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# **Freeway Deconstruction and Urban Regeneration in the United States**

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## 1. Freeway Deconstruction in an Urban Context

A new relationship between elevated freeways and central-city neighborhoods seems to be forming. Despite worsening traffic congestion, a number of American cities have or are in the midst of demolishing elevated structures in favor of at-grade boulevards and arterials with far less traffic carrying capacities. Nowhere has this been more evident than in the city of San Francisco, thanks in part to the Loma Prieta Earthquake of 1989. The damage caused by Loma Prieta forced city officials to address whether to sink funds into building new facilities and seismically retrofitting existing ones, or replacing structures with slower moving at-grade facilities while at the same time opening up access to waterfronts, removing physical obstructions, and redeveloping economically stagnant neighborhoods. In San Francisco's case, demolition of the elevated Embarcadero Freeway, along with assorted streetscape enhancements, the introduction of surface tramways, and urban re-designs, has radically transformed the city's downtown waterfront, creating an open, nicely landscaped, pedestrian-friendly corridor. Just west of downtown San Francisco, several miles of the Central Freeway spur were also torn down, replaced by an attractively landscaped more "human scale" boulevard, improved transit, pedestrian and bikeway facilities and new public spaces. Several other spurs and ramps of the Central Freeway are also currently being taken down.

Portland, Oregon is well-known as a pioneer in progressive planning, evidenced by the decision 30 years ago to bulldoze the Harbor Drive freeway and replace it with a 37-acre waterfront park. Milwaukee recently tore down its Park East Freeway, opting to use the vacated land for housing, shops, and offices. Hoping to reverse the flight of households and businesses from the central city, then-Mayor John Norquist spearheaded a community-based effort to transform 26 acres of prime urban real estate to a New Urbanism-type "new town/in town". A ground-level six-lane boulevard, McKinley Avenue, has been constructed, adorned with tree-lined medians, granite pavers, and wide sidewalks. Officials in New York City, Akron (Ohio), Chattanooga (Tennessee), Ft. Worth (Texas), Washington, D.C. and other cities are today looking into dismantling freeways as well as a tool toward global urban regeneration. The movement is global in its reach, no more underscored than with the experiences of Seoul, Korea. Under the leadership of Mayor Lee Mung-bak, Seoul's Cheonggyecheon elevated expressway was torn down last year and the buried stream beneath was brought back to the surface as a linear park. According to some observers, Mayor Lee staked his political future on this one-of-a-kind \$313 million project, calling it "a new paradigm for urban management in the new century".<sup>1</sup> Echoing the sentiments of visionaries like Jaime Lerner of Curitiba, Brazil and Enrique Penalosa of Bogotá, Colombia, Mayor Lee's defense of the project is thus: "we want to make a city where people come first, not cars".

Freeway demolitions can be viewed as a bold, and according to critics, risky, experiment in urban renewal. They also reflect a re-ordering of municipal priorities. Freeways stand as monuments to an era when high priority went to "mobility" – i.e., efficiency of

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<sup>1</sup> Seoul Metropolitan Government, "Cheonggyecheon Restoration Project", Seoul, Korea, 2003; see: <http://www.metro.seoul.kr/kor2000/chungahome/>.

automobile movements, in particular of professional-class suburbanites to good paying jobs downtown. Many multi-level freeways were built, seemingly, without regard to the fact they severed longstanding neighborhoods, formed barriers and visual blights, cast shadows, and sprayed noise, fumes, and vibration on surrounding areas. With the cumulative effects of designing the city for automobility evidenced by continued traffic jams, worsening environmental conditions, and dysfunctional urban districts, priorities are now shifting toward promoting economic and environmental sustainability, livability, and social equity.

