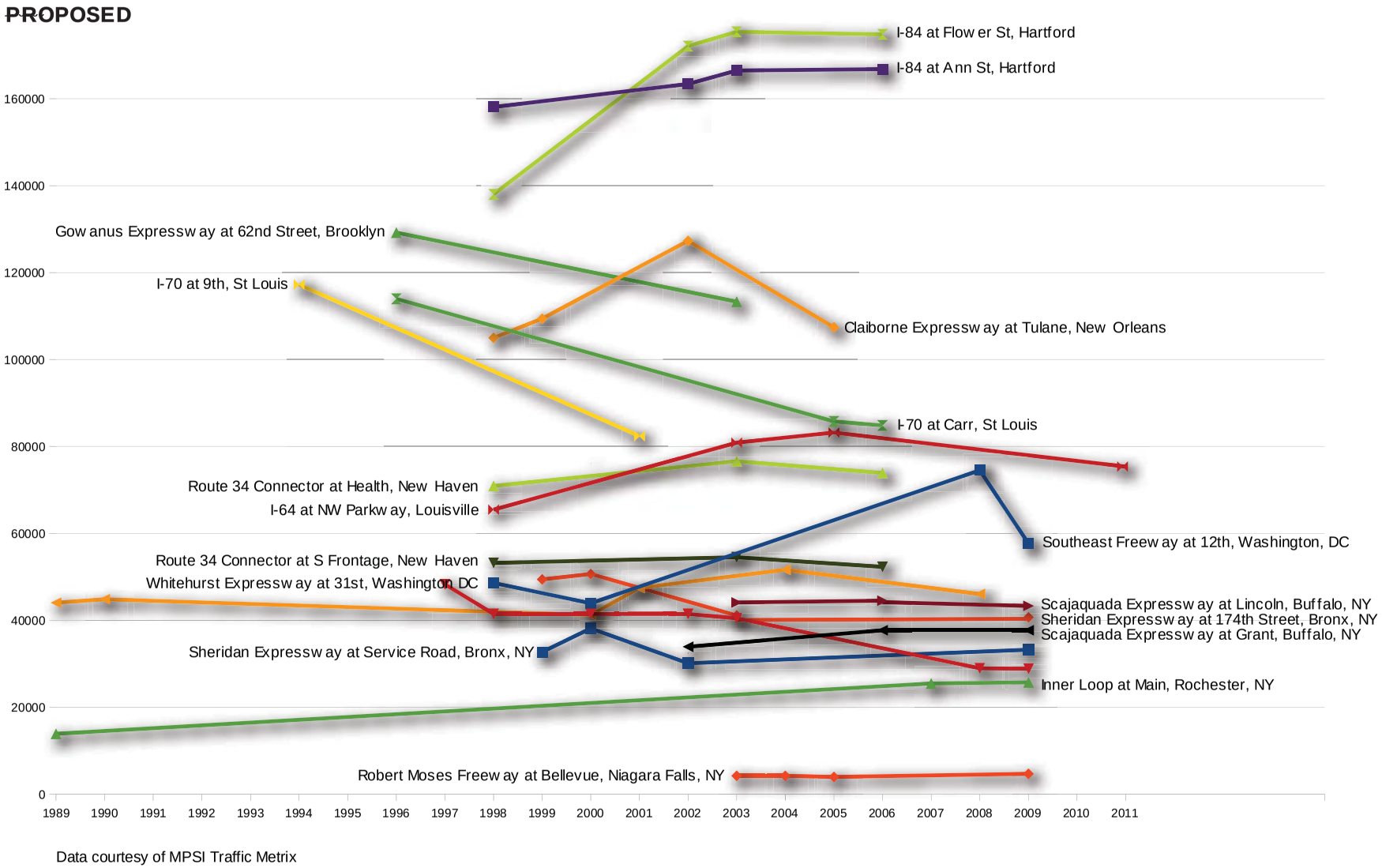

Figure 6: Diagram of selected traffic counts of currently proposed projects in Figure 3, once again from a variety of sources. This shows how many of these have already decreased in volume; have flatlined; or are already in the range of precedent traffic counts. Individual investigations would have to be conducted in order to ascertain the variety of reasons why, but some of these are clearly in shrinking cities or areas with changing transportation characteristics that may enable roadway right-sizing.

of cities.

2: *Highways in the 20th Century City*

It would be difficult to overstate the impact of traffic planning on American cities during the 20th century. As the configuration of industry shifted from a centralized model based on urban agglomeration to a decentralized model based on suburban growth,[6] cities endeavored to accommodate the automobile into existing urban environments – with drastic results. The automobile grew in popularity at an astonishing rate, with a handful of registrations in 1910 exploding to 20 million only 10 years later.[7] The automobile era quickly eclipsed the streetcar age and new types of urban roads began to reshape the city. Modernist discourse painted auto mobility as a key component of city fabric redesign. Key proposals like Le Corbusier's Radiant City and Frank Lloyd Wright's Broadacre City exemplified the new streamlined possibilities of the modern city, dramatically freed from the low dense typologies of the historic fabric and promoting a new vernacular of high-rises surrounded by wide parks and enormous multilevel freeways.

Other more tempered plans for the city included the philosophy of Lewis Mumford, who did not have the same iconic plans as Le Corbusier or Wright but who became an outspoken critic of twentieth century planning through his writings. Mumford acknowledged the future importance of the highway in city planning but also advocated its integration with transportation planning and landscape in order to minimize its destructive impacts and promulgate its positive ones. He believed that highways could be used to rationally guide urban growth, but must be carefully inserted into existing urban environments and never into city centers, and that travel options other than the automobile must be planned in parallel.[8] Thus Mumford approved of the planning of early parkways; but was highly critical of later highway development, denouncing it as a destructive repetition of the same mistakes.[9]

The concept of the multilevel, mechanically efficient city became real first through elevated railway infrastructures and then through elevated highways. These structures were designers' answer to the problem of placing extensive new arteries through existing city fabrics. In New York, the West Side Highway was built in 1927 as the first elevated route of its kind, in an attempt to improve the chaotic traffic patterns along the busy Manhattan

6 Alan Berger and Charles Waldheim, "Logistics Landscape," *Landscape Journal* 27:2 (2008).
7 Edward Weiner, *Urban Transportation Planning in the United States: History, Policy, and Practice* (New York: Springer, 2008), 9.
8 Cliff Ellis, "Lewis Mumford and Norman Bel Geddes: The Highway, the City and the Future," *Planning Perspectives* 20 (January 2005): 60-61.
9 Ellis, "Lewis Mumford and Norman Bel Geddes," 61.

Figure 7: West Side Highway, New York, 1974 - intersection with Gansevoort Street (Wikimedia Commons)

piers[10] and mimicking the elevated train lines that had been introduced to remove rails from streets and increase both safety and capacity.

10 Robert Moses later expanded on this with his parkway construction throughout the city, including the extension of the West Side Highway northwards as the Henry Hudson Parkway in the 1930s.

The introduction of the elevated highway was complemented by the development of the parkway as a typology for increasing vehicular mobility in a park-like setting – often literally within parklands. In metropolitan Boston, pressures to modernize the street network resulted in construction initiatives similar to those happening nationwide, including the construction of the Northern and Southern Arteries in the 1920s. A system of parkways, originating with Frederick Law Olmstead's metropolitan parks plan and originally designed for pleasure drives, served as an early arterial network,[11] later supplanted by much larger highways. The concept of an elevated Central Artery bringing fast-paced auto traffic downtown was discussed as early as the 1920s.12 These early examples begin to illustrate the intense and rapid change that the automobile almost immediately impressed on the urban form, claiming increasing amounts of space within the city. Thus while most of the mileage in the highway system was famously built after the enacting of the 1956 Highway Act, urban highway and parkway building significantly impacted cities much earlier.

Mid-century legislation enabled massive expansion on this earlier piecemeal effort. President Eisenhower's 1956 Federal Aid Highway Act proposed a 41,000 mile network aimed to connect 90% of US cities with populations of 50,000 or greater. The 46,876 mile-long result, as well as its accompanying connectors and spurs, was intended to streamline vehicular circulation and increase interurban access. After suffering through the Great Depression and the shifting industrial and societal trends of World War II, American cities were experiencing serious and increasing problems that would drive forward the age of urban renewal, highway building, and decentralization. These included traffic congestion, decreasing property values accompanied by blight and reduced tax base, inadequate public transport facilities, growing costs of city government, and a loss of confidence of investment capital in desirable housing ventures.[13] Thomas H. MacDonald, chief of the Bureau of Public Roads from the 1930s into the 1950s, believed that cities had tried and failed at resuscitating their economies through zoning and planning; as one of the original planners of the interstate highway system beginning in the 1930s he maintained that comprehensive investment in road construction was the key option for urban revitalization.[14] Highways were seen as crucial, lifesaving "operations" necessary for the modernization and salvation

11 Allan K Sloan, *Citizen Participation in Transportation Planning: The Boston Experience* (Cambridge, Mass.: Ballinger Pub. Co., 1974) 10.

12 "Streets, Drawing of Central Artery, Boston, MA," *American Landscape and Architectural Design, 1850-1920,* http://hdl.loc.gov/loc.award/mhsalad.210120.

13 Richard F. Weingroff, "The Genie in the Bottle: The Interstate System and Urban Problems, 1939-1957," *Public Roads* 64: 2 (2000), http://www.fhwa.dot.gov/infrastructure/rw00c.cfm.

14 Weingroff, "The Genie in the Bottle."

Figure 8: Metropolitan Boston Highway Plan, 1965 (private collection)

of the American city.[15]

And yet highways' unintended consequences precluded the consummation of this vision of reinvigorated urban areas. As history has since shown, the system in reality only increased the trend of decentralization and disinvestment in city centers. Many of these highways were built in downtowns, as seen in Boston's Central Artery, Hartford's 1-84, Providence's I-95, and many more. Often, several were intended to crisscross one city, as was planned in San Francisco, to maximally increase mobility and reject the image of the old, cramped,

15 Weingroff ,"The Genie in the Bottle."

densely used urban grid. Importantly, it must be remembered that their impact was significant not only directly within city centers, but also throughout these cities' inner ring suburbs. In the Boston area, for example, large swaths of Somerville, Chelsea, Jamaica Plain, and Allston/Brighton were demolished to make way for the network of new highways serving the downtown. While officials believed that such drastic intervention was the only choice for stimulating comprehensive urban redevelopment, they were also well aware of the gamble they were taking; in a lucid prediction a 1941 report noted that well planned roads "will become more and more useful as time passes," while those constructed unwisely "will become more and more of an encumbrance to the city's functions and an all too durable reminder of planning that was bad."[16] While the American transportation network was impressively expanded due to the investment in highway planning, without a doubt its legacy also points to plenty of "bad" planning.

Indeed, the speed at which the highway network was built and the treatment of adjoining neighborhoods resulted in some of the most grievous planning mistakes of the era. The system's approach to reorganizing urban transportation, and its attendant size, scope, expense, and speed of implementation, resulted in controversy and criticism that increased rapidly over a few years in the late 1960s.[17]

The enormous social, environmental, and economic impacts became rapidly apparent. The system, with its convenient two-pronged effect of increasing highway access and a handy device for razing slums or at the very least building over less desirable urban areas, became famous for building 'white men's highways through black men's bedrooms.' Prior to protective legislation, planners were able to build on public parklands, particularly waterfronts, and to take advantage of the lesser political power of neighborhoods characterized by immigrant or minority populations. In California's Bay Area, for example:

> "The construction of three major interstate highways and the Bay Area Rapid Transit (BART) line completed the destruction of West Oakland in the 1960s…their construction leveled large parts of West Oakland, isolating neighborhoods from one another and cordoning others off behind a mass of concrete... Construction scars, ugly structures, and accumulating refuse blighted poor neighborhoods and lessened property values. Repair shops and car washes, muffler and spray paint services, and used car lots and parking garages arose disproportionately in poor neighborhoods…"[18]

The social legacy of these schemes was similarly extreme and has been disparaged for

16 Weingroff, "The Genie in the Bottle."

17 Raymond A. Mohl, "Stop the Road : Freeway Revolts in American Cities," *Journal of Urban History* 30 (2004) 674, DOI: 10.1177/0096144204265180, and Weingroff, "Genie in the Bottle."

18 Fairfield, *The Public and its Possibilities: Triumphs and Tragedies in the American City*, 255

decades by critics. African-American neighborhoods, for example, were heavily damaged during this era:

> "African Americans experienced urban redevelopment and urban renewal as dispossession. Black neighborhoods of home owners, good-paying jobs, convenient streetcars, and the lively street life of the immediate postwar period disappeared, replaced with shabby streets, aggressive policing, and either 'eerie quiet' or rushing traffic. Redevelopment and renewal evicted more than twenty thousand small businesses, most of which never reopened, gutting the heart and sole of many black communities…Despite legislative guarantees, only .5% of redevelopment and renewal funds between 1949 and 1964 went to aid the relocation of displaced residents."[19]

This experience was much the same in cities around the United States. In the Boston area, communities similarly characterized by marginalized, low income, minority, and/or foreign-born populations were disturbed or destroyed by the construction of the Massachusetts Turnpike (I-90) through Brighton, Northeast Expressway/ Route 1 / Tobin Bridge through Chelsea, smaller additions such as the elevation and expansion of McGrath Highway in Somerville, and later I-93 through Somerville. As Allan K. Sloan documents in his history of citizen participation in Boston's planning in the mid-20th century, the interstate program actually started out with substantial public support because of its promise to renew slum and shabby downtown areas, and renewal-minded officials were elected on the basis of this promise.[20] The system also destroyed significant amounts of parkway as they offered another economic path of little resistance; McGrath/O'Brien highway, the Bowker Overpass (built over the Olmstead-designed Charlesgate in Boston's Back Bay and Fens), and the Forest Hills Overpass in Jamaica Plain were all built by a park agency: the MDC (now known as DCR, the Department of Conservation and Recreation).

As the true impact of the system was revealed, intense community protest mounted in many cities, including San Francisco, Portland, Oregon, New Orleans, and New York. In the Boston metropolitan area, public battles raged over the placement and design of I-93 in Somerville; the planning of I-95 South, and the proposed Inner Belt (I-695). The community uproar resulted in the creation of a task force and re-study of the metropolitan transportation plan; the findings of these resulted in then-Governor Sargent's 1970 moratorium on highway building. The creation of the Boston Transportation Planning Review "called for an 'open participatory process'… in response to criticism of the characteristics of previous transportation planning in the Boston region."[21] Thus ended the age of fast-paced highway construction in metropolitan Boston, much as the program ceased

19 Fairfield, *The Public and its Possibilities: Triumphs and Tragedies in the American City,* 255-256.
20 Sloan, *Citizen Participation in Transportation Planning,* 13.
21 Sloan, *Citizen Participation in Transportation Planning,* 35.

around the US. Yet over the prior 15 years, roadway construction had made an enormous impact on the Boston area, most notably through the construction of the Central Artery through downtown, but also through the destruction of inner-suburban neighborhoods and the expansion of previously smaller-scale roadways such as the McGrath Highway. Furthermore this was accompanied by the erosion of the aesthetic quality of many miles of parkway such as Revere Beach Parkway; Storrow Drive; Route 16 in Chelsea, Everett and Medford; and Morrissey Boulevard in Dorchester, through steady "spot improvements" of intersections[22] that enabled the encroachment of automobile domination and increasingly sparse environment for other modes.

In the late 1960s, the course of transportation planning changed. Increasing pressure from community activism and the "highway revolts" as well as new environmental legislation forced a reexamination of the planning and design process. In reaction to the practice of building roadways through public parklands, the enactment of the Federal Transportation Act of 1966 included Section 4f, which required the examination of all feasible and prudent alternatives to the use of parklands for federally funded transportation projects. More comprehensively, the National Environmental Policy Act of 1969 (NEPA) was the first example of an overarching federal policy to "prevent or eliminate damage to the environment."[23] By requiring Environmental Impact Statements for all proposed federally-aided projects, this legislation made it much more difficult to construct such roadways in urban areas. Through the 1970s, the process became still more complex and diversified. Due to legislation such as the Joint FHWA/UMTA Planning Regulations and Policy on Major Urban Mass Transportation Investments (1975 and 1976), planners were forced to address a larger list of issues and wide range of alternatives, including transit system options, transportation system management measures, and traffic engineering improvements; they also were required to thoroughly assess social, economic, environmental, and energy impacts.[24] Thus the highway revolts and the environmental movement led to the implementation of increasingly strict legislation; an official reflection of a change in the public mentality towards highways and towards large-scale intervention in American cities.

An Infrastructural Legacy

Though the highway era may be now over, cities will be coping with its complex legacy for many years to come. Urban highways are clearly a necessary component of vehicular mobility in cities. It is difficult to imagine how metropolitan areas today would function

22 Comments from Fred Salvucci, May 10, 2011.
23 Weiner, *Urban Transportation Planning in the United States*, 62.
24 Weiner, *Urban Transportation Planning in the United States*, 97

without the bold infrastructural visions enacted on behalf of the automobile since the 1920s. And yet, the negative legacies of highway planning have continually raised questions about its legacy and what the next steps should or could be. Neighborhoods bordering the highway corridors have borne much of the brunt of these intrusions, and struggle with decline and disuse. Today's highway corridors are more often than not surrounded by acres of underutilized, often contaminated parcels. They are the domain of strip malls, parking lots, car impounds, vacant lots, and uses unwelcome in other areas of the city.[25]

It sometimes cannot be determined whether these conditions are cause or effect. Since highways were built through undesirable, low-land value areas, in some cases this marginalized aspect has existed in such corridors prior to highway construction. The history of the southern end of McGrath/O'Brien will support this as it was built alongside a railway corridor that was characterized by industrial uses since the land was created by fill. The disamenity of the highway enables a land-banking effect in very central areas that otherwise would be too expensive for low-density uses like warehouses, distribution centers,

Figure 9: Streetside view of McGrath/O'Brien Highway (intersection with Washington Street)

25 Roger Trancik, *Finding Lost Space: Theories of Urban Design* (New York : Van Nostrand Reinhold, 1986).

26 Kevin Lynch, *Wasting Away* (San Francisco: Sierra Club Books, 1990) 113.

27 Daniel Campo and Brent D. Ryan, "The Entertainment Zone: Unplanned Nightlife and the Revitalization of the American Downtown," *Journal of Urban Design*, 13.3 (2008).

28 Lynch, *Wasting Away*, 102.

3: *Highways Reconsidered in the Twenty-First Century City*

Since the elevated structures integral to the urban highway model were largely constructed in the 1950s and 1960s, many are now nearing the end of their useful lives. This provides a new and pressing situation in which planners must decide whether to rebuild the highways as they stand or to redesign the roadway. This presents the opportunity for a new kind of "highway revolt" and to reclaim lost urban space from the automobile.

The decision to rebuild versus to redesign is a strong tension in which sticking with the status quo will actually be *more* costly than new innovative solutions:

> "The focus of many transportation development programs in urban areas has shifted from the construction of new freeways and expressways to the reconstruction of existing facilities. The cost of reconstruction, in many instances, will exceed the original construction cost, and will likely be the most costly of all project undertaken by transportation agencies. Moreover, most transportation agencies have limited experience in reconstruction of major highways. Since more urban and suburban freeways and expressways are less than 40 years old, this is a relatively new type of program."[29]

This thus presents an enormous opportunity for change within the context of transportation planning. As seen in the examples of the Bay Area's Octavia Boulevard, Embarcadero, and Mandela Parkway, and at the West Side Highway in New York, highway removal previously only became possible in isolated instances of structural failure and collapse. The maintenance of reasonable traffic conditions during reconstruction in such projects is extremely challenging and any increase in congestion or change in traffic patterns means an opportunity for mode shift to expanded transit options.

Several other trends have also combined to complement these questions on the status of the urban highway. On a broad scale, the trend of city center renewal and investment has attempted to reverse the trend of disinvestment and decentralization.[30] There has also been a shift in attitude toward mobility and increasing boldness in promoting multimodal transportation options. Although transportation planning is still largely the domain of highway engineers and throughput measures, there is increasing emphasis given to other modes via public transit improvements, streetscaping, and bike and pedestrian networks

29 James B. Saag, *Project Development Methodologies for Reconstruction of Urban Freeways and Expressways.* (Washington, D.C. : National Academy Press, 1999) 1.

30 John Kromer, *Fixing Broken Cities: The Implementation of Urban Development Strategies* (New York: Routledge, 2010).

as context-sensitive complements to traditional vehicular transportation planning.[31] In the post-highway era, American cities must balance the traditional concern for vehicular traffic with concern for urban quality of life and economic development.[32] Often, residents have long wished for an opportunity to revisit the issue of urban highways in their communities and have harbored resentment of the negative impacts they have imposed on their quality of life.[33] The comprehensive redevelopment necessary for these structures is in some cases a welcome opportunity to reinvigorate anti-highway rhetoric amongst community groups. In the case of McGrath Highway in Somerville, community groups invested in quality of life along the corridor are highly concerned about its condition but also thrilled at the opportunity its decrepitude presents. Somerville has long possessed strong community advocacy since it was faced with massive demolition and environmental degradation due to plans for I-93 as well as Route 2 and the Inner Belt in the 1960s. These groups have long vilified the highway structure as one of the most frustrating obstacles towards change in their neighborhoods, and are more than willing to undergo a long planning and construction process to right this wrong. The next section will investigate the planning context that may enable them to proceed with a vision of roadway right-sizing.

31 Donald Appleyard, *Livable Streets* (Berkeley: University of California Press, 1981).

32 Francesca Napolitan explored the change in attitude towards mobility in her 2007 masters thesis, "Shifting Urban Priorities: The Removal of Inner City Freeways in the United States" (Massachusetts Institute of Technology, Department of Urban Studies & Planning, 2007). She identified four prospective ingredients necessary to bring about the removal of an urban highway: 1) concern over the structural condition of a viaduct; 2) a window of opportunity exists to consider removal rather than status quo; 3) the concern for mobility must be lower than for economic development, quality of life, or other factors; and 4) those in power must value these concerns more highly than the benefits associated with the highway infrastructure.

33 Supported by stakeholder interviews discussed later in this thesis.

4: *Roadway Right- Sizing: Planning and Engineering Contexts*

A review of recent planning and engineering literature reveals a void in terms of formulating a standardized approach to redesigning urban highways. Planning literature in general regularly promotes streetscaping, traffic calming, and non-vehicular travel modes but is only able to leverage these tools on roads up to the scale of urban arterial; urban highways can only be approached only under special circumstances. In the meantime, in the traffic engineering literature, the concept of downgrading vehicular capacity has largely been a non-option. Thus there is a gap in both sides of the literature as well as between them. Highway removal continues to be treated largely on a case-by-case basis; while largely hailed as brilliant successes in the world of urban planning, these projects are singular aberrations in the world of traffic engineering. Yet, it is a combination of both these literatures that may enable an increasing acceptance of highway right-sizing, removal, or redesign.

Much attention has been given to the idea of the urban streetscape and new forms of multimodal accessibility. Donald Appleyard's 1981 *Livable Streets* is one of the most important pieces of literature to begin a serious dialogue on the concept of multipurpose, vital thoroughfares. This work reintroduced the urban boulevard as a viable option for high-capacity roadways. Allan B. Jacobs, Elizabeth MacDonald, and Yodan Rofé contributed significantly to the reexamination of this typology through their well known work *The Boulevard Book* (2002). The authors examined why boulevards had fallen out of favor to be replaced by limited access routes, and why this was harmful to the urban fabric and detrimental to usage by all modes. Boulevards had been considered an outdated and suboptimal typology because of supposedly higher accident rates and lower levels of service; Jacobs et al reexamine the facts and find that "the data strongly suggests that, as a group, the US boulevards studied cannot be said to be less safe than comparable, normally configured streets."[34] They ask,

> "Where are the data and analysis that led transportation engineers to the conclusion that multiway boulevards are unsafe, the data and analysis that back up the professionally promulgated standards and norms? We have yet to find them."[35]

This research has contributed to the resurgence of interest in the boulevard as an urban typology and the possibility of using high-capacity boulevards in place of limited-access arterials.

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34 Allan B. Jacobs, Elizabeth Macdonald, and Yodan Rofé, *The Boulevard Book: History, Evolution, Design of Multiway Boulevards* (Cambridge, Mass.: MIT Press, 2002) 98.

35 Jacobs, et al, 97.

Naturally boulevards themselves must also be implemented in a manner sensitive to surroundings and to issues of multi-modal accessibility. They must be designed as amenities rather than simply as brutal at-grade highways. Considerable attention must be given to how the traffic flows may react to de-elevation. In Boston and surroundings, the McGrath, as well as the Bowker Overpass and the Forest Hills overpass, are in a structurally deficient condition that presents the potential to reexamine their functionality. However, all three also present concerns on the volume of at-grade traffic that might result instead.[36]

Perhaps due to these works and their cadre, the importance of streetscape planning in multiple capacities ranging from neighborhood streets to arterials has in the past decade or so been steadily more readily acknowledged by traffic engineers. The Institute of Transportation Engineers (ITE) and the Federal Highway Authority (FHWA) offer multiple publications on the subject. However, the literature reveals little acknowledgement of the urban highway as a typology for which there is any hope of improvement. Typically such literature encompasses smaller scale streets up only to the level of urban arterial or boulevard, with nothing at the scale of highways, freeways, or parkways.[37]

One initiative that has started to bridge the gap between traffic engineering and planning is Context Sensitive Solutions (CSS) from the Federal Highway Administration.[38] This program is building guidelines for more flexible, accommodating, and multimodal transportation design. The FHWA initiated the program in 1994 to recommend ways transportation planners can use flexible design solutions within the framework of current laws and regulations to accommodate community concerns and planning goals without compromising safety. In response to the reaction against AASHTO standards, the 1991 Congressional reauthorization of the Intermodal Surface Transportation Efficiency Act (ISTEA) enabled such guidelines to change.[39]

The guidelines were developed in conjunction with the ITE and the Congress for the New Urbanism, which has researched and published extensively on streetscape design. This collaboration is seemingly well poised to bridge the gap between transportation planners/ engineers and urban planners/ designers. Some of its material is still very much centered on highway engineering and associated standard best project practices (based on the AASHTO "Green Book," a document outlining engineering and design standards); but other

36 Eric Moskowitz, "Pothole renews debate on overpass: Neighbors want Bowker torn down," *Boston Globe*, March 12, 2011.

37 The level of service examined in this literature commonly excludes anything higher than urban arterial. For example, see Institute of Transportation Engineers, *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*, (Washington, DC: ITE, 2010).

38 "Context Sensitive Solutions.org," accessed January 2011 http://www.contextsensitivesolutions.org.

39 FHWA Resource Center, "CSS Quick Facts – How CSS Developed," accessed January 2011, http://www.cssnationaldialog.org/documents/QuickFacts/CSS-Quick-Facts-How-CSS-Developed.pdf

guidelines focus intensively on public participation, communication and collaboration, streetscaping, multimodal access, natural systems, and incorporating flexibility and creativity into roadway design. In this way, CSS is essentially a working document designed to possibly correct the inefficacies and false moves of the type of project process typified during the highway era. Its literature and case studies illustrate best practices for a variety of contexts, from residential streets to scenic highways.

Although the program shows great promise and offers very astute, comprehensive guidelines for some contexts, it has shortcomings in several areas. Most notably, it does not offer many suggestions for dense urban downtowns, particularly their highways, and does not explore the "road diet" or right-sizing concept. Typically, its guidelines are applicable only up to the boulevard level of service (35 mph or less). Indeed, the guidelines offer only two categories, urban or rural – meaning that suburban areas are often lumped into urban, and that truly dense urban downtowns receive no special considerations.[40] This is a strange oversight since through working with the New Urbanists, the CSS documents incorporate the idea of Andres Duany's "Transect," a gradient defining development characteristics from rural to urban. CSS refers to 'cut and cover' highway projects such as Seattle's Freeway Park and the possibility of downgrading roads in functional classification, but stops short of investigating these as anything more than idiosyncrasies. This leaves open a great opportunity to develop CSS style guidelines for the redevelopment of urban highway corridors – making a final bridge from the realm of the highway engineer to the world of the urban planner. Given the trajectory of the highway removal trend, CSS would benefit by considering roadway downsizing as an established alternative.

In its highway literature, CSS offers a limited number of types of highway improvement projects: New Construction, Reconstruction, 3R (resurfacing, restoration, rehabilitation); and Maintenance.[41] "Improvement" in this context still means "expansion" solely. Yet its treatment of the former West Side Highway shows that the approach is more flexible and applicable than these three options illustrate. As an older, limited access route winding through previously industrial surroundings, this case is a close precedent for the McGrath Highway site, though its waterfront location means that some of its dynamics differ. The reconstruction of the route as a surface boulevard will be discussed further in the case studies section.

40 U.S. Department of Transportation / Federal Highway Administration, "Flexibility in Highway Design," 61, accessed January 2011, http://contextsensitivesolutions.org/content/reading/flexibility/resources/flex_full/.

41 Context Sensitive Solutions.org, "Types of Highway Improvement Projects" (2005) accessed January 2011, http://contextsensitivesolutions.org/content/reading/types-of-highway/.

CSS is a significant advance in the tools of highway designers to better serve the needs of communities surrounding these corridors. It is possible this tool reflects the advocacy of planners and transportation researchers who have developed theories on traffic calming and road diets. The underlying dialectic promoting the shift towards the mindset of CSS is discussed in the next section.

5: *Theories of Traffic Calming and Latent Demand*

The concept of highway removal is controversial because of the fear that 1) no other roadway typology can accommodate high enough traffic numbers; and 2) traffic will spillover onto local roads and cause backups elsewhere in the system. Critics charge that "central city traffic congestion will worsen, and putting more cars and trucks onto surface streets will increase pedestrian fatalities" and that economic gains will be offset by the loss of businesses preferring freeway-served suburban locales.[42] And yet, in cases where highways have suddenly been closed because of collapse, traffic repercussions have been surprisingly mild or nonexistent. Transportation officials are often at a loss as to how roadway networks adapt and avoid gridlock in cases where a highway has suddenly been closed. In other words, the system may be more adaptable than traffic advocates think. This section investigates precedents on which data for traffic dispersal is available in order to underline the fact that fears of traffic chaos are often unfounded.

