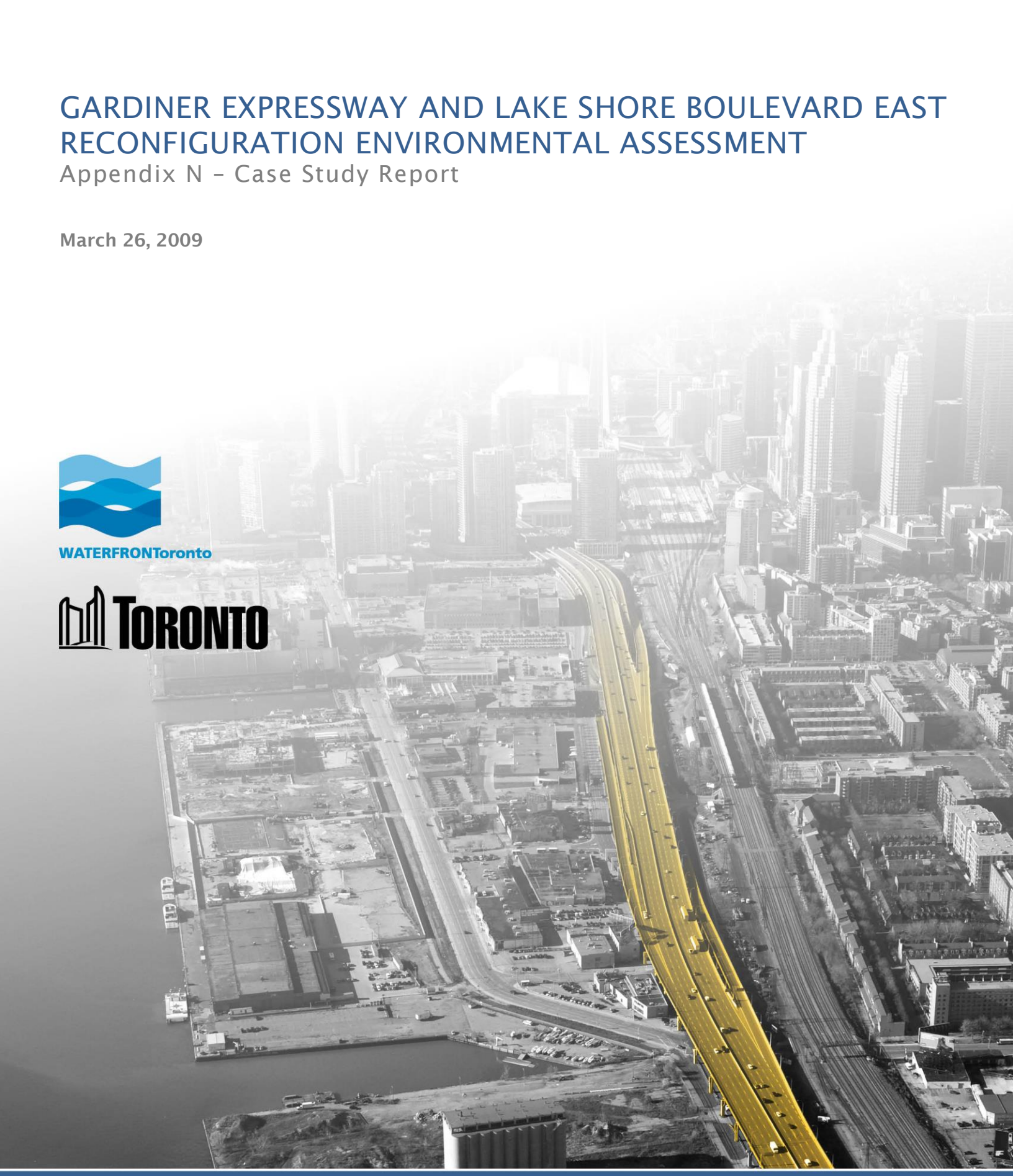
GARDINER EXPRESSWAY AND LAKE SHORE BOULEVARD EAST RECONFIGURATION ENVIRONMENTAL ASSESSMENT

Appendix N – Case Study Report

March 26, 2009



WATERFRONToronto

TORONTO

DILLON CONSULTING

HARGREAVES ASSOCIATES

MORRISON HERSHFIELD

PERKINS + WILL

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Introduction

In March 2009, Waterfront Toronto and the City of Toronto initiated a study entitled "Coordinated Provincial Individual / Environmental Assessment and Integrated Urban Design Study Gardiner Expressway and Lake Shore Boulevard Reconfiguration." A team of consultants, led by Dillon Consultants, will study the future of the Gardiner Expressway and Lake Shore Boulevard in the context of the overall redevelopment of Toronto's waterfront. As a first task in this process, the consultant team prepared the following case study report.

This report is composed of 12 case studies of highway reconfiguration from around the world. The cases describe a range of approaches for both transportation planning and urban design related to highway removal as well as potential costs and benefits of such projects.

A common theme in many is that cities often consider highway removal when infrastructure becomes functionally obsolete. This occurs either at the end of its useful life or after natural disaster.

Another theme is that highway removal decisions are usually made in the context of a significant shift of priorities. City leaders and citizens alike begin to prioritize the goals of sustainable urban development over those of auto-mobility. This latter lesson may have particular resonance for Toronto and the Gardiner Expressway.

The case studies collected here serve multiple purposes:

First, the cases illustrate potential alternative design and development scenarios. The current Gardiner Expressway study will consider multiple alternatives. We looked to see how other cities have approached similar contexts.

Secondly, the cases offer urban design strategies from which we can learn. What are the most innovative ideas for redeveloping land reclaimed by highway removal? How have cities improved conditions around highways they've decided to live with?

Lastly, some of the cases describe how to develop an integrated design approach to highway removal. An integrated approach identifies the full range of issues and opportunities – from urban design to open space, economic development to the environment. The least imaginative projects are those that consider the problem only from the perspective of transportation.

Nearly all of the case studies share a common context with the Gardiner. They separate a downtown from its waterfront. The cases also are, for the most part, from this past decade. While historically significant, the trio of early and already well-documented highway removal projects – Harbor Drive in Portland, OR; the Park East Freeway in Milwaukee, WI; and Boston's "Big Dig" – are not included here.

While the cases tell us what can work in highway removal, at the same time some cases have lessons about what doesn't work and strategies to reconsider.

The case studies were researched using a range of documentation, including design reports, environmental impact statements, newspaper articles, and personal interviews. For each, information was gathered in four categories: urban design, open space, transportation, and economic development. While each case is described in detail, key information and big ideas are summarized in a matrix at the end of the report.

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Scale Comparisons

Scale Comparisons

A8ern8
- Zaanstadt, The Netherlands, 0.4 km (0.25 miles)

Bonaventure Expressway
- Montreal, QC, 1 km (0.6 mile)

Whitehurst Freeway
- Washington, DC, 1.2 km (0.75 miles)

Buffalo Skyway
- Buffalo, NY, 1.6 km (1 mile)

Sheridan Expressway
- Bronx, NY, 2 km (1.25 mile)

Viaduct des Arts
- Paris, France, 2 km (1.25 miles)

Gardiner Expressway
- Toronto, ON, 2.4 km (1.5 miles)

Embarcadero Freeway
- San Francisco, CA, 2.5 km (1.6 mile)

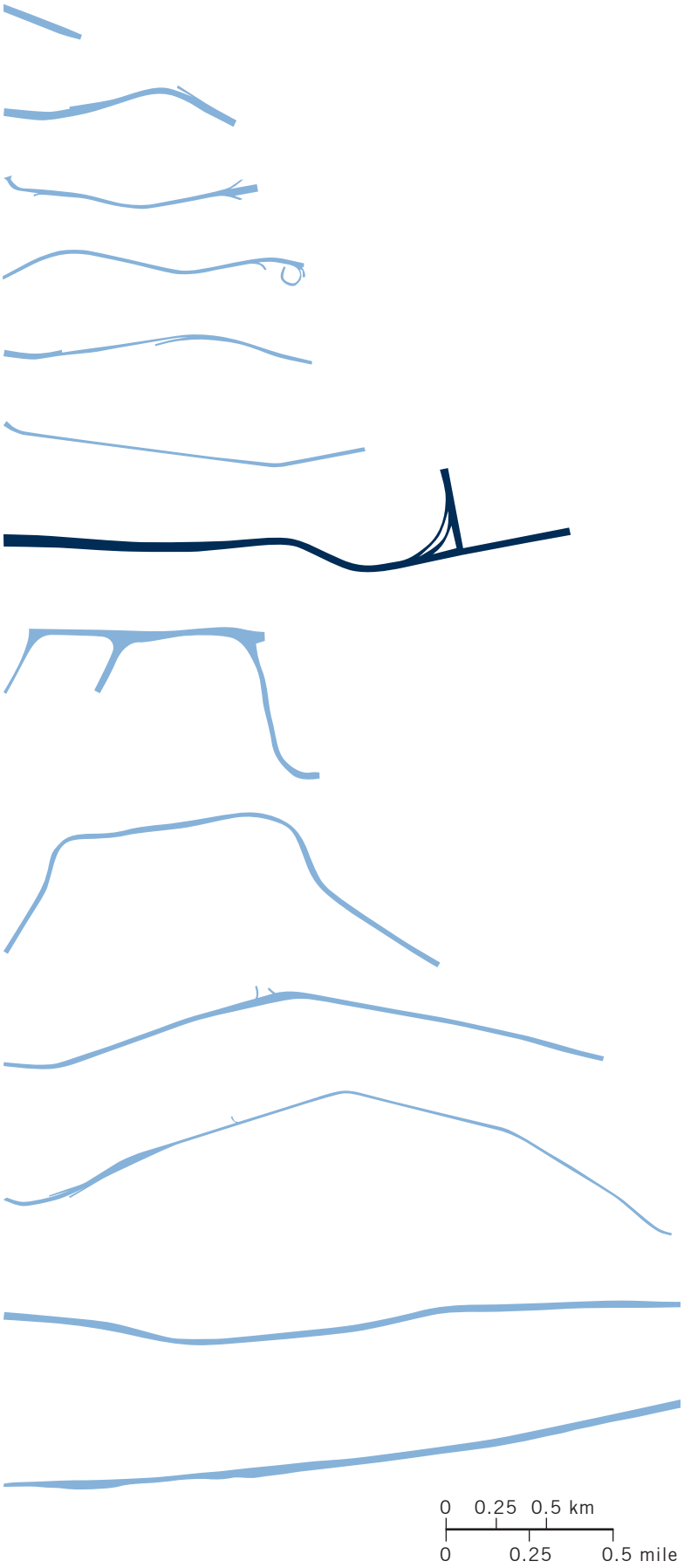
Riverfront Parkway
- Chattanooga, TN, 2.7 km (1.7 mile)