In some places, priorities have abruptly shifted to the well-being of central-city neighborhoods – e.g., economic redevelopment, creating attractive, livable places, and freeing up public land for affordable housing. In keeping with smart-growth principles, some argue for “de-mobilization strategies” – redesigning the city to reduce car travel. In this spirit, freeway deconstruction is a corridor-scale version of neighborhood traffic calming or perhaps even the automobile-liberating principles of New Urbanism designs. Some critics charge that freeways induce car travel (e.g., “build it and they will come”) and give rise to car-dependent landscapes, and reason that removing road capacity should have the opposite effect. As Milwaukee’s former Mayor John Norquist remarked: “The Park East Freeway creates congestion by encouraging people to travel further and further between increasingly insignificant places”.<sup>2</sup>

Advocates argue that bulldozing freeways will spur economic redevelopment by not only removing physical barriers and visual eyesores, but also by freeing up large swaths of valuable urban land for large-scale projects. Critics counter, however, that central-city traffic congestion will worsen, and putting more cars and trucks onto surface streets will increase pedestrian fatalities. Some also fear that any economic gains will be offset by businesses leaving core cities in favor of freeway-served suburban locales. Against this backdrop of controversy and uncertainty, this paper reviews the evidence on both land-value and traffic impacts, drawing mainly upon evidence from the United States. Original research results on the land-value impacts of Seoul’s Cheonggyecheon stream restoration project are presented.

## **2. Land-Value Impacts**

At its core, the deconstruction of freeways represents a trade-off between mobility and safety objectives on the one hand and urban re-generation and economic development objectives on the other. A common way to gauge the economic benefits of public initiatives – be they infrastructure investments or disinvestments – is to study changes in land prices. In an open marketplace with a pent-up demand for mobility or access to high-quality urban space, studies show that access to transportation facilities as well as supportive land-use environments (e.g. mixed-use development) and public amenities are associated with high residential land prices.<sup>3</sup> Most studies of transportation

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<sup>2</sup> L. Schriebman, “On a Tear: Looking for Land – Try Tearing Down a Highway”, *Planning*, January 2001, p. 10.

<sup>3</sup> R. Cervero and M. Duncan, “Neighborhood Composition and Residential Land Prices: Does Exclusion Raise or Lower Values?”, *Urban Studies*, Vol. 41, No. 2, 2004, pp. 299-315.

infrastructure, however, examine how the expansion of capacity influences prices. What might be the effects of the withdrawal of capacity or the replacement of a higher functioning facility with a lower functioning one (e.g., an elevated, grade-separated freeway replaced by an at-surface boulevard)?

Polinsky and Shavel found amenities like open space positively influence property values although impacts depend on levels of mobility – nicely landscaped districts that are highly congested generally are not valued any more than less landscaped ones with similar congestion levels.<sup>4</sup> A more recent study of Boston’s notorious “Big Dig” project (wherein an elevated freeway was replaced by a tunnel) found proximity to open space had a positive impact on property values.<sup>5</sup>

In order to further probe the economic impacts of freeway removal, I worked with two Korean scholars – Chang Deok Kang (a doctoral student in UC Berkeley’s planning program) and Tae Ug Rho (on the faculty of Kang-nam University in Korea) – to measure the capitalization effects of the Cheonggyecheon freeway removal/stream restoration project. To conduct the analysis, we obtained “Publicly Announced Land Price” data for year 2005, a cross-sectional database that contains information on property address, land use, and assessed land price in the national assessor offices.<sup>6</sup> Using data for 6,276 property parcels, a hedonic price model was estimated that predicted land prices per square meter as a function of key explanatory variables, including the distance of recorded parcels from Cheonggyecheon. Sampled properties were situated between 23m and 8,291m from Cheonggyecheon. Forty percent of the parcels were commercial-retail users. Among non-commercial uses, most were single-family houses (32%) followed by mixed-use projects (13%), multiplex housing (6%), offices (5%), and condominiums (1%).

Table 1 presents the results of the hedonic price model that predicts land prices as a function of distance to Cheonggyecheon as well as other control variables. The model was estimated using candidate variables with significant predictive powers as well as an interactive term that gauged the influences of distances on land values by land uses. A quadratic curve provided the best fit in explaining the influences of distance from Cheonggyecheon on land values.