The concept of latent demand and traffic demand elasticity is at the very center of the concept of right-sizing of urban highways. It has largely been assumed that expansion is the only option; and yet numerous precedents examined here will show that a decrease in capacity is more easily handled than previously believed. It is possible that these cases essentially observed the phenomenon of "triple convergence" in which roadway capacity increases often fail to provide congestion relief, because the newly available capacity is filled by traffic attracted from 1) parallel routes; 2) parallel modes; or 3) shifts in travel time into the peak period.[43] A decrease in capacity may therefore exhibit this phenomenon in reverse. It may well be that given the large redundancy of multimodal urban networks, this process is equally valid in absorbing the shock of capacity loss.

While all the reasons are not always clear, two key aspects to capacity decrease are: a balance in tradeoffs – "between mobility and safety objectives on the one hand and urban regeneration and economic development objectives on the other"[44] and a balanced approach to preparing the city for this change: 'engineering, education, and enforcement.'[45]

Research within the field of transportation planning and engineering is seeking to understand how supply and demand adjust when capacity is reduced or when a link

42 Cervero, "Freeway Deconstruction and Urban Regeneration in the United States," 2.
43 Anthony Downs, *Stuck in Traffic: Coping with Peak-hour Traffic Congestion* (Washington, DC: Brookings Institution, 1992).
44 Cervero, "Freeway Deconstruction and Urban Regeneration in the United States," 2.
45 Cervero, "Freeway Deconstruction and Urban Regeneration in the United States,"7.

disappears from a roadway system. Since the addition of transportation capacity potentially affects the likelihood of additional trips taken by urban residents, the reverse should occur with traffic calming and reducing capacity for a parallel reduction in additional trips taken. Neither relationship – increased capacity and increased demand, or the inverse of decreased capacity and decreased demand – has been unquestionably proven. Ryuichi Kitamura's evaluation of existing empirical data on the subject finds that models using the standard sequential procedure are:

> "capable, in principle, of forecasting diverted, transferred, and shifted traffic, although actual practice may be less than ideal... Impacts on car ownership, residential and job location choice, and land use need to be better understood and incorporated into the forecasting procedure. More widespread use of panel surveys is encouraged." [46]

Thus the lack of understanding on this commonly cited phenomenon points to the additional work to be done in traffic demand modeling. Although the research has yet to precisely quantify the relationship between traffic supply and demand, the existing research does show that the elasticity of the network to adapt to change is typically greater than predicted. A study from the United Kingdom researched over 70 case studies of road space allocation in eleven countries and collected opinions from over 200 international transportation experts.[47] The results suggest that:

> "…predictions of traffic problems are often unnecessarily alarmist, and that, given appropriate local circumstances, significant reductions in overall traffic levels can occur, with people making a far wider range of behavioural responses than has traditionally been assumed."[48]

The context for this report is the official shift on road building in the United Kingdom in the 1990s that acknowledged that road expansion was not always a solution to congestion; on the contrary, building additional capacity could in fact generate traffic. The acceptance of the concept of induced demand stemmed from the building of the M25 motorway around London, which in spite of increased capacity did not result in traffic improvement to the expected degree.[49] In an effort to avoid this problem in the future, numerous improvements to bus and other modes were proposed; yet these were rejected based on fears that automobile traffic from those routes would be negatively impacted and/or diverted onto other streets. Since there was little existing research work on whether correlation

46 Ryuichi Kitamura, "The Effects of Added Transportation Capacity On Travel: A Review of Theoretical and Empirical Results" *Transportation,* (2009) 36:745–762.

47 S. Cairns, S. Atkins and P.Goodwin, "Disappearing traffic? The story so far," *Municipal Engineer* (Proceedings of the Institution of Civil Engineers) 151 (March 2002), 13-22.

48 S. Cairns, et al, 13.

49 S. Cairns, et al, 13.

exists between reduced capacity and reduced demand, the results of such a scheme were unknown. The controversy and the lack of information spawned several studies in 1997 which were re-analyzed, updated, and expanded by Cairns, Atkins, and Goodwin in 2002. The examples studied included any kind of work that resulted in reduced or reallocated capacity: pedestrianization of downtowns, increased bus lanes, bridge damage, etc. Overall, researchers found these projects exhibited a median reduction in overall traffic volumes of approximately 11%.

Interviews revealed that while planners and engineers may recognize the possible effects leading to trip reduction, "it is reported that, in practice, many work on the basis that traffic levels remain fixed" and that the demand for car trips accommodated in urban planning schemes is far less elastic than it may be in reality.[50] Planners appear to be more skeptical than necessary since "Controversy… is not always dispersed by technical success."[51] Even though case studies may prove that highway removal is a technically feasible option, planners still have an uphill battle against the misconceptions about traffic adaptability and context sensitive design.

Of course, two key facts must be understood in relationship to these findings: First, in the past, traffic reduction schemes were very conservative and so only the projects with the highest likelihood of success would have been implemented, so the results are skewed for successful traffic reduction. Secondly, it must also be acknowledged, as the researchers noted, that each project is highly individual in its characteristics, and a wide array of percent reductions is thus to be expected. Since this study covered many European cases, one may approach these results critically from an American perspective, arguing that the traffic system and land use pattern here is so highly skewed towards the automobile that system users cannot divert to other routes or modes the way they could in other countries. The primary American example used in the study is the closure of a New York City highway in 1973 (presumably the West Side Highway, but it is not specified). This is clearly an environment where alternative modes are readily available in a density not seen many other places in the United States. Thus perhaps a key message here is that traffic reductions will occur and projects are highly likely to be successful, but only if other travel options are available. This study again points to the need for further research within an American setting and to more concretely define the phenomenon of induced/reduced demand. The uncertainty remaining in the research on this subject may mean that projects proposed with this phenomenon in mind will continue to be the exception rather than the rule.

50 S. Cairns, et al, 14.
51 S. Cairns, et al, 14.

6: Current Implementations

The focus on livable streets, the development of Context Sensitive Solutions guidelines, and the continued examination of the modeling of reduced demand are three examples out of many that show a shift in the trajectory of transportation planning in the 21st century. This shift points to an imminent re-examination of highway viaducts across the United States to acknowledge removal, reorientation, or right-sizing as an option for urban routes. Federal funding has already been released to support some of this work. Title XII of the American Recovery and Reinvestment Act of 2009 (Recovery Act) appropriated $1.5 billion through September 30, 2011, for Supplementary Discretionary Grants for a National Surface Transportation System. These grants were awarded on a competitive basis for capital investments in projects that will have "a significant impact on the Nation, a metropolitan area or a region."[52] As such, these projects have a large multimodal element, encompassing goals of sustainable development and economic development.[53] The latest round of these funds, known as Transportation Investment Generating Economic Recovery or TIGER funds, included monies for three highway removal projects: [54]

- Construction of Downtown Crossing / removal of Route 34 in New Haven, CT: a limited access route replaced with two corridors, reclaiming 11 acres for downtown development, creating 2,000 construction jobs/ 960 permanent jobs, add over $80 million in wages and $100 million in overall economic activity for the city.[55]
- A study for the removal of the Claiborne Expressway/I-10 in New Orleans:[56] a report commissioned by the Congress for the New Urbanism found that "the replacement of major segments of the Claiborne I-10 freeway with a restored urban boulevard would result in a well-functioning transportation system that meets regional needs while promoting the economic and social rebirth of the once-vibrant Claiborne Avenue and its surrounding communities" and would free up more than 50 acres of re-developable land.
- A study for the removal of the Sheridan Expressway in the Bronx, which runs as a redundant connector only a mile and a quarter long between the Cross Bronx and Bruckner Expressways. The removal project has a strong proponent in the form of the Southern Bronx River Watershed Alliance.[57]

52 "DOT Information Related to the American Recovery and Reinvestment Act of 2009 (Recovery Act)," United States Department of Transportation, Accessed March 2011, http://www.dot.gov/recovery/ost/faqs.htm.

53 US Department of Transportation, "Transportation Investment Generating Economic Recovery (TIGER) Grants," February 17, 2010, http://www.dot.gov/documents/finaltigergrantinfo.pdf.

54 Irwin Dawid, "Federal Transportation Funds For Highway Removal?" *Planetizen*, October 21, 2010. http://www.planetizen.com/node/46514.

55 Danny Serna, "Route 34 replacement to unite downtown New Haven," *Yale Daily News*, 18 October 2010., http://www.yaledailynews.com/news/2010/oct/18/route-34-replacement-to-unite-downtown-new-haven/.

56 "Restoring Claiborne Avenue: Alternatives for the Future of Claiborne Avenue," Congress for the New Urbanism, accessed January 2011, http://www.cnu.org/restoringclaiborne.

57 Sam Dolnick, "Plan to Remove Bronx Expressway Gains Traction," *New York Times*, 12 July 2010, http://www.nytimes.com/2010/07/13/nyregion/13sheridan.html.

Congress for the New Urbanism, which has created a program called Freeways without Futures to identify prospective highway removal projects, has hailed the latest round of TIGER grants as a sign that such projects are gaining ground in popularity and viability.[58] The grants are designed to help communities encourage more sustainable forms of transportation, such as transit, bicycling and walking— many of which "could not have been funded without this program."[59] Since this funding was specifically developed in response to the Great Recession, it is not an annually renewed program and it is unknown what funding will be available for future programs. Other projects that did not win federal funding in this round nevertheless wait on local drawing boards and hopefully will be ready to implement in the future when the economic situation improves.

In Massachusetts, numerous projects are underway thanks to the $3 billion Patrick-Murray Accelerated Bridge Program, instituted in 2008 after a fatal bridge collapse in Minnesota.[60] It was through this program that the Gilman Street bridge and the McCarthy overpass on the McGrath Highway (at the Washington Street intersection) was identified as structurally deficient and kicked off the study to determine whether to replace the road's viaducts or de-elevate it. The program represents a significant investment in infrastructure repair and as of January 31, 2011 it resulted in the completion of 42 bridge projects, with another 69 bridge projects currently in construction, and an additional 49 bridge projects scheduled to start construction within the next year; over the course of the eight year program, more than 200 bridges are planned to be replaced or repaired.[61]

As part of this program, the McGrath Highway will receive construction monies provided the project uses said funds by 2016. Since the City of Somerville, and its residents, had for many years expressed interest in removing the elevated structures of the highway, and since the maintenance of such structures has proven highly costly, particularly in the northeast's climate, MassDOT agreed to undertake a conceptual planning study to examine the possibility of replacing the McGrath/O'Brien highway with a boulevard.[62] The year-long study now underway was initiated in early 2011 with McMahon Associates as lead consultant. As the future of the highway is considered, it is important to revisit its function within the urban fabric, its history, and its relationship to similar precedents to understand from multiple perspectives how a shift in image and in accessibility patterns may be encouraged there, and how best to meet Somerville's goals of economic development and neighborhood re-connection. The next section will establish this context.

58 "Highway To Boulevard Concept Comes of Age With Today's Joint HUD-DOT Announcement," Council for the New Urbanism, October 20, 2010, http://www.cnu.org/node/3744.

59 Dawid, "Federal Transportation Funds For Highway Removal?"

60 Eric Moskowitz, "Demise of overpass may help reconnect a necklace," *Boston Globe*, 07 January 2011, http://articles.boston.com/2011-01-07/news/29336544_1_state-officials-route-road/2.

61 Massachusetts Department of Transportation, "Accelerated Bridge Program: Fixing Bridges, Doing Business Differently," accessed March 2011, http://www.eot.state.ma.us/acceleratedbridges/.

62 Interview with Ethan Britland, Massachusetts Department of Transportation Project Manager, Route 28 / McGrath Highway De-Elevation Study, 23 February 2011.

7: *Site Background:*
McGrath/O'Brien Highway Corridor

The case of the McGrath/O'Brien Highway in Somerville/Cambridge, Massachusetts is one such project where a city and its citizens are fighting to take urban space back from the automobile and leverage transportation planning interventions to improve accessibility, environmental quality, economy, and equity. The history of the McGrath/O'Brien corridor mirrors the story of transportation planning over the twentieth century and portrays the encroachment of ever-expanding automobile infrastructure and accompanying developmental complexities within old, inner-ring industrial suburbs, the City of Somerville and the East Cambridge segment of the City of Cambridge. While the segment running through Somerville and East Cambridge is only approximately 2.7 miles long, it is an incredibly complex environment because of the presence of multiple, sometimes incompatible land uses, extensive railway infrastructure, both passenger and freight, and the addition of light rail with the Green Line extension now underway.

The corridor begins in the southeast at the Charles River Dam, which connects East Cambridge with the West End of Boston. It then proceeds northwest through the edge of East Cambridge, with dense residential areas to its west and industrial areas and rail facilities to its east. In Cambridge, the road is known as Monsignor O'Brien Highway, with the name changing to McGrath at the Somerville border, marked by an at-grade traffic signal at Twin Cities Plaza, a shopping center to the west that straddles both municipalities. North of this point the highway is elevated and continues as such for most of its path through Somerville, past the Brickbottom neighborhood and the Inner Belt industrial area to the East and the mixed-use Union Square neighborhood to the West. It passes over the MBTA Fitchburg commuter rail line, turns northwards and crosses Somerville and Washington Streets in a series of complex and messy intersections. These intersections are made more complex by the presence of the viaduct's on and off ramps, frontage roads, complex turning lanes, lack of signage, and erratically timed lights. The section north of Washington Street returns to grade at Medford Street as a multilane urban arterial that crosses the MBTA Lowell commuter line / future Green Line extension with a short bridge, crosses Broadway at grade, runs underneath I-93 in a complex interchange, and then joins with the Fellsway to cross the Mystic river into Medford. As it forms a key connection between the Charles River and the Mystic River, it has implications for waterfront access and the metropolitan open space network. The road was recently

transferred from the jurisdiction of the Department of Conservation and Recreation (DCR) to the Massachusetts Department of Transportation's (MassDOT) Highway Division.[63]

7.1 McGrath Highway: Key Facts

Route Identification	MA Route 28
Roadway Classification	Other Highway (non-interstate)
Through traffic breakdown	Very high percentage from immediately adjacent communities See discussion on CTPS data, 7.3.1.
Vehicles /day:	35,000-65,600 Average Daily Traffic. (Varies by section) These numbers are in the range of highway removal projects studied in the I-81 case study report.
Proposed redesign:	De-elevation and new replacement boulevard
Project scope:	2 miles within Somerville (McGrath) and 2.7 miles within Cambridge (O'Brien)
Context:	Urban, industrial, commercial, residential, infrastructural
Location:	Somerville, MA, and Cambridge, MA
Population of city	77,478 (Somerville); 101,355 (Cambridge) as of 2000 census
Timeline:	Currently in year-long study; completion estimate is 2013
Estimated Cost/ Cost per mile:	Official numbers are not yet available, but numbers associated with the accelerated bridge program estimate $8.8M for Gilman/ MBTA tracks and $22.9M for the bridge over Washington Street alone. Another number casually estimated was $70-100million total / approx 2 miles = $35-50 million per mile[2]

7.2 History

The history of the corridor is instrumental in understanding not only the reasons behind its current configuration but also what has been lost there over the years and what interventions have been attempted. What is now the highway corridor was originally partly characterized by the small-scale, narrow, winding streets typical of the original settlement patterns of Somerville, Cambridge, and other older Boston-area neighborhoods. "Somerville and Cambridge have always been mazes of tortuous routes, zigzagging, narrow, bewildering streets through which truck driver or pleasure-seeking motorist had to twist

63 Jim O'Sullivan, "Transportation bill takes McGrath Highway out of DCR Hands," *Somerville Journal*, 18 June 2009. http://www.wickedlocal.com/somerville/news/x488801998/Transportation-bill-takes-McGrath-Highway-out-of-DCR-hands.

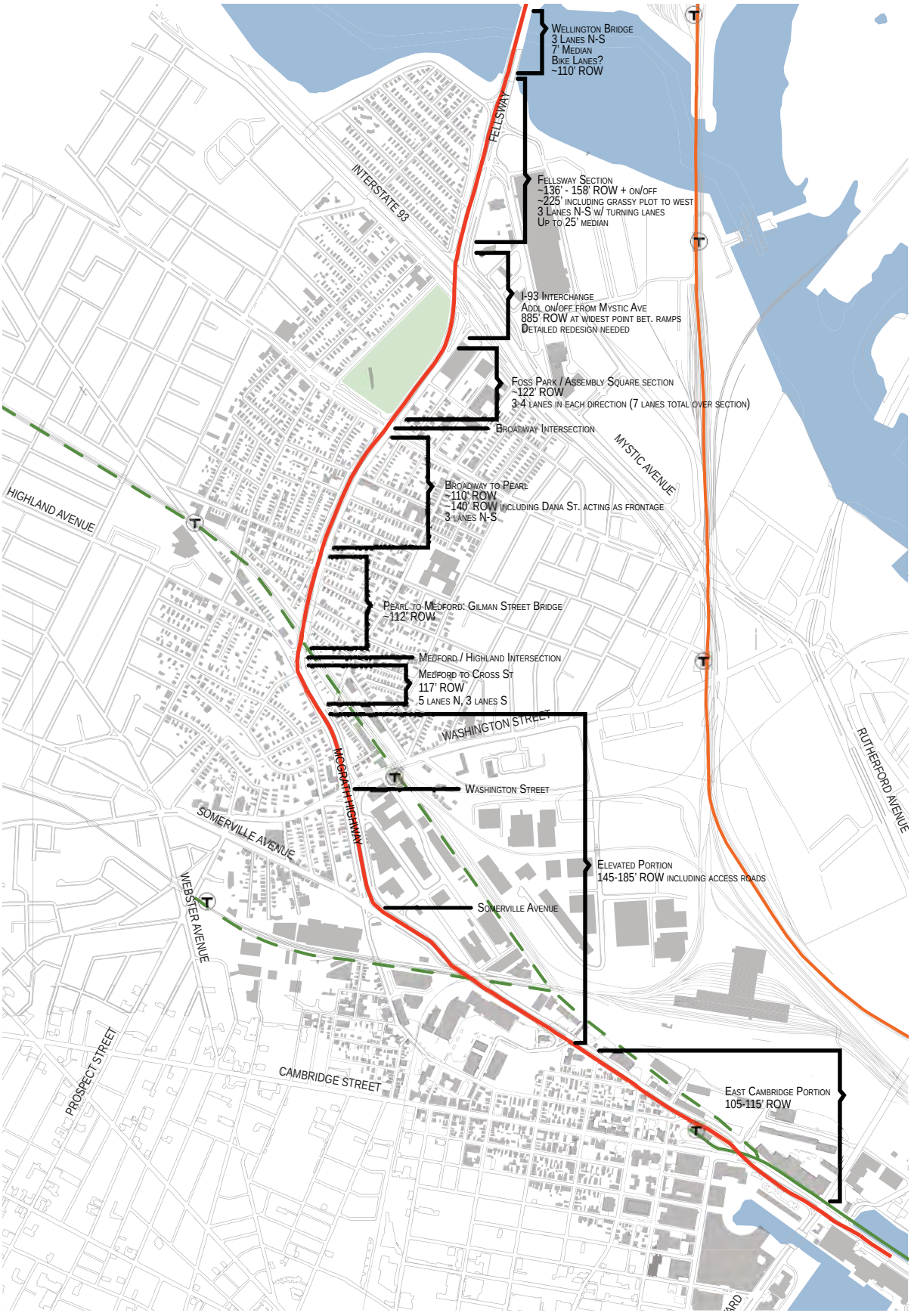

Figure 10: Analysis of the McGrath/O'Brien Corridor showing variable rights of way, intersection characteristics, and surrounding contexts

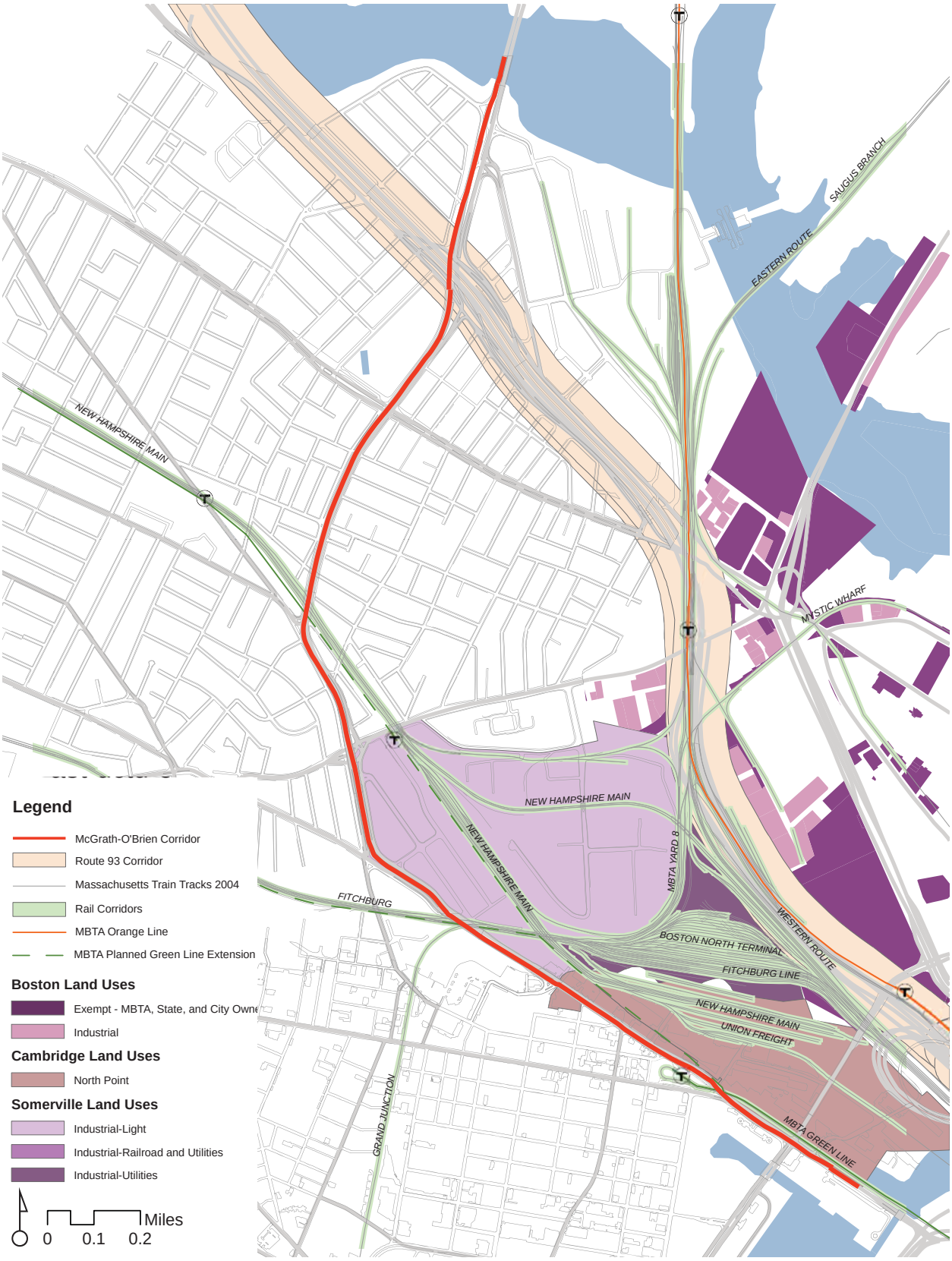

Figure 11: Map illustrating the extent of the infrastructure surrounding the highway corridor: rail lines, interstates, public utilities, waterways, and various types of industry

his way before getting anywhere."[64] This pattern was established to the north and west in dense residential neighborhoods extending from the Winter Hill, Prospect Hill and East Somerville areas. Prior to roadway improvements for the automobile, these neighborhood streets needed only to be "wide enough for teams to pass"[65] and complimented the dense settlement pattern of the city.

The rest of the area, to the south and east, was built out in conjunction with the railroad's construction through what is now known as the Inner Belt. The railroad and related facilities also expanded on man-made land created by filling in Miller's River and altering the coastline of East Cambridge. Because of its proximity to the railroad and to earlier waterfront access, this area was characterized by a mix of industrial and commercial uses from its initial settlement onwards. Industries along the corridor and reaching towards the Union Square vicinity included a sugar refinery, a Boston Elevated Rail Road Car Power Station, coal and lumber yards, and livestock yards and slaughterhouses.[66]

At the turn of the century, these neighborhoods were connected to downtown Boston via multiple streetcar lines. At their height, circa 1915, an extensive web of tracks connected neighborhoods throughout the Boston and its immediate suburbs. Routes ran not only through the present-day McGrath corridor, but also connected it laterally with its surroundings. This streetcar network largely served much of the transport needs of these neighborhoods, which were booming at this time and increasing in residential and commercial density.[67]

As the automobile gained in popularity, however, the transportation characteristics of the area changed rapidly. Concern for improved vehicular access to downtown Boston from its northern suburbs began early in the 20th century, and plans for a vehicular artery through Somerville began around 1910.[68] Concerns about traffic congestion and the lack of a direct connection between Boston and burgeoning suburbs to the north was a topic of concern for both City of Boston, the City of Somerville, and other northwards cities such as Malden – as until this point the only option was the narrow 18th and 19th century streets of the area.[69] Presumably these cities realized that their economic development was limited by the access constraints in place. After more than a decade of agitation and support from local

64 Corrinne Danforth, "Start Made in Razing 200 Houses to Open Way for Northern Artery," *Boston Globe* (ProQuest Historical Newspapers), 1 March 1926.

65 Danforth, "Start Made in Razing 200 Houses to Open Way for Northern Artery."

66 Massachusetts Department of Transportation, "2004 Reconnaissance Survey for the Locally Preferred Alternative, Boston Urban Ring" (PAL Report No. 1396.01), Chapter 6, page 126, http://www.theurbanring.eot.state.ma.us/downloads.

67 Sam Bass Warner, *Streetcar Suburbs: The Process of Growth in Boston, 1870-1900,* (Cambridge, MA: Harvard University Press, 1978).

68 Danforth, "Start Made in Razing 200 Houses to Open Way for Northern Artery."

69 "Cities Urge Building of Northern Artery," *Boston Globe* (ProQuest Historical Newspapers), 22 May, 1924, 28.

governments, in 1923 preliminary plans were completed for what was to be the Northern Artery and the Metropolitan District Commission was given the authority to acquire property via eminent domain. It seems that due to the intense desire by these cities to have the route built, great leniency was given the planning agency of the time, the Metropolitan Planning Division, to build as direct a route as possible as quickly as possible.[70]

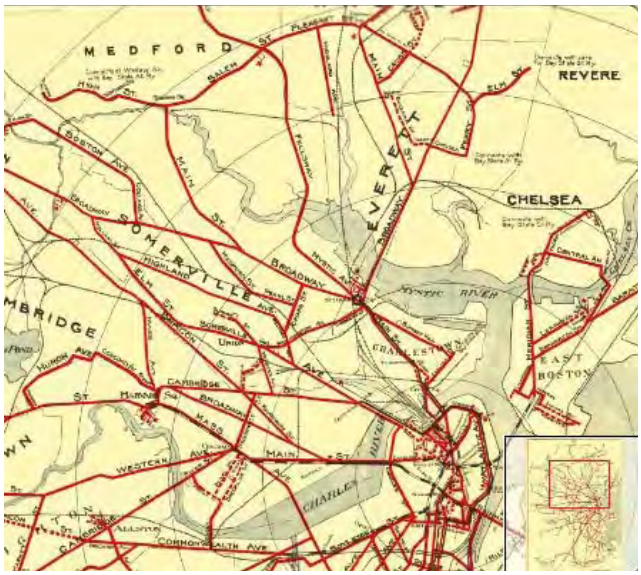

Figure 12: Streetcar Lines in Metro Boston 1915 (Courtesy of Ward Maps Co. Publisher: Walter Mather)

The new road was to be a wide boulevard to accommodate increased volume and speed of automobile traffic into Boston via the Charles River Dam. Two lanes of traffic served both directions with streetcar lines in the middle, similar to Commonwealth Avenue in Brighton today. This streetcar traveled the Cambridge length of the roadway; in Somerville, the streetcars branched off towards Union Square via Somerville Avenue and towards Winter Hill via Medford Street. Routes 99 and 100 traveled part of the Fellsway from Medford and then turned inbound on Broadway, Somerville.[71]

The Northern Artery followed the path of Bridge Street, and into Somerville along what was formerly parts of Somerville Avenue, Medford Street and Winthrop Avenue, joining with the Fellsway to cross the Mystic River into Medford. The eastern end of this route followed what had always been an industrial corridor. However, the rest of the route ran through the densely populated residential and mixed use neighborhoods bordering Union and Gilman Squares, and in fact completely destroyed a largely residential node once known as Central Square, Somerville.[72]

Over its three and a half mile length, the new route significantly widened narrow existing roadways and cut across several blocks in a densely built environment, and the amount of property requiring acquisition and demolition exceeded 220 lots, including over 200 homes. Demolition began in 1926, and as work proceeded, residents and business owners expressed a wave of nostalgia for the old neighborhoods and significant dissatisfaction at the impact

70 "Cities Urge Building of Northern Artery."

71 Bradley H. Clarke, *Streetcar Lines of the Hub: The 1940s, Heyday of Electric Transit in Boston*, (Boston: Boston Street Railway Association, 2003).

72 ProQuest Information and Learning Company, and Sanborn Map Company, "Somerville, MA, 1900," *Digital Sanborn maps, 1867-1970. Massachusetts*. (ProQuest Information and Learning Company: Ann Arbor, Mich., 2001), http://sanborn.umi.com/.

