

THE HIGHWAY AND THE AMERICAN CITY: RETHINKING A TROUBLED RELATIONSHIP

Ted Shelton, AIA  
University of Tennessee

Almost since the passage of the Federal-Aid Highway Act of 1956 (commonly known as the National Interstate and Defense Highways Act) the urban segments of the Eisenhower Interstate Highway System have been controversial. Flashpoints for protests and tools for radical reshaping of the urban fabric, over the last half century the urban sections of the system have had profound social, environmental, and structural impacts on numerous American cities.

The greening of the American city is a linchpin of a sustainable global future. As we look for ways to retrofit U.S. cities with green infrastructures, the elimination of urban interstate segments could create intriguing sites for these developments within the otherwise crowded and difficult urban landscape. My current research project, *The Highway and the American City*, explores this possibility.

This project investigates the impacts that highways<sup>1</sup> have had on the American city. The thesis of this research is that the intrusion of the highway into the urban fabric of many American cities significantly compromises inhabitants' abilities to live socially connected lives of low environmental impact. The project posits that this is due both to the disruption that the highway visits upon other, finer-grained infrastructures and the centrifugal force of the highway that disperses population, commerce, and services ever further from the center city. This project proposes to investigate this thesis in three ways:

1. by examining the cultural history of the relationship between the highway and the city in America,
2. by analyzing the environmental, social, and structural impacts of highways in selected American cities, and
3. by proposing alternate urban designs in which selected portions of urban highways are removed and replaced with infrastructures vital to the greening of the American city.

In this way, the urban segments of the interstate system are seen as having played an unexpected role in the development of the American city – that of placeholder within the urban fabric for infrastructures unimaginable at the time of their construction.



The Highway and the American City:  
Rethinking a Troubled Relationship

Ted Shelton, AIA  
University of Tennessee





## Background: Greening North Knoxville

**Funded by an AIA Research for Practice (RFP) Grant in 2007,** *Greening North Knoxville: Visualizing Sustainability in Urban Conditions* was a research project that used geographic information visualization (GIV) software to map and visualize multiple aspects of urban sustainability. This mapping of previously invisible or partially visible issues in the form of geospatial information provided a model through which architects and urban designers might more fully process and understand a particular neighborhood's sustainability through the means with which they are most accustomed – visual information (Figure 1).

The Greening North Knoxville project took a step toward being able to understand the interactions of environmental concerns in urban conditions through visual means. Though visualization of multiple aspects of urban sustainability will require significantly more effort, this project laid the groundwork for such investigations by both demonstrating the usefulness of the information embodied in the constituent analyses and developing a clearer understanding of methods by which these might be combined into more complex information models. However, one of the striking findings from this analysis is the significant impact that highways have on the sustainability of urban neighborhoods. While this result is in many ways simply the confirmation of a truth already understood through voluminous anecdotal evidence, its demonstration was so clear as to refocus the next iteration of my research. Rather than simply focusing on inner ring neighborhoods per se, I am now investigating how highways affect the city throughout the urban fabric and, informed by the findings from this phase, later suggesting ways in which any negative effects identified might be ameliorated through more integrated design strategies.