The model shows that land values decline with distance from Cheonggyecheon and that commercial properties command the highest prices. That is, the closer a parcel is to Cheonggyecheon, the more value it commands in the open marketplace. Using the mean values of other predictor variables in Table 1, Figure 1 presents a plot of the relationship

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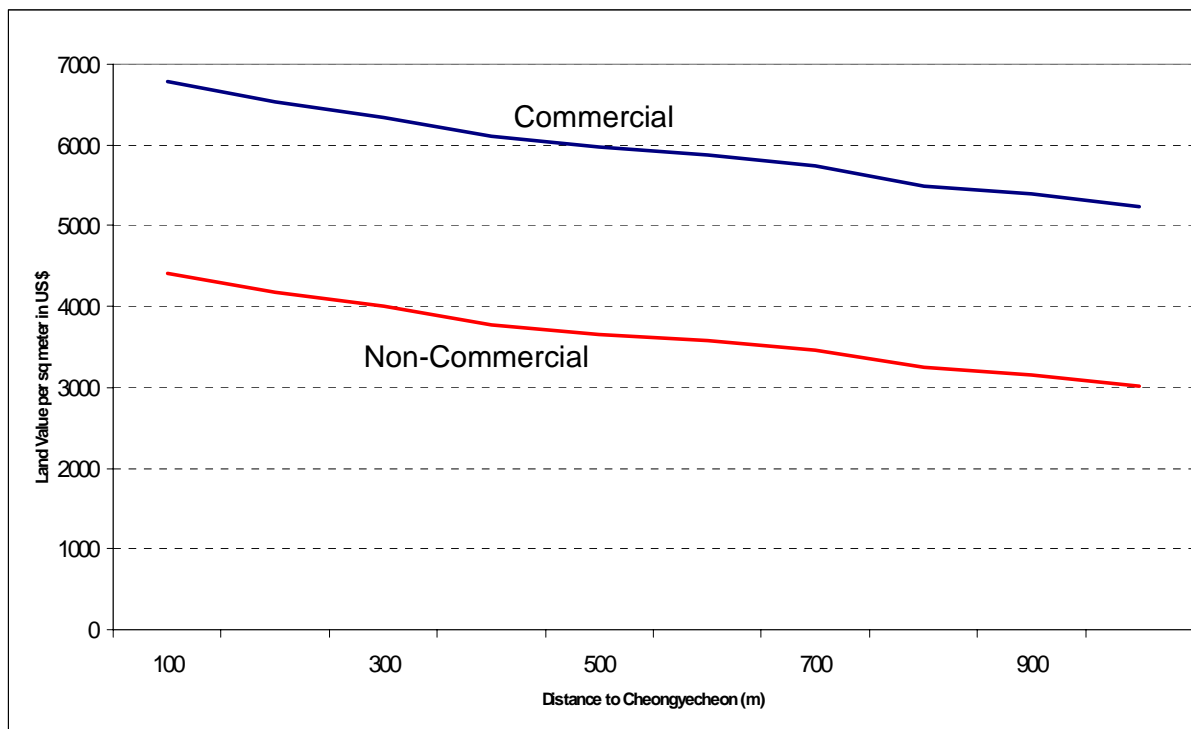
<sup>4</sup> M. Polinsky and S. Shavel, “Amenities and Property Values in a Model of an Urban Area”, *Journal of Public Economics*, Vol. 5, 1976, pp. 119-129.

<sup>5</sup> K. Tajima, “New Estimates of the Demand for Urban Green Space: Implications of Valuing the Economic Benefits of Boston’s Big Dig Project”, *Journal of Urban Affairs*, Vol. 25, No. 5, 641-655.

<sup>6</sup> The Korean government assesses land prices annually for property taxation. Among the explanatory variables used to explain land prices per squared meter were: network distance of the property to the closest point of Cheonggyecheon and to the CBD (Seoul City Hall), employment and population densities, municipal expenditures, and land-use type. Distance data were compiled using GIS techniques. Prices were expressed in U.S dollars using a conversion of \$1 = 951 Korean Won.