Figure 13: The newly completed McGrath/O'Brien at the border of Somerville and Cambridge looking towards Boston, 1926 (Courtesy of the Cambridge Historical Commission)

of the construction on the neighborhood and the scale of expulsion and destruction.[73] Such stories included those of elderly residents who had lived in the neighborhoods for their entire lives, now forcefully relocated. The papers also highlighted the engineering controversies and confusion. It seems that public participation in or knowledge of the project was minimal, as some of the specifics of the route remained shrouded in secrecy, such as what was to be done about a large warehouse building that extended 25 feet into the proposed boulevard's bed. Another article hit upon the tradeoffs of positives and negatives: while the road was "knitting Greater Boston back together in a great North and South gateway" it was at the same time "a huge scar upon the thickly settled communities through which the grotesque claws of steam shovels have gashed the path."[74] This backlash foretold what would become a strengthening sense of disentitlement in Somerville as additional regional infrastructure would be built in the coming years, culminating in the battle against I-695 and I-93 in the late 1960s.

When completed, the new road acted as an important connection between Memorial Drive/ downtown Boston and the northern suburbs/Mystic River corridor, and streamlined the traffic flow through Somerville and East Cambridge. However, its negative aspects were

73 Danforth, "Start Made in Razing 200 Houses to Open Way for Northern Artery."

74 "Girders of Bridge Soon Will Link Sections of Big Northern Artery," *Boston Globe* (ProQuest Historical Newspapers), 17 August 1926, 13.

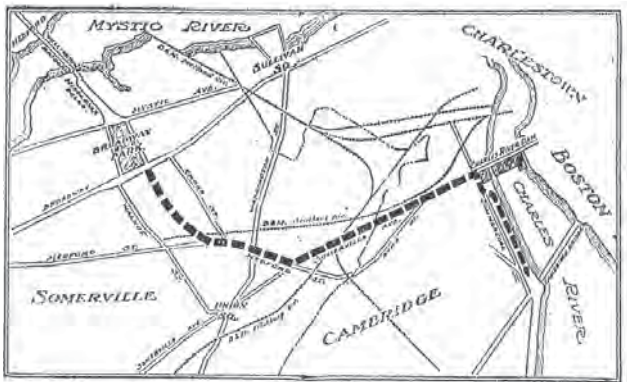

Figure 14: Original construction scheme, 1926 (Boston Globe Archives)

Figure 15: Demolitions along the route, 1925. (Courtesy of Cambridge Historical Commission)

significant: additional traffic was now drawn through Somerville, close to residences; neighborhoods were split and damaged; and a strong division or edge was added to the city, effectively cutting off East Somerville and making access to bordering industrial areas difficult. The addition of the highway to East Somerville added another inaccessible corridor to an area already saturated by railroad and industrial infrastructure. The McGrath corridor differs from many of the typical highway construction stories in the US since its initial construction took place in the 1920s, well before the boom in highway expansion of the 1950s and 1960s. The building practices of the era and its segmented format mean that it was built at a smaller scale than the expressways built in following years. And yet, the results are much the same.

The preference given to the automobile in planning the corridor also likely hastened the demise of numerous streetcar lines in the area. Since the height of the streetcar era around 1910, its network had been shrinking; by the 1940s two lines remained: those that had run through the corridor from Lechmere to Clarendon Hill (routes 87 and 88) were discontinued in 1941 (they then ran as trackless trolleys until 1963 and were then supplanted by bus lines)[75]. Additional routes in the area, such as number 100 running from northern Boston to Medford, were likewise discontinued (in 1955), decomposing the network connectivity and emphasizing the shift to vehicular traffic.

The Somerville portion of the Artery was renamed Monsignor McGrath Highway in 1933, while the Cambridge portion was renamed Monsignor O'Brien Highway in 1950.[76] At this time, planning for increased vehicular circulation began again, and in 1956 portions of the boulevard were reconstructed as a viaduct in order to streamline circulation. What had

75 Clarke, *Streetcar Lines of the Hub*

76 The Northern Artery was renamed McGrath Highway in 1933. ("An Act Designating A Portion Op The Northern Artery, So Called, As The Monsignor McGrath Highway" (Boston: Secretary of the Commonwealth, 1933) 1933 Chap. 0078.) The Cambridge portion was renamed Msgr O'Brien Highway in 1950. ("An Act Designating A Portion Of The Northern Artery, So Called, As The Monsignor O'Brien Highway," (Boston: Secretary of the Commonwealth, 1950) 1950 Chap. 0097.)

Figure 16: 1900 Sanford Maps reveal the extent to which the corridor was changed by this construction; intervention site is inset

originally been a modestly sized boulevard transformed into an elevated highway for some segments and a wide multilane at-grade highway at others.

Additional demolition, relocation, and unsuccessful redevelopment projects nearby further isolated and divided area neighborhoods. A large part of the Inner Belt and Brickbottom, including a neighborhood of workers' housing was razed in preparation for the never-realized I-695 interchange and an accompanying office park.[77] The Inner Belt area gained its name from the I-695 proposal rejected by Governor Sargent after intense community protest. This roadway would have pushed through the area as an elevated route connected at the north to I-93 and joined by an extension of route 2 which would have passed through Union Square, causing an incredible amount of additional destruction in Somerville's neighborhoods.[78] Demolitions had already taken place for a real estate development project designed to complement the construction of the highway when community activism successfully stopped the Inner Belt.

Somerville, already having experienced takings from the construction and enlargement of the Northern Artery / McGrath Highway and negative impacts from nearby railroad and industry, took on a still larger burden in the late 1960s with the construction of I-93 along the Mystic River and through several neighborhoods near the northern border of the city. The construction of the link from Medford to downtown's Central Artery was delayed for about a decade while the community battled the proposal and sought to at least ameliorate its effects by partially or full submerging the roadbed.[79] These efforts were unsuccessful and the construction effort was too far along to fall under the jurisdiction of the 1970 highway moratorium. The highway's construction displaced hundreds of families, mostly families with small children living in dense three-decker neighborhoods typical of the city[80] and turned what had been a thriving neighborhood into an empty, unwelcoming highway-edge.[81]

Since the McGrath/O'Brien's elevation and expansion in 1956, its surroundings have largely stagnated. The large-scale commercial redevelopment anticipated after the age of highway building never materialized, in spite of several planning initiatives nearby. Along McGrath today one finds a mix of empty lots, tow lots, car service stations, warehouses, a waste transfer facility, and other low-density, low-intensity uses. Actually, Kevin Lynch describes

77 Somerville Redevelopment Authority, "Urban renewal plan: Inner Belt Urban Renewal Area," Somerville, MA Redevelopment Authority, 1968.

78 Joseph Butler Jr., "What Somerville Stands to Lose" *Boston Globe (ProQuest Historical Newspapers)*, May 17, 1960, 14. This estimated relocation of 1500 families and the loss of over $400,000 per year in lost business revenue (1960 dollars)

79 A. Plotkin, "Somerville Fights I-93 in the Sky" *Boston Globe (ProQuest Historical Newspapers)*, June 7, 1970

80 A. Plotkin, "Three Agencies Push Route 93 Artery Link" *Boston Globe (ProQuest Historical Newspapers)* January 19, 1963, 1.

81 Interview with Somerville Transportation Equity Partnership president Ellin Reisner, 3 February 2011.

part of this very site in his *Wasting Away* in 1990, as a quintessential urban remnant:

> "Within any city littered yards are used for low-cost storage and low-value activity, and fragmented, master-less spaces are used for disposal….Linwood Avenue, in inner Somerville, Massachusetts, is typical of such marginal areas. Isolated behind the elevated McGrath highway, it is accessible only by a single indirect entrance. Its low, repatched, concrete block buildings, spotted with signs, are closed in on themselves. They are warehouses, services industries, and repair depots. They stand within ragged dirt and asphalt yards, full of discarded objects. The broad streets, surfaced in cracked and oily paving, have no regular edges, but are sporadically lined with broken chain-link fences. An ugly, polluted, yet tolerant place…it is a refuge for infant and relict enterprises."[82]

The theory that this remnant space had utility for infant enterprises, a hopeful element in Lynch's description, never materialized. Little has changed for much of the site since Lynch discussed it. The area is still characterized by tow lots and repair shops. Brickbottom Artists Association and Joy Street Studios are islands of activity in an otherwise unwelcoming environment. The site is only a mile or two outside of downtown Boston and less than a mile from the booming Kendall Square technology cluster in Cambridge; and yet the isolating effect of infrastructure has kept redevelopment to a minimum. The deficiencies in the area have been clearly and emphatically identified by both its residents and by official planning documents, as will be discussed in the following section.

7.3: Previous Planning and Development Efforts in the McGrath/O'Brien Corridor

7.3.1: Toward a Route 28 Corridor Transportation Plan

The corridor has long been identified for its economic development and real estate development opportunities, and thus it has a significant history of planning efforts. The highway itself was the subject of a 2008 CTPS (Central Transportation Planning Staff) study under the direction of the Boston Region Metropolitan Planning Organization, at the request of the City of Somerville. This report, "Toward a Route 28 Corridor Transportation Plan" combined a summary of socioeconomic data, stakeholder concerns, an urban design workshop, and bicycle and pedestrian access.[83] It attempted to coordinate contemporary and planned roadway improvement projects with the expected development and traffic growth in the area. CTPS found however that "it was not possible to develop a true corridor transportation management plan as is normally done. This is because much of

82 Lynch, *Wasting Away,* 113.

83 Central Transportation Planning Staff, "Toward a Route 28 Corridor Transportation Plan: An Emerging Vision," (Boston Region Metropolitan Planning Organization: Draft, 2008), 1.

the background information related to land development or transportation projects in the area that would impact travel along Route 28 was, and still is, largely unavailable."[84] This presumably refers to the fact that at the time the Central Artery was not yet complete and that Green Line extension planning was still in more preliminary stages. In addition, the report uses outdated data, collected in 2002, prior to the completion of the Central Artery which would have had considerable impact on traffic patterns in the area.

However, until this year, this was the most complete analysis available on the corridor and is vital in determining the feasibility of its redesign. The study included a license place survey which collected data at the pedestrian bridge over the McGrath Highway at Pearl Street and at O'Brien Highway at the Museum of Science.[85] The study found that 58% of the vehicles originated in the immediate vicinity of the study area. The survey was taken during morning rush hour and thus reflected the inbound domination of the traffic flow. Taking the two count areas together, Somerville makes up the majority of all origins, with 14.5%. 42% of the vehicles originated in areas north and north-west of the corridor, which CTPS believes entered the corridor via I-93. Between the two reporting stations, a difference of over 2000 vehicles was noted, indicating that at least this many exited the route. Since significant traffic also enters the route via Medford Street, Somerville Avenue, and Washington Street, this number is in reality much higher. This reflects that the 'highway' is used more as a local distributor/collector than as a limited access/ through route. (The study should have included more reporting stations in order to better ascertain this number). The report hypothesizes that significant distribution of traffic likely occurred at East Cambridge, locations "served well by Memorial Drive and other principal arterials."[86] I would also hypothesize that massive numbers were also distributed via the Washington Street intersection, into Union Square, based on observations at this intersection. This is corroborated by the report's observations that the traffic contribution from the majority of upstream communities dropped 70-80% by the time it reached the Museum of Science survey location, indicating that the added traffic was clearly added downstream.

Based on this survey, CTPS concluded that the highway was used in two ways: as a local thoroughfare by drivers from the immediately surrounding community; and as a collector/ distributor from destinations northwards to other major facilities such as Memorial Drive south of the study area. But the study also claimed that it is "used far less as a through facility to Boston than as a collector/distributor facility between origin and destination towns that are not served well by I-93."[87] Given this, I would contend three things: Firstly,

84 Central Transportation Planning Staff, "Toward a Route 28 Corridor Transportation Plan," Appendix A: Response to Comments Memorandum , 24 September 2008.
85 Central Transportation Planning Staff, "Toward a Route 28 Corridor Transportation Plan," 19-27.
86 Central Transportation Planning Staff, "Toward a Route 28 Corridor Transportation Plan," 27.
87 Central Transportation Planning Staff, "Toward a Route 28 Corridor Transportation Plan," 27.

the fact that it is heavily used to reach local destinations gives it more of a local arterial character than "other freeway", its official designation. Secondly, many of the towns included in the study area are served well by I-93 and that construction on the Central Artery during the time in which data was collected likely caused a shift towards McGrath/ O'Brien. Thirdly, a substantial amount of traffic on McGrath is actually destined towards the Kendall Square area, which is characterized by CTPS as "local" but actually acts as a through movement for the corridor, and which could be served by I-93, the Green Line, or the proposed Urban Ring.

Considerably more data is necessary to gain a better understanding of traffic dynamics in the corridor. This study gives us a snapshot, but it is outdated and incomplete, since it only included AM peak period inbound (southbound) traffic and only two collection points. The main fact contributed by this study is that so many vehicles are exiting and entering between the two collection points indicates that the road is more important as a gridded connector than as a through-thoroughfare. It seems that between the lines of the report, CTPS desired the maintenance of the roadway within its current capacity and within its current function.

While the report takes a somewhat sanguine attitude towards the possibilities for the highway, the commentary included in Appendix A of the report more bluntly indicates the need for extensive traffic planning in the corridor. Comments revealed a belief that conditions were either already worse since the collection of data (debatable depending on the status of the Central Artery) or that conditions would soon be dire because of the amount of development proposed in the corridor, without considerable traffic demand management. The comments also suggest concerns over the use of outdated data throughout the report what seem to be some serious omissions, and additional concerns for inclusion from the City of Somerville. In short, the 2008 plan is valuable for preliminary information, but is incomplete.

7.3.2: Assembly Square

Two large projects have bookended the corridor over the past few decades and have progressed in fits and starts. Surprisingly, these plans have not had a significant impact on the discussion of the corridor as a whole as of yet, designed as and functioning as islands separate from the undesirable image of McGrath thus far.

At the northern end of the corridor, between the Mystic River, the Fellsway, and I-93 is the Assembly Square district.[88] This site has been the focus of several redevelopment efforts

88 Much of the general history and general information on this development is courtesy of the City of Somerville, "Squares and Neighborhoods - Assembly Square," accessed January 2011, http://www.somervillema.gov/departments/ospcd/squares-and-neighborhoods/assembly-square.

aimed at creating and recreating a commercial and employment center for the city. This area was originally the site of a Ford Motor plant which closed in 1958; and a complex of packing plants, bakeries, and warehouses owned by the First National Stores. The Boston and Maine Railroad owned land and lines in the district, which decreased in use as businesses died out. In the late 1960s nearby homes and businesses were demolished for the construction of I-93. This major route was built at the border of the southern edge of the site, effectively cutting it off from East Somerville.

Thus much of the site lay empty or underutilized from the 1950s until the late 1970s. During these years, the site was much like the present day Inner Belt: acres of underutilized space, crisscrossed by rail spurs of varying activity, and offering little access for any mode, largely closing off the district for development without significant intervention. In 1980 the City of Somerville declared that the district was "blighted, substandard, and decadent" and moved to implement a 20-year urban renewal plan.[89] The former Ford plant was redeveloped into the Assembly Square Mall, and other large-scale / big-box retailers such as the Home Depot were attracted to the site. IKEA has also long been slated to locate on the waterfront at the site, but its construction has been delayed due to community pressure to reorient its location away from the waterfront. As part of the site's redevelopment, community groups, particularly the Somerville Transportation Equity Partnership (STEP) have been active in campaigning for an optimal MBTA Orange Line stop to enhance accessibility to the site and decrease the vehicular traffic imposed by its redevelopment. Community activism on issues such as IKEA and the creation of, location of, and design of the Orange Line MBTA station has successfully made the project more sensitive to local needs but also stalled the project for several years.

Additional planning efforts took place at the Assembly Square district in 2000: the "2000 Planning Study," which aimed to implement "a new vision for Assembly Square as a 24-hour, mixed use district with residential, retail, office, cinema, restaurant, hotel, and recreational open space uses," enacted new zoning measures, and extended the urban redevelopment plan for another 20 years.[90] This step in the process had the positive of improving the image of the redevelopment for the City – offering a mix of uses, better designed for local users—but also signified the additional decades needed to fully maximize the redevelopment of the area.

89 City of Somerville, "Squares and Neighborhoods - Assembly Square."
90 City of Somerville, "Squares and Neighborhoods - Assembly Square."

Figure 17: Assembly Square Plan, Courtesy of the City of Somerville/Federal Realty

In its current iteration, the project is called "Assembly on the Mystic" and is intended to create 1.78m sf of office space; 1.07m sf of retail; and 2,100 residential units.[91] Currently, the IKEA portion of the project is stalled, with others still in various stages of planning and approval; total completion is slated for 2013, but given the current economic climate, it seems likely that the development will take significantly longer than anticipated and possibly require replanning for the new current real estate climate.

Amongst the most intensive planning and financing efforts was that surrounding the MBTA Orange Line station, which was seen as both a result of and a stimulus for the redevelopment of Assembly Square. Funding has been found and lost for the station several times, but after a lengthy public review and design process, the station is on track for construction. Additional state funding has been found for the project, adding to federal stimulus funds, for street construction and improvements, begun in 2010.[92] This includes more than $65 million in state-bond and federal-stimulus funding to construct public infrastructure.[93] The MBTA has

91 A jump in progress came in 2005 when multiple sites in the district were sold to Federal Realty Investment Trust, allowing for a rearrangement to a plan that was better supported to the community, by allowing IKEA to be re-sited away from the waterfront and better accommodating a mixed-use, transit-oriented design (City of Somerville, "Assembly Square").

92 George P. Hassett, "Major Construction Begins this Month in Somerville at Assembly Square," *Somerville News*, 5 May 2010, http://www.thesomervillenews.com/archives/748.

93 Harrison Jacobs, "$65 million influx boosts prospects for development in Assembly Sq. area," *Tufts Daily*, 8 September 2009, http://www.tuftsdaily.com/65-million-influx-boosts-prospects-for-development-in-assembly-sq-area-1.1868910.

now advertised[94] for construction of the MBTA organize line station, providing new transit option for East Somerville, Everett, and Medford traffic not accounted for in the CTPS study.

The story of Assembly Square reflects multiple themes relevant for the rest of the McGrath-O'Brien corridor. First, the district is a major part of the legacy of important industrial sites in prime location, but with serious challenges for redevelopment, including their size and the need for infrastructural reorganization to make them usable for new uses and to allow them access, particularly by multiple modes. Its redevelopment shows the tension between providing amenity to local residents versus economic development and attraction for regional residents. It also shows a progression from an older, more suburban model of development apparently accepted by the City of Somerville prior to 2000, when the vision of a suburban strip-style mall was replaced by a mixed-use, transit-oriented development.

This change in vision may have limited benefit for the surrounding context, however, based on review of the current scheme. The plans for Assembly on the Mystic orient the site away from the McGrath Highway and from I-93 and in upon itself, sheltering the mixed use/residential areas from the high-traffic areas to the south and west. Given its border with I-93 as well as McGrath, the district is secluded and circulation constrained. Much of the development is located behind existing uses on the border with McGrath/ Fellsway, including the Middlesex County District Court, and a multistory hotel. These properties are surrounded by parking lots and have little relationship to the street, and their placement will impair the developers' ability to create connectivity between Assembly and surrounding neighborhoods. The only portion of the Assembly development directly bordering the McGrath corridor is the northwest corner, which has been designed as a large parking lot. While the development is slated as 'transit-oriented' it should be noted that even though it offers transit connectivity via the planned Orange Line station, it also includes 1300 parking spaces, largely structured, in addition to the large parking lots already on site. And, while this arrangement of uses, with the mixed use and residential areas facing the waterfront and sheltered from nearby highways by commercial uses, is sensible from a real estate and design point of view, it also exhibits an orientation away from surrounding neighborhoods and a disconnect to the corridor itself. Clearly, its designers did not expect the road to become more attractive any time soon, and turned the entire development away from it. Therefore, though large in area and scope, this development does not seem poised to make positive change to the corridor. The strengthening of transit orientation provided by the Green Line extension, the addition of the Assembly Square Orange Line station, as well as a redesign of McGrath, may cause

94 Massachusetts Bay Transportation Authority, "Construction Bid Solicitation – Assembly Square," 11 May 2011, http://www.mbta.com/business_center/bidding_solicitations/design_and_construction/construction_bid/?cbid=193

developers to reconsider this orientation and to better integrate the development with its surroundings. And, while the development on the one hand may threaten to add more traffic to nearby roads, the recently assured construction of the Assembly Square Orange Line Station provides a new transit option for northern and East Somerville, Medford, and Everett aside from the heavily used Sullivan Square station. Again, the construction of this station was not included in the 2008 CTPS study and thus its impact on the McGrath corridor is largely unascertained.

7.3.3: North Point

Figure 18: North Point: Note O'Brien 'boulevard' in foreground. (Courtesy of developer website).

At the south-easterly end of the McGrath–O'Brien corridor lies the North Point district, which is undergoing a redevelopment process with many important parallels to Assembly Square's. North Point, which is a redevelopment of the former yard of the Boston and Maine Railroad, sits mainly in East Cambridge, but also incorporates pieces of Somerville and Boston.[95] Like Assembly Square, the development aims for a transit-oriented vision. And, like Assembly Square, it will rely on the successful orientation of a nearby MBTA stop to accomplish this: the Lechmere Green Line stop, to be re-oriented as part of the Green Line extension. The similarities do not end there. North Point has progressed in fits and starts; the 45-acre site was originally owned by the Boston and Maine Railroad, which went bankrupt in the late 1970s and was purchased by Guilford Transportation Industries in 1983. By many accounts the property was underused for decades before redevelopment began in the late 1980s. This instigated Cambridge's own plans for the area drawn up in 1989.[96] The Museum Towers at North Point were designed in 1988 but weren't completed until 1997 due to extensive negotiations with the City.[97] During this time the property went on the market, and its parcelization changed to allow for larger-scale development, with former tenants, such as the BFI Industries waste-transfer facility, relocating. The site then languished during further real estate negotiations, comprised of a feud between the owners and a sale to a new

95 North Point is sited where Millers River existed in the 19th century; this river formed the border between Cambridge and Somerville, and upon its filling this border became uncertain.

96 Community Development Dept, "Eastern Cambridge Design Guidelines: North Point" City of Cambridge, 2003.

97 The Congress Group, "Museum Towers – Cambridge, Massachusetts," Accessed February 2011, http://www.congressgroup.com/PDF/TheCongressGroup_MuseumTowers.pdf.

developer.[98] As of now, several buildings have been completed, and the most recent plan for the area lists a final tally of 19 city blocks, 5.2 million sf of offices and laboratories; 2700 condos and apartments, and shops and amenities. In 2010, the legal battles associated with the deterioration of the original investment team and the subsequent sale of the property were settled, and it is hoped the project will now move forward quickly with its new investors.[99,100]

The City of Cambridge has long placed emphasis on the enormous development opportunity in NorthPoint. Their attitude towards the development could have considerable impact on the entire McGrath-O'Brien corridor, given the traffic implications of such a large project. The 2001 citywide rezoning allowed for increased density, FAR, and parking areas in the district. Because of the area's traffic characteristics, however, concerns over the feasibility of such growth and its impact on neighboring communities have been a constant accompaniment. The Association of Cambridge Neighborhoods led the charge against the original citywide plan, arguing that it was too ambitious and allowed for too much density; 10,000 new residents and workers in North Point might be fine, but not the planned 6,500 new parking spaces and their inevitable impact on traffic in the area. A review of the numbers and their potential impact on already-crowded roadways renewed calls for alternate development strategies, such as parking restrictions, density restrictions, or even car-free development. Concerns over affordable housing were also raised. The development is caught in the balance between providing the maximum amount of new housing, as it is one of the last inner-ring areas allowing housing development on a large scale, and doing so with the least negative impact on the surrounding traffic network.[101]

In response to the concerns raised by neighborhood groups, the 2001 East Cambridge Planning Study altered the citywide rezoning for the district. This reduced the overall square footage anticipated and shifted some of it to residential rather than commercial uses. The study still anticipated 7,299,000 sf total new construction in East Cambridge over the next 20 years, of which 3,687,000 sf would be contributed by the North Point development.[102]

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98 Jay Fitzgerald, "Co. aims to sell Cambridge property after court victory: High point for builder," *McClatchy-Tribune Business News (ProQuest)* 23 June 2010; And: Thomas C. Palmer Jr., "Feuding owners aim to sell NorthPoint," *Knight Ridder Tribune Business News*, 25 July 2007, 1.

99 Jillian Fennimore, "After years of legal battles, Cambridge's NorthPoint project moves ahead," *Cambridge Chronicle*, 22 June 2010, www.wickedlocal.com/cambridge/news/business/x1314976689/Cambridges-NorthPoint-project-moves-ahead.

100 Marilyn Jackson, "NorthPoint has a New Investor," *Cambridge Chronicle*, 09 September 2010, http://www.wickedlocal.com/cambridge/news/x2002276457/NorthPoint-has-a-new-investor.

101 David Ortiz, "Another East Cambridge master plan: Group raises concerns about density, traffic in city proposal" *Cambridge Chronicle*, 02 August 2001.

102 City of Cambridge, "Eastern Cambridge Planning Study," October 2001, http://www2.cambridgema.gov/cdd/cp/zng/ecaps/index.html.

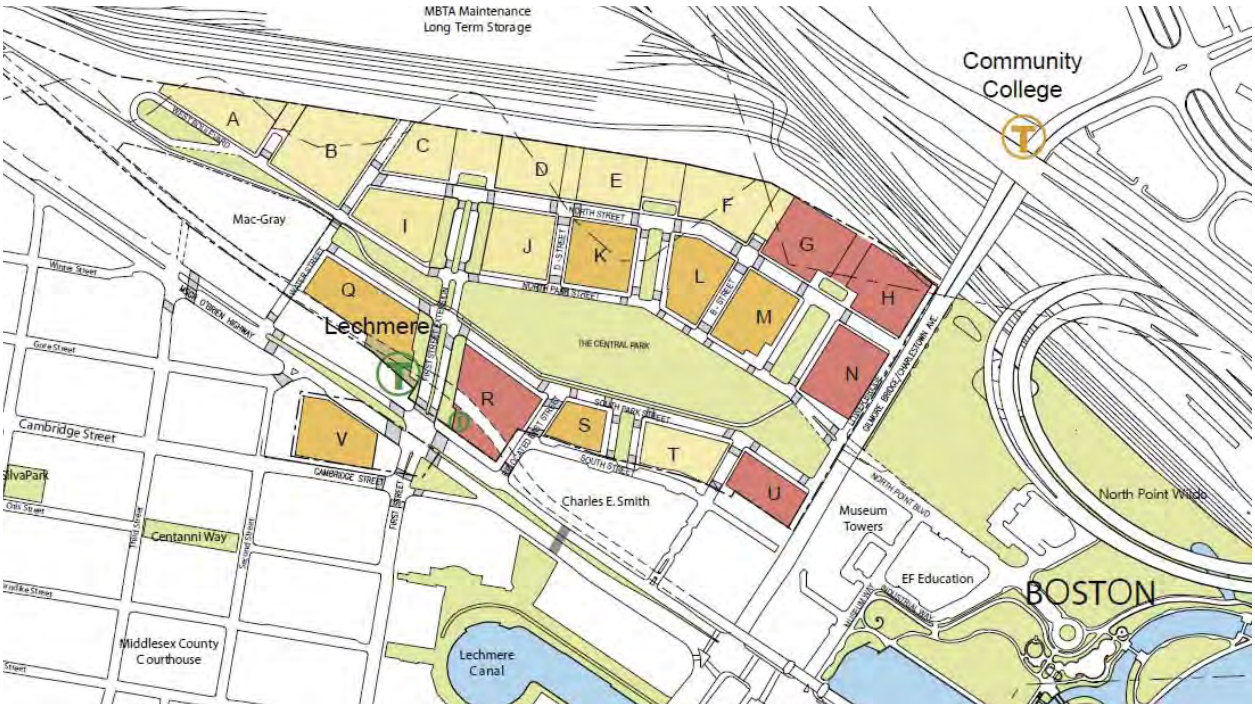


Figure 19: North Point Preliminary Plan, Courtesy of the City of Somerville

Because of the scope of this development, there are serious implications for traffic volumes in the McGrath-O'Brien corridor. Overall, according to the DEIR, North Point is projected to generate 16,105 daily automobile trips; 17,715 daily transit trips and 10,230 daily walk/bike/other trips (945 AM peak hour trips and 1,095 PM peak hour trips), according to projections developed using 1990 census modeshare data.

There is further concern that the characteristics of the road system in the area make it even less adaptable than average to large influxes of new users. The 2001 study examined traffic characteristics of the district and prospective impacts of the North Point build-out on surrounding roads. One of the primary areas of concern was the lack of connectivity, or inconsistent connectivity, between O'Brien Highway the East Cambridge neighborhood. Many of the gridded streets there do not directly connect to the highway, with the exception of Third Street – resulting in large turning volumes there. The inconsistencies in how the McGrath-O'Brien Highway was built to connect or not connect to the local street network adds to the confusing quality of its intersections, difficulty of wayfinding in the area, and lack of neighborhood connectivity. Because of these concerns, the 2001 Study aimed to reduce the anticipated number of trips generated by new development by 2020 to approximately half of what would have been allowed by existing zoning [103]

North Point and Assembly Square exemplify the opportunities and challenges for development in the corridor. They stand to contribute substantial traffic increases, but

103 City of Cambridge, "Eastern Cambridge Planning Study," 2-16.

also offer opportunities to transform large sections of the corridor. At North Point, both developers and the City of Cambridge, through various sets of goals and guidelines for streetscaping, massing, connectivity, etc, have demonstrated the important role this boulevard will bring to the project. The extreme width of O'Brien demands even more attention to streetscaping and crossings, as well as a critical view towards actually reducing the roadway width. Without a reorientation of the highway itself, as well as a transit-oriented final result, North Point, Assembly Square, and other future developments may end up islands of towers in the park, isolated by highway, train, and industry – greatly at odds with the desired vision.