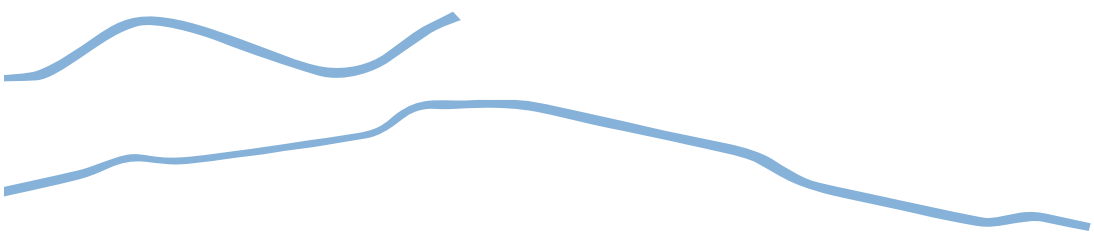
East River Esplanade
- New York, NY, 3.2 km (2 miles)

Alaskan Way Viaduct
- Seattle, WA, 3.2 km (2 miles)

Cheonggyecheon Expressway
- Seoul, Korea, 6.1 km (3.75 miles)

West Side Highway
- New York, NY, 8.2 km (5 miles)





Scale Comparisons

Gardiner Expressway – Toronto, ON

- Year built: 1965; Length: 2.4 km; Vehicles per day: 120,000

Viaduct des Arts – Paris, France – "Ameliorate"

- Year built: 1850s; Length: 2 km; Vehicles per day: N / A

Buffalo Skyway – Buffalo, NY – "Do Nothing"

- Year built: 1966; Length: 1.6 km; Vehicles per day: 43,400

East River Esplanade – New York, NY – "Ameliorate"

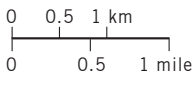
- Year built: 1954; Length: 3.2 km; Vehicles per day: 175,000

Whitehurst Freeway – Washington, D.C. – "Do Nothing"

- Year built: 1949; Length: 1.2 km; Vehicles per day: 45,000

A8ern8 – Zaanstadt, The Netherlands – "Ameliorate"

- Year built: 1970s; Length: 0.4 km; Vehicles per day: N / A

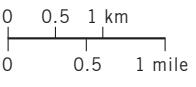


Alaskan Way Viaduct – Seattle, WA – "Replace"

- Year built: 1959; Length: 3.2 km; Vehicles per day: 110,000

West Side Highway – New York, NY – "Remove / Replace"

- Year built: 1937; Length: 8.2 km; Vehicles per day: 140,000



Scale Comparisons

Bonaventure Expressway – Montreal, QU – "Remove"

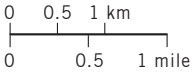
- Year built: 1967; Length: 1 km; Vehicles per day: 55,000

Embarcadero Freeway – San Francisco, CA – "Remove"

- Year built: 1957; Length: 2.5 km; Vehicles per day: 80,000

Sheridan Expressway – Bronx, NY – "Remove"

- Year built: 1962; Length: 2 km; Vehicles per day: 40,000

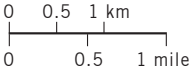


Cheonggyecheon Expressway – Seoul, Korea – "Remove"

- Year built: 1958-76; Length: 6.1 km; Vehicles per day: 120,000

Riverfront Parkway / 21st Century Waterfront – Chattanooga, TN – "Remove"

- Year built: 1960s; Length: 2.7 km; Vehicles per day: 20,000



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Alternatives

Alternatives

The 12 case studies that follow are categorized into four alternatives: Do Nothing, Replace, Ameliorate, and Remove.

An alternative presents a conceptual way to solve a given problem. With respect to the Gardiner Expressway, alternatives propose different approaches for reconfiguring Toronto's street and transit network.

Waterfront Toronto developed four alternatives during earlier Gardiner Expressway and Lake Shore Boulevard studies. The alternatives provide initial points of consideration for the current Gardiner Expressway study. The following describes the alternatives, as defined by Waterfront Toronto:

Do Nothing

- "Maintain the existing road infrastructure in the Gardiner Expressway and Lake Shore Boulevard areas."

The "Do Nothing" alternative represents a continuation of the "status quo" with respect to maintenance costs and traffic volume.

Replace

- "Remove the existing elevated expressway and replace its express function with a different type of grade-separated facility, above- or below-grade."

Ameliorate / Retain

- "Maintain the existing elevated expressway, but modify the ramps and Lake Shore Boulevard to create a better urban environment."

Remove

- "Remove the elevated expressway without replacing the grade-separated express function and replace instead with an at-grade boulevard."

Whereas the four alternatives above represent the current study's starting point, additional alternatives may be considered. Each alternative will integrate proposals for road and infrastructure reconfiguration with public transit and pedestrian solutions, open space and public realm design, and redevelopment opportunities.

Gardiner Expressway in downtown Toronto.

The following describes additional alternatives illustrated by the 12 case studies. These case study alternatives may offer ideas for new unique alternatives or design variations on the four initial alternatives.

Rebuild

- Highway removal studies have been initiated when elevated structures have become unsafe or damaged either by natural disaster or reaching the end of useful life. This was the case, in particular, after earthquakes in San Francisco and Seattle.

  In these instances, alternatives to reconstruct and reestablish an elevated highway's structural integrity were considered. This alternative maintains the "status quo".

Remove Plus

- In some case studies, highway removal offered opportunities to create new large-scale public amenities or reclaimed land for redevelopment. In Seoul, Korea, for example, the Cheonggyecheon Expressway was replaced with a 6-kilometer (3.75 miles) linear park.

Reduce

- A key issue in highway removal studies is whether future scenarios should accommodate traffic volumes (vehicles per daily) at or above existing levels. In some case studies, however, the preferred alternative reduced traffic capacity.

  In Chattanooga, Tennessee, for example, studies showed that an existing parkway had excess capacity. A new boulevard, therefore, was designed to accommodate lower traffic volumes than the demolished highway.

Infill

- Studies to remove waterfront elevated structures have considered the opportunity to modify the waterfront edge through infill.

  An example is the Westway proposal for Manhattan's Hudson River waterfront. It proposed replacing an elevated highway with a tunnel buried underneath infill – thereby adding 178 acres of new waterfront land.

Air-rights

- New construction on elevated highway air-rights has also been considered. Studies for the East River Esplanade, for example, considered building new residential towers over F.D.R. Drive on Lower Manhattan's east side.

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Comparative Analysis

Comparative Analysis

KEY CASE STUDY LESSONS

- Solutions come in different shapes and sizes.
- Transportation solutions should be seen through the lens of city-building and quality of life.
- Transportation uses are continually evolving – changes in demographics, economics, and lifestyle effect traffic demand.
- Traffic demand can be managed.
- Transportation infrastructure offers extraordinary opportunities for design, creativity, and new public realm.
- Infrastructure does not have to be single-purpose or boring.
- The public sector must be strategic in order to capture value of investments in infrastructure to serve both community and development goals.
- City-building projects of this magnitude require vision and active commitment at the highest levels of leadership – mayors, governors, and city councils. Moreover, the full range of stakeholder input, from support to opposition, must be understood and responded to substantively.

The Gardiner Expressway is 2.4 km long (1.5 miles) elevated highway. Its construction was completed in 1966. The six-lane highway (three lanes in both directions) carries 120,000 vehicles per day in the area between Jarvis Street and Leslie Street.

The Gardiner passes through mostly industrial land on the Lake Ontario waterfront. The area includes East Bay Front and Lower Don Lands, two precincts currently being planned by Waterfront Toronto. A railroad embankment forms a barrier between these precincts and three medium-density, mixed-use neighborhoods upland – St. Lawrence, the Distillery District, and West Don Lands.

In terms of scale and urban context, the Gardiner Expressway is most similar, among the case studies, to the Embarcadero Freeway in San Francisco; Bonaventure Expressway in Montreal; Alaskan Way Viaduct in Seattle; and F.D.R. Drive in New York City.

The 12 case studies in this report were analyzed from the combined perspectives of urban design, open space and public realm, transportation, and economic development. Applying these four lenses revealed overall lessons that may resonate for the current Gardiner study. These lessons follow.

It is important to note that whereas about half of the case studies are built, others are still in planning and design stages. In this way, the cases offer both lessons from implementation and inspiration for design ideas.

Solutions come in different shapes and sizes.

The case studies reflect a diversity of approaches – which suggests there is no single strategy for addressing elevated highway issues. Design and development strategies undertaken by cities depend on physical context, transportation needs, public realm goals, and available resources, among other factors.

New York City, for example, had over US $1 billion in federal funds available to create a 8.3 km (5 mile) urban boulevard. The boulevard is abundantly landscaped and includes a bicycle greenway. In contrast, the Amsterdam suburb Zaanstadt took a more modest approach. It choose to live with an elevated highway by improving the space underneath with a grocery and recreation programs. The project cost □2.7 million.

Though these solutions have different scales and costs, both became equally significant public gathering spaces for their respective city.

Transportation solutions should be seen through the lens of city-building and quality of life.

Elevated highway removal decisions are conventionally measured against transportation criteria – level of service, travel time, etc. However, ambitious cities like San Francisco and Montreal have viewed their highways from a different perspective. They have set goals for waterfront access, public realm, transportation, sustainability, and development, then accessed how their highways will have to change to achieve these greater urban goals.

Transportation uses are continually evolving – changes in demographics, economics, and lifestyle effect traffic demand.

The highways of the mid-20th century, particularly in the United States, were designed with specific goals in mind. One key planning agenda was to connect downtowns to suburbs. Planners also sought to link industrial waterfronts to the new interstate highway system.

In some cases studied, city agencies found that these historic goals no longer apply. Moreover, while there is always concern about urban highway congestion, sometimes traffic demand actually decreases over time.

In Chattanooga, for example, Riverfront Parkway no longer served as a though-route for industrial trucking in the Tennessee River

Valley as it did in the 1960s. In fact, the parkway had excess capacity. Redesigning the road as an at-grade boulevard did not therefore produce congestion downtown.

Traffic demand can be managed.

The most successful highway reconfiguration projects complement changes to expressway functions with new transit infrastructure and policy. Traffic demand strategies range from increased public transit to user fees for parking, from incentives for alternatives to commuting by car to congestion pricing.

Seoul, for example, complemented the demolition of the Cheonnggyecheon Expressway – which carried 120,000 vehicles per day – with new bus rapid transit. Seattle will add new light rail when the Alaskan Way Viaduct is replaced with a tunnel. These improvements not only encourage mode shift (from car to public transit, for example), but set the stage for reducing carbon emissions.

Transportation infrastructure offers extraordinary opportunities for design, creativity, and new public realm.

Highway reconfiguration provides rare opportunities for cities to strengthen waterfront connections and create new public realm there. At the same time, some cities have learned that they need not always turn their back to infrastructure.

New York City is developing a new public esplanade under the elevated F.D.R. Drive in Lower Manhattan. Through lighting, program diversity, surface materials, and noise-attenuating cladding, the space under the highway will be transformed into an inviting, active space. Moreover, innovative design will give the East River Esplanade a unique character, making it a one-of-a-kind public space in the city.

Infrastructure does not have to be single-purpose or boring.

Cities are transforming both de-commissioned and active infrastructure into new civic landmarks and unexpected spaces for urban activity. Paris closes the Georges Pompidou Expressway in summer to create an urban beach along the banks of the Seine. Both Paris and New York have re-imagined elevated railroads as linear parks. The design of the High Line in New York integrates landscape with an iconic industrial-era elevated structure.

The public sector must be strategic in order to capture value of investments in infrastructure to serve both community and development goals.