**Table 1. Hedonic Price Model of Land Prices as a Function of Distance to Cheonggyecheon, Seoul, Korea**

	Coefficient	T Statistic	Probability
Distance to Cheonggyecheon, meters	-1.230	-8.169	0.000
Distance to Cheonggyecheon, Squared	0.000308	10.484	0.000
Land Use (Commercial =1, Non-Commercial =0)	2401.44	14.982	0.000
<i>Interaction: Commercial Land Use (1) * Distance from Cheonggyecheon</i>	-0.177	-1.947	0.052
Distance to CBD, meters	-0.463	-16.615	0.000
Public Expenditure Ratio	22879.55	3.083	0.002
Developable Area Ratio	4306.42	2.631	0.009
Total (population + employment) Density	6.583	19.424	.000
Constant	-9137.2	-2.230	0.026
<b>Summary Statistics: N=6,276; R-Square = .368</b>			



**Figure 1. Plot of Land Value Capitalization with Distance to Cheonggyecheon, Commercial and Non-Commercial Properties**

between land values and distance from Cheonggyecheon for the “typical” commercial and non-commercial properties. For an “impact shed” of 1 kilometer, the graph reveals a clear capitalization effect: evidently, the amenity of properties being located with a walkable distance of the restored urban stream is being expressed in property values.

### **3. Neighborhood Impacts**

While most evidence is anecdotal, it is apparent that neighborhoods which witness the removal of freeways replaced by at-surface boulevards have witnessed a renaissance. In the nine years between when the double-decker elevated Central Freeway of San Francisco was removed and the Octavia Street boulevard took its place, there has been a neighborhood renaissance, mainly in the form of housing upgrades, infill development, and selective commercial property development. Gentrification started once the boulevard was approved in 1999 suggesting most land-use changes occurred in anticipation, not following, the freeway removal. This is not unlike experiences with freeway and rail-transit investments showing most land-use and price impacts occur prior to and during, not following, project construction.

In downtown San Francisco, the replacement of the Embarcadero Freeway with the tree-lined promenade/traditional streetcar corridor has been a key factor in stimulating the adaptive reuse of former warehouses south of Market Street into apartments and condominiums (Photo 1). Changes in development before-and-after the freeway demolition within a ¼ buffer of the former freeway versus other transitional zones of downtown San Francisco found significant increases in building permit activities.

The replacement of Milwaukee’s Park East elevated freeway with the McKinley Avenue landscaped boulevard is similar poised to stimulate adaptive re-use. Construction is currently underway to convert a long-empty tannery factor to 500 condominiums, 300 apartments, and neighborhood retail. Twenty-eight traditional city blocks with an “urban feel” are slated for mixed-use development along with the extension of the riverwalk and a fine-grained block pattern.

While not a freeway demolition project, a capacity-reduction scheme recently introduced in Chattanooga, Tennessee has had a similar objective: stimulating central-city redevelopment. The Riverfront Parkway was converted from a four-lane, limited access highway to a two-lane highway with angled parking, wide sidewalks and trails for pedestrians, and four at-grade intersections. In a way, this unique project represents context-sensitive “redesign”. The conversion is part of a city-led plan to revitalize the central-city waterfront, enhance waterfront access, and improve enhance pedestrian access to a new aquarium, newly constructed boat pier, and esplanade. A \$17 million mixed-use development featuring residential and retail stores is planned for a former factory site and several major developers are currently seeking approval for mid-rise housing projects.



**Photo 1. Replacement of San Francisco's Waterfront Embarcadero Freeway with an At-Surface Artery**

#### **4. Traffic and Safety Impacts.**

In the near term, removal of freeways reduces road capacity. Unless surface-streets are redesigned, signalization systems and transit services are upgraded, and former motorists opt not to travel, congestion levels will likely rise. Some fear that pedestrian accidents and fatalities will also increase – transferring fast-moving traffic from grade-separated structures to surface streets means that potential conflicts between cars and pedestrians will dramatically increase. How do such negative consequences stack up against the benefits of enhancing neighborhoods, attracting new businesses, putting land back on the public tax rolls, and providing new housing choices?