Given the amount of investment to be devoted to both NorthPoint and Assembly Square, major additional planning will required to coordinate the efforts and maximize the benefits to the community. With developments as large as North Point and Assembly Square, there is a prospective danger of a fractured implementation effort, where the changes are so large and so long-reaching that it may be easy to lose sight of the overall vision in their host municipalities. The planning of the McGrath/O'Brien corridor must take into account all of these initiatives and leverage them for the maximum overall benefit, rather than incremental successes of individual projects. The nature of the corridor itself, intertwining transportation planning initiatives with urban planning, design, and redevelopment schemes, demands a comprehensive approach and cooperation between multiple municipalities and the constituencies within them.

7.3.4: Toward More Comprehensive Planning

Transportation Demand Management

Planners have already been busy working on the traffic concerns arising from large-scale development in the McGrath/O'Brien corridor. In fall 2006, concurrently with the East Cambridge Master Plan update, the City of Cambridge made permanent its Parking and Transportation Demand Management (PTDM) Ordinance, first enacted in 1998. This ordinance is part of a citywide effort to moderate the increase of automobile trips in the city and requires developers or businesses that create new parking to submit a plan for reducing the number of single-occupancy vehicle trips made to that location.[104] However, for impact along the McGrath/O'Brien corridor, similar and perhaps more comprehensive ordinances need to be enacted in neighboring cities. Somerville, for example, has used transportation demand management in district plans like those for Union Square and Assembly Square, but seemingly has yet to implement a more comprehensive program. It is important for these planning concerns to be converted into more formal regulations prior to the initiation of multiple redevelopment initiatives in the area.

104 City of Cambridge, "Parking and Transportation Demand Management Ordinance Fact Sheet," Accessed March 2011, http://www2.cambridgema.gov/cdd/et/tdm/ptdm_fact_sheet.pdf.

Lechmere Station Relocation – and Controversies

Because of mounting traffic concerns, transit planning in the area takes on added importance. The improvement of the MBTA Green Line station at Lechmere (and indeed the construction of the Green Line Extension as a whole) has attained utmost importance in the district planning discourse because of this grave concern for traffic impact and the general belief that the roadways are already full to capacity. The North Point plan originally hinged on the fact that the developers would provide funds for the relocation and improvement of the Lechmere Station; during their investor upheaval, sale, and replanning, this promise fell through the cracks, causing considerable delays to the Green Line extension.[105] In 2008, Massachusetts transportation leaders, frustrated by delays, took over the responsibility for building the station.[106]

The plans for this station bear an important relationship to the redesign of the highway corridor. Plans call for the current station to be closed and for First Street to be extended across Cambridge Street and Monsignor O'Brien Highway toward the new station. North Point developers are also required to provide better pedestrian crossings over O'Brien Highway.[107] The new First Street extension as planned will have traffic signals designed to allow pedestrians enough time to safely cross First Street and Monsignor O'Brien Highway in one trip.[108] The preliminary roadway geometries enabling this to happen, however, seem inconsistent with these goals. The redesign of the McGrath-O'Brien corridor will determine the efficacy of the new transit, pedestrian, bicycle, and vehicular accessibility and connectivity of North Point. It is essential that the circulation plan for North Point be designed to provide North Point Boulevard to Inner Belt Way, Community Path, and Urban Ring connectivity, and a reduced O'Brien footprint.

The 2003 North Point Somerville Planning Study

In 2003 the City of Somerville commissioned a study (simply entitled "North Point Somerville Planning Study" [109]) in response to the 2001 East Cambridge planning efforts. This study focused on the portion of North Point that fell within Somerville, but also encompassed the adjoining districts along McGrath Highway, primarily Brickbottom and the Inner Belt. Because of this wider scope, the study was an important step in identifying

105 Paul McMorrow, "NorthPoint continues to go south," *Boston Globe*, 12 April 2010.

106 Casey Ross, "State to take over building of T station," *Boston Globe*, 21 August 2008.

107 The 2006 East Cambridge Neighborhood Study Update states that "In the future, developers in the North Point area are required to provide improved pedestrian crossings of Monsignor O'Brien Highway and a new Lechmere transit station, among other improvements" "as part of their special permit mitigation requirements" (20) but this seems likely to be up for debate in the future each time such requirements are drafted. After all, the Green Line station originally slated to be constructed and paid for by North Point developers was stalled and finally taken over by the state, setting a weak precedent for the enforcement of such requirements. City of Cambridge, "East Cambridge Neighborhood Study Update: Summary, Recommendations and Action Plan," 2006, http://www2.cambridgema.gov/cdd/cp/neigh/1/eastcamb_ns_update.pdf.

108 City of Cambridge, "2006 Master Plan Update."

109 Icon Architecture, "North Point Somerville Planning Study" with the City of Somerville, February 2003.

and asserting potential for future development and determining parallels with the planning initiatives of neighboring municipalities. The study examined existing conditions, reviewed other municipalities' plans, zoning, and developed a municipal impact study to begin to quantify the amount and type of future change that could occur in Somerville. Importantly, the document identified the need for additional planning in the corridor. In 2005, for example, ICON and Vollmer Associates followed up on this plan with a study of access alternatives to the Inner Belt area.

The Brickbottom Edge As Center Competition

To expand on the opportunities explored in the ICON study, in 2006 the City of Somerville hosted an urban design competition for the Brickbottom district, in conjunction with the Boston Society of Architects. This competition and the resulting publication encouraged creative dialogue about the area. The design program sought to address the needs determined from the 2003 study: economic development transportation, smart growth opportunities, housing, innovation and creativity, and open space and ecologic issues; cultural diversity and identity. The proposed solutions explored whether or not to remove McGrath – some proposed total removal, others by section, and some proposed an artistic or functional reuse for the structure. New visions included the creation of an art park, a center for clean industry (possibly taking a hint from Volkswagen's Transparent Factory in Dresden) and a net-zero energy developments incorporating all the newest green technologies, somewhat similar to the proposed Rivergreen Technology Park in Malden. What the competition made clear was that the treatment of the elevated McGrath Highway was central to the redevelopment possibilities of all its surrounding districts.

Mode Shift Opportunity: Green Line Extension

The MBTA Green Line extension is expected to have a large impact Somerville as a whole and in particular upon the neighborhoods immediately adjacent. The mode-shift opportunity presented by the significant addition to the rapid transit system presents a key argument for the de-elevation and boulevard-ization of the McGrath/O'Brien corridor. The Green Line extension corridor utilizes the Lowell Commuter rail right of way (and the Fitchburg right of way for the Union Square spur), which essentially runs parallel to the highway and is poised to serve many densely populated communities which otherwise may have reason to use the highway. Green Line stops in the area include the aforementioned Lechmere stop at the southeastern end of the corridor; a stop in Brickbottom on or near Washington Street, to be discussed in more detail later; a stop in Union Square on its own spur; and, slightly farther from the corridor, a stop at Gilman Square. An additional stop has been suggested at Twin Cities Plaza and neighborhood advocates are currently arguing for construction in a manner that makes its future inclusion possible, even if funds are not currently available.[110]

110 Interview with Ellin Reisner, 3 February 2011.

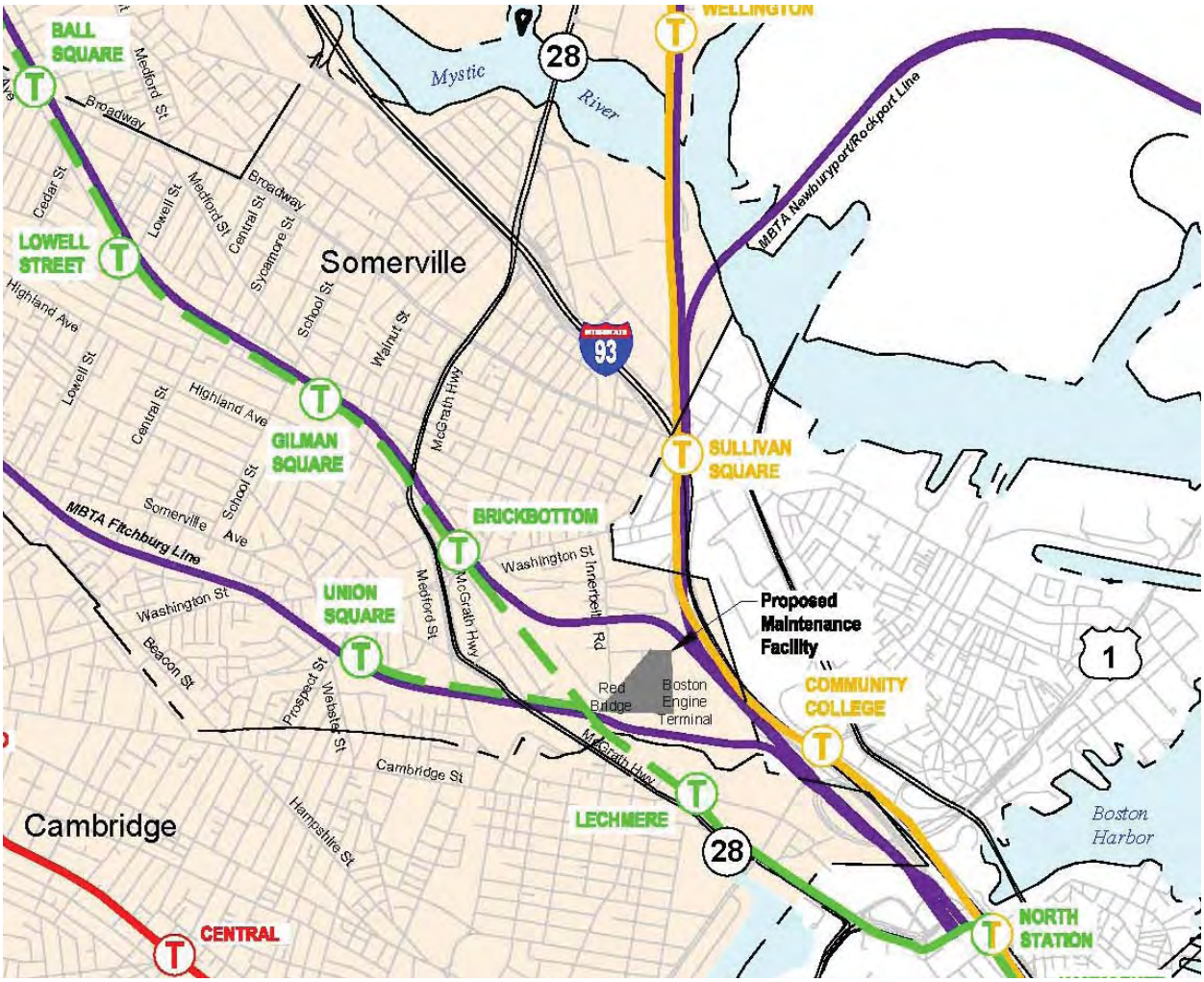


Figure 20: Planned MBTA Green Line Extension in the study area

Additional transportation modeling is necessary to determine the mode shift that the Green Line extension may attract, but it is certainly poised to attract considerable ridership. Based on the 2009 CTPS traffic model, the Green Line extension will attract an up to an estimated 28,850 boardings at the new stations per day[111] and shifting the modeshare to up to 74% transit per contiguous Traffic Analysis Zone (TAZ).[112] This would cause a mode share shift similar to that instigated by the opening of the Davis Square MBTA Red Line station in 1984. This mode shift is estimated in the FEIR:

> "The Proposed Project is expected to generate the MBTA's anticipated daily ridership at the Project's seven stations (boardings and alightings) by approximately 52,000 by the year 2030, with approximately 90 percent of these trips to take place in the Project's opening year of 2014. The Green Line would also see an increase of 30,700 boardings and the entire MBTA system would see an increase of 7,900 new daily linked transit trips as a

111 Executive Office of Transportation, "Green Line Extension Project: Ridership Advisory Group Presentation," 12 November 2008, http://greenlineextension.eot.state.ma.us/documents/advGroup0709/Mtg9_111208/RidershipPresentation.pdf.

112 Bruce Kaplan, CTPS, "Memorandum: Representation of Somerville Transit Mode Shares in the CTPS Model," 29 April 2009, http://www.greenlineextension.org/documents/about/Topics/ModeShareMemo_090429.pdf.

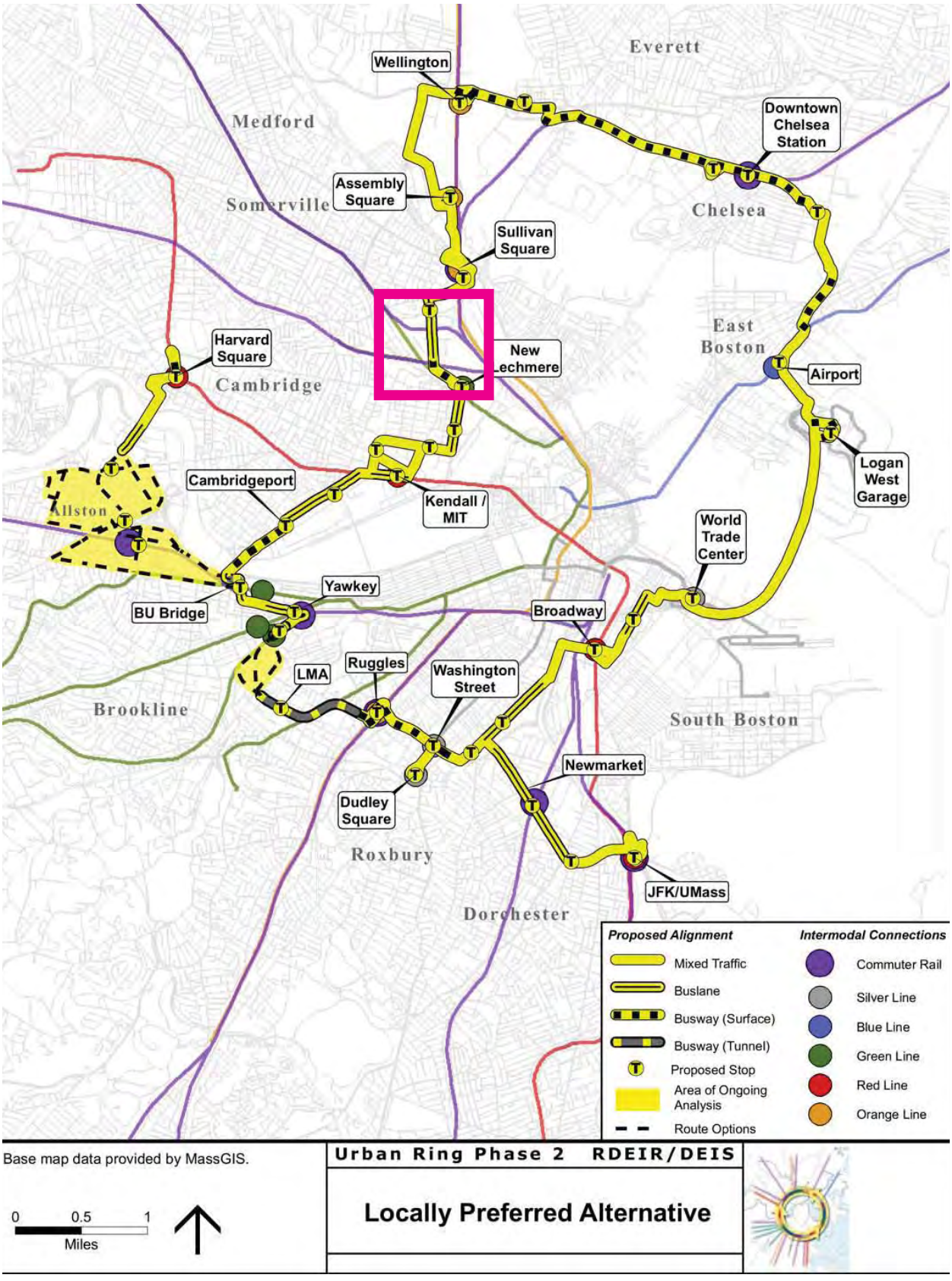


Figure 21: Urban Ring Plan (Courtesy of CTPS)

> result of the extension of the Green Line service. Of these new transit rips, approximately 70 percent of these riders are projected to switch from using their automobiles to using transit. The Proposed Project would reduce vehicle miles traveled (VMTs) by 25,018 per day (projected to the year 2030)."[113]

Based on this change in modeshare, and since the Green Line serves the same northwest-southeast corridor as McGrath/O'Brien, it is likely that this shift in modeshare could decrease the traffic pressures on the highway. The complexity of this tradeoff, and the uncertainty of the project schedules, means that this effect could be very difficult to predict even through detailed traffic modeling. The prospective development along the corridor, pending possible zoning changes and parking restrictions for auto trip reduction[114] must emphasize the primacy of accessibility and connectivity and support this mode shift through parking restrictions, better street grid connectivity, and attraction and accessibility of the T stations.

The current numbers estimated by the MBTA do not include the impact of the proposed de-elevation of the McGrath Highway, therefore it is likely that they underestimate the prospective ridership in the corridor. Similarly, the traffic projections for McGrath/O'Brien do not include estimates of mode shift to the new Green Line and Orange Line stations. These two models are highly interconnected. In an ideal scenario the Green Line extension and the reorientation of McGrath would be planned in conjunction, placing and designing stations in a manner that would be better accessible and more visible to the corridor; rerouting buses; even scheduling the removal of McGrath to coincide with the opening of the Green Line, to encourage the mode shift to the greatest degree.

Further in the future, additional transit options may be possible. The Urban Ring, an MBTA proposal for a phased introduction of bus rapid transit and light rail to encircle Boston neighborhoods, is planned to run through the area. After preliminary documents were completed, however, this project has been put on hold, due to the challenges of funding MBTA projects at this time.[115] However, if the project is to be resuscitated in the future, the redesign of the McGrath/O'Brien corridor and its surrounding street grid must be carefully considered. In particular, the connection of First Street northwards across the highway into North Point, through the development, across the Fitchburg rail corridor and into the Inner Belt to connect with Inner Belt Road, through that district to connect up to Sullivan

113 Massachusetts Department of Transportation, "Green Line Extension Project: Final Environmental Impact Report," (June 2010): 4-3 and 4-4.

114 City of Cambridge, "East Cambridge Planning Study," 2-16, example which proposes restrictions beyond the City's Parking and Transportation Demand Management (PTDM)

115 Office of Transportation Planning, "The Urban Ring," Massachusetts Department of Transportation, Accessed January 2011, http://theurbanring.eot.state.ma.us/.

and Assembly squares. Without this reorganization of the street system, the Inner Belt will remain largely inaccessible and traffic that might have been dispersed will remain concentrated on McGrath/O'Brien.

7.3.5: Future: Suggested transportation planning in the corridor

Plans for McGrath must accommodate the changes wrought by these concurrent planning and development initiatives; yet in turn the success of these plans is also contingent on the successful redevelopment of the highway. Now, with the possibility of removing the old elevated structure, the time has come to redesign the corridor itself. The optimal redesign is only possible if VMT increase is kept at a minimum. In order to accomplish this, multiple schemes must be implemented, including:

1. Narrow McGrath/O'Brien to simplify lanes, crossings, and intersections
2. Extending the street grid, such as First, Second, and Third streets, across the highway to connect into the inner belt and to secondary parallel routes wherever possible.
3. Connect North Point roadway network to Inner Belt Road.
4. Improve pedestrian connectivity from the new Lechmere Station to East Cambridge
5. Limit parking
6. Maximize transit use

Multiple complementary strategies including geometric solutions, maximizing transit, and transportation demand management will ensure that large scale redevelopment of the highway corridor can be pursued with limited negative impacts and a net gain for surrounding neighborhoods. The proposal by STEP and the City of Somerville to construct a bridge over the "Valley Tracks" rail lines connecting North Point Boulevard to Inner Belt Road would serve five important functions:

1. Provide a connection for the Community Path (planned as part of the Green Line extension project) to the Charles River park system.
2. Allow the planned Urban Ring transit project to connect the Longwood Medical Area, MIT, Kendall Square, and Lechmere through to Sullivan Square and beyond.
3. Allow automobiles to connect to and from North Point to Sullivan Square without using McGrath/O'Brien.
4. Bypass and offer a secondary parallel route during the reconstruction / demolition of McGrath
5. O'Brien can be reduced in scale to provide better pedestrian connection between the new Lechmere Station and East Cambridge.

Figure 21: Proposed road grid connectivity between North Point and the Inner Belt

The current study underway will determine the feasibility of de-elevating the McGrath viaduct and replacing it with an at-grade boulevard. This was instigated by the City of Somerville and carried out by MassDOT with main consultants McMahon Transportation Engineers and Planners, and will:

- Evaluate the current usage of McGrath Highway that goes beyond the analysis from the Central Transportation Planning Staff's "Toward a Route 28 Corridor Transportation Plan: An Emerging Vision," and looks at traffic from a post-Central Artery Project perspective.
- Evaluate current usage of other major roads in the corridor, including I-93, Mystic Avenue, Broadway, Highland Avenue, Medford Street, Washington Street, and Somerville Avenue in Somerville; Rutherford Avenue and Austin Street in Boston; and Monsignor O'Brien Highway and Land Boulevard in Cambridge. Also identify any potential changes under consideration for these roadways.

- Determine the impacts to Route 28 congestion and to other corridor roadways from various lane configurations on an at-grade or below-grade McGrath Highway (at least from its northern junction with Medford Street to Poplar Street).
- Make recommendations for the project limits of an elevated structure removal project (based on the conditions of the existing structures, the need to segregate rail traffic, the resulting opportunities for new connections and redevelopment opportunities, and the impacts on safety).
- Identify opportunities for new development parcels and/or park space from an overall reduction in right of way width potentially made possible by the elimination of elevated structures.[116]

The outcome of this study will determine not only whether the viaduct will be eliminated, but also determine the future course of action for achieving a new vision in the corridor. In order to make this study action-oriented, and in order to achieve timely conclusions consistent with the legislative requirement to access the authorized accelerated bridge program funds, there should be a MEPA scope adopted to guide the study and ensure timely decisions.[117] It seems highly desirable to access the $31.72 million thus far identified for McGrath reconstruction,[118] to finance the removal of the McGrath viaduct, to landscape a new surface boulevard, and to build a bridge connecting NorthPoint Boulevard and Inner Belt Road. It seems highly unlikely that the monies identified thus far are adequate to rebuild the viaduct in its entirety, if that were the desirable alternative. Refocusing the study to support real decision-making is essential if the available funds are to be utilized prior to the 2016 legislative deadline.

7.4 Traffic Predictions Based On Precedents

As discussed in Section 5, precedent studies offer important insight into the flexibility of traffic systems and the theories of traffic calming and latent demand. The complexity of the road system and the apparent flexibility of drivers in choosing routes (varying by city, of course) means that this is a very complex change to model. Thus, at the McGrath-O'Brien corridor, we cannot be entirely certain how traffic characteristics will change system-wide once its capacity is decreased. What precedents do show us, however, is a very general breakdown of where most of the road users go, and, most importantly, show that gridlock, or even longer trips or additional congestion, does not occur – often to the surprise of critics. A few examples here serve to illustrate this phenomenon.

116 Massachusetts Department of Transportation, "Route 28 / McGrath Highway De-Elevation Study: Request for Response (RFR)," 23 July 2010.
117 Comments from Fred Salvucci, 12 May, 2011.
118 Estimates from the Accelerated Bridge Program project list. See http://www.eot.state.ma.us/acceleratedbridges/.

Central Freeway / Octavia Boulevard, San Francisco

When Central Freeway was closed for initial earthquake repairs in 1996, the 60,000 or the 90,000 drivers who had used it daily seemed to simply disappear – in fact, a "mystified" Caltrans organized a phone survey to find out where everyone went.[119] In the weeks previous, Caltrans had issued warnings about the impending closure, for fear of severe traffic backups. Instead, they were baffled to find that traffic was down 30%; they could only account for the whereabouts of 20,000 drivers using initial studies and another 8,000 users who switched to transit.[120] A later study revealed the following breakdown of replacement routes chosen:[121]

- 75.8% Use a different freeway ramp/route;
- 11.1% use city streets only;
- 2.8% no longer make the trip;
- 2.2 switched to public transit;
- 2.8% use a combination of freeway and public transit;
- 2.1% used a combination of freeway and local streets;
- 1.8% chose other means;
- 1.3% made fewer trips.

The many drivers who had simply seemed to disappear based on initial license plate observations were revealed to have dispersed into smaller streets or ramps not monitored by Caltrans.[122] Octavia Boulevard now carries about 45,000 cars per day and operates at capacity.

West Side Highway

When part of West Side Highway collapsed in New York in 1973, the resulting closure had similarly mystifying effects. 53% of the 80,000 vehicles that had used the route disappeared, without any effect on the city's traffic; experts could not even measure an impact on speeds throughout the traffic network.[123]

Harbor Drive, Portland

In the case of Portland, Oregon's Harbor Drive, at the time of closing (1974), it carried about 24,000 vehicles per day. When its closure was suggested, traffic engineers believed there

119 Erin McCormick, "Calling all cars: Where are you? Phone survey to find missing Central Freeway drivers," *San Francisco Examiner,* 18 September 1996, A, http://sfgate.com/cgi-in/article.cgi?f=/e/a/1996/09/18/NEWS5223.dtl

120 McCormick, "Calling all cars: Where are you?"

121 John W. Billheimer et al, "Public Information Activities to Mitigate the Impacts of Closing San Francisco's Central Freeway," *Transportation Research Record* 1632 (1998), 68-77.

122 Billheimer, "Public Information Activities…" 75.

123 City to River.org, "Self-Healing Roads: Strong Track Record of Success for Highway Removal," *City to River Blog*, 22 July 2010, http://citytoriver.org/blog/?p=306.

would be gridlock, that it would "back cars clear up to Lake Oswego."[124] Proponents believed that cars would simple shift to the under-used I-405. When the elevated structure was removed and replaced with a boulevard and a waterfront park, it was the latter scenario that proved the case. There was absolutely no impact on congestion.[125]

Comparisons to McGrath/O'Brien

Many activists use these examples as evidence that highway removal is a feasible and beneficial option in many cases, and in fact serves to reduce overall VMT. Though every circumstance varies considerably depending on the base level characterizations of traffic in any given city, the patterns of adaptation illustrated by the above examples give some indication of how traffic may adapt to a change in capacity at the McGrath Corridor.

The latest comprehensive traffic analysis at McGrath/O'Brien was the 2001 data used in the 2008 corridor planning study by CTPS, which found that average daily traffic (ADT) varies by segment between 40,000 and 65,000 vehicles, with higher usage occurring when a backup occurs on I-93.[126] Based on the precedents, it is likely that this amount of traffic could be accommodated on an urban boulevard and/or absorbed by alternate routes. New data is being gathered as part of the current de-elevation study; it is anticipated that these numbers will show one of two characteristics. Firstly, they may show sustained numbers in the range of 40,000-65,000 ADT depending on segment; since numerous intersections are operating at capacity along the route, it is not possible that numbers could expand past this point. The second possibility is that ADT actually decreases, due to the increase in capacity at I-93 since the 2001 study. For further comparison of boulevards, see:

Other comparable US boulevards from Jacobs' *The Boulevard Book*

Grand Concourse, Bronx, NY:	57,950 ADT
Queens Boulevard, Queens, NY:	37,654
Eastern Parkway, Brooklyn, NY:	61,000
Ocean Parkway, Brooklyn, NY:	74,000
K Street, Washington DC:	51,850

Local Examples[127]

Commonwealth Avenue Boston:	20,900 ADT, 2005
Melnea Cass Boulevard, Boston:	35,500 ADT 2007
Arborway, Jamaica Plain:	34,200 (2007)
Fresh Pond Parkway:	30,000 up to 52,000 (2002)
Memorial Drive at MIT:	31,600 (2006)

124 Ernie Bonner, "Interview with Richard Ivey," 13 January 1995, http://www.pdx.edu/usp/planpdxorg-interview-richard-ivey.

125 Ernie Bonner, "Interview with Richard Ivey."

126 Central Transportation Planning Staff, "Toward a Route 28 Corridor Transportation Plan: An Emerging Vision," 2.

127 Central Transportation Planning Staff, "Average Daily Traffic on Massachusetts Roads," Accessed March 2011, http://www.ctps.org/website/counts/viewer.htm.

Traffic Planning Conclusions

Based on these numerous precedents we can arrive at three major conclusions:

- Traffic networks adjust flexibly and more easily than expected to the removal of even a major transportation link.
- Boulevards are a successful replacement and can accommodate larger volumes of traffic.
- In the case of McGrath/O'Brien the availability of I-93 and the Green Line as alternative routes, and the constraints at the Medford/Highland and First Street intersections suggest the possibility of capacity reduction.

Based on this examination of McGrath/O'Brien's traffic conditions, surrounding development, and precedents, it is clear that the redesign of the corridor is very much possible, and in fact encouraged, from a technical perspective. The next chapter will move beyond the roadways themselves to explore what kind of changes in the surrounding neighborhoods may be expected.

8: Case Studies for Neighborhood Change

To examine what kind of neighborhood change might be expected due to the redesign of the McGrath/O'Brien corridor, I chose the following examples for more in-depth case studies based on an initial survey of their similarities. McGrath is a non-waterfront highway slightly removed from the center of any major Central Business District (CBD). Many other prominent examples of highway removal/ reorientation involve downtown waterfront interstates such as Boston's Central Artery and Portland's Harbor Drive. I believe that the waterfront location of these highways is a significant part of their redevelopment, with their location driving land values/shifts in use and investment in very different patterns from inland locations. These areas also, for example, receive additional public investment in the form of new convention centers, stadiums, or other public amenities (see New York's Javits Center and Intrepid Sea Air and Space Museum; Boston's Convention Center; and Portland's new waterfront park as examples of additional investment for the renewal of downtowns and waterfronts.) Likewise, after careful consideration, I also chose to exclude San Francisco's Embarcadero because of its waterfront, downtown aspect.[128] I did, however, retain the West Side Highway in New York because of other important similarities and lessons in the case.

Central Freeway / Octavia Boulevard, San Francisco, CA

Octavia Boulevard bears a resemblance to McGrath-O'Brien case through its non-waterfront location that is slightly removed from San Francisco's CBD. Furthermore, the site is surrounded by a mix of uses, with dense residential areas as well as small businesses.