Public investment in highway reconfiguration and removal creates benefits – from development parcels to increased property values to improved quality of life. The public sector must act strategically in order to capture this value. In Montreal, for example, parcels created by removing the Bonaventure Expressway will be sold to the private sector for mixed-use development. Highway removal will also enhance the value of recent redevelopment in the neighboring *Cite Multimedia*.

Conversely, opportunity costs accumulate when decision-making processes drag on. In Seattle, real estate speculators acquired properties along the Alaskan Way Viaduct during a decade of transportation studies. The public sector lost the opportunity to acquire these properties itself, then increase revenue through disposition.

City-building projects of this magnitude require vision and active commitment at the highest levels of leadership – mayors, governors, and city councils. Moreover, the full range of stakeholder input, from support to opposition, must be understood and responded to substantively.

City leaders need to support and advocate for integrated approaches to infrastructure design. Their vision must embrace the full range of urban design, public realm, transportation, and economic development opportunities. Visionary leadership is complemented by an informed and engaged public that has an active role in developing design solutions.

The Gardiner Expressway and downtown Toronto viewed from the south-east.

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Case Studies

Replace

Alaskan Way Viaduct, Seattle, WA

Background

The Alaskan Way Viaduct is a 3.2 kilometer (2 mile) four-lane double-stacked elevated highway (two one-way lanes on each level) along Elliot Bay in downtown Seattle.

Constructed in 1959, the viaduct approaches downtown Seattle from the south. It creates a physical barrier between Seattle's baseball and football stadiums and its port area. The viaduct mostly serves local traffic, which by-passes downtown on the way from Seattle's north and south neighborhoods. The viaduct also limits access to the Elliot Bay waterfront from downtown.

An earthquake in 2001 damaged the structure's joints and columns. Following the earthquake, the viaduct also settled, raising alarm that Seattle's seawall sustained damage as well. It was determined after the earthquake that removing or replacing the viaduct would be more cost effective than a retrofit.

Because the Washington State Department of Transportation (WSDOT) owns the viaduct and the City of Seattle owns the seawall, removal and replacement studies were jointly initiated. A range of alternatives – from an urban boulevard to a cut-and-cover tunnel similar to portions of Boston's Big Dig – were analyzed.

Parking is a common use under the Viaduct.

The Alaskan Way Viaduct separates downtown Seattle from the waterfront.

Alaskan Way Viaduct Section – Before (Existing)

The Governor announced in early 2009 that the viaduct will be replaced by deep bored tunnel under downtown Seattle. This alternative was not evaluated in the EIS. Cost for the bored tunnel is estimated at US $4.24 billion.

Urban Design

The Alaskan Way Viaduct, in particular because it is a double-decker structure, is thought to reduce the quality of the downtown environment and potential port-area development value. Its visual impact on Steinbreuk Park is especially felt, since this open space is symbolically important to both downtown and the city.

Most land in the downtown waterfront area is privately-owned. While some development parcels will be created, the City of Seattle does not stand to significantly re-capture public investment value through land disposition. Direct economic benefits to the City would come through increased tourism and rising property values.

The viaduct also poses a sharp environmental challenge to Seattle – maintaining current traffic volumes on the viaduct will likely exceed state carbon reduction goals, some of the most ambitious in the U.S.

The study's urban design objectives were mostly related to existing waterfront land use plans. Pedestrian and bicycle access were key goals, as well enhanced waterfront and mountain views. All alternatives studied how to create waterfront pedestrian realm and whether bringing the viaduct to grade might, in fact, diminish existing pedestrian realm.

The viaduct is an aging infrastructure. For this reason, safety and design deficiencies – for example, 3-meter-wide (10 feet) lanes – were key concerns. Yet transportation strategies revolved around a key question. Should viaduct redesign accommodate existing traffic volumes – 110,000 vehicles per day – or encourage mode shift?

Existing condition under the Viaduct.

Rendering of proposed condition.

Alaskan Way Viaduct Section – After (Proposed)

All alternatives were designed for multiple modes, including light rail. However, alternatives posed markedly different replacement approaches. On the one hand, investment could be made in a large infrastructure solution. On the other, many smaller street reconfigurations and transit projects might fulfill the City's needs.

Process

Six alternatives were studied: no build; "rebuild" – rebuild a section of the elevated structure and replace the rest with an urban boulevard; "aerial" – rebuild the entire elevated structure; "tunnel" – two alternatives with varying capacity; and "surface" – a new urban boulevard.

These were combined and narrowed to two alternatives: a tunnel with a four-lane at-grade boulevard and an elevated structure with a six-lane at-grade boulevard.

Public dialogue about the Alaskan Way Viaduct focused primarily on congestion. In a 2008 ballot initiative, the public rejected both alternatives. Media suggested voters were influenced by the specter of the Big Dig.

Ultimately, decision-making authority lay with the state. The deep bored tunnel is the most expensive alternative and has limited lane width and access ramps. However, it will allow for minimal disruption during construction (as compared to cut-and-cover technology). The state will assume US $2.81 billion of expenses for the tunnel. The city and port will pay for seawall reconstruction. The project is estimated to create 10,000 jobs over 10 years.

Throughout the eight-year process, the city lost opportunities to capture incremental value the project would potentially create. Real estate speculators began purchasing land within the viaduct corridor that might have come under city-ownership.

LESSONS OF THE ALASKAN WAY VIADUCT

- Choice of technology played a key role in political decision-making. Yet while the deep bored tunnel and urban boulevard will enable significant urban design improvements, it requires massive resource allocation and trade-offs – over US $4 billion.
- Choice of technology also posed transportation trade-offs. Lane widths are constrained and there are limited ramp connections.
- All alternatives considered design implications for integrating multiple transportation modes, including light rail, pedestrian, and bicycle.
- Development and value capture opportunities were lost to the City throughout the prolonged study process.

West Side Highway, New York, NY

Replace / Remove

Background

The West Side Highway extends for 8.2 kilometers (5 miles) from 58th Street to Battery Park along Manhattan's Hudson River waterfront.

Construction of the West Side Highway was completed in 1937. The new elevated highway with an at-grade street below serviced river piers and adjacent manufacturing and distribution districts. A section of the highway collapsed in 1974, closing it to traffic and opening a twenty-year debate on the West Side's future.

The Mayor, Governor, and other city leaders shortly-thereafter advocated for the Westway. This massive project, designed by Venturi Scott Brown, proposed 220 acres of redevelopment, all funded with federal and state transportation grants. A tunnel under 178 acres of landfill would replace the highway. Open space and new housing would be constructed on the fill. Legal battles, however, stalled the project until 1985, when the City diverted the funds to other transportation projects.

US $690 million remained for the West Side Highway's reconstruction. In 1987, the City developed a new plan for an at-grade six-lane boulevard (three lanes in each direction), which was completed in 2001.

Urban Design

The Westway and final West Side Highway Reconstruction Project reflect two different, era-specific planning approaches. Whereas the Westway is more aligned with large-scale urban renewal, the eventual West Side Highway reconstruction illustrates a more

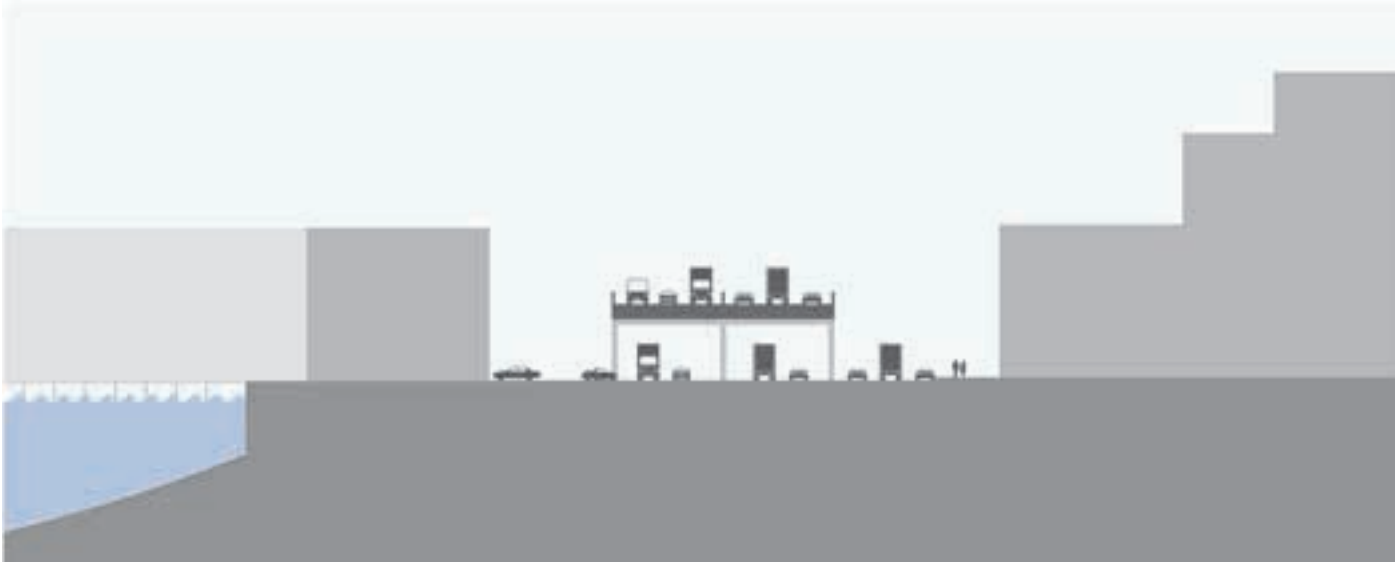
View of West Side Highway facing north; circa 1940s. Hudson River waterfront shipping and industrial uses are seen on the left.

contextual approach. Even so, the Westway was conceptualized as a more context-sensitive design than 1960s-era highway projects that displaced neighborhoods.

By the time of the collapse, the West Side Highway's role had changed. The industrial Hudson waterfront was in decline as an active city economy sector. The highway's narrow lanes and sharp turns also made the structure technologically obsolete. Following the highway closure, the West Side was largely perceived to be a haven for crime.

The Westway would have created long-term real estate opportunities for the City for land disposition. However, the cost – US $1.7 billion – was generally perceived to be excessive for a new highway. The West Side Highway Reconstruction project created new demand for adaptive reuse and infill along the West Side. Former industrial buildings have been converted to residential, for example. Area property values increased by 20 percent,

View of West Side Highway facing south after completion of restoration project in 2000s.



West Side Highway Section – Before (1930s to 1970s)

totalling US $200 million of added value.

The boulevard proposal EIS questioned whether Manhattan even needed a limited-access arterial. The transportation study analyzed nearly all of Manhattan and concluded that the West Side Highway acted more as a collector-distributor road. Replacing the highway with an at-grade boulevard, therefore, wouldn't be a loss for most drivers. (Whereas the West Side Highway carried 140,000 vehicles per day in the 1970s, today it carries 95,000).

The Department of City Planning authored the new boulevard plan. Design objectives included creating a new multi-modal route and pedestrian waterfront connections as well as streetscape improvements. To this first end, the design incorporates a segment of the Manhattan Greenway bicycle and pedestrian path. The plan also limits auto access and turning locations, and provides a raised median in order to increase pedestrian safety.