In a study of over 100 cases of road-capacity reductions (e.g., street and bridge closures, pedestrianization of streets, car-free zones, roadway demolitions) in Europe, North America, Japan, and Australia, Phil Goodwin and other U.K. researchers found an average overall reduction in motorized traffic of 25 percent, even after controlling for possible increased travel on parallel routes.<sup>7</sup> This “evaporated” traffic was assumed to represent a combination of people forsaking low value-added (discretionary) trips and opting for alternative modes, including transit riding, walking, and cycling. Over time, the researchers note, traffic declines appear to be offset by latent demand and secular increases in travel.

The city of San Francisco was a leader in the freeway revolts of the 1960s, halting the planned construction of elevated freeways that was to ring the northern waterfront of the

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<sup>7</sup> P. Goodwin, C. Haas-Klua, and S. Cairns, Evidence on the effects of road capacity reduction on traffic levels, *Journal of Transportation Engineering + Control* Vol. 39, No. 6, 1998, pp. 348-354.



city and to tie the Bay Bridge and Golden Gate Bridge. Several decades later, San Francisco once again staked a leadership role by tearing down two major freeways – as noted earlier, the Central and Embarcadero freeways. The chief concern of freeway deconstruction in San Francisco has been that traffic congestion and car-pedestrian accident levels would increase. There is anecdotal evidence that this might have happened. In the late 1990s, San Francisco had the highest rate of pedestrian injuries and fatalities of any California city.<sup>8</sup> Some argue this was a consequence of freeway removal – notably, intermixing formerly grade-separated traffic with pedestrians. To accommodate increased traffic, city engineers introduced a dynamic signalization system that allowed “green waves” of traffic that formerly moved on elevated freeways to move swiftly along city streets used also by pedestrians and cyclists. There was also a lot of hyperbole about the traffic nightmares that would be caused by the freeway removal. When Caltrans shut down the Central Freeway in 1996, the director of operations predicted there would be bumper-to-bumper traffic for 45 miles east across the Bay Bridge and south into the San Francisco peninsula. State traffic planners warned that morning commutes would increase by as much as two hours. Fortunately, these nightmarish scenarios never materialized, though some contend traffic conditions are worse today than before

In examining traffic impacts, it is helpful to understand what happened to the 80,000 cars per day that formerly used the Central Freeway. How many were absorbed by surface streets? To what degree did improved traffic signalization accommodate added traffic? Did some motorists switch to carpooling, bicycling, walking, or telecommuting? Did some stop making discretionary trips altogether? While there has been no research to probe these specific questions, there is nonetheless a growing literature on “reduced demand” that could shed light on these questions.

An evaluation of the closure of San Francisco’s Central Freeway sought to assess the redistributive impacts on traffic and to evaluate the impacts of the “3 Es” of traffic mitigation strategies: engineering, education, and enforcement. When the freeway was closed in August 1996, so much media attention had been given to the possibility of traffic gridlock that the traveling public was evidently “scared away” from driving along the corridor (a repeat of the 1984 Los Angeles Olympics phenomenon wherein prior public announcements about the prospects of traffic gridlock prompted many residents to go on vacation or forego travel). A September headline of the *San Francisco Chronicle* proclaimed: “Traffic Planners Baffled by Success: No Central Freeway, No Gridlock, and No Explanation”.<sup>9</sup> One analysis showed a lot of the traffic was redistributed: six weeks after the closure, 42% of the traffic that the closed portion of the freeway had carried was found on three primary detour routes; other routes outside of the primary detour routes recorded traffic increases that amounted to over half of the former Central Freeway volumes.<sup>10</sup> A survey mailed to 8,000 drivers whose license plates had been recorded on