Cyprus Freeway / Mandela Parkway, Oakland, CA

This site bears resemblance to McGrath in that it passes through lower-income/minority neighborhoods with a mix of industrial, commercial and older residential areas. It is also removed from the downtown district and does not border any waterfront. Oakland itself bears similar functionality to Somerville and East Cambridge, in that it is a city in and of itself but it also functions as an early industrial suburb of a larger city, namely San Francisco, which is now faced with redevelopment opportunities. The corridor winds through dense residential sections but also through some low-intensity, auto-dominated districts.

West Side Highway, New York, NY

The West Side Highway was one of the earliest elevated highways, built around the same time as McGrath/O'Brien's original route. The area is similarly industrial and

128 In spite of the parallel between the MUNI investment there and the Green Line investment at McGrath.

which is shifting as development pressures increase. Its waterfront location means its context differs slightly from the Somerville case, but its examination by Context Sensitive Solutions.org makes it a valuable investigation of how CSS guidelines can be applied for a positive project outcome.

8.1: Precedent #1: Central Freeway / Octavia Boulevard, Hayes Valley, San Francisco, CA

History:

Central Freeway was a spur built in 1959[129] into the Hayes Valley neighborhood of San Francisco in the midst of a freeway building spree that threatened to crisscross the city. Even though it was just a relatively short stub, it was nonetheless blamed for negative impacts on the neighborhood. These included the usual three: neighborhood isolation; increased congestion and air pollution; and economic decline. While residents therefore called for its removal, many others feared traffic mayhem if it was removed.[130] The argument was abruptly shifted in 1989, when the Loma Prieta earthquake damaged the highway structure. The resulting forced closure created an unexpected chance to observe traffic patterns without this link in place. The viaduct was, however, repaired and continued operation until another closure in 1996, when a series of ballot measures were put forward to determine whether to continue repairing the structure versus remove it. In 1999, the city and Caltrans agreed to replace the structure with a boulevard, and hired Allan Jacobs and Elizabeth MacDonald (authors of *The Boulevard Book*) to design it. The boulevard was officially opened in 2005.

Octavia Corridor's Redesign

The Central Freeway originally touched down to connect to the street grid at Fell Street and Oak Street, two major east-west routes.[131] Now it instead connects to Market Street, five blocks to the south. The square formerly obliterated by the ramps' touchdown is now a green park. The new boulevard has two travel lanes in each direction and one frontage lane in each direction. MacDonald writes that:

Figure 23: Street view, Octavia Boulevard, San Francisco (Preservenet.com)

129 John King, "An Urban Success Story: Octavia Boulevard an Asset to Post-Central Freeway Area," *San Francisco Chronicle*, 3 January 2007, B1, http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2007/01/03/BAG4VNBUJM1.DTL.

130 Congress for the New Urbanism, "San Francisco's Octavia," accessed February 2011, http://www.cnu.org/highways/sfoctavia.

131 John King, "An Urban Success Story."

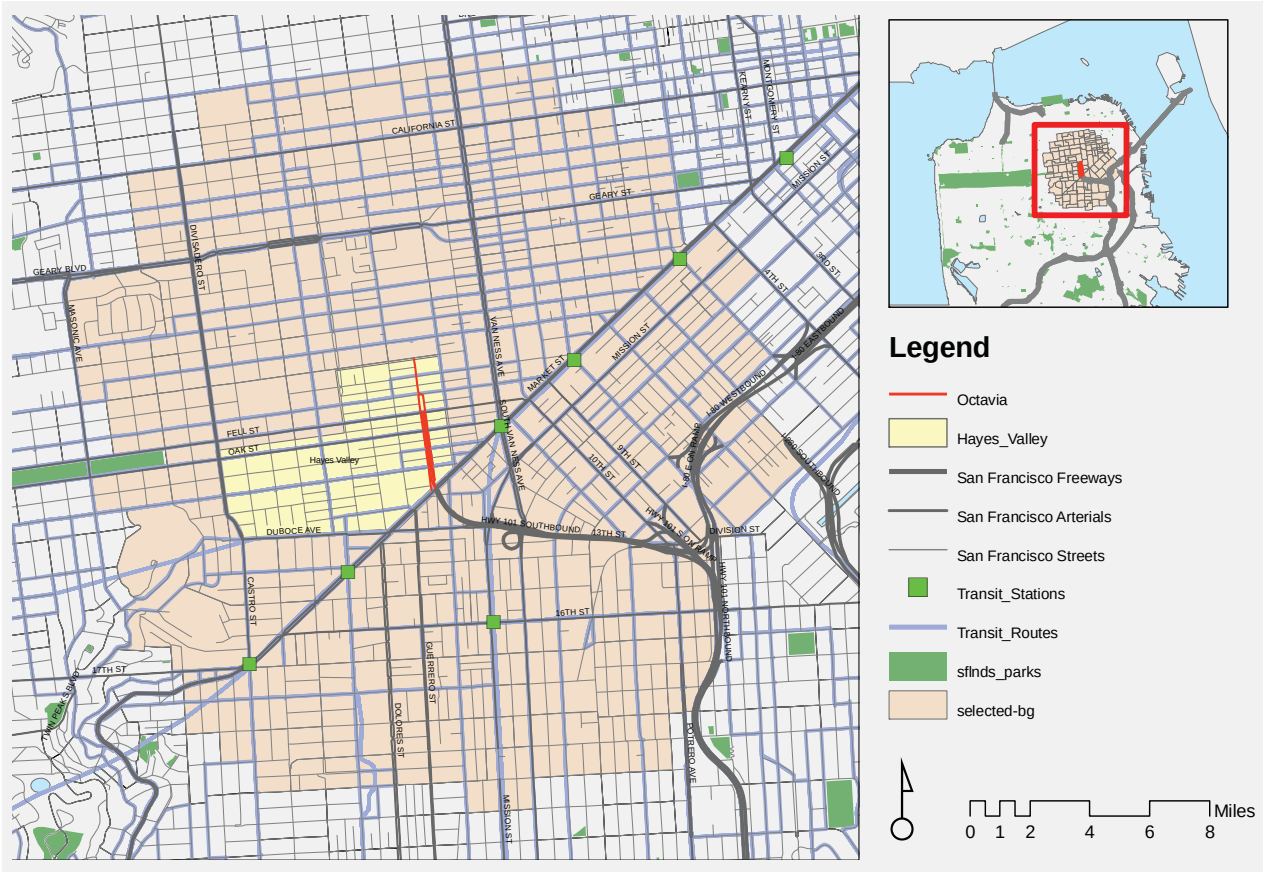


Figure 24: Context Map, Octavia Boulevard, San Francisco

> "…a major consideration was to keep the boulevard as narrow as possible so that there would be room for new buildings along its eastern side, replacing structures torn down when the freeway was built. Having buildings facing onto the side access roadways was crucial for these spaces to make sense, whether the buildings were residential or commercial."[132]

According to its designers, Octavia Boulevard is the first true multiway urban boulevard built in the United States since about the 1920s, with the exception of one in Chico, California, which was created on a railroad right-of-way in the 1950s.[133]

Traffic patterns have been simplified by eliminating left turns at most intersections. Even right turns are restricted from the center lanes. The traffic is also calmed and dispersed by a lane shift encouraging a left onto Fell Street, while through connectivity is maintained by local lanes, marked by a different pavement type, through to Hayes Street.

132 Elizabeth MacDonald, "Building a Boulevard," *Access* 28, (Spring 2006): 2-9.
133 Elizabeth MacDonald, "Building a Boulevard."

Cyclists are now accommodated by sharing the local access lanes with cars. This solution cuts down on the overall width of the right-of-way and also brings a woonerf-like shared space to slow cars as well as afford cyclists more room. This solution was based on the shared lanes along the Esplanade in Chico, CA.[134] Unfortunately the design of the frontage lanes has precluded right turns from center lanes and caused some confusion at intersections. This configuration may function better if there is room for a considerable buffer / merge area (20+ feet) between lanes for a more comfortable merge, but it still results in rather awkwardly converging traffic.

Impact

The impact of the transformation from viaduct to boulevard has been noteworthy. In terms of the area economy, property values in the neighborhood have risen significantly. Prior to the removal of the viaduct, condominium prices in Hayes Valley were 66% of citywide averages; after the completion of the boulevard, prices are around 91% of the city average, with most of the increase occurring nearest to the project site.[135]

Gentrification

The CNU reported that "residents noted a significant change in the nature of the commercial establishments in the area," from lower end establishments towards "trendy restaurants and high-end boutiques."[136] In expectation of this and the threat of gentrification, the city planned to construct units of affordable housing in the land opened up by the freeway. Overall, nearly 1000 new housing units will be built.[137]

Robert Cervero, of the Department of City and Regional Planning at the University of California at Berkeley, completed an analysis of Octavia Boulevard's near-term impact on surrounding real estate prices.[138] He also examined the Embarcadero Freeway removal's impact on San Francisco's waterfront. Cervero used a matched-pair statistical analysis of census tracts to compare the difference changes in tracts that were adjacent to the project versus those in a similar neighborhood that did not host such an intervention. The neighborhoods were compared through data available before and after the freeways were removed.

134 Elizabeth MacDonald, "Building a Boulevard," 8.

135 Congress for the New Urbanism, "San Francisco's Octavia."

136 Congress for the New Urbanism, "San Francisco's Octavia."

137 Seattle Department of Transportation, "Seattle Urban Mobility Plan", January 2008, 6C-2, http://www.seattle.gov/transportation/docs/ump06%20SEATTLE%20Case%20studies%20in%20urban%20freeway%20removal.pdf

138 Robert Cervero, Junhee Kang and Kevin Shively, "From elevated freeways to surface boulevards: neighborhood and housing price impacts in San Francisco," *Journal of Urbanism* 2:1 (2009), doi: 10.1080/17549170902833899.

Figure 25: Before and after, Octavia Boulevard, San Francisco (Google)

In the Hayes Valley "impact zone" around the new Boulevard, Cervero noted the following:

- 32.9% increase in total white population; 35.9% decrease in total black population, with the opposite trend noted in comparison zone.
- Decrease in percent of households with children from 37% to 23.4%
- In a hedonic analysis of real estate prices, Cervero found that they:
  - Initially increased with distance from the corridor, reflecting the negative impact of the viaduct
  - After the construction of the boulevard they increased by $116,000 (2005) but this amenity effect decreased with distance from the new boulevard.

These statistics point to a strong gentrification trend, real estate value boost, and neighborhood economy shift along the Octavia corridor due to the amenity effect of the new boulevard. Fortunately, this trend was foreseen by city officials who proposed a strong affordable housing component of the new construction anticipated along the boulevard. Approximately 900 units were expected to be built there; half of these are to be low-income. Caltrans transferred ownership of land uncovered by the highway removal to the city, so that these new parcels may be developed according to local vision. In addition, parking standards in the area have been relaxed in order to keep building, owning, or renting there affordable. In 2005, the Octavia Boulevard Housing Design Competition invited designers to explore creative options for the development of the narrow lots made available by the freeway removal.[139]

Circulation

139 San Francisco Prize, "Octavia Boulevard Housing Design Competition – Competition Kit," February 2003, http://www.sfprize.com/plusdoc/Part_1_Introduction_Site_Context.pdf.

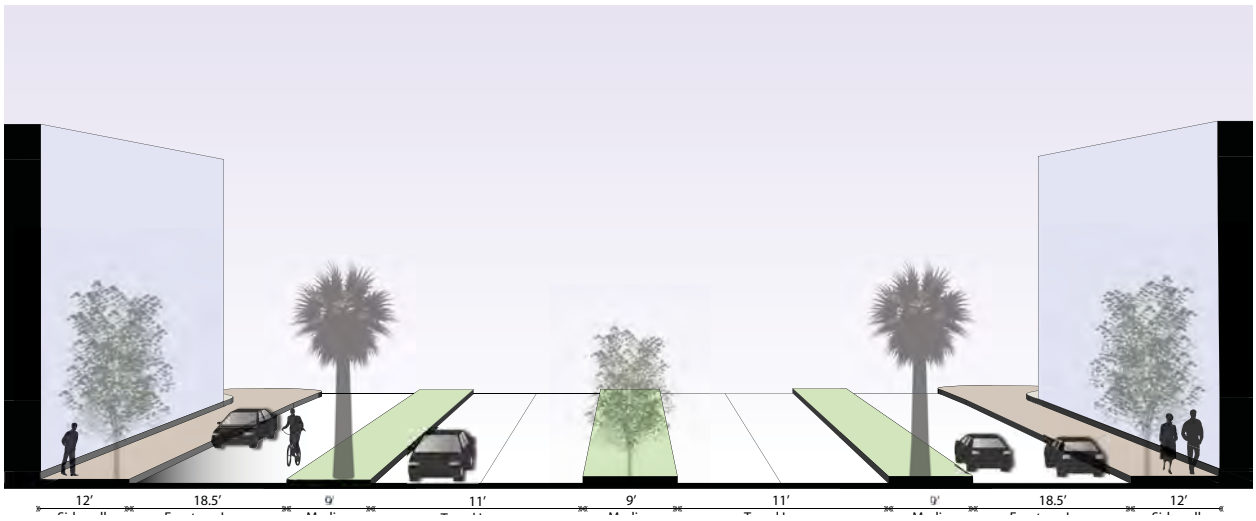


Figure 26: Octavia Boulevard, San Francisco: Typical Section

The new route is not without congestion. At peak times, traffic can back onto surrounding streets, particularly those on Oak Street making a southwards turn towards the Central Freeway ramp; as a result of this backup, there have reportedly been problems with non-local drivers using the local lanes as a through route.[140] There are reports of numerous collisions because of the new lane structure and a slowdown in bus service.[141] One critic commented that "the parallel lanes are awkward for drivers who want to move from the local lanes into the central path. Some of that can be helped by changing the timing on traffic lights. But boulevards are so unfamiliar to most people, and the distance is so short -- five blocks north to south -- that confusion is guaranteed."[142]

At least some of the source of this problem may be that the local lanes aren't clearly marked as such. A change in the design that widened the local lanes and did not reserve more expensive patterned/textured "local" pavements for them—thus they act and look too much like through streets, which was not the original intent of the design. Elizabeth MacDonald commented that the width and orientation of the traffic lanes was a "major issue" because they did not conform to the traffic engineering standards:

> "Applying a standard interpretation of fire engine access rules to the side roadways would have resulted in very wide lanes. To solve this problem, the design team proposed placing the median trees near the central roadway and giving the access roadway side of the median a mountable curb. Thus, in the event of an emergency, a fire engine could easily enter the access road by

140John King, "An Urban Success Story."

141 Philip Langdon, "Freeways Give Way to Boulevards-Slowly," *New Urban Network*, 01 July 2008, 1, https://newurbannetwork.com/ad/redirect/13430/t85?url=node/6928.

142 John King, "Octavia Boulevard – an Urbane Triumph: Few Flaws Found on Test Drive of City's Newest Entry Route," *San Francisco Chronicle*, 13 September 2005, http://articles.sfgate.com/2005-09-13/bay-area/17391760_1_freeway-ramp-first-time-drivers-oak-street.

> driving with one wheel on the median. This design approach was vetted with the fire department and they agreed to it. In the end, lane-width compromises were reached all around, and the central lanes ended up eleven feet wide, the access lanes ten feet wide, and the parking lanes eight feet wide."[143]

Nine to ten and a half feet would have been adequate for these lanes and would have kept speeds down. There were similar arguments over intersection design. Engineers argued for the standard wide turning radii and to have the local access roads rejoin the travel lanes for intersections – possible a still more confusing scheme. The designers argued for keeping the access roads separate, even with their own stop signs. This may not have worked out as expected, as it is the relationship between the local roads and the main traffic lanes that causes much of the confusion at Octavia's intersections. The center lanes and the side lanes function effectively as separate but parallel streets, with the center lanes confined to through circulation as they might be on a limited access road, since turns are constricted; and with the side lanes having their own signage and signalization. This is a very different format from what drivers are accustomed to, but it is one that allows dual functionality of a through street on the one hand and a quiet neighborhood side street on the other.
In the end, MacDonald cites two key failures that have caused the problems with the access roads. Firstly, these lanes are still too wide and too inviting for through traffic. The transition between the freeway and the boulevard allows too-fast traffic through these widths. There has also been a lack of successful experimentation with the signalization of the access roads.[144]

Lessons

Overall, the project has been hailed as a success, winning numerous planning awards and the accolades of the local community and the city at large. In spite of being only five blocks long, the boulevard has become a landmark for urban planners seeking to reduce the impact of automobiles on the urban form. The San Francisco Chronicle even wholeheartedly excused the street's congestion level, stating that "It means the boulevard is filling a need."[145] Based on this survey of research on Octavia Boulevard, the case can offer several important lessons for the redesign of McGrath/O'Brien:

- Do not underestimate the ability of traffic to reroute itself after the removal of or decrease in capacity of a key link. Octavia Boulevard replaced a roadway that at one time accommodated 90,000 ADT; it now contains about 45,000 ADT.
- Carefully consider intersections and what drivers are accustomed to.
- Carefully consider prioritization of other modes, such as bus. As discussed above, one

143 Elizabeth MacDonald, "Building a Boulevard."
144 Elizabeth MacDonald, "Building a Boulevard," 9.
145 John King, "An Urban Success Story."

of the keys in any traffic reduction scheme is to ensure the availability of other feasible if not attractive options. Maintaining or improving bus speeds is thus an important consideration.

- Carefully consider lane widths and design speed, particularly for local access lanes if they are to take on a mixed-mode character.
- Consider whether local traffic being entirely separate is a prudent option.
- Consider future development: McGrath/O'Brien has a wider right of way, but the concept of keeping the new roadbed as narrow as possible will enable a maximum amount of development to orient itself along the roadway.
- Think creatively about parking requirements: a decrease in the minimum required parking, or placing a low upper limit on allowed parking, may decrease developer/owner costs, allow denser development, and encourage non-vehicular access.
- Plan for gentrification and ensure adequate and creative affordable housing plans.

8.2: Precedent #2: Cyprus Freeway / Mandela Parkway, Oakland, CA

Across the bay, the creation of the Mandela Parkway is a similarly impressive accomplishment, though, for one reason or another, not as well known. The Parkway replaces the Cyprus Freeway, another double-decked viaduct that collapsed during the 1989 Loma Prieta Earthquake. The caveat at Mandela Parkway is that a new freeway was built, the I-880, in a new configuration along the waterfront to replace the demolished Cyprus Freeway. However, its planning and construction took over 10 years, during which time the traffic network adjusted, the neighborhood evolved, and the community took the time to demand a redesign they could use.

Mandela Parkway is much longer than the five-block Octavia Boulevard – it is about a mile and a half in length and a full city block wide. The project extends from 8th Street to 32nd Street and involves improvements on both sides of the Mandela Parkway alignment and as well as the median, which varies in width from 65 feet to 110 feet. The project is roughly 18 blocks long with approximately 14 acres of landscaping.[146]

The Parkway was originally a surface road paralleling the enormous eight lane, double-decked Cyprus Freeway viaduct. More than 160,000 vehicles used this regional artery, the northern end of I-880, every day. The dramatic and deadly collapse of the viaduct on October 17, 1989 suddenly forced the closure of this major link. It also presented an opportunity to dramatically rethink this neighborhood and the infrastructural

146 Caltrans, "Mandela Parkway Improvement Project," Accessed February 2011, http://www.dot.ca.gov/dist4/Mandela/mandela.htm.

burdens it had borne since the 1960s and prior. As an industrial, lower-income, minority neighborhood, West Oakland typified the type of district often targeted for infrastructure construction. The neighborhood was identified as decrepit and ripe for urban renewal in the late 1950s, in spite of the strong community spirit there.[147] The destruction and construction completely altered the face of the neighborhood in exchange for better regional connectivity:

> "The construction of three major interstate highways and the Bay Area Rapid Transit (BART) complete the destruction of West Oakland in the 1960s. Connecting the suburbs to downtown San Francisco the new transportation arteries sent San Francisco real estate prices soaring and provided suburban commuters access to good jobs. But their construction leveled large parts of West Oakland, isolating neighborhoods from one another and cordoning others off behind a mass of concrete. Construction of the BART line destroyed a vital black commercial district of small stores and restaurants, jazz clubs, and barber shops…the new systems employed few and, even as a transportation system, bypassed West Oakland's densest neighborhoods."[148]

Given this legacy, the residents of West Oakland were eager to construct a transformational amenity to replace the Cypress Freeway. Similar to Octavia, the boulevard required years and much community activism to come into being. Community and business leaders placed great importance on the project: not only was it an attempt to mend a scar long imposed on the community, but it was also the chance to attempt to create a civic center for African-American life in Oakland.[149] Due to community activism, Caltrans officials eventually elected to rebuild the freeway through industrial properties and railroad yards located at the edge of the city.[150] Caltrans worked extensively alongside the City, and in fact the right of way was transferred to city ownership for maximum collaboration, and CSS guidelines were implemented by engineers to maximize flexibility and community accommodation.[151]

Redesign

The redesign of the Mandela Parkway focused on goals very relevant to the McGrath/O'Brien project. The street configuration consists of two lanes of traffic in each direction with a wide center median. The project realigned the surface road to provide a more consistent corridor and gridded intersections and added a host of pedestrian amenities including a wide meandering concrete pathway through the median. The project was

147 Fairfield, 255.

148 Fairfield, 256.

149 Chris Thompson, "City Unveils a Bright New Plan for West Oakland's Mandela Parkway," *Express*, 27 February 1993, 3- 4.

150 Jacob H. Fries, "Last I-880 Link Opening: Finished Cypress to Connect North I-880 to East I-80 Come Wednesday," *San Francisco Examiner*, 29 September 1998, http://sfgate.com/cgi-bin/article.cgi?f=/e/a/1998/09/29/METRO6362.dtl.

151 Context Sensitive Solutions.org, "Mandela Parkway Corridor Improvement – Project Abstract," Accessed February 2011, http://contextsensitivesolutions.org/content/case_studies/mandela_parkway_corridor_improv/.

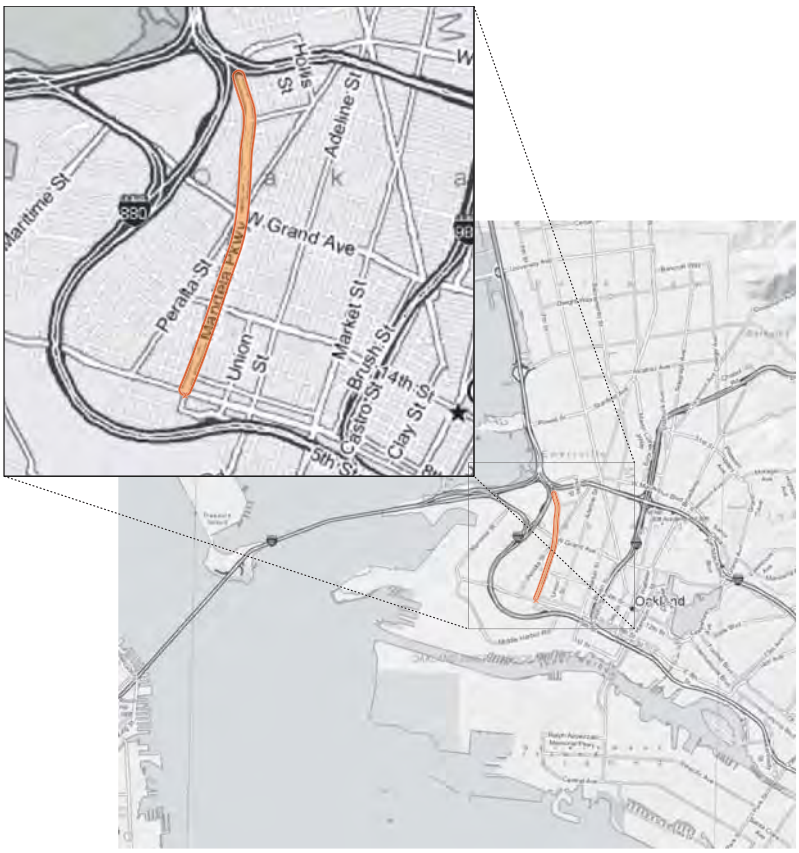


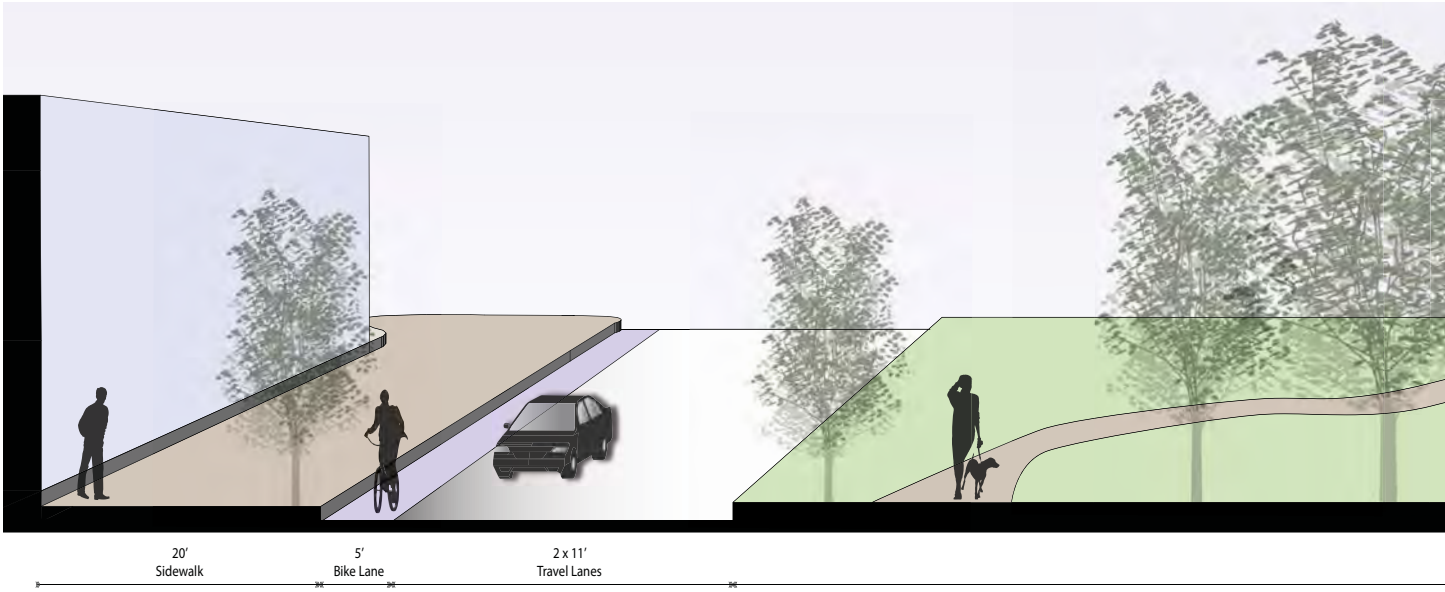
Figure 27: Context Map, Mandela Parkway, Oakland, CA.

designed as a "gateway" for the city and is a truly impressive intervention. The parkway is a stripe of vivid green that winds through what is still a semi-industrial area. It is a blooming arboretum, replete with labeling of 68 labeled species of trees including a collection of 39 different oak trees from around the world.[152] It incorporates sidewalk improvements, multi-use paths, and bicycle lanes (which connect with the Oakland Bay Trail.)

The idea of inserting this type of grand parkway into a largely industrial neighborhood sparked criticism as to whether it was worth the expenditure; whether development would occur; and what other impacts might be, such as gentrification. Skeptics saw investment in the project as a possible "boondoggle"[153] and for a variety of reasons, it took five years of studies and hearings and two additional years to secure funding before the project could begin. Criticisms didn't quite end with the project's implementation, either: some still see the project as irrelevant, pointing out the "$12.5 million park belt is nestled between

152 Caltrans, "Mandela Parkway Improvement Project."

153 Phillip Matier and Andrew Ross, "Oakland Project: Boon or Boondoggle? Mandela Parkway May Draw Builders – or More Troubles," *San Francisco Chronicle*, 20 September 2004, B1, http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2004/09/20/BAGRS8RK5Q1.DTL.



rows of corrugated steel warehouses, storage yards and plenty of barbed wiring."[154] This parallels the land use issue at McGrath/O'Brien – it is a gamble to invest millions in a site bordered by land that will take years to redevelop. And yet, as the case shows in Oakland, this is an investment that pays off.

Gentrification

Since the project was completed in 2005 its supporters have been proven correct. Development has taken off in the corridor. In 2004, lofts were already under construction at 28th Street and Mandela. Mandela Gateway Housing, a 182-unit mixed-use public housing development by Oakland Housing Authority, was constructed at the Parkway's intersection with Seventh Street, near the new BART station. The proposed Mandela Transit Village will occupy the corner at Fifth Street with residential condominiums (209,000 sf), commercial space (38,600 sf). Other projects include West End Commons, a new live/work development of upscale townhouses at 28th street, and high end housing plans for the Southern Pacific RR station.[155] Sites such as the former Red Star Yeast Factory located at Mandela and Fifth Street present further opportunities for transit oriented development.[156] In the Dogtown area, further north along the Parkway, eight residential and live/work projects were proposed within the past three years.[157] At nearby Wood Street, between the Parkway and the rail corridor, about 1600 new homes have been built, with more planned. And, according to one

154 Matier and Ross, "Oakland Project: Boon or Boondoggle?"

155 Patricia Brown, "Born of Disaster, Little Park Helps Redeem a Community," *New York Times (ProQuest Historical Newspapers)*, 22 October 2005, A12.

156 City of Oakland and Hood Design, "Seventh Street Concept and Urban Design Plan,"15 October 2004, http://www.planning.org/communityassistance/2005/pdf/7thStreetpart1.pdf.

157 Oakland City Planning Commission, "Staff Report– Case File Number CMDV02-086, 2885-2895 Hannah Street and 1551 32nd Street," 19 June 2002.