Landscape plays a significant role the boulevard's overall visual quality. Barrier curbs and the median are designed to be 0.6- to 0.85-meters-tall. These high curbs offer deep planting beds, allowing for a variety of trees, shrubs, and flowers. The diverse planting palette gives the West Side Highway a parkway character.

The West Side Highway is also integrated, in terms of design, with surrounding planning initiatives. Pedestrian crossing locations, for example, are coordinated with planned entrances to Hudson River Park. Surface materials, paving, and exterior furnishings were also aligned with design standards for Hudson River Park and the Manhattan Greenway.

Process

The Westway was ultimately stalled in court on environmental grounds. The court upheld a lawsuit contending that the project EIS did not properly consider impacts on striped bass. These migratory fish make habitat in the piles of abandoned piers along the Hudson.

The scale and ambition of both the Westway and West Side Highway Reconstruction Project were surely enabled by the funding source. Because most funds were federal, the projects were more politically palatable to local leaders and residents.

The Manhattan Waterfront Greenway parallels the West Side Highway.

LESSONS OF THE WEST SIDE HIGHWAY / WESTWAY

- The West Side Highway Reconstruction Project did not leverage as much development as is likely to occur in Toronto. Instead, it provided amenity access that encouraged substantial economic growth in upland neighborhoods.
- The details of roadbed design provided the opportunity for a richer landscape. The West Side Highway's parkway character makes the boulevard an appealing urban amenity and refers to the City's legacy of constructing parkways.

West Side Highway Section – After (Existing)

Remove

Bonaventure Expressway, Montreal, QC

Background

The Bonaventure Expressway is a 1-kilometer (0.6 miles) elevated highway extending eastward from downtown Montreal to the Lachine Canal.

Constructed in the 1967, the six-lane Bonaventure Expressway parallels the CN Railroad viaduct, which terminates at Bonaventure Place and Central Station downtown. The expressway opened shortly before Expo '67, a large-scale "world's fair" event. Two three-lane one-way at-grade streets – Rue Duke and Rue Nazareth – are located on either side of the elevated structure.

The viaduct and highway separate two neighborhoods. To the south, Griffintown is characterized by nineteenth-century industrial buildings. To the north, the *Cite Multimedia* is a new mixed-use redevelopment area .

The Societe du Havre de Montreal (SHM), a quasi-governmental organization established in 2002, proposed demolition of the Bonaventure in 2005. As part of Montreal's overall waterfront development strategy, Rues Duke and Nazareth would be expanded. Land reclaimed from the Bonaventure would be redeveloped as office, residential, and hotel. The development plan also includes improved area public transit and new waterfront open space.

The Bonaventure Expressway enters downtown Montreal from the east; Peel Basin and Lachine Canal are in the foreground.

Parking is a current use under the Bonaventure Expressway.

Bonaventure Expressway Section – Before (Existing)

The City is currently reviewing the project and approval may come in spring 2009. The project cost is estimated at CA $90 million.

Urban Design

From the perspective of SHM, removing the Bonaventure Expressway posed key development opportunities – creating 4.25 acres of new development parcels and increasing the value of *Cite Multimedia* redevelopment efforts. The Bonaventure had played a role in the area's decline during the 1970s and 80s. In addition, the structure blocked views and diminished pedestrian access to Peel Basin, a potential waterfront amenity.

Urban design objectives integrate transportation, open space, and development planning. The new district would, first of all, provide an entrance to the city and the recently redeveloped *Cite Multimedia* and *Quartier International de Montreal*. Though the plan proposes expanding Rues Duke and

Narazeth from three to four lanes, improved public transit is planned to reduce overall traffic demand. Light rail is proposed to serve as a link within Montreal's waterfront tram system.

Other key objectives are pedestrian and bicycle realm improvements. In particular, the plan includes an underground pedestrian network connecting Montreal Metro stations with new office and residential destinations.

Rendering of proposed condition.

Rendering of proposed condition.

Removal of the Bonaventure Expressway will create parcels for new development.

Bonaventure Expressway Section – After (Proposed)

Montreal already has an extensive network of tunnels – known as *La Ville Souterraine* – which link transit stations and underground retail centers.

The plan also incorporates the railroad viaduct as a development site. Similar to the Viaduct des Arts in Paris, the plan proposes to carve retail spaces into the CN Railroad viaduct's volume.

The project is estimated to encourage $2.7 billion in private investment. Overall, employment created by the project would add more than CA $2 billion to Quebec's gross domestic product. Jobs estimates range from 25,700 to 41,400.

Process

SHM purposed an integrated design approach with *L'autoroute Bonaventure Vision 2025*, specifically prioritizing sustainable development over mobility-based planning. The plan's five key principles emphasize quality of life, economic benefits, public transit, public realm, and an open development process. Accommodating automobile traffic was not the only project-driving priority.

LESSONS OF THE BONAVENTURE EXPRESSWAY

- Rather than evaluating the highway removal project only in terms of transportation planning, the implementing agency set ambitious goals for urban design, public realm, and development, then asked how the highway would have to change to achieve the goals. SHM framed the project as the process of creating a new urban district.
- Removal of the Bonaventure will reduce traffic capacity at the same time that new development will increase demand. The plan proposes a combination of increased public transit capacity, rush-hour demand management, and optimization of the local road network to reduce automobile traffic. These strategies are aligned with Montreal's transportation plan and the Kyoto Protocols.

Rendering of proposed condition looking south on Rue Nazareth. New development is to the left; new retail in the ground-level of the rail road embankment is to the right.

Riverfront Parkway, Chattanooga, TN

Remove

Background

The City of Chattanooga has since 2000 increasing turned its attention to orienting recent downtown investments toward the Tennessee River. Doing so required replacing Riverfront Parkway with an urban boulevard and, subsequently, creating new waterfront open space.

Riverfront Parkway followed the Tennessee River's contour for 2.7 kilometers (1.7 mile) as it curved around downtown Chattanooga's northern edge. The four-lane parkway was constructed in the 1960s in order to speed regional industrial truck traffic through Chattanooga. It separated the medium density downtown from the river. Its median-dividers prevented pedestrians from crossing the road to access the waterfront.

The City constructed and renovated several cultural amenities on both sides of the parkway during the 1980s and 90s. These included the Tennessee Aquarium, a baseball stadium, and a museum of American art. Following these investments, the City sought to reconnect downtown to the river and initiated efforts to remove Riverfront Parkway.

A quasi-governmental organization, RiverCity Company, hired Hargreaves Associates in 2004 to develop the "21st Century

Riverfront Parkway was reconfigured as an at-grade urban boulevard during the 2000s.

Waterfront". The plan creates connections across the new boulevard to 129 acres of new open spaces and mixed-use districts along the Tennessee River.

The 21st Century Waterfront cost US $120 million to construct (which excludes cost of removing Riverfront Parkway).

Urban Design

The parkway project and 21st Century Waterfront were implemented in parallel. Chattanooga's downtown grid was integrated with the boulevard, thereby creating waterfront pedestrian connections and new development parcels. The new waterfront amenities enhanced their value.

By the 1990s, Riverfront Parkway no longer served its initial use. In fact, the parkway had excess capacity. Its redesign was not an issue of accommodating traffic, but rather calibrating its dimensions for current volumes. Lanes were reduced to two, except for downtown, where it has four. Two additional downtown intersections were added to disperse potential congestion.

The 21st Century Waterfront is composed of six open space and development districts on both sides of the river. Because there is little developable land between the parkway and river, most planned development has occurred just upland of the new roadway. The downtown side includes a reconstructed park with terraced public spaces leading to the river edge and amphitheater there. Piers provide boat launches and river views.

Hargreaves' plan is characterized by strong landforms and active shapes. These provide both flood control as well as recreation space.

The Riverfront Parkway streetscape today connects downtown to the Tennessee River.

A sweeping fly-over bridge connects a new downtown public plaza to the arts district, located on a dramatic river bluff. The design therefore gives downtown and the riverfront a contemporary character.

Process

RiverCity Company was established in the 1980s to steward redevelopment along Chattanooga's waterfront. The organization financed the 21st Century Waterfront using no Chattanooga general funds. Fifty percent of the development budget came from a hotel tax, the other fifty from private sources.

The vision for the waterfront was also established by political and agency leadership. Both the Mayor and the city's Planning and Design Studio strongly advocated for an innovative approach for downtown and the river. Whether such vision will continue was questioned in 2005. The mayoral election in that year was won by a candidate who specifically ran on an anti-downtown investment platform.

The City of Chattanooga reports that it leveraged the US $120 million investment in the waterfront for US $2 billion in new public and private development. Before the parkway removal was complete, more than US $100 million in new mixed-use and residential development downtown had already been constructed or planned.

The 21st Century Waterfront offers public access to the river.

LESSONS OF RIVERFRONT PARKWAY / 21ST CENTURY WATERFRONT

- This project illustrates that to implement an innovative design vision, it must be supported and sought after by the highest levels of leadership.
- The roadway design is calibrated for current traffic volumes.
- The City recognized that the role of the highway had shifted – from serving as a through-route for industrial trucking to providing access to cultural and natural amenities.

Pedestrian connections across the River over views of the new watefront park.

Remove

Embarcadero Freeway, San Francisco, CA

Background

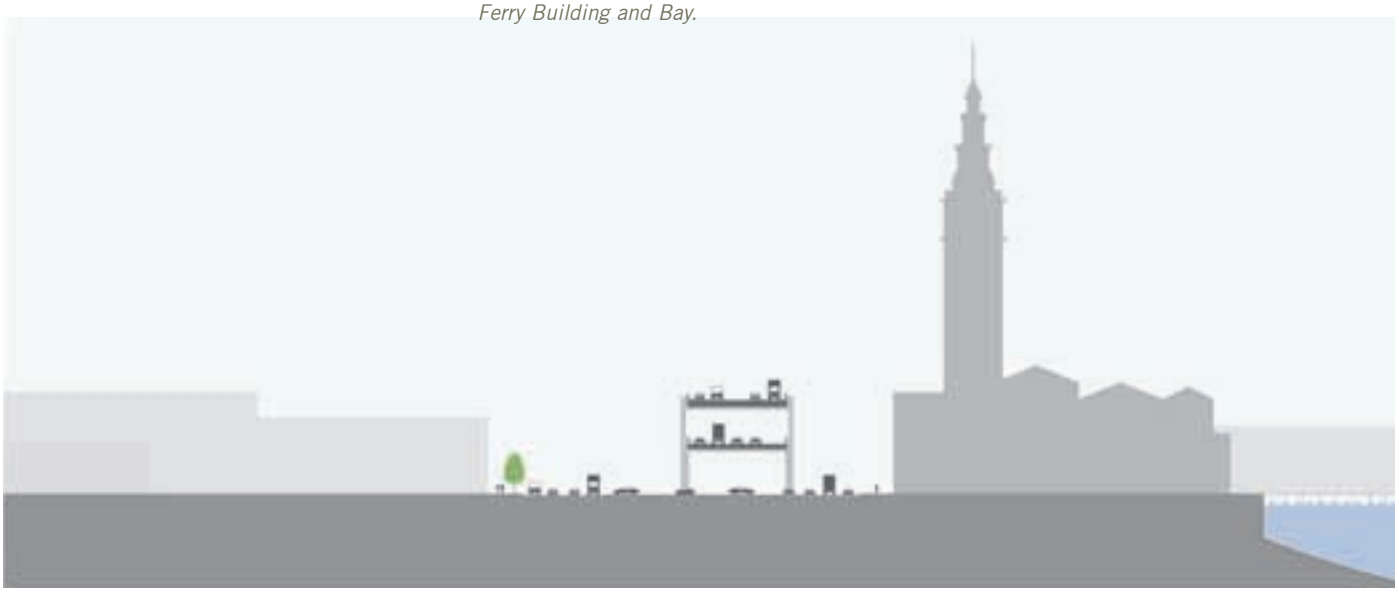
The Embarcadero Freeway was a 2.5 kilometer (1.6 mile) double-deck highway constructed in 1957 in order to provide a connection between the Bay Bridge and Golden Gate Bridge.