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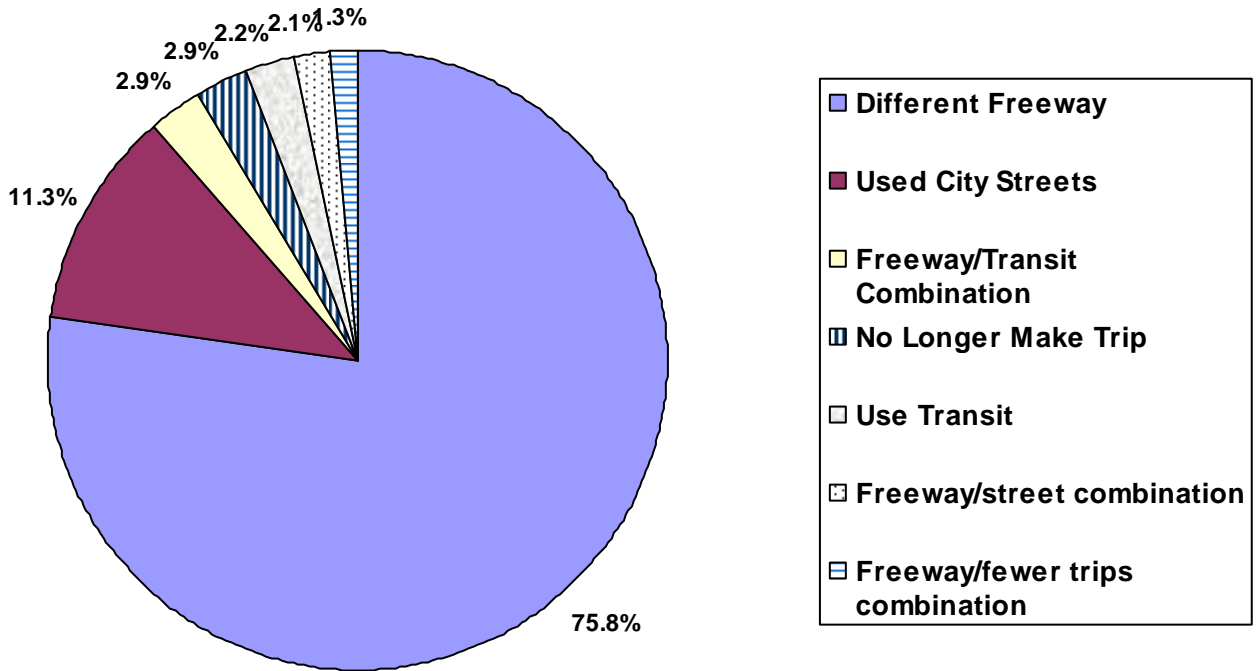
<sup>8</sup> Surface Transportation Policy Project, *Dangerous by Design: Pedestrian Safety in California*, San Francisco, 2000.

<sup>9</sup> *San Francisco Chronicle*, September 13, 1996.

<sup>10</sup> G. Robbins, J. Billheimer, D. Sibley, “Closing a Major Urban Freeway with Minimal Traffic Congestion”. San Francisco Department of Transportation and Parking, 2001.

the freeway prior to the closure revealed that 66% had shifted to another freeway, 11% used city streets for their entire trips, 2.2% switched to public transit, and 2.8% said they no longer made the trip previously made on the freeway (Figure 2).<sup>11</sup> The survey also found that 19.8 percent of survey respondents stated they made fewer trips since the freeway closure. Most were discretionary trips, such as for recreation. Also, average one-way trip length increased by 7.7% (from 21.2 miles to 22.8 miles).

By September 2005, right-of-way of the former Central Freeway had been replaced by an award-winning Octavia Boulevard (see Photo 1). The boulevard provided a renewed connection to several major facilities. The former 93,100 vehicles recorded on the Central Freeway in 1995 had dropped by 52%, or to 44,900 vehicles by 2006, some six months after the Octavia Boulevard opening. Today, Octavia Boulevard and the network of streets that link to it are operating at capacity during peak hours. As a result, some motorists have opted to continue using street detours that were planned ten years ago for the first Central Freeway demolition.<sup>12</sup>



**Figure 2. Source of Traffic Shifts Following Removal of San Francisco’s Central Freeway**

<sup>11</sup> Systan, Inc., “Central Freeway Evaluation Report”, May 1997.