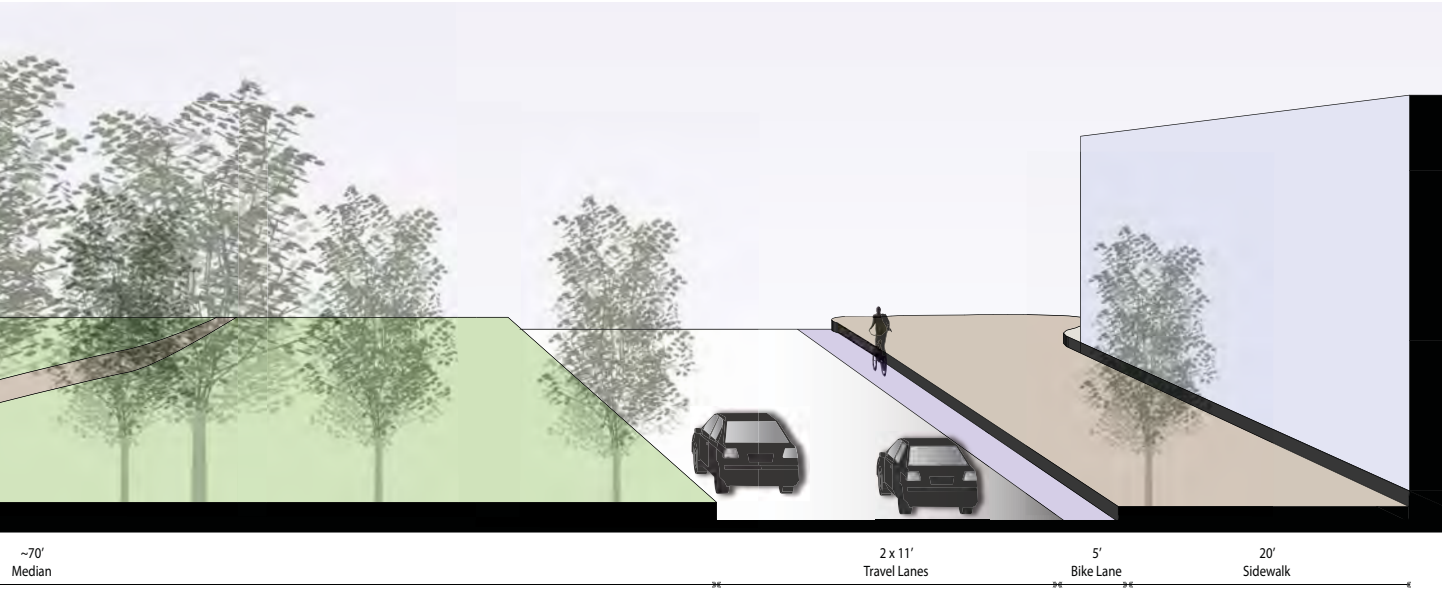


Figure 28: Mandela Parkway: Typical section

source, "artists have occupied and claimed some properties and private renovations are being done on almost every street... It's as if a new day is dawning on a place that had been written off as hopeless."[158]

This is a burst of investment and gentrification, which is a factor city-wide but is particularly clear in the Mandela Parkway corridor. West Oakland had long been known as a poor African-American neighborhood, with chronically high unemployment and a median household income of only $18,000 (in 2005, at the end of the Parkway project).[159] Neglect, disuse, and all the accompaniments of a disinvested neighborhood had plagued the area for years, exacerbated by the disamenity of the nearby freeways and rail lines. But today: "Oakland is being rebuilt right before our eyes," according to Clinton Killian, member of the Oakland Planning Commission.[160] West Oakland, specifically the Lower Bottom neighborhood directly adjacent to the new Parkway, is one of the areas fastest to transform. Once "a community of old homes and dying industry in the shadow of the Port of Oakland," the neighborhood's census tract experienced the largest jump in household income in the Bay Area between 1990 and 2000.[161] This speedy transformation has prompted longtime residents concerns over the need for more affordable housing plans and for more local employment opportunities for residents so that they maximize benefit

158 Chip Johnson, "Community Breathes Life into Old Park," *San Francisco Chronicle*, 28 July 2006, B1, http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2006/07/28/BAG7NK79HU1.DTL.

159 Patricia Brown, "Born of Disaster, Little Park Helps Redeem a Community."

160 Clinton Killian, "New Buildings in Oakland" *Oakland Post*, Vol. 41, Iss. 31 (26 January-1 February 2005) 4, http://proquest.umi.com.libproxy.mit.edu/pqdweb?did=806358641&sid=2&Fmt=3&clientId=5482&RQT=309&VName=PQD.

161 Chip Johnson, "Community Breathes Life into Old Park."

Figure 29: Aerial, Mandela Parkway, Oakland, CA (Bing Maps)

from this transformation.[162] "Blacks fought for economic power in the 1960s, only to see it decline. Now, money is resurgent, but blacks are giving ground to whites and Latinos and a culture of investment."[163]

In the decade up to the construction of Mandela Parkway, the gentrification of West Oakland became a concern of great magnitude for local community groups. Concerned at the drastic change in character of the area and the scale of redevelopment, groups were further alarmed by the significant displacement of minorities in the area: Oakland' black population has decreased by 25% since 2000.[164] Longtime residents have accused the government of "predatory development."[165] The trend in gentrification started with the boom of Silicon Valley and since then affordability has become a perennial concern in West Oakland.[166] However, by most accounts the area directly around the parkway was still largely unaffected by the surge in development and prices;[167] since the completion of the project this has changed and it now seems clear that the transformation of Mandela Parkway is part of this larger shift towards a new demographic.

162 Chip Johnson, "Community Breathes Life into Old Park" and Rick DelVecchio, "Rebuilding Didn't Bring Jobs To a Neighborhood in Need" *San Francisco Chronicle*, 21 July 1997, A7, http://sfgate.com/cgi-bin/article.cgi?f=/c/a/1997/07/21/MN71857.DTL.

163 Rick DelVecchio, "Oakland's Parkway Renaissance: Site of quake-toppled freeway viewed as path to redevelopment," *San Francisco Chronicle*, 22 April 2000, http://articles.sfgate.com/2000-04-22/news/17644846_1_west-oakland-oakland-port-home-sites.

164 "Gentrification Focus Of West Oakland Tour" *Oakland Post*, 43: 24 (20 – 26 December 2006) 8, http://proquest.umi.com.libproxy.mit.edu/pqdweb?did=1197874521&sid=1&Fmt=3&clientId=5482&RQT=309&VName=PQD.

165 "Gentrification Focus Of West Oakland Tour."

166 Janine DeFao, "Home Buyers to Get Help in West Oakland," *San Francisco Chronicle*, 11 August 2000, A21, http://sfgate.com/cgi-bin/article.cgi?f=/c/a/2000/08/11/MN90229.DTL, and Rick DelVecchio, "Boom Times in Oakland Shutting Out the Poor," *San Francisco Chronicle*, 1 November 1999, A1, http://sfgate.com/cgi-bin/article.cgi?f=/c/a/1999/11/01/MN104222.DTL.

167 Matier and Ross, "Oakland Project: Boon or Boondoggle?"

Figure 30: Street view, Mandela Parkway, Oakland, CA (David Baker Partners Architects)

Circulation

Because of the decision to relocate I-880, reconstruction took over ten years. The agency had to buy the land, complete archeological studies, remove hazardous toxics, build to cross railroad and BART corridors, and complete environmental, legal, and financial requirements.[168] In the meantime, traffic patterns shifted the I-880 traffic moved to the remaining parts of the Oakland freeway network, causing I-980 and portions of I-580 to become heavily congested, but removing for the first time the burden of the highway traffic from West Oakland.[169] Accommodation of high volumes seems not to have been a high priority for the Mandela Parkway since the freeway traffic was effectively shifted to other freeways wholesale.

Mandela Parkway's new relationship with I-880 is similar to McGrath's relationship with I-93. While by no means should we assume that traffic network format is identical, nonetheless both I-880 and I-93 are larger, newer interstates serving regional needs, while Mandela and McGrath/O'Brien are older, smaller, and more locally-oriented byways. The fact that traffic shifted to other freeways rather than funneling onto the surface road at Mandela shows how regionally oriented the traffic patterns were and how a surface boulevard could easily accommodate local traffic needs once regional traffic shifted to parallel routes. Further increasing the relevance of the case, the Mandela corridor is complemented by parallel transit options. The 26 bus, for example, runs on parallel Adeline Street, a short walk away; while the BART stops at the southern end of the Parkway and parallels it northwards towards the MacArthur station on the Bay Point and Richmond lines.

McGrath/O'Brien shows that much of its traffic has local origins and destinations with a small percentage using it as a regional throughway. Since the thoroughfare was constructed, many changes have taken place – including construction and later improvement of the Central Artery and I-93. This created a more direct route from the north of Boston to downtown, leaving McGrath as a backup route for cases of extreme

168 John Wildermuth, "What Took them So Long?" *San Francisco Chronicle*, July 20, 1997, http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/1997/07/21/MN59CYP.DTL#ixzz1IVjEAeBF

169 Federal Highway Administration, "Replacing Oakland's Cypress Freeway," *Public Roads* 61: 5 (1998) http://www.fhwa.dot.gov/publications/publicroads/98marapr/cypress.cfm

congestion.[170] This decrease in regional importance supports the practicability of downgrading McGrath from "other expressway" to neighborhood arterial. Likewise, these massive changes in regional characteristics mean that it makes little sense to reconstruct the highway as it was in the early 20th century.

Lessons

Mandela Parkway's implementation has two major lessons. Firstly, the project and its outcome show that it is risky but fruitful to invest millions in a neighborhood that may take years to redevelop. The community activism was an important aspect in ensuring that the final vision was something that would benefit the neighborhood. The final product makes a statement about the neighborhoods identity – the name imparts respect to black history and racial peace, while the attention given to landscaping and arboreal habitat offers a greener future and homage to the "land of oaks." This parkway is new gateway to the city.

The case also shows the scale of gentrification that can occur. How much of the development was spurred but the parkway itself versus by the overall gentrification of the City of Oakland is difficult to ascertain. Regardless, the affordable housing work there will become increasingly important. The award-winning Mandela Gateway housing is an important step, but if gentrification in the neighborhood and in the city as a whole continues, affordability will become an increasingly important topic. This issue is very much relevant to the case of McGrath/O'Brien in Somerville, where limited affordable housing is available and fears about gentrification are growing as development pressures increase and the housing market recovers. In Union Square, for example, there is a already a 92.5% difference between established 2000 rental rates versus today's advertised rental rates, indicating that gentrification is already very established in the area and may only increase with new investment in the redesign of McGrath Highway.[171] Other learning points from the Mandela Parkway project include:

- Public investment in corridor urban design and beautification pays off.
- Preparation for the long haul: the project took over 15 years due to cleanup efforts, relocation of traffic, and fundraising
- Gentrification as a concern cannot be underestimated and, as in San Francisco, affordable housing was a key point in the macro-view of the neighborhood.
- Context sensitive design is an integral compliment to infill development
- The boulevard or parkway presents the opportunity for a new civic center / open space / neighborhood image.

170 Central Transportation Planning Staff, "Toward a Route 28 Corridor Transportation Plan: An Emerging Vision," 2.

171 Based on $805 median rent in Union Square in 2000 (City of Somerville, "Five Year Consolidated Plan," 251) and the author's informal survey of asking rents which averaged about $1,550 per month in 2010.

8.3: Precedent #3: West Side Highway, New York, NY

Figure 31: Context map, West Side Highway, New York

The West Side Highway[172] was one of the first viaducts of its kind, built in the 1920s, placing it in the same vintage as McGrath/O'Brien. It was also one of the first highways to be removed. The limited access route, stretching from the lower Manhattan up to 72nd Street, was an early part of the system of freeways created by Robert Moses throughout New York City and surroundings. It was and is part of Route 9A, an important traffic artery in the city offering connectivity northwards. Since it had been constructed prior to the enactment of modern highway design standards (such as curve radii appropriate for highway design speed), the highway was for many years considered to be dangerous and substandard.[173] Over the years, the condition of the viaduct degraded to such a point that in 1973, a 60-foot section of the highway collapsed under the weight of a cement truck. The elevated structure was subsequently demolished in the late 1970's, once it was determined that it was too expensive to repair the old viaduct, and the existing at-grade roadway was repaved to serve as an interim roadway until a permanent replacement for the West Side Highway could be constructed. In the meantime, a proposed project called Westway that called for a decked-over, depressed highway adjacent to the Hudson River, circulated, caused heated controversy, and was finally abandoned because of environmental concerns and neighborhood opposition. Anti-highway advocates had gained momentum as a result of the defeat of Robert Moses' Lower Manhattan Expressway and were able to successfully block additional highway construction in the city.

172 Information from this case study is taken from:
Preservation Institute, "New York, NY: West Side Highway," *Removing Freeways – Restoring Cities*, Accessed January 2011, http://www.preservenet.com/freeways/FreewaysWestSide.html; and:
Context Sensitive Solutions.org, "Case Studies: Route 9 Reconstruction," *Flexibility in Highway Design*, Accessed January 2011, http://contextsensitivesolutions.org/content/case_studies/flex_9/resources/flex_9/.

173 Preservation Institute, "New York, NY: West Side Highway."

Figure 32: West Side Highway, New York: Before (Preservation Institute)

In 1993, after the Westway proposal was dropped, the city made an economically-driven choice to improve the surface road, West Street, into a boulevard as a permanent solution that would tame the traffic headaches of the West Side while not requiring the construction of additional highway capacity. This was completed in 2001. The design incorporated 19-foot wide green medians, bicycle paths, decorative streetscaping, and a linear park alongside the roadway and the Hudson. The linear park connects the East Coast Greenway with new developments along the river and the Olmsted-designed Riverside Park along the northern part of Manhattan. Most of the new boulevard is four lanes in both directions, but parts narrow down to three lanes each way. The redesign radically changed the face of the corridor, which had been isolated not only by the old viaduct as well as by train yards and by other industrial uses that cut off the waterfront from the rest of the city. The corridor is still characterized by heavy traffic, but it also now serves as an important pedestrian and bicycle link to waterfront attractions. Aesthetically, the corridor is barely recognizable, as the green, landscaped pockets along the boulevard are a true reversal from the industrial dereliction of the old West Side Highway.

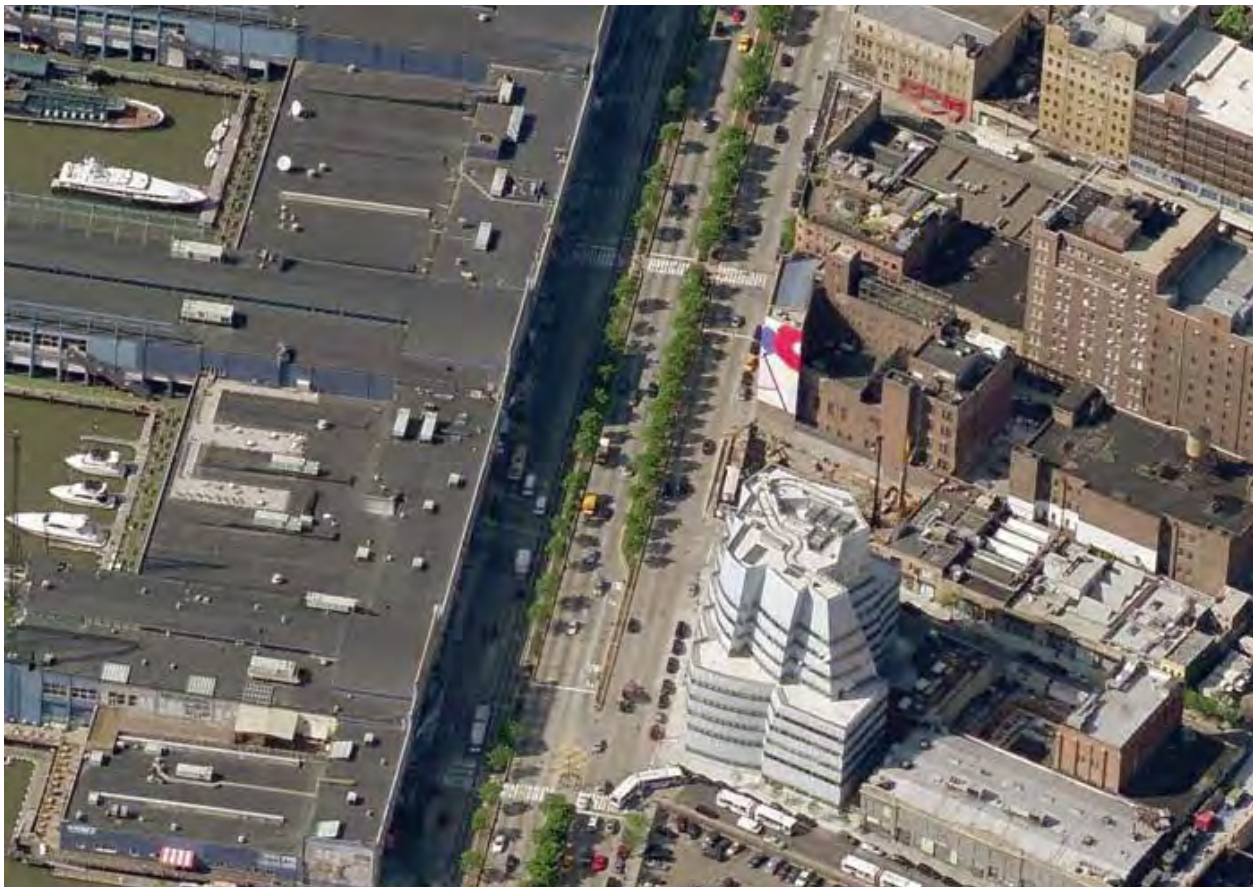


Figure 33: West Side Highway, New York: After (Bing Maps)

The new roadway accommodates average daily two-way traffic volumes ranging from 69,000 to 81,000 vehicles. When the West Side Highway collapsed, New York City DOT estimates that as many as 10,000 vehicles per day diverted to Manhattan's other north-south routes; traffic engineers worried that this was further taxing the capacity of these already congested parallel routes.[174] At the same time, anti-highway advocates estimated that 53 percent of the traffic that had used this highway disappeared upon its closure, "dramatic proof that building freeways generates traffic and that removing freeways reduces traffic."[175]

In order to determine whether a boulevard would work as a solution in this case, NYCDOT researched several key concepts. Firstly, the traffic analysis was extensive, covering nearly all of Manhattan – sensible given the length of the roadway in question. What this model determined, however, is key for McGrath and for similar highway redesign opportunities. The analysis determined that:

174 Context Sensitive Solutions.org, "Case Studies: Route 9 Reconstruction," 133.
175 Preservation Institute, "New York, NY: West Side Highway."

> "…virtually none of the users of the highway were traveling over its complete length, but rather using it to gain access to the east-west street system on the island. The road thus operates, both today and in the future, as essentially a collector-distributor system."[176]

In order to maintain this functionality, turns off of the route are controlled by limiting the openings in the center median and allowing only right turns onto the intersecting streets.[177]

The CSS case study illustrates how the final design concept was arrived upon by extensive community communication, incorporation of multiple travel modes, and examination of other, more economical, options rather than the reconstruction of a facility with the same or greater traffic capacity. The FHWA credits detailed travel demand modeling,[178] but it was also the "facts on the ground" -- initially the collapse of the expressway and later the development of the boulevard—that resulted in a dramatic change in the scale of the proposed improvement. In this case, the proposed solution changed from a six- to eight-lane elevated urban freeway of the scale of the formerly proposed Westway to a six-lane urban boulevard with a design speed of 40 mph.[179] Part of the project's feasibility was its use of CSS guidelines, incorporating lowered design speed and right-of-way impact mitigations, to benefit the character of surrounding development, namely the burgeoning waterside district of Manhattan in the vicinity of the Javits Center, Intrepid Sea Air Space Museum, etc. The key to this Context Sensitive Solution was to choose a more appropriate and more economical smaller-scale solution rather than assuming an expansion in capacity was the only choice. This early case study thus outlines several design concepts key for subsequent projects:

- Lowered design speed- even below the maximum for urban arterial (however, at 40mph the roadway still functions much like a highway)
- Limiting turns and maintaining simple intersection design
- Extensive greening
- Extensive attention to parallel modes and quality of environment.
- Facts on the ground, namely the community and political context, determining the feasibility of moving traffic to other modes
- The pros and cons of capacity reduction: maintain at street for traffic calming but increase street-side exposure to traffic vs. move below ground (i.e., the Westway solution) and accommodate / encourage additional traffic demand – bringing more cars

176 Context Sensitive Solutions.org, "Case Studies: Route 9 Reconstruction," 137.
177 Context Sensitive Solutions.org, "Case Studies: Route 9 Reconstruction," 137.
178 Context Sensitive Solutions.org, "Case Studies: Route 9 Reconstruction," 140.
179 Context Sensitive Solutions.org, "Case Studies: Route 9 Reconstruction," 140.

to spill out at either end.

Precedent Studies: Conclusions

The examination of the transformations at Octavia Boulevard, Mandela Parkway, and West Side Highway show that highway removal and redesign is a powerful concept not only for the reformatting of the roadway itself, but also very much for the transformation of surrounding neighborhoods. These examples show different ways that designing for context can promote the success of replacing highways with surface boulevards/parkways, reflecting a reordering of priority, with emphasis on community and environmental compatibility replacing through traffic speed and capacity as primary goals. While the replacement roadways demonstrate the high capacity that at-grade streets can accommodate, they also convey a priority on green space and connectivity through complementary pedestrian, bicycle, and transit options. The contrast between the before and after conditions in each case gives important clues as to how the McGrath/O'Brien corridor could likewise evolve. The next section will examine existing conditions at McGrath/O'Brien as a base for this future evolution.

Figure 34: Street view, West Side Highway, New York (Preservation Institute)

9: Current Conditions at McGrath/O'Brien Highway

9.1: Issues and Constraints

The de-elevation and redesign of the McGrath/O'Brien Highway will enable the City to maximize development potential of underutilized areas and improve the quality of life within established neighborhoods. In combination with the Green Line, a new urban boulevard will improve both the accessibility and the image of the corridor. Rather than languishing as the neglected back yard of the city, the corridor itself has the potential to become a highlight of the community and an invigorated area that draws the city together rather than divides it.

Underutilized Land

Parcels made less desirable by the highway's environmental externalities are underutilized, containing lower value businesses such as storage warehouses, auto repair shops, parking lots, and so on. Industry and lower-scale commercial uses certainly have their place within the city, but at this site, they conflict with the very dense residential areas surrounding and are out of context with the City of Somerville's vision for mixed-used, transit oriented development and possibly advanced technology facilities development. The amount of underutilized land in this corridor is astonishing considering its proximity to downtown Boston and the busy mixed-use neighborhoods of Somerville and Cambridge. ICON Architecture's study for the City of Somerville estimated over 135 acres that are:

> "…ripe for transition in the next twenty years…enough of the area is in marginal use or underutilized that a sensitively planned, phased redevelopment of the fabric of the area is possible. With strategic changes and improvements to the area's infrastructure, and the catalyst of North Point, such a redevelopment is likely."[180]

As an example to quantify the current amount of underutilization, one plot on New Washington street is basically vacant, with only 9000 constructed sf of outbuildings on a 3,387,500 sf plot.[181]

Congestion and Automobile Domination

Currently, the McGrath/O'Brien corridor is dominated by heavy vehicular traffic and by auto-based uses such as auto repair shops, tow-lots, and parking lots. Accommodation for

180 Icon Architecture, "North Point Somerville Planning Study," 61.

181 City of Somerville Assessor's Database, http://data.visionappraisal.com/SomervilleMA/DEFAULT.asp (accessed 1 December 2010).

other modes is negligible. The highway is plagued by low levels of service, with heavy traffic and slow travel speeds.[182] Several intersections are highly problematic given both the volume of traffic seeking accommodation as well as the complexity and confusion of their design. The corridor's safety record is cause for concern, with several intersections amongst the highest in accident rate in one study:

Top 1000 Crash Locations in Study Area (1995-1999)[183]

Location	*Rank*	*City*
Route 28/Mystic Avenue/I-93	4	Somerville
Route 28/Washington Street	30	Somerville
Route 28/Broadway	107	Somerville
Route 28/Pearl Street	212	Somerville
Route 28/Land Boulevard	196	Cambridge

The road is a key connection for local commuters, and is characterized by short trips based on the local street network as well as some through-commuters whose needs could equally be accommodated by I-93 and Storrow Drive as discussed above in the review of the 2008 CTPS report. Less than 11 percent of surveyed vehicles were observed at both a northerly survey point, the pedestrian bridge, and at the southerly Museum of Science survey point."[184]

The average speed on McGrath in the study area is only 18.67 miles per hour according to one data sample.[185] As shown in traffic speeds in the study area, the worst congestion and intersection level of service in the corridor is at either end of the elevated portion of the highway, at Third Street and at Medford St/Pearl St. It seems plausible that these intersections are more heavily burdened because they lie on either end of the elevated segment which limits access and shunts on/off traffic to fewer intersections rather than distributing the traffic more evenly throughout.[186]

Speed indexes "indicate that there are severe delays from the I-93/Mystic Avenue/Route 28 interchange area to the Medford Street intersection and also near the Route 28/Land Boulevard/ Charlestown Avenue intersection."[187] These support the above hypothesis that the causes of congestion are mainly the complex intersections on either end of the study area, rather than the characteristics of the roadways in between.

182 Data sample from Mikel Murga, Lecturer and Research Associate at MIT's Department of Civil and Environmental Engineering, reports that the average speed on McGrath in the study area is only 18.67 miles per hour. Recorded during morning peak using GPS, June, 2010.

183 Boston Region Metropolitan Planning Organization, "Journey to 2030" (Table B.1 page 2, Appendix B), 5 March 2010, http://www.ctps.org/bostonmpo/3_programs/1_transportation_plan/plan_2030.html.

184 "Toward a Route 28 Corridor Transportation Plan," 27.

185 Data sample from Mikel Murga, Lecturer and Research Associate at MIT's Department of Civil and Environmental Engineering, recorded during morning peak using GPS, June, 2010.

186 "Toward a Route 28 Corridor Transportation Plan," 43-44.

187 "Toward a Route 28 Corridor Transportation Plan," 32.

Figure 35: McGrath at Twin Cities Plaza

Multimodality Issues

The area is lacking in amenities for pedestrians, cyclists, and transit users. Several intersections lack pedestrian signalization. Narrow sidewalks, few street trees or street furniture, and difficult wayfinding add to this hostile environment. The width of the street is not as much a problem for crossing as are the lack of signals and the confusion of the intersections. The pedestrian bridge near Otis Street and the parallel frontage roads on this stretch are welcome exceptions.

Circulation

Some parcels nearby remain vacant or underutilized because of lack of highway access. Some of these are a result of clearing for anticipated highway expansion, the Inner Belt, during the 1960s, which never came to fruition; today these parcels have no vehicular access from Somerville, largely because there is no crossing over the Fitchburg rail corridor at this point. This is a major connectivity problem requiring reversal for redevelopment.

Stalled Development

As discussed in Section 7, developers recognize the corridor's development potential and numerous large-scale developments have been considered. Yet these have progressed in fits and starts for a variety of reasons.

Figure 36: McGrath Highway: View towards Prospect Hill and Union Square

Lack of Amenity and Environmental Quality for Residents

The highway has long been regarded a divider and an eyesore, particularly the elevated portion running from Medford Street to the Somerville Border. This separates Brickbottom, the Inner Belt, East Somerville, Cobble Hill, and Union Square from each other. The separation is not only caused by the physical presence of the highway itself, but also because of the unattractive land uses surrounding it (particularly from Washington Street southwards) and the resulting lack of any cohesion in the human environment there.

In the northern part of the study area, McGrath is directly adjacent to high-density residential areas. Clearly, this land use pattern is also detrimental as homes are exposed to the noise and pollution of the traffic and the neighborhood is divided by a nearly impassable divide. Much of the area has already been designated an environmental justice population; the air pollution can be expected to worsen within 330 feet of a roadway, while associated lower rents mean that disadvantaged populations are disproportionately affected.[188] There

188 Bae, Chang-Hee Christine, et al, "The exposure of disadvantaged populations in freeway air-pollution sheds: a case study of the Seattle and Portland regions," *Environment and Planning B: Planning and Design* (2007: volume 34, 154 – 170).

is little green space in the area to assuage any of this area and any buffer zones along the highway are poorly cared for. Apparently little design work or improvement has taken place on the highway since its last expansion in the 1950s, another signal of the need for planning attention in the neighborhoods.[189]

Since I-93 essentially parallels McGrath/O'Brien, it also places an additional infrastructural burden on these marginalized neighborhoods and adds significantly to their environmental justice concerns. Somerville unsuccessfully battled for depressing I-93 during its construction in 1968; it was a city particularly vulnerable to the tenets of the highway movement since some of its leaders, such as Mayor Lawrence Bretta at one time, welcomed such construction with the belief that it would bring more development opportunities in the city. Unfortunately these largely have failed to come to fruition– the Inner Belt district, for example, is even more derelict than prior to the construction of I-93.

Today, residents and the City have reason to believe that significant change is on the horizon. Firstly, like many of the other viaducts built during the 1950s highway construction boom, the elevated portions of McGrath are in disrepair and will need either significant reconstruction or removal. The McCarthy Overpass in particular will soon be rated "structurally deficient" by MassDOT's Highway Division.[190] Given the expense of the significant concrete and steel repair for reconstructing the elevated deck, and given the detrimental impact the highway has had on its surrounding for the past 50 years, considerable support has been building to remove at least part of the elevated structure. In 2010, an RFR was released by MassDOT to "evaluate the feasibility, benefits, impacts, and costs of removing at least a portion of the elevated structure on McGrath Highway."[191] This led to the study now underway with McMahon Associates and subconsultants, to be completed in 2012.