The freeway wound through medium density residential neighborhoods, including Chinatown, Rincon Hill, and Transbay, as well as San Francisco's central business district.

Public protest in the 1950s – the "freeway revolt" – led to a reduction in scale of the new highway. Even so, the Embarcadero was a visual and physical barrier between downtown and the bay.

Following damage sustained during the 1989 Loma Prieta earthquake, CALTRANS studied replacement strategies for the Embarcadero. Two years later, the Embarcadero was demolished and replaced with a six-lane

When constructed in the 1950s, the Embarcadero separated downtown from the Ferry Building and Bay.



Embarcadero Freeway Section – Before (1950s to 1980s)

at-grade boulevard. The new boulevard was developed along with a new waterfront promenade, pedestrian- and bicycle-ways, and a streetcar line.

Fifty percent less cars use the boulevard daily than the elevated structure, which carried 80,000 vehicles per day. There was no significant increase in downtown traffic congestion.

Urban Design

The 1989 earthquake and subsequent collapse revived in public imagination the potential for the San Francisco to reestablish its historic relationship to the bay. The Embarcadero was perceived to be an urban eyesore and barrier to waterfront access. In addition, it marred the city's front door, separating the iconic Ferry Building from the foot of Market Street.

Urban boulevard and esplanade construction was guided by clear urban design principles, thereby creating new development opportunities. Design guidelines and a public art program shaped the boulevard's consistent and unique character. Pedestrian-amenable design made the boulevard a generous public gathering space.

Subsequently, 100 acres of land were reclaimed for new development. The Ferry Building was reopened to the public as a regional food market. Two other waterfront projects – Pier 1 and the Embarcadero Center – attracted new retail and office development.

Housing development also significantly increased. Over 7,000 new housing units were planned for former rights-of-way and ramps in Rincon Hill and Transbay. 2,000 units were developed in the south of Market area. Today, over 83 percent of residents in south of Market arrived after 1990.

The redesign envisioned Embarcadero Boulevard as a multi-modal street integrated with the surrounding urban grid. Transit

View of the Ferry Building from the south-east.

Removing the Embarcadero reclaimed over one mile of waterfront.

Embarcadero Freeway Section – After (Existing)

improvements in the Embarcadero corridor, however, built upon existing efforts. San Francisco had implemented "transit first" policies since 1972. The city Board had passed highway demolition resolutions three times in the 1970s and 80s. In 1986, the issue was brought to public referendum, which was voted down.

Concern over congestion increases downtown did not materialize despite an immediate 25 percent capacity reduction. Forty-two percent of drivers found alternate routes within six weeks of the earthquake. Other drivers reduced discretionary trips or opted for public transit.

Process

CALTRANS studied three alternatives for the damaged Embarcadero Freeway: seismological retrofit; a tunnel; and an at-grade urban boulevard.

The third alternative was selected primarily based on cost. This alternative attracted significant public support, in particular from anti-growth advocates. Almost immediately after the earthquake, San Francisco's Mayor announced his support for demolishing the Embarcadero.

Yet there was also opposition. Chinatown merchants argued removing the highway would decrease their customer base, which was increasingly shopping in suburban locations.

LESSONS OF EMBARCADERO FREEWAY

- The Embarcadero Freeway removal signaled a shift in priorities among municipal officials from mobility-based planning to sustainable urban development.
- Urban design has a key role to play in highway removal – boulevard design slowed traffic, thereby creating an environment amenable to retail and residential development. In addition, land use planning was intergrated with traffic engineering.
- Values of property adjacent to the new Embarcadero Boulevard increased by 300 percent; jobs in the area increased by 23 percent.

The Ferry Building has becoming a gathering space for the city. Over 25,000 people visit it each weekend.

Cheonggyecheon Expressway, Seoul, Korea

Remove

Background

The Cheonggyecheon Restoration Project transformed a 6.1-kilometer (3.75 miles) elevated expressway corridor in downtown Seoul into a linear park and reclaimed stream.

Between 1958 and 1976, the Cheonggyecheon stream was incrementally covered by a ten-lane at-grade street. A four-lane elevated highway was constructed above. The Cheonggye district, composed of office buildings and retail markets, became among Seoul's most congested areas.

A new mayor initiated a plan in 2002 to demolish the highway from the central business district eastward, day-light the buried stream, and create an open space amenity for the city. Highway removal would be complemented by new bus rapid transit. In just 27 months, the highway had been replaced by pedestrian esplanades and gardens. Two-lane boulevards were located at-grade on either side of the open space, which, along with the stream, is two meters (6.5 feet) below-grade.

The project cost was publicly reported as US $390 million, though the budget may have been as much as US $900 million.

The Cheonggyecheon Expressway contributed to declining property values and population loss in Seoul's downtown before it was replaced by a linear park.

A esplanade offers public access to the day-lighted creek.

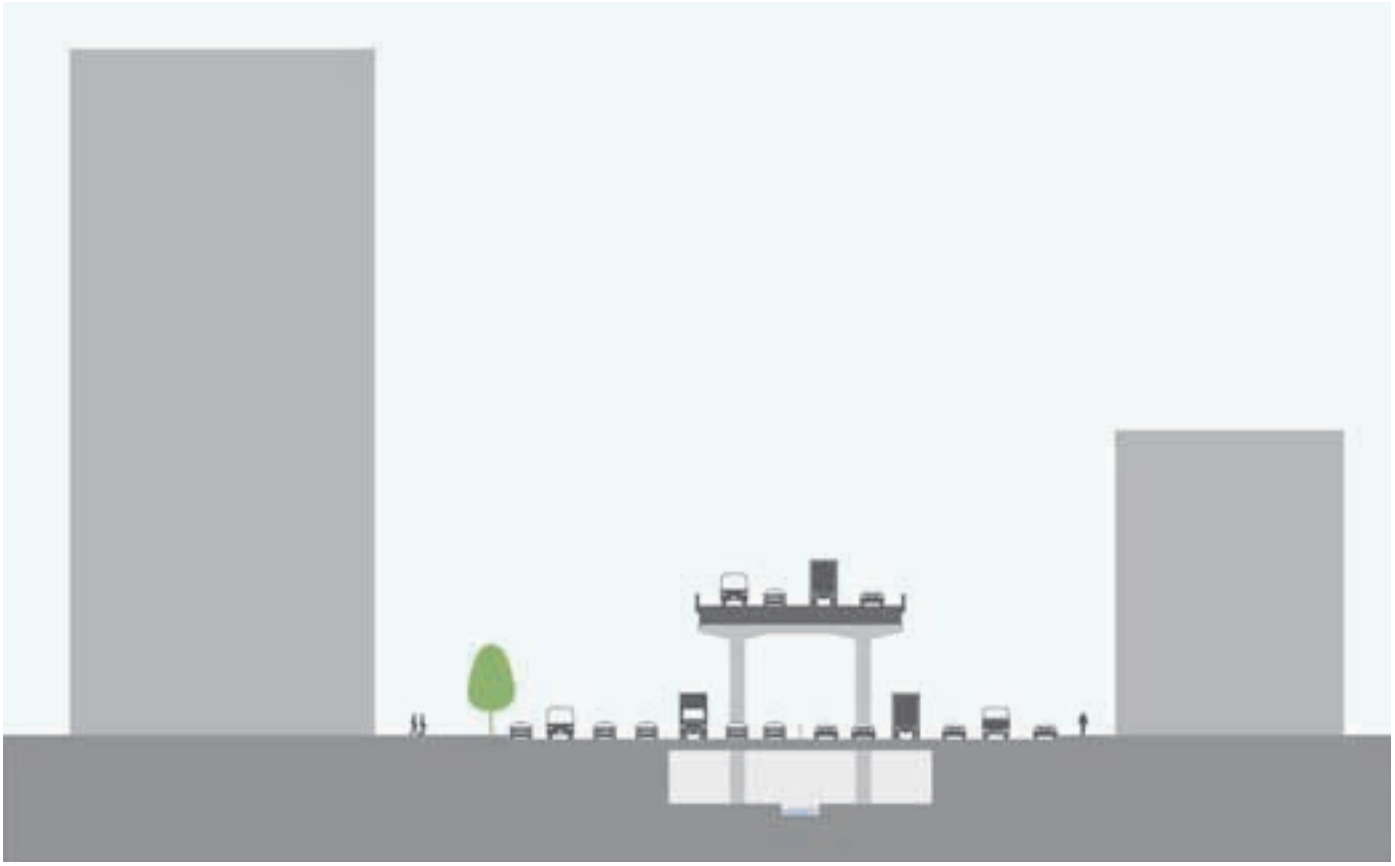
Urban Design

The Cheonggyecheon Restoration Project signaled a shift in municipal officials' priorities towards quality of life issues. Moreover, the new Mayor committed to remaking Seoul as a sustainable city. Not only did the Cheonggye area suffer from congestion, but also population and property value decline. The new open space would benefit the 200,000 area merchants as well as Seoul residents as a whole.

Pedestrian access to the below-grade public space is provided at 5-minute-walk intervals by terraced steps. New pedestrian bridges connect either side of Cheonggyecheon. A variety of landscape types and water features characterize different park segments. In the year following its opening, the park attracted 90,000 visitors daily. Thirty percent of visitors came from outside Seoul's metropolitan area.

The elevated structure removal occurred at the same time as significant upgrades to Seoul's public transportation system. A bus rapid transit route was introduced to absorb riders from at least 120,000 cars formerly on the expressway. Bus rapid transit was also increased on feeder routes. In the previous decade, the City created incentive programs to encourage commuters to use transit and raised user fees for parking downtown.

Combined, these transportation strategies resulted in a nine percent decrease in traffic into the central business district.



Cheonggyecheon Highway Section – Before (1950s to 2000s)

Sustainability objectives guided the project as well. The City recycled ninety-six percent of demolition debris for street paving material. Removal of the expressway appears to have lowered summer temperatures in the project area by seven degrees.

The seasonal Cheonggyecheon stream, however, is not truly restored. Water is diverted from the nearby Han River to assure continuous water flow in the 1-meter-deep (3 feet) streambed.

Process

Much impetus behind the project was political. The Mayor had campaigned on quality of life issues, including the proposal to demolish the Cheonggyecheon Expressway. Having made good on his promise, he campaigned for and won the Korean presidency.

Values of property adjacent to the Cheonggyecheon project are estimated to have increased by 30 percent. Between US $8.5 and $25 billion of long-term economic benefits are estimated as a result of the project.