<sup>12</sup> Department of Parking & Traffic, “Octavia Boulevard Operation, Six Month Report”, March 2006.

Two other studies found a similar scope of traffic-reduction impacts. In May 1974, Portland, Oregon's Harbor Drive freeway was torn down. Before-and-after comparisons found 9.6% fewer vehicle trips on nearby roads and formerly connecting bridges. Following the Northridge Earthquake in 1995, four freeways suffered significant damage. During the several years of reconstruction, an 8.4% drop in traffic was recorded on mainline and parallel roadway facilities.

Other recent freeway removal and capacity-reduction schemes reveal more significant real declines in traffic. In the case of the elimination of two lanes on the Riverfront Parkway in Chattanooga, a comparison of traffic counts in 2002 (before) and 2005 (after) the parkway narrowing revealed a 44% decline in average daily traffic. An alternate route experiences a 12% increase in flows. Since transit ridership levels remained largely unchanged over this period, it appears the reduction of capacity eliminated low value-added and more discretionary trips.

While all of these initiatives involve capacity reductions, it could be the case that boulevard designs offer compensatory benefits through their operational and logistical attributes. A multiway boulevard is capable of handling large amounts of relative fast-moving through-traffic as well as slower local traffic within the same right-of-way but on separate but closely connected roadways.<sup>13</sup> It is also important to keep in mind that the aim of boulevards and roadway redesigns is not necessarily to accommodate displaced or redistributed traffic. To do so would be to embrace the philosophies and design practices of much of the post-second-war-world era. Writes urban designer Elizabeth Macdonald about the possible traffic impacts of boulevards that replace freeways: "Focusing on every potential traffic conflict or possible bad-driver behavior and trying to solve each by adding greater lane widths, wider turn radii, great tree setbacks, or more movement restrictions is a misapprehension of the complex manner in which good boulevards".<sup>14</sup>

## 5. Conclusion

While the jury is still out on the long-range impacts of freeway deconstruction, evidence to date suggests that, on balance, they are positive. Original research of Seoul's Cheonggyecheon freeway removal/stream restoration project reveals substantial capitalization effects. Whether this has been due to the removal of a visual eyesore and public nuisance or the positive effects of a central-city stream and public amenity cannot be assessed from the cross-sectional database used to conduct the analysis. Still, the evidence suggests that the more valuable resource in many large, built-up cities is high-quality public space, not transportation accessibility.

Evidence from the United States suggests that following the removal of freeways, most traffic gets redistributed to alternative routes, with public transit absorbing relatively few

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<sup>13</sup> E. Macdonald, "Building a Boulevard", *Access*, No. 28, 2006, pp. 2-11.

<sup>14</sup> Macdonald, *ibid.*, p. 6.

former freeway travelers. Many discretionary trips are likely not taken once central-city road capacity is removed. Also, the traffic chaos predicted following freeway demolition generally has not materialized, a consequence of operational enhancements, marketing, and transportation demand-management strategies.

It would be wrong to conclude that elevated freeways are increasingly relics of a bygone era. Tampa, Florida, for example, recently opened six-miles of an elevated freeway (three lanes plus a breakdown lane on each side). However, the era of indiscriminate freeway construction and a focus on mobility-based planning is without question over. Whatever freeways and high-capacity road facilities are built in the future will have to be strategically sited and tied to larger urban development and land-use objectives of the cities and neighborhoods they serve. In this sense, freeway deconstruction is tied to the re-ordering of urban priorities that gives preference to planning for people and neighborhoods, not mobility. Smart growth, high-quality public transit options, bike- and pedestrian-friendly corridors, and improved boulevard designs will no doubt serve to further diminish the necessity for high-capacity elevated freeway structures in many global settings.