9.2: Major Stakeholders

Three major groups of stakeholders exist in the planning of highway removal and redesign projects: The community and the facility users, represented by multiple groups; the municipality; and the roadway authority. In the case of McGrath/O'Brien, most of the

189 Interview with Ellin Reisner, 3 February 2010.
190 Massachusetts Department of Transportation, "Route 28 / McGrath Highway De-Elevation Study: Request for Response (RFR)."
191 Massachusetts Department of Transportation, "Route 28 / McGrath Highway De-Elevation Study: Request for Response (RFR)."

planning focus is within Somerville, since that is where the elevated portion lies.[192] Removal of the highway has found wide support and surprisingly little controversy so far. Judging from the 2008 preliminary corridor plan, input since then, and preliminary discussions for the citywide Comprehensive Plan, residents, community groups, and business owners support corridor reorientation. To gain an understanding of current facts on the ground at the McGrath/O'Brien corridor, I spoke with Michael Lambert, Director of Transportation and Infrastructure for the City of Somerville; members of two community groups: Brickbottom Artists Association and Somerville Transportation Equity Partnership (STEP); and Ethan Britland's, MassDOT's project manager for the de-elevation study.

The City of Somerville

The City strongly supports the idea of transforming the highway into a boulevard and instigated MassDOT to study de-elevation schemes. "The City believes this would facilitate movement across the corridor by current Somerville residents and visitors, and also create a more attractive environment for redevelopment along the corridor."[193] According to Michael Lambert,[194] Director of Transportation & Infrastructure, the City believes that the current highway:

- Creates a barrier between neighborhoods in Somerville
- Isolates Union Square from East Somerville
- Creates dangerous and unpleasant crossings for bike and pedestrians
- Does not accommodate bikes and pedestrians on the highway proper despite being the most direct connection to downtown
- Under capacity ever since Big Dig opened (I-93 is two blocks to the east)
- Is "broken" in the sense that on intersections and on-ramps create unnecessary backups and dangerous merges

Additional support may be garnered from the fact that it will cost less to redevelop it than to rebuild the highway in its current format and then maintain it in the longer term. No official figures are yet available but estimates casually mentioned in preliminary meetings

192 Community interviewees noted that the City of Cambridge is not particularly active in the planning of O'Brien highway or indeed in the planning of the Lechmere Green Line extension district. They have completed planning studies of the East Cambridge neighborhood, particularly concentrating on the development of the biotech industry there and the concerns of the residents over the shift in land uses. But, the O'Brien corridor and the Lechmere stop planning has been largely grouped with NorthPoint and apparently left to the developer and the MBTA. The City of Cambridge seems reluctant to push for a radically different solution to the wide roadway at McGrath/O'Brien, based on plans that accommodate existing conditions rather than push the envelope for the roadway's design.

193 Massachusetts Department of Transportation, "Route 28 / McGrath Highway De-Elevation Study: Request for Response (RFR)."

194 Interview with Michael Lambert, 29 January 2011.

have indicated interest in this cost-saving aspect of the de-elevation. The Green Line Extension planning initiative has already activated community discussion in this corridor and brought out a continued desire to have the highway removed particularly since there are two stations in close proximity on either side of the highway. So has the comprehensive planning process now underway with a committee of 55 constituents representing every neighborhood, elected official, and numerous community groups - the removal is a specific goal of the plan.

The City anticipates some pushback from MassDOT because of the established engineering guidelines and capacity for the road; they anticipate, however, that the study currently underway will show that such capacity reduction is possible and the benefits of removing the barrier far outweigh any reduction in capacity. Some current projects in the City are a test-out for traffic calming/streetscape improvement process. For example, the Broadway improvement project involves work with MassDOT and the process for "right-sizing" – including lane removal/ bike and pedestrian infrastructure.

Somerville wants to create new gateway for the city and is enthusiastic about the opportunities for development that this project presents. High density/affordable housing, transit oriented development, and job base diversification are anticipated initiatives enabled by removing the highway and creating a tree-lined boulevard. Noting these opportunities, the City has been a leader in initiating the de-elevation study and promoting the project, leveraging the accelerated bridge reconstruction program into more comprehensive corridor improvements.

Somerville Transportation Equity Partnership (STEP)

STEP has been active in Somerville transportation issues since its founding in 2003. The organization is made up of many Somerville residents, including President Ellin Reisner, with whom I spoke. The organization is active in lobbying for better public transportation access in Somerville, which has historically experienced a lack of investment, and awareness for environmental justice issues. As such, the organization has a key interest in the re-planning of McGrath Highway.

One of its members, Wig Zamore, noted the visibly degraded viaduct supports under the McGrath Highway and alerted the authorities, which instigated interim repairs and further examination of the structure for replacement or removal. STEP has been critical of the 2008 corridor master plan, pointing out that it focused primarily on vehicular capacity rather than earnestly looking for alternatives. The organization will be actively involved with any public aspects of the de-elevation study effort and in working with the City.

Reisner was concerned that unless several initiatives were planned concurrently – including the Green Line and improvements to major arterials such as Rutherford Avenue – there was a possibility of shifting *more* traffic onto McGrath. STEP is highly concerned about safety issues – the nearly impassable intersections and inaccessibility by foot to what amenities exist, such crossing to Target or Assembly Square from East Somerville. East Somerville is nearly a "walled area" considering the highways that surround it. Given its density and characteristics it is particularly grievous that better planning has not focused there.

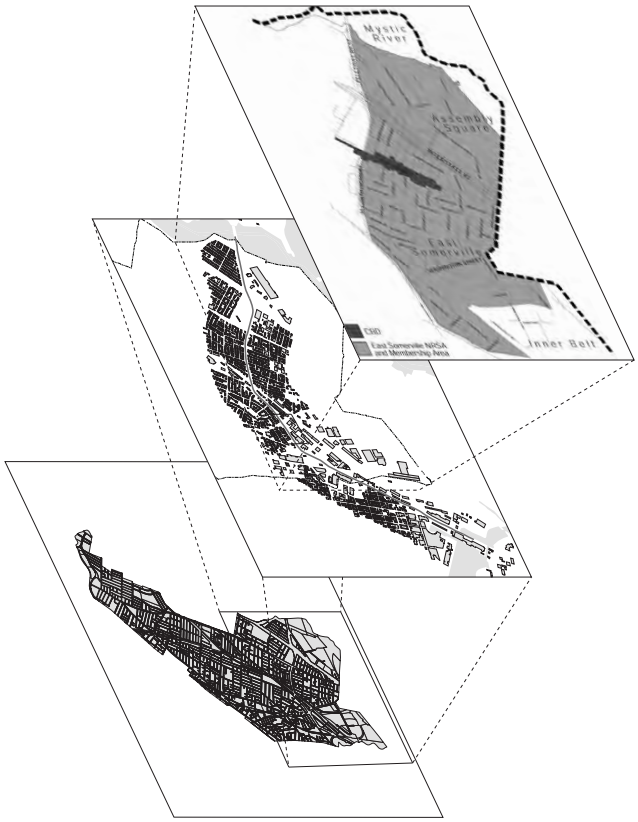


Figure 37: East Somerville: Neighborhood Location

Accessibility is a huge issue for STEP and one on which the redesign of McGrath, and the incorporation of the Green Line extension, must focus. Bus service in the area is not extensive and STEP is very concerned that the MBTA isn't looking into improvements to correlate with the Green Line extension. The physical environment of the neighborhood is difficult to traverse. Foss Park, at the corner of Broadway and McGrath, is difficult to access – a key issue since it is Somerville's largest park and located in an area with real need for open space. Informal paths reflect desire for pedestrian access in many areas. Intersections have no countdown lights and short crossing times, in spite of recent lengthening. Right turn lanes at intersections are "green all the time" – meaning turn on red is allowed and further endangers pedestrians.

What enabled this situation? It is part of a long history of missed opportunities and disenfranchisement. Somerville has had a history of political corruption and was primarily a low income community that was less able to rally successfully against destructive urban renewal policies. One of these was the construction of I-93, which was devised as an elevated highway in spite of organized neighborhood opposition. Reisner commented that the neighborhoods at I-93 changed from a robust, self-contained neighborhood into a residential edge zone with many empty businesses, degraded value as a historic area, and detrimental health impacts, which STEP is currently studying. Reisner credits immigrant influx and entrepreneurship for the return of business vitality to the neighborhoods

bordering the interstate; these populations now require better services and access. Recognizing the history of poor transportation and land use decisions for the city led to the formation of advocacy groups such as STEP.

The contrast between Cambridge and Somerville is notable: Somerville had in the past used an older and more suburban model of development; has a high percent of untaxable land due to MBTA holdings and other infrastructure; is more residential; and has fewer jobs. There is a new mentality now as epitomized through the City's impressive new planning initiatives.

STEP is a proponent of land use changes in Inner Belt as well as a focus on affordable housing, but prioritizes the connection by sustainable and safe pedestrian/bike/transit networks. STEP's vision for the future is of increased safety, walkability, environmental quality, neighborhood integrity, and economic development. Residential portion of the corridor would likely remain much the same, though small scale land use changes may take place in the neighborhoods. Inner Belt land use changes will continue and hopefully pick up speed.

STEP is advocating Green Line station design strategies that are most beneficial to serving neighborhoods and economic development goals. At the Twin Cities site, for example, no station is planned but STEP is advocating that the track layout be designed to make construction of a station possible in the future. There is concern that the MBTA is neglecting such key opportunities for budgetary reasons.

STEP has found that neighborhood residents already use a multimodal approach to transit even though the area isn't conducive to it yet. Many walk to Sullivan for access to buses and the Orange Line. The community path will increase accessibility and decrease need for drop-offs at these stations. Travel patterns are already changing, possibly due to changes in Union Square. STEP believes that a boulevard concept that calms traffic, increases circulation and connectivity, and enables key land use changes in the area is the correct concept to pursue.

Brickbottom Artists Association

Brickbottom Artists Association, is located directly adjacent to the Highway, wedged between it and the MBTA Fitchburg railway. I spoke to resident David Tonnesen, who has lived at the complex since its founding in 1988. Ownership and long term residency make the complex a stable and well-established entity, and also ensure that residents are heavily involved in planning initiatives in the neighborhood. The association has been particularly active in the planning of the Green Line extension, the tracks of which run directly past the

complex. They are not as concerned about the proposed McGrath de-elevation since it is further in the future; however there is certainly great interest in the project due to the improvements in accessibility and environment in the proximity of the residences. Similarly to STEP, there is a concern that the agencies involved might miss some opportunities inherent in the project. For example, the elevation of the Green Line tracks could be reconsidered to allow increased access to/from McGrath through to the Inner Belt.

Figure 38: Brickbottom Artists Association location (highlighted)

A number of residents do not own cars and generally take advantage of the relatively close proximity of amenities in spite of the lack of pedestrian amenities. The complex has relatively direct access to Union Square via the Somerville Ave Extension underpass, but the conditions and isolation of this route have given it the moniker "the "scary way."

The community has been heartened by some of the recent initiatives, changes, and upgrades in the area. This includes a victory in persuading officials to locate the new Green Line maintenance facility away from the residences, after a two – year- long period of negotiations in which residents were active.[195] The surrounding uses have also become more agreeable, with major renovations completed at Herb Chambers auto, new ownership and changes at Pat's Tow, and the proposed relocation of the waste transfer facility. Other nearby commercial/light industrial uses include Iron Mountain, VDA (movie sets), liquor distributors, UPS, etc. These entities are not particularly active in planning initiatives. The area had experienced a brief boom during the dot-com era, when agents and passersby might ask residents about particular buildings in the area for real estate interests; with the end of the dot-com era this burst of change suddenly disappeared and since then many uses have remained stagnant.

The Brickbottom community is not threatened so much by the possibility of change in the neighborhood; rather they are concerned about change that does not benefit the community and is done for regional needs instead. They are particularly concerned about state/top-down leadership rather than initiatives coming from the neighborhood or city level. The community has existed for so many years and its members are owners, so gentrification or any change in uses does not so much threaten them. They are furthermore concerned about

195 Tom Nash, "Somerville's Brickbottom Spared MBTA Maintenance Facility," *Somerville News*, 19 May 2010, http://www.thesomervillenews.com/archives/648.

accessibility to the increasing amenities popping up around them. The complex is currently a sort of island in the midst of infrastructural and industrial uses, and the Green Line actually has as much possibility of isolating them further as it does of better connecting them, since it will reactivate formerly disused land and create additional barriers such as elevation/grade changes.

The McGrath Highway de-elevation offers the possibility of better connectivity and increased amenity to Brickbottom residents, a possible trade-off to any negative impacts imposed by the Green Line extension. A new bridge would likely be required to cross the Green Line tracks reaching towards Union Square, but the at-grade boulevard will offer greatly improved accessibility at each side of the Brickbottom Artists complex, at Somerville Ave, the Somerville Ave extension, and at Twin Cities Plaza/Rufo Road.

MassDOT[196]

MassDOT's Accelerated Bridge Program targeted the McCarthy Overpass, which carries McGrath Highway over Washington Street, for reconstruction due to its deteriorated condition. As stated above, the City of Somerville has for many years expressed interest in removing or de-elevating certain elevated or grade-separated portions of McGrath Highway in order to reconnect neighborhoods, promote economic development of the Inner Belt and Brickbottom Districts, and to create an urban boulevard style roadway. Additionally, in these times of financial constraints with respect to transportation funding and resources, long-term maintenance of elevated structures has proven costly. For these reasons, the Secretary of Transportation and Chief Executive Officer Jeffrey B. Mullan directed MassDOT's Office of Transportation Planning to undertake a conceptual planning study to examine the possibility of de-elevating portions of McGrath Highway. The study was initiated in early 2011 with McMahon Associates as the lead of the consultant team.

Because the 2008 Central Transportation Planning Staff (CTPS) *Toward a Route 28 Corridor Transportation Plan: An Emerging Vision* relied on older data, the current study will involve new traffic counts or collection of existing counts by others. This updated data will be fundamental for subsequent work and analysis of any alternatives.

Ethan Britland, MassDOT's project manager for the current study, stated that the 2008 CTPS study indicated that there may be opportunities for changes in functional classification and/or capacity of the roadway. Although it is still too early in the study process to give any indication of its final outcome, it is a vital first step in examining viable options for the corridor. While MassDOT will be examining multiple options for the corridor, their inclusion of the boulevard option is encouraging and will find substantial

196 Interview with Ethan Britland, MassDOT project manager for the Route 28/McGrath De-Elevation Study, 23 February 2011.

support in the community and at the City of Somerville, who will eagerly look forward to the data that may prove or disprove the possibility or ease of de-elevation.

These stakeholder interviews confirmed the general support for the redesign of the highway but also concern as to how the design would be implemented and whom it would benefit. They confirmed the issues and goals to be acknowledged in future plans and strategies for the corridor, which are discussed further below.

9.3: Proposed Planning and Design strategies for McGrath/O'Brien

The redesign of McGrath/O'Brien Highway as a green urban boulevard or parkway presents numerous highly significant opportunities for the adjoining neighborhoods and for the encompassing municipalities. These opportunities are well demonstrated by precedents and include:

- Gain back space from the automobile: decrease "lost space"
- Circulation to new amenities: MBTA station, Community Path, new development
- Economic development: The mayor has stated a desire to see higher-intensity commercial uses, particularly R&D, office, and advanced technology, move into the area, adding to the city's tax base and providing new jobs while requiring fewer services[197]
- Housing: the Boston area is highly constricted in terms of housing and in need of additional affordable units.[198] Opening this area to development and gaining additional public-owned land should encourage the construction of new units
- Offer an alternative to the standard practices illustrated in the previous corridor plan using CSS and Livable Streets guidelines
- Create a neighborhood and city gateway. The exits from 93 in this area are arguably one of the most entry routes into Somerville and the redesign of the corridor will completely rehabilitate this first impression of the city
- Improve open space connectivity between rivers by developing additional green spaces, pedestrian and bicycling circulation, and emphasizing the role of the community path
- Maximize mode shift to Green line as well as non-motorized modes
- Increased safety; slower design speed more appropriate for surroundings and enabling a more constant speed rather than the bursts between congested intersections currently seen on the highway.

197 Danielle Dreilinger, "T Stops could wake up sleepy squares," *Boston Globe*, 15 February 2009, http://www.boston.com/news/local/articles/2009/02/15/t_stops_could_wake_up_sleepy_squares/; and Mayor J. Curtatone, Letter to The Honorable Board of Aldermen, 11 February 2010.

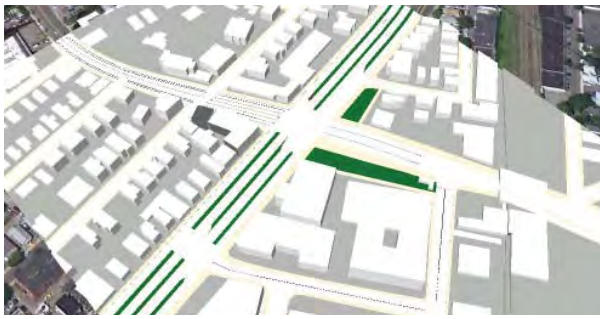
198 Scott S. Greenberger, "Word of Slash in U.S. Housing Funds Stuns Boston," *Knight Ridder Tribune Business News*, 8 January 2003, 1.

- Compliment Somerville's progressive planning vision.
- Accommodate but calm auto traffic.
- Redesign option analysis.

My proposed redesign of an example section, the Washington Street intersection, embraces these opportunities. This redesign does not seek to solve the complex engineering problems present in the corridor; traffic modeling is underway to determine feasibility for intersection redesign and specifics such as bridge elevations. Rather, this scheme looks at the overall opportunities for the corridor and then chooses one intersection for redesign to demonstrate the successful accomplishment of these opportunities.

The extreme auto orientation of the corridor at the nearby Wellington/Fellsway area (north of I-93) serves as a reminder that removal of the overhead viaduct may provide no community benefit if the at-grade boulevard is not properly oriented towards non-auto modes. For this reason is it essential that the study explore more than one design for a surface boulevard; and a study of an option incorporating a modified elevated roadway as a comparison for both aesthetic quality and reconstruction cost. It would be highly desirable for the study to be subject to a MEPA scope, to ensure that multiple options are explored. Community input will be integral to the final selection, as the different options have different pros/cons and may better accommodate some uses versus others.

The following pages illustrate the design concepts developed for McGrath/O'Brien.



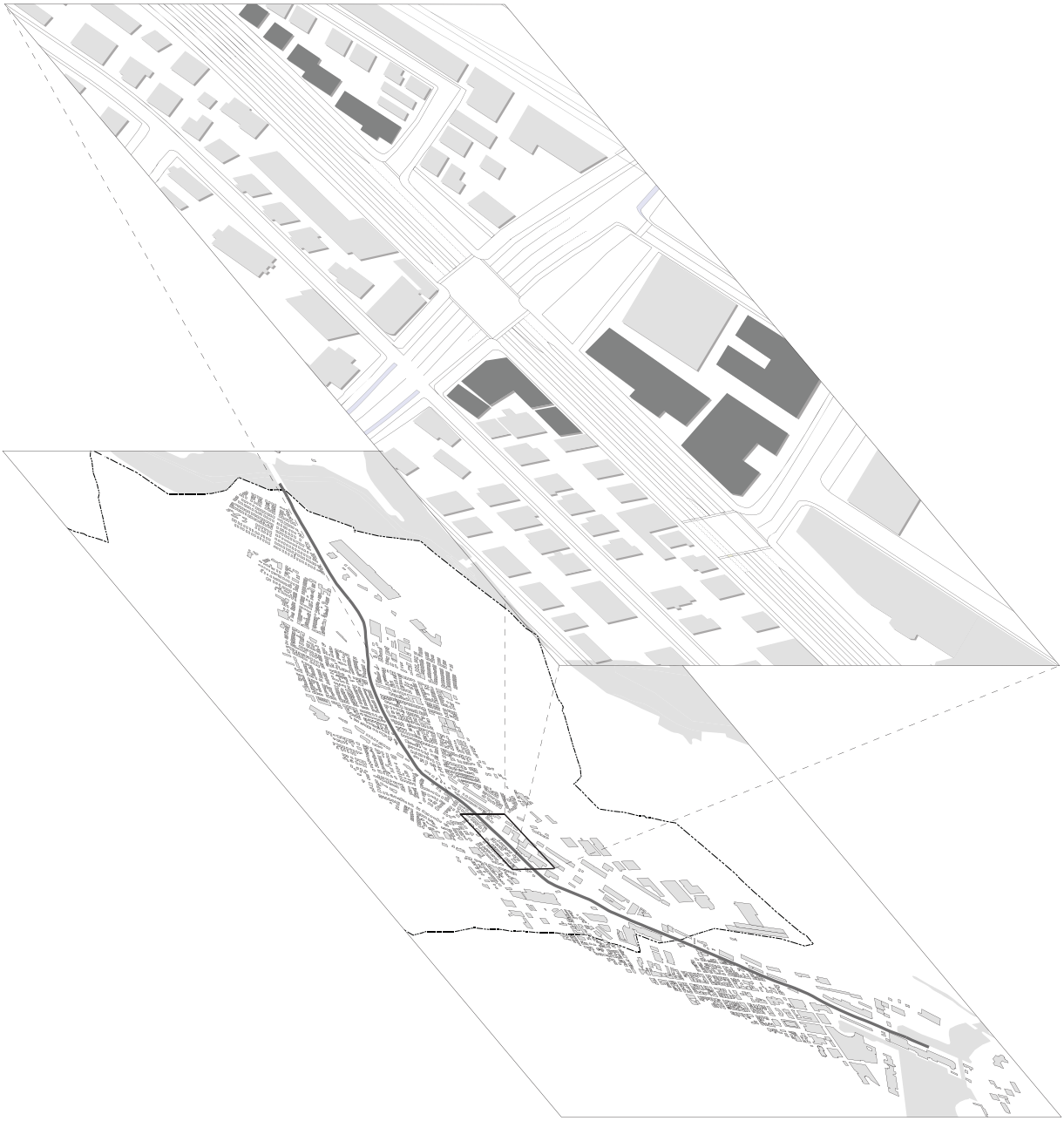
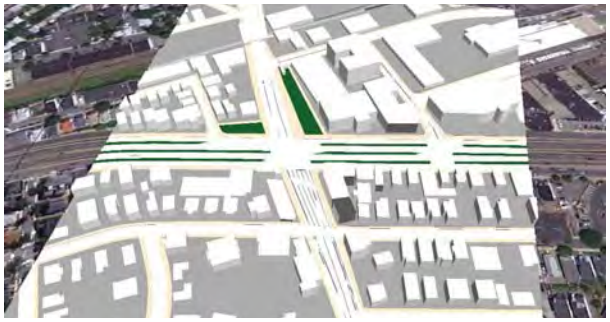
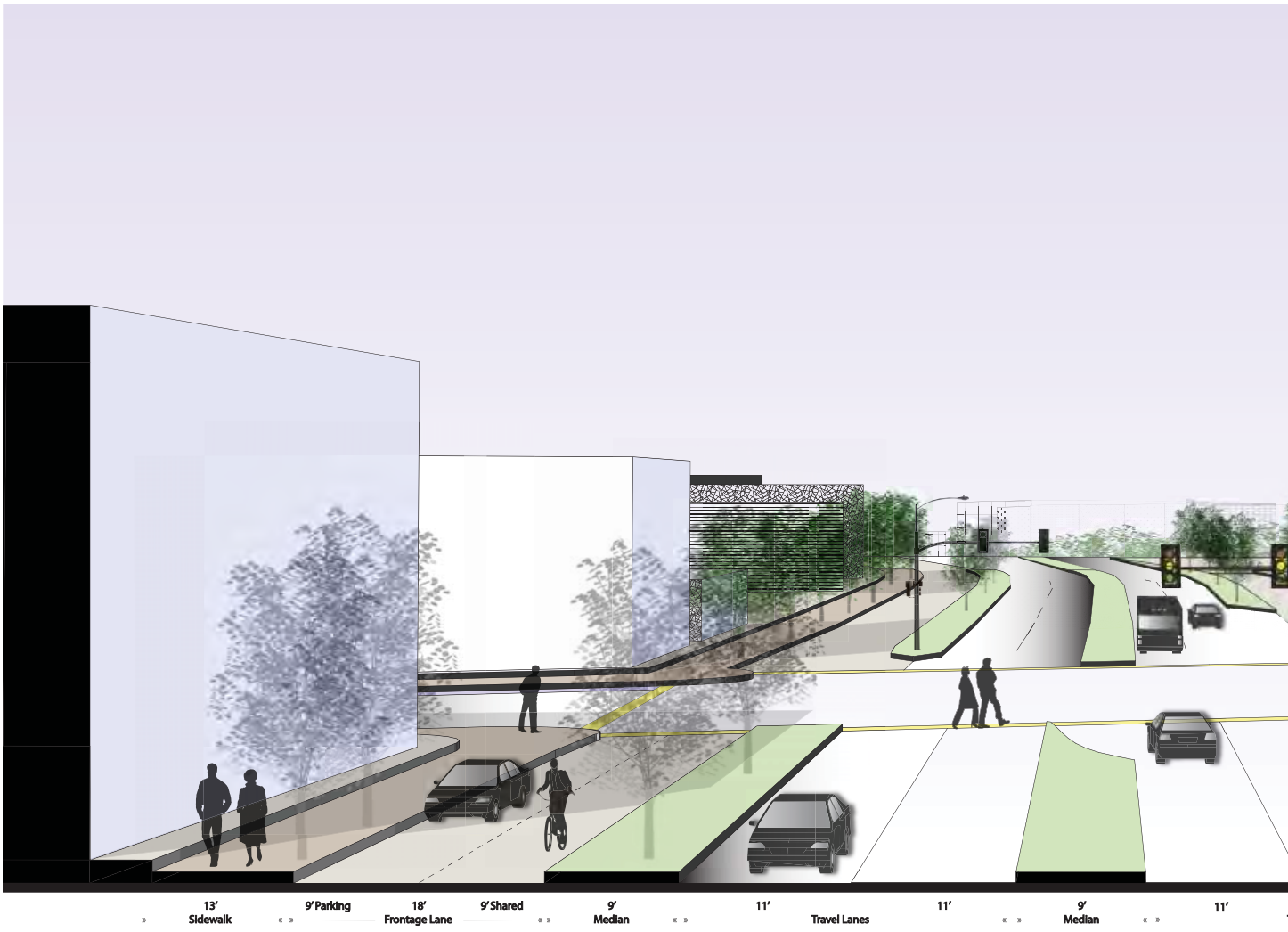


Figure 39: Intervention site context (above)
Figure 40: Model development (below)





9.3.1: Boulevard Option

One option takes inspiration from Octavia Boulevard and features four central travel lanes divided by a central median, catering to through traffic.

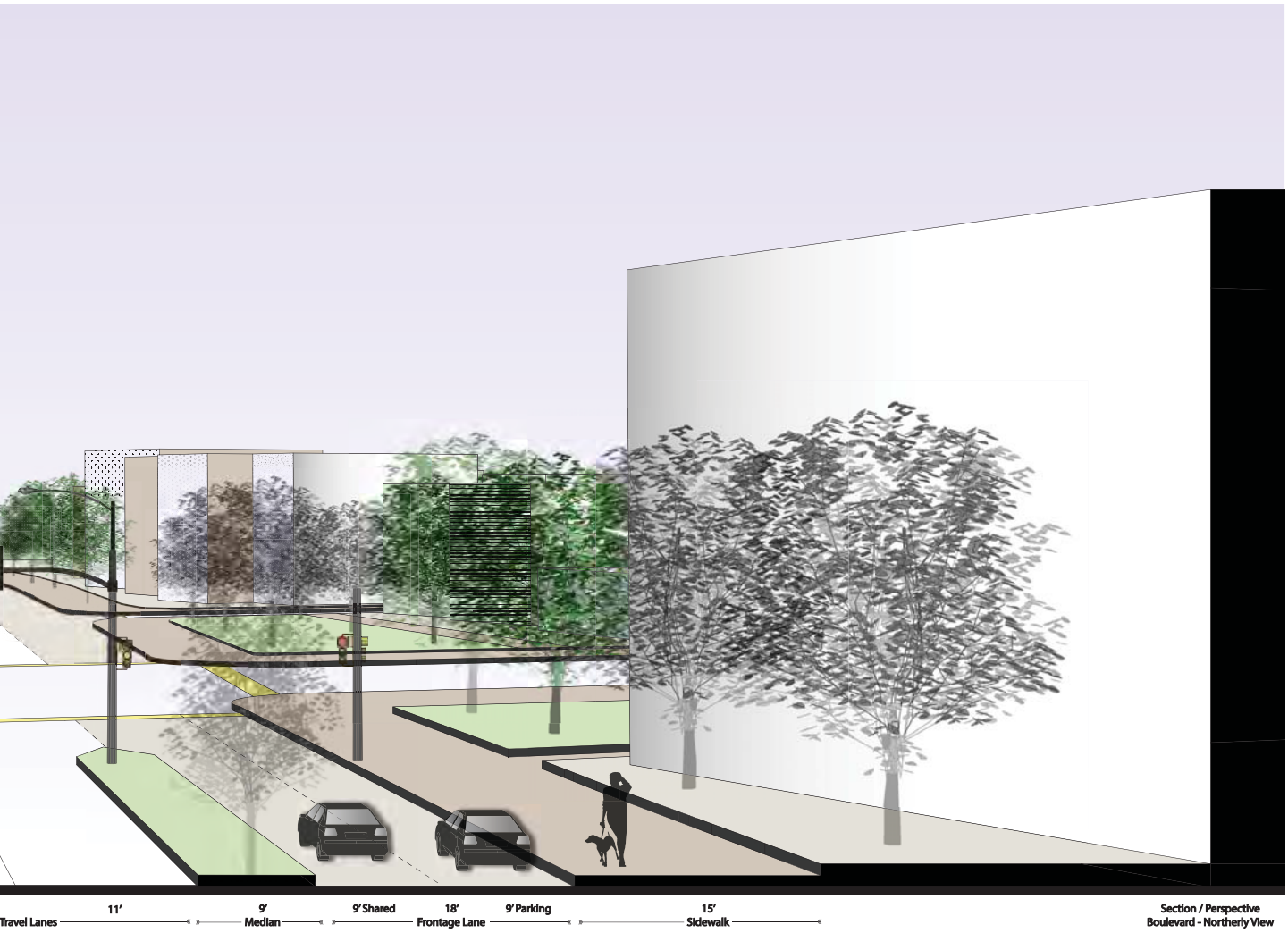


Figure 41: Boulevard option - typical cross section

On either side of this is a separate frontage lane providing local access, parking, and bicycle connectivity. Sidewalks are widened to 12-15 feet. The width of these and of the medians can be adjusted to fit the typology to the variable width of the corridor.