LESSONS OF CHEONGGYECHEON RESTORATION PROJECT

- Highway removal was coordinated with system-wide transportation strategies. New bus rapid transit, a form of congestion pricing, and parking user fees together helped to reduce traffic downtown after the Cheonggyecheon Expressway was demolished.
- The Cheonggyecheon Restoration Project illustrates how the desire to remake the city's image can drive large-scale infrastructure improvements.
- Implementation occurred in an incredibly short timeframe. Yet the project followed a top-down, urban renewal planning model – thousands of street merchants, for example, were relocated out of the district. This planning approach is less feasible in North America.

Cheonggyecheon Highway Section – After (Existing)

Remove

Sheridan Expressway, Bronx, NY

Background

The Sheridan Expressway is a 2 kilometer (1.25 mile) highway along the Bronx River in the Bronx. It connects the Bruckner Expressway to the Cross Bronx Expressway.

The Sheridan was constructed in the 1960s as a minor link in the Bronx highway system. The Bronx has historically shared the heaviest proportion of New York City's trucking traffic. The Sheridan separates a high density residential neighborhood of five- to six-story apartment buildings from the Bronx River. Immediately to the south is Hunts Point Market, the world's largest wholesale food distribution center.

The New York State Department of Transportation (NYSDOT) undertook studies in the late-1990s to improve access to Hunts Point. Fulton Fish Market had just relocated from Lower Manhattan to Hunts Point. At the same time, a coalition of non-profit organizations – including South Bronx Watershed Alliance and Sustainable South Bronx – developed in 1999 a community plan. It proposed an at-grade boulevard to replace the Sheridan, reclaiming 28 acres for open space and housing.

Though NYSDOT incorporated the community plan into its alternative plan, the agency's recommendation in 2007 was to retain the Sheridan Expressway. Subsequently, NYSDOT announced in 2008 that because the earlier recommendation was determined to be infeasible, the agency will continue to study two options – highway removal and retention – and will issue a new report in 2010.

Urban Design

The community plan argues the Sheridan Expressway has excess capacity. Replacing it with an at-grade boulevard would therefore remove a waterfront barrier without increasing congestion or travel times. The Sheridan Expressway is also bound to historic environmental justice issues in the South Bronx.

Since the Bronx shares the largest volume

Cyclists on Sheridan Expressway during bicycle event.

of truck traffic, its neighborhoods have high incidences of asthma and other air-quality-related health issues. Construction of the highway in the early-1960s was followed by two decades of neighborhood disinvestment.

NYSDOT focused its study on access to Hunts Point Market. It did not consider urban design issues.

The community plan aligned highway removal with neighborhood and open space planning goals. The plan includes 1,200 affordable housing units, 120,000 SF of retail, community, and manufacturing space, and a 10-acre park. The new waterfront open space would provide a key link in the overall plan for the 37-kilometer (23 miles) Bronx River watershed – which has gained two new open spaces in the last five years. In addition, highway removal would reclaim land for housing development.

The Community plan estimates new development would create 700 new jobs. Similar waterfront park projects in New York City, such as Hudson River Park, have stimulated reinvestment in upland neighborhoods.

Process

Three families of alternatives were considered: remove the Sheridan Expressway and replace in an at-grade boulevard; reconstruct expressway ramps to improve Hunts Point access; and reconstruct the ramps and provide additional access from Port Morris to the south. Overall, 21 alternatives were evaluated within the three families. NYSDOT recommended two alternatives from family two.

A multi-step process evaluated the alternatives against 14 objectives. First, through a public process, the alternatives were scored against the objectives. Second, quantitative measures were assigned to each objective and the alternatives were scored again. In both instances, the scores were weighted based on public input.

NYSDOT's ramp improvement alternatives outscored the highway removal alternatives. In fact, because public input preferred reducing truck traffic on local streets as well as truck emissions, the highway removal alternatives quantitatively scored poorly.

LESSONS OF THE SHERIDAN EXPRESSWAY

- The evaluation methodology was overly complicated. By focusing on transportation objectives, the evaluation obscured neighborhood open space and development goals.
- The community plan reclaims land for development and increases neighborhood value through new waterfront connections.

The Bronx River Watershed Alliance proposes to create a 10-acre park and 1,200 housing units by removing the Sheridan Expressway.

Ameliorate

A8ern8, Zaanstadt, The Netherlands

Background

The City Council of this small suburb 16 kilometers (10 miles) north of Amsterdam undertook in 2003 an initiative to create a new town square. The project sought to reactivate the space under A8, a 7-meter-tall elevated highway.

A8 enters town from the east, just after spanning the River Zaan. When constructed in the 1970s, A8 formed a harsh physical barrier between the town's two civic activity centers, the church and town hall. Residents of the low-slung apartment blocks and townhouses in the surrounding neighborhood lost their river views and access. The effort to redesign A8 was advocated for primarily by residents and private businesses. At the time of the Council's initiative, A8's underside was mostly used for parking.

NL Architects, the town's design consultant, conceptualized the 40- by 400-meter area as a long "civic arcade". The introduction of new programs, cladding of the elevated structure, and surface treatments transformed A8 from a barrier into a gathering place. In addition, adjacent streetscape improvements re-established visual and physical connections among the town's three public realms – the river, church, and town hall.

The project cost was €2.7 million. A8ernA was awarded the European Prize for Urban Public Space in 2006.

Urban Design

Stakeholder input established the key project objective to create an open and simple meeting place and public face for the town. This objective responded directly to A8's

A8ern8 Highway Section – Before (1970s to 2000s); an Albert Heijn grocery store opened under the highway along with other neighborhood retail (above).

impact on the town fabric. A8 is a physical barrier between the north and south sides of town and the River Zaan. Aesthetically, it detracts from the surrounding architecture and natural landscape. Lastly, it diminishes use of public spaces next to the church and town hall.

Program is key to achieving the project objective. A variety of uses were introduced into the site, appealing to a range of town resident needs and interests. For this reason, A8ernA attracts residents of all ages.

The retail program includes an Albert Heijn supermarket, a pet shop, and flower shop as well as 120 parking spaces. Albert Heijn, in particular, was attracted to the site because it offered a highway accessibility and a rare opportunity for a large floor plate in town.

A skateboarding park, basketball courts, and ping pong tables provide youth with recreation amenities. A graffiti gallery serves as a public art component. A small marina with public seating was constructed where A8 lifts over the Zaan, opening up river views.

Material selection and surface treatment makes A8's understory inviting and attractive. Structural columns were clad in a variety of materials, including herringbone-patterned timber and reflective steel, into which back-lit lettering is dye-cut. Similarly, ground treatments – from timber decking to orange surface paint – differentiate program spaces.

Process

The A8ernA project was coordinated with a larger, city-wide planning effort to identify redevelopment sites for 10 new squares in Zaanstadt. Alternatives for at-grade or tunnel replacement of A8 were not seriously considered due to high costs.

The Mayor and City Council, church officials, merchants, and residents participated in the planning process. Stakeholder objectives and desires guided the design process. NL Architects incorporated nearly all community program requests into the final design.

The businesses under A8 have been incredibly successful. Albert Heijn has expressed interest in expanding and bringing in additional in-line retail.

Cladding and lighting on the highway columns makes the space more inviting; the skate-park generates amble activity.

LESSONS OF A8ERN8

- A8ernA shows it is possible to live with an elevated structure. This project adapts a visually repetitive space (concrete overhead, evenly space piers) with programmatic and visual diversity. The provision of a density of small programs and spaces with different characters makes an unappealing environment attractive.
- The project was driven, in part, by private market interest in utilizing a unique retail site.
- A8ernA is a small scale project guided by a highly participatory planning process. The process illustrates that a full range of stakeholder desires can be incorporated into project implementation without diminishing design quality or resorting to the "lowest common denominator".

A8ern8 Highway Section – After (Existing)

Ameliorate

Viaduct des Arts, Paris, France

Background

The Viaduct des Arts / Promenade Plantee is a 2-kilometer (1.25-mile) elevated railway structure in the 12th arrondissment of Paris. The viaduct runs parallel to Avenue Daumesnil within a dense residential neighborhood of five- to six-story buildings.

The brick and masonry viaduct was constructed in the nineteenth century. The railroad closed in 1969. From its closure to the late-1990s, the viaduct's large archways were episodically occupied by assortments of antique shops, auto garages, used bookstores, and other uses.

Atelier Parisien d' Urbanisme (APUR), the city's urban design agency, developed in the 1980s an historic restoration strategy for the viaduct. The plan proposed re-tenanting the 64 archways with artists, craftspeople, and restaurants. In addition, it included a new linear park and gardens overhead, which were designed by Philippe Mathieu and Jacques Vergely. APUR partnered with a local development corporation to identify and manage new tenants.

Whereas there were studios and workshops in the viaduct prior to renovation, the APUR project represented significant up-scaling of both the viaduct and Avenue Daumesnil.

Urban Design

By the 1980s the viaduct was considered an urban eyesore. Its shops did not contribute positively to neighborhood identity. In addition, the city had recently invested in the *grand projet*, Opera Bastille. As such, the Opera Bastille brought with it benefits for other area redevelopment and public amenities. The viaduct's eventual restoration was intended to enhance neighborhood retail, but also to create a contemporary Paris landmark.

The viaduct and promenade design emphasizes the structure's character and visual connections to the city. The archway restoration, designed by Patrick Berger, is intended to minimally distract from the structure's historic character. Glass cladding over the archways is set back in order to accentuate the masonry, which was restored in

Views of the city below are a key element of the Promenade design.

The archways under the viaduct provide space for artist studios, workshops, and restaurants.

the style of the Place des Vosges arcades. The promenade offers a range of gardens – some of which enclose visitors in landscape, others frame city views.

At street-level, a six-meter-wide (20-feet) tree-lined sidewalk separates the viaduct from a three-lane one-way street.

The project also addresses railroad embankment reuse, though less successfully. At the viaduct's eastern end, the promenade continues on an embankment. The restoration includes new retail constructed along the embankment. The architecture here, however, is far less appealing than the restored viaduct.

Process

The decision to retain and renovate the viaduct was guided by both design considerations and strategic coordination with other planning initiatives. APUR studied two alternatives in the 1980s – demolish and redevelop reclaimed land, or restore and create an elevated linear park.

The park alternative was an opportunity to build upon the recently completed *grand project*, the Opera Bastille, by adding another new public amenity. At the same time, the viaduct's north side orients towards backs of existing buildings. Demolishing the viaduct would create the difficult task of integrating these revealed buildings, now visually prominent, into the streetscape.

Most importantly, the park alternative aligned with APUR's new agency focus on "greening the city".

The Viaduct des Arts and Promenade Plantee were advanced as two separate, but interconnected projects. The Paris parks department manages the Promenade. A local development corporation manages the archway spaces and adjacent developments under an 18-year lease.

The dual-management structure is faulted for the viaduct's limited economic impact. Because two organizations manage the structure, a clear strategy has not be defined for coordinating viaduct activities with neighborhood development and promoting it throughout the city.

LESSONS OF VIADUCT DES ARTS / PROMENADE PLANTEE

- APUR advanced partnership with a local development corporation as a strategy for enhancing retail and residential development as well as strengthening the neighborhood's identity.
- The Promenade Plantee illustrates how potentially incompatible programs – when distributed on different levels – might co-exist in the same place. The tranquil elevated linear park is separated from the bustle of the retail street below.
- The Viaduct des Arts demonstrates a potential benefit to retaining existing infrastructure. Containing new uses in an historic structure creates a sense of connections between the past and present.
- The Viaduct des Arts shows how existing infrastructure may be successfully integrated into the public realm.