Intervention Site

To demonstrate this scheme in detail, I examined the intersection of Washington Street and McGrath Highway and its feeders, which include Washington Street leading towards Union Square; Washington Street leading under the rail corridor towards the Inner Belt; and what is currently the site of the viaduct leading north and south.

Figure 42: Intervention Site and Boulevard Plan

Rediscovered Space
This concept explores what possibilities exist when 'lost' space is reclaimed from the automobile and re-allotted to the pedestrian realm. The simplification of the roadway by removing the viaduct as well as its on/off ramps; by re-examining the need for large parking lots and converting them to on-street parking, and by rebuilding the street grid, significant space can be regained for new uses. The boulevard is not an all-in-one solution for reducing the auto-orientation of the boulevard; rather, land use changes **in**stigated by the infrastructural investment in the corridor will further shift the balance towards other modes over time.

Figure 43: Auto-domination and Pedestrian Inaccessibility

Rediscovered Space

This figure shows several of many stages over which pedestrian space might make gains over the area. The boulevard offers a huge first step in the process, providing ample sidewalks, safe crossings, and green/attractive streetscape where currently no such basic amenities exist. Following this, land use changes might enable the reclamation of some of the larger parking lots at the site, such as the one currently used by Autozone at the southeastern corner of the intersection. Upon the construction of the boulevard, this currently hidden corner suddenly becomes an important intersection, thus necessitating a land-use change. Later, land uses in the corridor spreads and additional streetscaping could branch out into the surrounding neighborhoods, as the importance of pedestrian activity gains in importance.

Figure 44: Regained Space

Building New Corners
In reclaiming space from the automobile, an incredible opportunity to build entirely new corners/intersections of activity results. Keeping the intersection as simple as possible – with narrow lanes and no extra traffic islands- maximizes the space available.

Figure 45:New Corners

Creating New Parcels

The scheme takes a cue from San Francisco in that it uses the least amount of space possible to accommodate through lanes, side lanes, and medians. The rest of it is agglomerated to create new parcels and recreate as much of the street grid as possible. These parcels could be developed to suit the City's needs in a way most appropriate for the context. With the Inner Belt broadly designated for future light-industrial and commercial enterprises, along the new boulevard transit oriented, higher-density affordable housing and mixed uses would be highly desirable.

Figure 46: New Parcels

Circulation - Green sight lines

At present, the viaduct severely inhibits circulation at the site. The circulation of the intersection is highly complex for automobiles and highly dangerous and nearly impassable for other pedestrians and cyclists.199 There furthermore is little reason for pedestrians from the dense Union Square and Cobble Hill neighborhoods to cross the corridor in the southeasterly direction, as this district is currently occupied by industrial and auto-oriented uses, with the exception of the Brickbottom Artists complex which adds some pedestrian traffic. However, with the construction of the new Green Line station at Brickbottom, significantly higher amounts of pedestrian and bicycle traffic must be accommodated and encouraged across the corridor.

Figure 47: Existing Circulation

199 Christina Pazzanese, "In Somerville, A Difficult Crossing to Bear," *Boston Globe*, 11 April 2011, http://articles.boston.com/2011-04-11/news/29407146_1_pedestrian-signals-crosswalks-intersection.

Circulation - Green sight lines
This scheme develops sight lines from the most densely populated and active neighborhoods (Union Square to the West; Cobble Hill/East Somerville to the northeast) towards the corridor and towards the new T station on Joy Street. Two linear parks along the boulevard pointing towards the new T stop on Joy Street. The green spaces themselves will serve as attractions/ landmarks and generate non-vehicular circulation into the corridor. They also immediately transform the streetscape of the corridor.

Figure 48: Proposed Circulation

Washington / Brickbottom T Stop location and orientation
The Brickbottom stop was proposed for a lot currently occupied by a parking/tow lot mid-block on Joy Street with a large, suburban style drop off area and the station set well back from the street, with much of it located over the tracks in combination with the platform (the tracks are elevated at this point so the station must be multi-level). This location was not yet finalized in the FEIR. My scheme suggests placing the station at the corner and orienting it with a strong edge along the street for maximum visibility. The design elements drawing circulation towards Joy Street will work with either location, though more effectively if the station is placed more prominently at the corner. Joy Street has ample capacity for street parking; a drop-off point can be added if necessary though I suggest a green space instead. The state recently announced a shift in the Brickbottom Station towards Washington Street embracing this opportunity, which increases the utility of redesigning the Washington Street/McGrath intersection as I have done here.

New Blocks / Grid

The new infill development located along the corridor is designed to break down the rather large blocks into more walkable sizes, in particular the one between Poplar Street and Washington Street. A street is added here to offer better access to the station and offer another option for a turn off McGrath Boulevard and into the neighborhood street grid at Brickbottom. This would require at least partial demolition of the large distribution type building currently sited there (occupied by U-Haul storage). Again, the street includes significant greening to transform the image of the area and give amenity to the residents across the boulevard who will now be able to cross and easily access the T via this route, rather than walking around a large superblock.

This intersection requires an additional light to allow for turns and for pedestrian crossing, which should be timed to correlate with the light at McGrath-Washington so it does not increase travel times on the boulevard. This new street would aid in circulation to and from the new station, allowing a loop to be made from the limited turns available off of McGrath. This loop could further aid bus service and turnaround for connections to the new station.

Figure 49: Alternative Station Location (As proposed by MBTA)

Vehicular Capacity

To aid vehicular circulation and simplify the intersection, turns are limited at Washington Street. I have suggested disallowing left turns from McGrath eastbound onto Washington. This reflects the concept at Octavia Boulevard in which turns were limited in the center lanes to reserve them for through traffic, mimicking the regional connectivity of the former freeway there, while the side lanes were reserved for local traffic and turns. My scheme aims to correct some of the issues with circulation in San Francisco, however. The through lane and the local lane have a merge area to enable right turns from the center lane. There is also a long merge area to enable easy circulation to Alston Street north of Washington.

Further study is needed to determine the traffic counts for vehicles desiring turns at the intersection, particularly given the added draw of the T station. I have included a turning lane from McGrath southbound towards Union Square to imitate the function of the exit lane currently serving that route; likewise I have included a left turn lane on Washington Street to provide for movement onto McGrath Highway and imitate the on-ramp that is currently provided there. There may be strong resistance to the idea of providing regular timed lights with turn arrows and pedestrian timers on the boulevard, since this concept is so different from the through traffic currently hosted on the viaduct. Once again, however, the boulevard design should be able to maintain current travel speed with proper light timing. The highway's intersections have already limited its capacity and speed; the pinch points further north at Medford Street and at Broadway eliminate further capacity or speed .

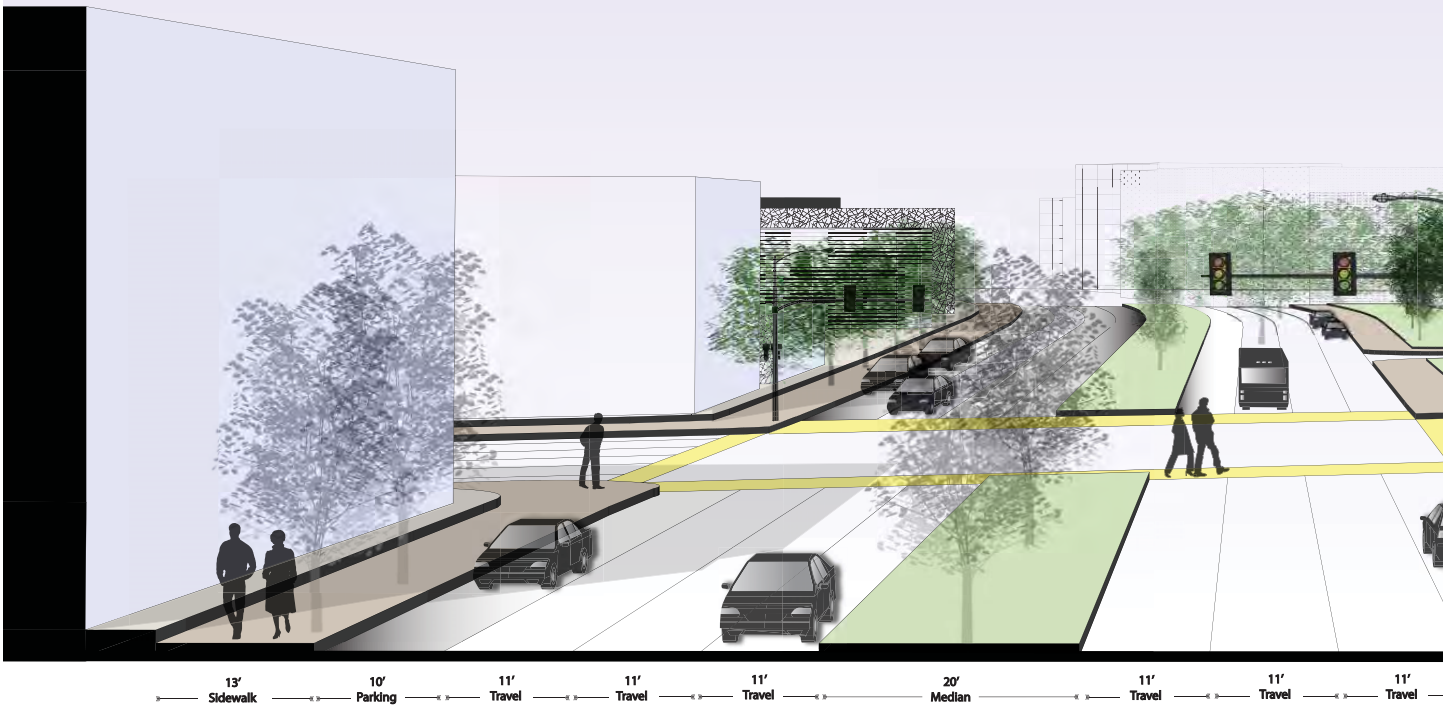
Bike traffic

The scheme proposes bike lanes along Washington Street to aid cross-corridor traffic. Within the boulevard itself, bikes share the frontage roads with local traffic in a low-speed environment. They are encouraged to use side roads or to follow the Washington Street bike lanes to the Community Path for better north-south connectivity.

9.3.2: Parkway Option

A "parkway" scheme offering many of the same benefits as the boulevard but with a different traffic profile, which is a parkway more similar to Mandela Parkway but incorporating more lanes/additional capacity similar West Street in New York City. Since it occupies a still narrower right of way than the boulevard concept, the parkway offers the same benefits in terms of Rediscovered Space, Building New Corners, Creating New Parcels Brickbottom T Stop location and orientation, and New Blocks / Grid.

Figure 50: Parkway Option 1- Linear Park



The parkway additionally builds on these with:

Additional Green Sight Lines
This option incorporates a similar right of way of 123' with a narrow footprint to allow space to the eastern side of the roadway to be redeveloped as a linear park. It also incorporates a wide median, with the idea that the wide of this space could be flexible to adapt this typology to the corridor's variable width. The space saved enables the same parcelization as the boulevard and also adds more area for linear green spaces to enhance the environment along the corridor.

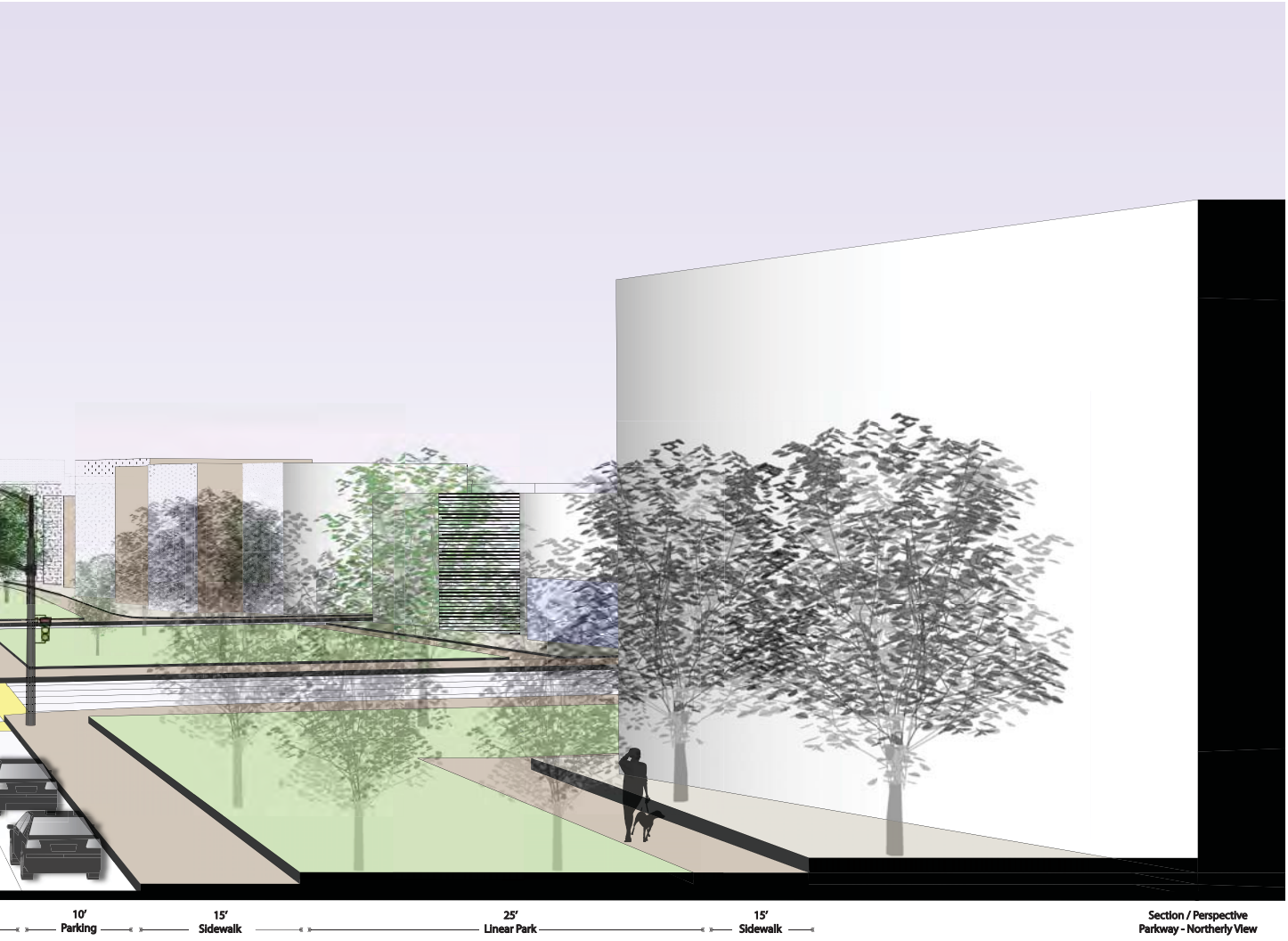


Figure 51: Parkway Option - Maximized Center Median

Vehicular and Non-Vehicular Capacity

This scheme simplifies intersections and traffic flows by omitting the local frontage lanes; this will be of benefit for the turning patterns and constricted lane space not only at the study area but also at Medford Street to the north. However, the omission of frontage lanes also means less of a buffer between traffic and pedestrians, cyclists, and surrounding neighborhoods. One benefit that the highway viaduct has provided to segments of the surrounding neighborhood is that it has indeed guarded them from noise and traffic, by lifting it up well above the residences. (See figures 29 and 30.) Several homes directly fronting the corridor between Broadway and Medford already have frontage roads sheltering them to some extent from the main congestion of the roadway. The design speed, speed limit, and timing of lights should aim to accommodate traffic at steady and reasonable speeds to avoid exposure to a large quantity of fast-traveling traffic similar to West Street in New York. Homes and businesses currently are sheltered from the traffic by the elevation of the highway (near Somerville Avenue) or by existing frontage lanes (near Pearl Street) will be resistant to this concept unless this is considered. Furthermore, it could be balanced by the amenity of additional green space gained by this typology; by concentrating the travel area and decreasing the space needed for medians, the parkway gains park space at the eastern side.

Figure 52: Parkway Plan

Parkway: Other Considerations

The lack of quiet frontage streets and the buffer they offer for adjacent residences, as well as the lower-speed environment for parking, cycling, and pedestrian traffic, is a concern. One method to offset these concerns could be to further confine the parkway to four lanes rather than the proposed six (including parking) with the extra land used to provide a more generous buffer and sidewalk, and/or additional depth in adjacent parcels. In this modified four-lane parkway, traffic would be constrained, encouraging more use of the Green line, and bicycles would be encouraged to use the nearby community path rather than use space on the narrow parkway. An option more similar to the Mandela Parkway design should be considered, with two lanes each way separated by a wide promenade, creating a green park-like image and amenity. In this case it would be essential to program active use and tree planting/landscaping in the promenade to ensure that it becomes an amenity and is not preyed upon for additional auto space such as left turn lanes.

The added benefit of this option is that it is more flexible in accommodating variable right of way widths, by adjusting the width of the median or linear park. It also would vastly simplify intersections currently marked by great complexity, such as at Medford Street, where large turning volumes would be better served by fewer lanes and 3- phase lights.

9.3.3: Other Schemes - Traffic circle

I considered a concept for a traffic circle to determine whether that would aid the connectivity at this intersection, and determined that it presented numerous challenges:

- Requiring multiple lanes and multiple lights to control traffic flows through the circle
- Large circle size needed as a result of multiple lanes
- Severe difficulty for pedestrian and bicycle crossings and connectivity to the T station
- Urban design challenges – removing the opportunity of new strong corners to give direction and identity to the intersection.
- Overall reducing the opportunity for change in image of the corridor, as a rotary could accommodate faster through traffic rather than a gridded, urban streetscape characteristic.

9.3.4: Other Schemes - BRT/LRT in corridor

Some constituents and designers have suggested incorporating mass transit directly into the corridor. At least one entry in the Brickbottom "Edge as Center" Design competition[200] proposed recreating the highway as multiway boulevard with light rail running down

200 Anya Bokov, Ed., *Edge As Center: Envisioning the Post-Industrial Landscape, Somerville Massachusetts. An international Urban Design Ideas Competition,* (Somerville: Mayor's Office of Strategic Planning and Community Development, 2007).

Figure 53: McGrath Highway at Washington Street, looking North: Before

the center, similar to the Embarcadero in San Francisco, or indeed similar to the original configuration of the highway back in the 1920s. Ellin Reisner also noted this suggestion, but revealed that MassDOT and the MBTA seems wholly disinterested in the concept, citing a dislike of surface tracks and a desire to utilize land already T-owned, namely the commuter rail rights of way.

The multiway aspect of the corridor presents the opportunity to possible offer preferential bus lanes in the future. Routes 80, 87, and 88 currently use McGrath Highway and with increased ridership and decreased vehicular modeshare, one of the center lanes could be reserved for bus use. However, many of these routes also parallel the Green Line extension and may be proven redundant. The proposed Urban Ring, a circumferential bus rapid transit line connecting Boston's inner suburbs, was also slated to run along part of the McGrath/O'Brien corridor, but the project is on indefinite hold pending funding. In addition, the proposal to connect the Urban Ring through Lechmere to the Inner Belt area and Sullivan Square via a new bridge over the Valley tracks and the community path, and auto grid penetration into the Inner Belt area would provide more benefit and should be

Figure 54: McGrath Highway at Washington Street, looking North: After, with boulevard option

developed and considered in the new study. The development of this parallel route is an important opportunity that might relieve the corridor of some of the access pressures it currently faces. Given the uncertainties surrounding the redesign of the bus network at this time then, including a BRT option into the McGrath/O'Brien boulevard replacement seems appropriate. Analysis may show that the space and speed characteristics of BRT in the boulevard would result in a pedestrian unfriendly environment—if, for example, it would require a still wider right of way or additional lanes to cross.

9.3.5: Comparison Option - Reconstructed Viaduct

Finally, a modified rebuilt viaduct option should be included for cost and aesthetic comparison. By eliminating the southbound off ramp to Somerville Avenue, considerable space could be recaptured without eliminating all of the viaduct.

All of these design options at Washington Street would interface to the north and south with intersection designs incorporating significant improvement in pedestrian amenity.

Planning Process and Next Steps

Creating a boulevard breaks with typical traffic engineering processes and the de-elevation constitutes a drastic change in character for the corridor and the community. Overall support seems broad thus far for the de-elevation and the implementation of a pedestrian-focused design, based on my stakeholder interviews, but planners will need to work to maintain and expand this support. As evidenced in the letters written in response to the 2008 corridor transportation master plan, serious concerns may be voiced over this drastic change. These first and foremost reflected possible resistance to the suggestion of reducing capacity. Plans must make the numbers of the anticipated modeshift clear to the public, and back them up with examples such as those discussed here, in order to assuage fears that traffic chaos will result. Furthermore the capability of a well-designed boulevard to handle considerable numbers of users will need to be emphasized; traffic counts at the McGrath/O'Brien are well within the range of those accommodated by precedents. Some of the concerns over reducing capacity have been and will be in reference to the low level of service currently characterizing the corridor's intersections. The planning documents will have to make clear that the capacity at these intersections cannot be increased, but that traffic calming, light timing, and lane simplification will better serve the traffic flows.

The calming of traffic within the corridor may also reduce the considerable congestion experienced at its terminus in Boston. The recent Craigie Bridge repair work enabled transportation officials to observe the removal of this linkage from the traffic network. They reported that "many of the highways and heavily used surface roads in the area performed as well as or even better than normal."[201] This is notable since the major alternative route in this instance was I-93, which seemed to easily accommodate the additional users. Studying the effects of further bridge repair on the network will reveal its flexibility and possibly enable planners to draw the conclusion that the McGrath/O'Brien redesign will demonstrate that the reduction of capacity on the McGrath/O'Brien will not have detrimental impact on other area roads. Plans should demonstrate that improved crossings and lower speeds will result in the same average corridor speed and improved facility for all modes.[202]

One voice that has as of yet not been investigated thoroughly is the small percentage of users, approximately 11% based on the traffic data discussed above, who use the road as an alternative to I-93 and travel the full length of the corridor as commuters from the northern suburbs to Boston. There are also some commuters coming from outside the "impact zone" of the positive attributes of the project, in Malden for example, who use the highway for

201 Eric Moskowitz, "Craigie Traffic Team Breathes Easier," *Boston Globe,* 09 November 2010, http://articles.boston.com/2010-11-09/news/29305124_1_control-room-detours-traffic.

202 Rather than the existing condition of slow intersection speeds / stops with bursts of significant speeds in between. I maintain that such irregularity in travel speed could be reduced by improving traffic signalization and simplifying intersections.

commuting to and from points north to jobs along the corridor itself. Will this group become more vocal as the project specifics become known? These users may become advocates of maintaining the throughway aspects of the highway. They will have to be convinced either that I-93 is a more appropriate route for their commutes, or they will want the boulevard to maintain enough capacity to continue to support some throughput. This latter option is not desirable since it is not intended that this boulevard become an at-grade pseudo-highway; part of its major benefit should be to discourage users who would be better served elsewhere. It may be that attempts to improve flow on I-93 would be a productive way to deal with the needs of this 11%.

A detailed timeline should be developed to estimate not only the design and construction process of the boulevard but also integrating the status of surrounding projects, including the Green Line Extension, the Charles River bridge projects, Mystic Avenue and other Somerville street redesigns, and large scale development efforts that will have significant impact on traffic.

The plans will have to build confidence /remind users of the significance of the Green Line and the resulting land use, circulation, pattern changes. They must also consider the phenomenon of "triple convergence" and of induced demand; unless a positive greened use of the space made available on the corridor is adopted, whatever capacity is shifted onto the Green Line will be taken up by other cars drawn by the new ease of travel on the roadway. Unless capacity is reduced, usage will remain the same because the empty space on the roadway will draw new drivers desiring a less congested, speedy alternative route. This is a key component of the theory of latent demand where drivers from other routes, other schedules, and other modes converge onto newly decongested roads.[203]

My analysis of the East Cambridge planning effort implies that considerably less attention is being given to its section of the corridor. The downsizing of the O'Brien cross section is important to retain pedestrian ease of access from the East Cambridge neighborhood to the Lechmere Station when it is moved to the far side of O'Brien Highway. This mitigation of the excessive auto intensity of the highway can be facilitated by the proposed changes to the street grid by emphasizing the lateral connectivity and permeability. This includes connecting North Point Boulevard to Inner Belt Road as advocated by proponents of the Urban Ring and the Community Path. By allowing autos to share this link, providing access into the Inner Belt area grid, some of the traffic pressure on McGrath/O'Brien will be redirected to an alternative path towards the hub of Sullivan Square—and will provide long-needed access to the Inner Belt area.

203 Downs, *Stuck in Traffic*..

It is important to success in Somerville that the benefits to East Cambridge and Lechmere of replacing the overpass with a surface boulevard be emphasized. Maintaining an viaduct format at McGrath Highway over Washington Street will continue to flood some intersecting streets like Medford Street and Gore Street with traffic by dint of their location at either end of the limited access section, as opposed to incorporating a grid format for better access circulation throughout. This is not to say that local roads could or should be given a new share of traffic, but rather that the removal of this limited access would simplify the circulation, allowing easier local routes and encouraging the use of other modes through this increased connectivity. Without such a redesign, the quality of the pedestrian access between East Cambridge, the new Lechmere Station, and NorthPoint would be permanently damaged.

The de-elevation study is underway, and community meetings will begin in Summer 2011. These meetings will include the stake holders discussed above as well as additional parties invested in business development in the area and those who have been involved with the Green Line extension already. The quantitative results of the study will determine what option is the best match for the roadway, but the qualitative input from meetings with determine the most context appropriate solution. I would contend that my proposal for a greened boulevard meet both of these and that they additionally make an important statement by the City of Somerville on its priorities for quality of life and environmental quality.

10: *Conclusions: Towards a Larger Theory of Roadway Right-Sizing*

This thesis explores the underlying trends and methodologies of highway removal, examines several case studies, and then applies these findings to a proposed redesign of McGrath/O'Brien highway. The history of highway construction and removal in American cities shows a trajectory of rapid increase and then decline of this roadway typology. The increasing numbers of projects and multiple proposals for highway removal speak to a larger trend of downsizing/right-sizing and quality of road design rather than a sole focus on throughput. This is the era of highway rationalization, an extension and crystallization of purpose extending from the age of highway revolts. This trajectory has been complimented by new and more context-appropriate guidelines for transportation planning and increased cross-pollination between urban planning and traffic engineering disciplines.

Studies increasingly show that roadway capacity reduction is a successful traffic management strategy, with numbers from case studies in San Francisco, New York, and Portland supporting the concept of traffic network flexibility and demand elasticity. This is an area that requires additional research, including studies to confirm facts about the theory of latent demand, transportation network gravity model characteristics, and the elasticity of capacity demand in roadway systems. In spite of increasing interest in highway removal, capacity reduction, and the resurgence of urban boulevards, breaking with the model of assumed traffic growth remains a controversial proposition in transportation planning and the availability of stronger evidence on these theories will greatly benefit proponents of roadway right-sizing.

This, in turn, may be able to better define how best to encourage mode shift from single occupancy vehicles to other modes. In general, more ex-post evaluations of projects with a predicted impact on mode share will be of great benefit to future projects and in establishing a rate of efficacy for these efforts. A tandem ex-post evaluation of the Green Line and McGrath Highway project may reveal how travel characteristics change and surveys can determine why users did or did not switch modes and how they reacted to the changes in the area.

In the case of the McGrath and O'Brien Highway, the physical deterioration of the elevated structure and imminent need to expend large amounts of money to rebuild the structure, in combination with scarcity of infrastructure funding, creates a 'policy window' in which replacing the elevated highway with an at-grade boulevard is a feasible outcome. The

presence of recently increased capacity on nearby I-93, and the imminent extension of the Green Line strengthen the case for this strategy. However, the quality of the design of the replacement boulevard for multiple users and abutters of the corridor will be the ultimate test of whether the boulevard will be a successful outcome for the Somerville and Cambridge.

In turn, McGrath may serve as a precedent for future reexaminations of similarly degraded roadways in the Boston metropolitan area. Beyond Somerville, for dozens of miles of degraded routes, such as Revere Beach Parkway, which do not have the fortuitous conditions of adjacent highway capacity or transit corridors, a similar green boulevard intervention will be more difficult to achieve political support. But a dramatic success in Somerville and Cambridge may serve as inspiration and motivation for increasingly bold interventions in other older suburbs.

Research currently under consideration at MIT focusing on the same geographic area as this thesis includes an examination of possible land use shifts caused by the Green Line Extension as well as an extensive traffic model of Somerville's traffic network to determine impacts that the multiple projects in this area will have on circulation. This thesis may serve as an opening statement and framework for planning concerns in the area and what may be expected based on the local and national history of highway planning and on precedent projects.

Further research on the resulting impact on urban form that these redesigns may enable – through increased density, new traffic patterns, and shifted land uses— will provide insights in the future of the older suburbs and inner cities burdened by these highways. The redesign of corridors such as the McGrath/O'Brien highway holds the power to impact large districts in older sections of American cities that have long been overburdened by infrastructure of little benefit to residents. Such older, denser suburbs are a key area for improvement since their density and location could enable a highly walkable, sustainable urban environment. Implemented on a broad scale, such infrastructural reorientation may have a profound impact on the future form of cities, enabling additional infill and greater density in areas that otherwise would remain inaccessible and lacking in quality of life.

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