The upper level of the viaduct is a a 4 kilometer (2.5 miles) linear park.

Some archways are left open to increase pedestrian connectivity within the neighborhood.

Ameliorate

East River Esplanade, New York, NY

Background

The East River Esplanade is a planned 3.2-kilometer-long (2-mile) series of public spaces along the Lower Manhattan waterfront and below F.D.R. Drive, an elevated highway.

The F.D.R. was constructed in 1954. The highway extends over more than 125 city blocks from Battery Park, north along the East River to Harlem. In Lower Manhattan, it forms a barrier between downtown neighborhoods and the waterfront. The Esplanade planning area includes six waterfront districts, from the Financial District to the Lower East Side. The area is characterized by high-density development – office towers to the south, "towers-in-the-park" housing development to the north.

This project is one among many public realm and redevelopment efforts sponsored since September 11th by the Lower Manhattan Development Corporation, Department of City Planning, and Economic Development Corporation. Population in Lower Manhattan has doubled – from 23,000 to 56,000 – in just eight years. The Esplanade is for that reason linked to Lower Manhattan's transformation into a residential neighborhood and efforts to attract investment.

SHoP and Ken Smith Landscape Architects, the City's consultants, developed a plan for new programs, upland connections, and open spaces on historic slips and piers. New program pavilions under the F.D.R. and surface treatments to its structure provide a transition from Lower Manhattan to the waterfront.

The project is funded by US $150 million from the Lower Manhattan Development Corporation.

Urban Design

The F.D.R. poses development barriers at both neighborhood and city scales. Within Lower Manhattan, it reduces access to inter-modal transportation – ferry and helicopter – and retail on East River piers. Improved access will most directly benefit new area residents. At

Rendering by SHoP of cladding, surfaces, plantings, and pavilions under F.D.R. Drive.

the same time, the Esplanade is one among several new open spaces in New York Harbor, including Governor's Island. The Esplanade is thus also considered a city-scale development strategy.

The Esplanade creates benefits at both neighborhood and city scales through connections, program, and public realm. The design includes a diverse, yet visually coordinated streetscape and exterior furnishings palette. New seating, planters, arbors, and landforms upland create public spaces and mark pedestrian paths to the river.

The environment under the F.D.R. is also improved so as to provide continuity of urban activity from upland neighborhoods to the river. New glass pavilions – 1,500 to 8,000 SF in size – are proposed to accommodate a range of retail, food, and community-requested programs. The underside of the F.D.R. will be clad with a modular system of noise-abating panels and lighting. The design approach treats the elevated structure as a "roof", creating a safe and inviting environment.

The plan also addresses, in contrast to the Westway, ecological impacts on aquatic life. Existing piers will be renovated to increase water flow through piles. Reef-balls will be installed at pile bases to encourage fish habitat formation.

Process

The purpose of the project was primarily esplanade design, and so highway removal alternatives were not considered in detail. The Environmental Impact Statement proposed two additional alternatives.

The first studied scenarios for building two to six residential towers over the F.D.R. Construction feasibility and cost ruled out this alternative. The second proposed replacing the F.D.R. with an at-grade boulevard.

The F.D.R. has excess capacity in its Lower Manhattan segment. However, accommodating existing capacity would require a six-lane at-grade boulevard – which would limit land available for the esplanade. There was therefore a trade-off between the boulevard alternative and potential public space created.

Though construction is publically funded, the Esplanade's US $3.5 million operating budget has a projected shortfall of 50 to 66 percent.

LESSONS OF THE EAST RIVER ESPLANADE

- The Esplanade design embraced the elevated structure and its form as an opportunity, leading to innovative approaches to public realm creation and a visually distinguished urban space.
- This public amenity is created in the context of an existing commuter population of hundreds of thousands, growing residential population, and public and private investments.
- The continued presence of the F.D.R. increases development costs for other waterfront sites. Construction costs for redevelopment of South Street Seaport, for example, were increased due to presence of the elevated highway.

Rendering by SHoP of Esplandade south of Brooklyn Bridge.

Views of F.D.R. along the East River facing south towards Lower Manhattan.

Do Nothing

Buffalo Skyway / Route 5, Buffalo, NY

Background

Ongoing improvement studies to Route 5, a limited access highway on Buffalo's south side, have prompted city and state leaders to call for removal of the Buffalo Skyway.

The Buffalo Skyway was constructed in 1966. The elevated structure is 360 meters tall (110 feet). It approaches downtown Buffalo from the south, crossing from the Outer Harbor over the Buffalo River. Route 5 is a grade-separated highway to the south and is the only highway that connects to the Skyway. Route 5 extends south 7 kilometers (4.3 miles) through the Outer Harbor, a manufacturing district on Lake Erie.

The New York State Department of Transportation (NYSDOT) undertook studies in 2006 to improve Outer Harbor access and potentially replace Route 5 with a boulevard. The studies did not consider alternatives for the Skyway. Yet because the Skyway is an extension of Route 5, its future is contingent on the EIS outcome.

Buffalo's Mayor and the local Congressman both support study of the Skyway's demolition. They cite another NYSDOT "management study" that shows long-term Skyway maintenance – ranging from 50 to 75 years – would cost more than demolition. However, the Route 5 EIS recommends a design that provides no new bridges over the Buffalo River.

Because the Skyway provides the only access from Route 5 into downtown, the recommended design for Route 5 rules out future removal of the Skyway.

Urban Design

The Skyway decreases access to a planned waterfront pedestrian and bicycle greenway and places an urban eyesore on views of Lake Erie and the Buffalo skyline. The Skyway is closed frequently due to snow and auto accidents.

Yet its most significant measure may be opportunity cost. Redevelopment of 25 acres of land reclaimed from Skyway demolition

The Skyway is 360 meters (110 feet) tall.

would return US $47.5 million. Altogether, an at-grade configuration would open up 77 acres to redevelopment, much of which would be sold by NYSDOT. In addition, the at-grade alternative makes redevelopment of Buffalo's Inner Harbor waterfront area complex. Similarly, Route 5, in its present configuration, reduces potential Outer Harbor development.

The broad benefits from replacing Route 5 and the Skyway with at-grade roads are public waterfront connections and new development opportunities. Urban design considerations, however, are for the most part absent from the NYSDOT EIS. The recommended alternative, for example, leaves in place the highway embankment, a significant physical and visual barrier. The alternative also recommends expanding a parallel service road – Furhmann Boulevard. Doing so uses land for infrastructure and offers minimal new waterfront access.

Process

NYSDOT evaluated four alternatives for Route 5: no action; modifying ramps and interchanges; replacement with a six-lane boulevard; and a hybrid of the modify and boulevard alternatives.

The selection of the second alternative – modify – appears most directly based on cost. All four alternatives scored roughly equal when evaluated against quantitative and qualitative objectives. These ranged from level-of-service and travel time to waterfront access and neighborhood impact. Yet the second alternative's estimated cost was US $95.1 million, whereas the boulevard's was US $124 million.

Despite NYSDOT's recommendation to retain the Skyway and Route 5, several public and private waterfront developments are planned. The "Greenbelt" project will spend US $14 million to improve 2 kilometers (1.25 miles) of Lake Erie Shoreline. A 12.5-acre, US $53 million redevelopment project was recently completed in Buffalo's Inner Harbor. Another $100 million of other cultural and civic improvements for the waterfront are also planned.

While the Mayor and Congressman support further study for Skyway demolition, decision-making authority rests with NYSDOT.

LESSONS OF THE BUFFALO SKYWAY

- At-grade alternative offers opportunity for state to recapture value of public infrastructure investment by selling land reclaimed through highway removal.
- Current NYSDOT recommendation uses waterfront land for infrastructure development and fragments existing development parcels.

View of Skyway facing south.

Route 5 is a significant barrier to the Outer Harbor.

Do Nothing

Whitehurst Freeway, Washington, D.C.

Background

The Whitehurst Freeway is a 1.2 kilometer (0.75 mile) four-lane elevated highway in the Georgetown neighborhood of Washington, D.C. The District Department of Transportation (DDOT) initiated in 2005 replacement studies for the Whitehurst, seven years following a major renovation. The Mayor abruptly discontinued DDOT's studies in 2007.

Georgetown is a medium density mixed-use neighborhood northwest of downtown D.C. The Whitehurst Freeway was constructed in 1949 along the Potomac River, which forms Georgetown's southern edge. 45,000 drivers use the highway daily, many of which commute downtown from northwest D.C., Maryland, and Virginia. A significant link exists at the Whitehurst's western end where it meets Francis Scott Key Bridge, which connects to Virginia.

A 10-acre park, Georgetown Waterfront Park, was constructed by the National Park Service in the mid-2000s along the Potomac River in the area riverside of the Whitehurst Freeway.

Urban Design

The Whitehurst's neighborhood impact is particularly accentuated by the development of the new waterfront park. Whereas the surrounding area was characterized by lumberyards and meat packing plants when the Whitehurst was constructed, today Georgetown is a gentrified, mixed-use neighborhood.

The freeway poses a barrier for pedestrian connections. Just a single transportation mode – automobile – is accommodated along the waterfront. Additionally, real estate values that might benefit from the new park are diminished by the Whitehurst's proximity.

The DDOT study focused most specifically on accommodating peak traffic volumes. Preserving river views and improving pedestrian connections were project objectives, but urban design was not a significant consideration. In fact, DDOT's emphasis on traffic appears to have focused public attention on congestion, distracting dialogue from potential design benefits.

The Whitehurst Freeway along the Potomac River.

Process

The Whitehurst Freeway was renovated in 1998 at a cost of $35 million. The decision to rehabilitate the freeway followed a study that also considered demolition. Since then, the area experienced increasing high-value development, including a Ritz-Carlton residence and a movie theater. The case made regarding the elevated freeway was that its removal will help to achieve the waterfront's full revitalization potential.

DDOT studied four families of alternatives: no build; replacing the Whitehurst with a six-lane at-grade boulevard with connections to Key Bridge; a six-lane at-grade boulevard without connections to Key Bridge; and replacing the Whitehurst with a tunnel. Altogether, 19 alternatives were developed within these four families.

Design alternatives, however, dwelled on specific minor changes rather than posing distinct design concepts. The evaluation criteria were similarly complicated. Each alternative was scored against 28 criteria. Each criteria score was then weighted based on a level of significance established through public input.

Ultimately, the five highest-scoring designs represented each of the three build alternatives. The alternatives evaluation process did not therefore provide a clear design direction.

Existing condition on K Street under the elevated structure.

LESSONS OF THE WHITEHURST FREEWAY

- Public dialogue focused on congestion issues and perceived potential for project to contribute to further gentrification of Georgetown.
- The Whitehurst Freeway serves a role in regional commuting patterns. However, the study did not analyze regional impacts of removing the highway.
- The case to remove the Whitehurst Freeway was weakened since $35 million had been invested in its rehabilitation in the last decade.

New Georgetown Waterfront Park – Whitehurst Freeway is visible to the right, Francis Scott Key Bridge in the background.

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“Teasers” and Boulevards

"Teasers"

WHAT IS A "TEASER"?

The following precedents address the challenges of urban highways and elevated structures in ambitious and innovative ways.

These projects combine landscape architecture, infrastructure design, pedestrian realm planning, and development to create unique and dramatic spaces in the city.

Waterfront Park – Louisville, KY

- This park designed by Hargreaves slopes under I-64, providing a new waterfront connection.

Voie George Pompidou – Paris, France

- In summer, the highway along the Seine riverbanks is closed, making way for "Paris plages" – temporary urban beaches.

Carrasco Square – Amsterdam, The Netherlands

- Surface materials activate the space under an eleavated rail in this project by West 8.

The High Line – New York, NY

- A decommissioned evelated rail in Manhattan has been re-imagined by Field Operations as a linear park. The new Standard Hotel is partially built on air-rights over the High Line. Steven Holl's 1981 conceptual project "Bridge of Houses" (left) proposed housing on the High Line.

Slussen International Design Competition (2009) – Stockholm, Sweden

- Jean Nouvel proposes to create a Ponte Vecchio-esque pedestrian bridge of shops and restaurants atop a 1950s-era highway in downtown Stockholm.

“Teasers” and Urban Boulevards

STREETS AS CIVIC SPACES

Prominent urban boulevards often provide separate spaces for pedestrians and bicyclists as well as generous landscape and tree canopy.

These precedents from around the world offer ideas for improving the streetscape quality in the Gardiner Expressway and Lake Shore Boulevard area.

Avinguda Diagonal – Barcelona, Spain

- The Diagonal separates local and thru-traffic and provides bicycle and pedestrian realm.

Pacific Boulevard – Vancouver, British Columbia

- Vancouver recently enhanced landscape, lighting, and sidewalks on Pacific Boulevard.

University Avenue – Toronto, ON

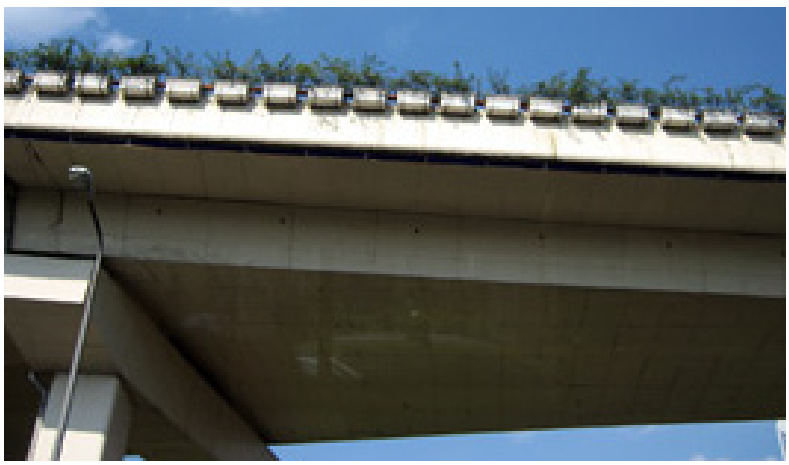
- University Avenue serves as a significant civic space for the city.

Eastern Parkway – Brooklyn, NY

- A generous promenade is part on this Olmstead-designed boulevard.

Octavia Boulevard – San Francisco, CA

- This boulevard replaced the Central Freeway, an elevated highway.



Shanghai Street Greening – Shanghai, China

- Landscape planters enhance visual quality of elevated highways in Shanghai.

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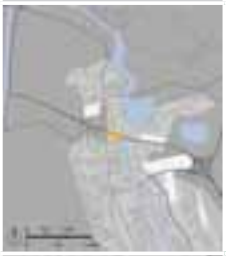
Summary Matrix

Case Study Summary Matrix

Name	Context	Type	Location	Age	Size	Vehicles per day
Gardiner Expressway	–	–	Toronto, Ontario	43	2.4 km (1.5 miles)	120,000
Alaskan Way Viaduct		Replace	Seattle, WA	50	3.2 km (2 mile)	110,000
West Side Highway Reconstruction Project / Westway		Replace / Remove	New York, NY	37 (at time of collapse in 1974)	8.2 km (5 miles)	140,000
Bonaventure Expressway		Remove	Montreal, Quebec	42	1 km (0.6 miles)	55,000
Riverfront Parkway / 21st Century Waterfront		Remove	Cattanooga, TN	50+ (at time of removal)	2.7 km (1.7 mile)	20,000
Embarcadero Freeway		Remove	San Francisco, CA	32 (at time of collapse)	2.5 km (1.6 mile)	80,000
Cheonggyecheon Restoration Project		Remove	Seoul, Korea	24 (at time of removal)	6.1 km (3.75 miles)	120,000
Sheridan Expressway		Remove	Bronx, NY	47	2 km (1.25 mile)	40,000

Urban Design Goals	Open Space Goals	Transportation Goals	Economic Dev. Goals
–	–	–	–
• Increase pedestrian access to the waterfront. • Preserve and enhance views of waterfront and mountains.	• No significant open space goals beyond enhancing waterfront access.	• Replace elevated structure with deep bored tunnel and six-lane at-grade boulevard. • Provide new light rail along Viaduct route. • Public dialogue about alternatives considered whether future scenario should accommodate current traffic volumes or encourage mode-shift.	• Increase downtown and waterfront property values. • Grow tourism through new waterfront amenities. • Most waterfront land is privately-owned, so limited opportunity for City to recapture $4.24 billion public investment in the bored tunnel.
• Enhance pedestrian connections to waterfront.	• Boulevard design coordinated with plans and design guidelines for Hudson River Park and Manhattan Greenway.	• Demolish elevated highway and replace with six-lane at-grade boulevard. • Limit access in order to reduce congestion on neighborhood streets, but enhance role as collector-distribution road.	• Whereas Westway was intended to create long-term development opportunities on filled land, the West Side Highway created demand for adaptive reuse and infill.
• Reclaim 4.5 acres of development parcels for residential and office. • Enhance value of redevelopment in Cite Multimedia and Griffintown. • Create new entrance to the city. • Develop new retail under railroad viaduct.	• Provide access to Peel Basin, waterfront park network, and waterfront amenities.	• Demolish elevated expressway and expand two at-grade boulevards. • New light rail to reduce automobile demand. • Create new underground pedestrian network with connections to transit stations.	• Develop 12,500 new housing units. • Develop 900,000 square meters of commercial, and 1 million square meters of cultural and recreation space.
• Integrate downtown street grid with new urban boulevard, thereby creating new development parcels. • Connect downtown cultural amenities to the waterfront.	• New and reconstructed waterfront park, amenities, and amphitheater. • New pedestrian connections across Tennessee River.	• Replace grade-separated parkway with at-grade boulevard. • Reduce excess road capacity to meet existing demand.	• Create a framework for new development downtown and on the Tennessee River's north shore. • 21st Century Waterfront is estimated to have attracted US $2 billion in private investment.
• Complement new urban boulevard with waterfront esplanade, public art, and new retail and housing development. • Reconnect downtown San Francisco to the bay. • Restoration of the historic Ferry Building as a regional food market.	• New waterfront esplanade and pedestrian and bicycle greenway.	• Replace earthquake-damaged elevated highway with six-lane at-grade urban boulevard. • Advance city's "transit first" policies by providing new waterfront streetcar route.	• Reclaim 100 acres for new housing, office, and public space. • Encourage development of over 10,000 new housing units in adjacent neighborhoods.
• Advance Mayor's commitment to making Seoul a model for sustainable development. • Reverse property value and population decline in commercial and retail districts facing Cheonggyecheon Expressway.	• Create new open space amenity for entire city. • Day-light historic creek and create waterfront esplanade.	• Replace four-lane elevated expressway and ten-lane at-grade highway with two two-lane boulevards. • Create new bus rapid transit service on Cheonggyecheon route. • Reduce traffic demand through incentives for commuters to use transit and increasing user fees.	• Strengthen Seoul's position as a global financial center. • Government reported cost at US $390 million, though may have been as high as US $900 million. •
• Reclaim land for housing and waterfront open space. • Improve access to Hunts Point Market (wholesale food distribution center).	• Connect to planned Bronx River watershed greenway.	• The purpose of the study was to improve truck circulation into Hunts Point Market. A community plan proposed removing the highway. While the NYSDOT included this option in their study, it was ultimately not selected.	• Provide 1,200 affordable housing units and 700 jobs. • Enhance upland neighborhood property values by improving waterfront connections.

Case Study Summary Matrix

Name	Context	Type	Location	Age	Size	Vehicles per day
A8ern8		Ameliorate	Zaanstadt, Netherlands	30+	400 meters (0.25 miles)	N/A
Viaduct des Arts / Promenade Plantee		Ameliorate	Paris, France	150+	2 km (1.25 miles)	N/A
East River Waterfront Esplanade		Ameliorate	New York, NY	55	3.2 km (2 miles)	175,000
Buffalo Skyway / Route 5		Do Nothing	Buffalo, NY	43	1.6 km (1 mile)	43,400
Whitehurst Freeway		Do Nothing	Washington, D.C.	60	1.2 km (0.75 miles)	45,000

Urban Design Goals	Open Space Goals	Transportation Goals	Economic Dev. Goals
• Create a new "civic arcade". • Re-establish physical and visual connections between town center and waterfront. • Clad underside of elevated structure in order to create inviting environment. • Develop new retail under elevated structure.	• Provide a diversity of recreation programs that appeal to range of users and age-groups (skateboard park, basketball, and marina, among others).	• This project made no changes to existing highway configuration.	• Supermarket tenant was attracted to site that offered opportunity for highway accessibility and large floor-plate in town.
• Create a new Paris landmark through historic restoration of 19th-century infrastructure. • Strengthen role of Avenue Daumensil as a neighborhood cultural and retail corridor. • Advance city agency goal for "greening the city".	• Develop new 2.5-mile-long linear park on top of elevated rail viaduct.	• Railroad viaduct closed in 1969. This project had no significant transportation goals.	• Re-tenant retail and cultural spaces with up-scaled uses.
• Develop new public spaces and programmed pavilions under elevated highway. • Clad underside of elevated structure in order to create inviting environment. Elevated highway treated as "roof" for new public spaces. • Coordinate with and enhance other post-September 11th Lower Manhattan public realm and development initiatives.	• Develop network of upland public spaces, arbors, and planters that connect to waterfront esplanade.	• Street section and parking under elevated highway reconfigured in order to create pedestrian-friendly environment.	• Support overall post-September 11th planning for Lower Manhattan to provide new amenities for residents and works. • Advance transformation of Lower Manhattan into a residential district.
• Route 5 study does not consider significant urban design goals.	• Improve access to planned waterfront pedestrian and bicycle greenway.	• Improve access to Outer Harbor (manufacturing district on Lake Erie).	• At-grade option (not recommended by NYSDOT) would create value recapture opportunities for the state.
• Improve pedestrian access from neighborhood to Potomac River. • Preserve and improve river views.	• Connect to new waterfront park.	• Provide alternative route for 45,000 vehicles that use Whitehurst Freeway.	• Build on previous decade of increased property values by removing impediment to waterfront revitalization. • $35 million public investment in rehabilitating the freeway in 1998 weakened argument for its removal.

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