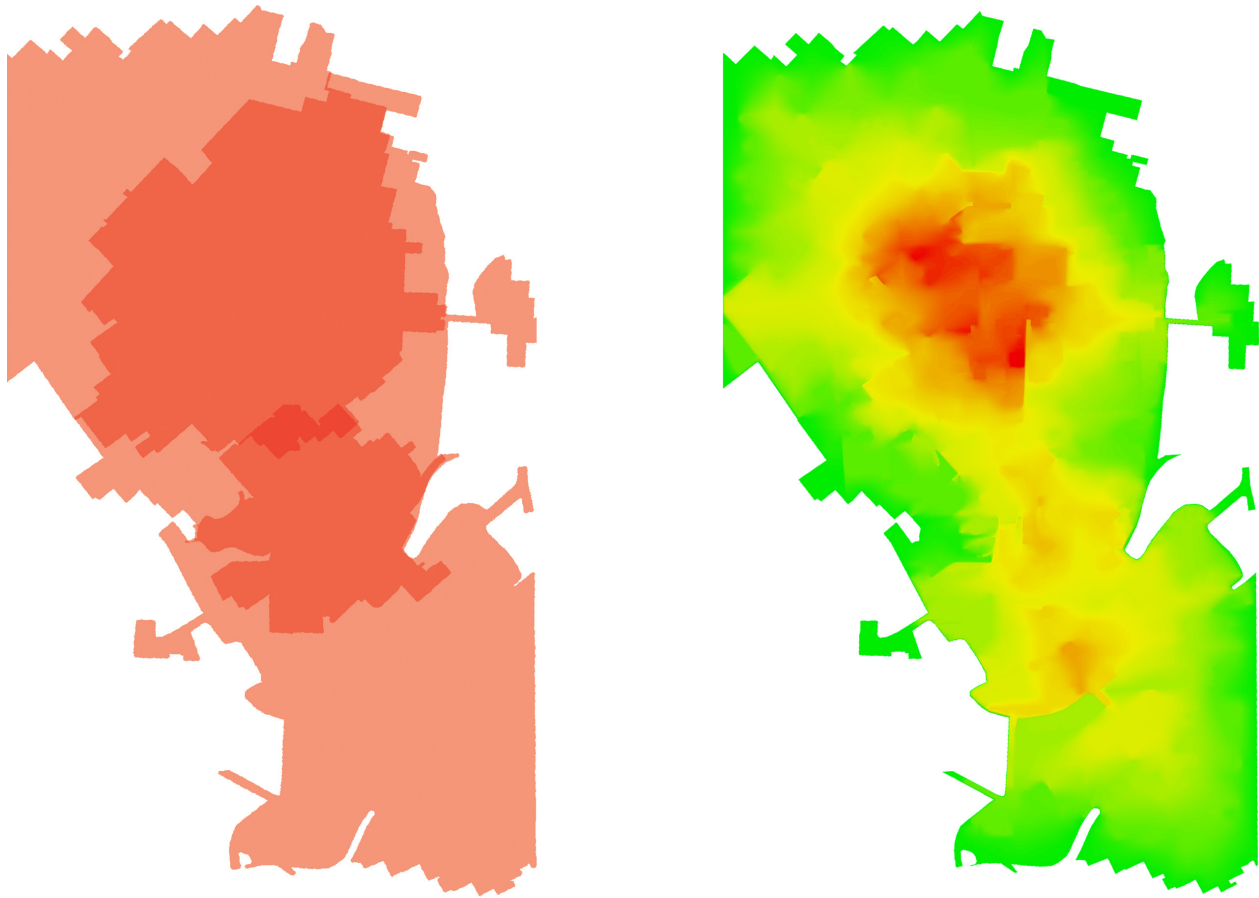


Figure 1: Diagrams showing proximity of neighborhood amenities through the lens of LEED for Neighborhood Development (left) and GIV visualization from the Greening North Knoxville Project (right), the later of which clearly shows the effects that major streets and urban interstates have on neighborhood connectivity. While the left diagram is generated using a single walking distance, the right diagram takes into account a gradation of walking distances.

## The Highway and the American City

The Interstate Highway System is the largest piece of infrastructure ever created. During a half century of existence it has done what infrastructure often does – underpinned a way of life so thoroughly that the very contours of society would be drastically altered were it removed. There is little doubt that the Interstate Highway System has been a significant benefit to the country in many ways, particularly with regard to the movement of goods and the sense of personal access to the vast continent that has, in many different guises, long been part of the American identity. Yet, these blessings have been accompanied by various curses: air and noise pollution, the environmental, fiscal, and social strains of suburban sprawl, and the destruction of vital urban neighborhoods to name a few.

This project proposes an editing of the system, selectively removing portions of the network where it interacts with mid-sized American cities. This reconsideration of the system promises to change its very meaning and function and profoundly alter the relationship between the city and the countryside in America. Embedded in this proposal is the notion that in these cities the Interstate Highway System has been serving a purpose never imagined for it – acting as a placeholder within the urban fabric for a host of new infrastructures that will shape the 21st century as profoundly the interstate shaped the 20th.



Figure 2: Relationship between U.S. mid-sized cities and the interstate highway system. Cities marked in red have been preliminarily identified for detailed examination. They are listed below.

## The Highway and the Mid-Sized City

The loci of this project are the numerous places where the Interstate Highway System intersects mid sized American cities, which are here defined as cities with populations between 100,000 and 300,000 (Figure 2). This project focuses on mid sized cities for several reasons. In 2006, U.S. Census data classified 198 cities as mid-sized. These cities contained a total population of 31.5 million citizens or about 11 percent of the total population of the country at the time. By way of comparison, the 59 cities that were larger than 300,000 in 2006 contained 49.3 million people with half of those located in the ten largest cities in the country.<sup>2</sup> Therefore, by using mid-sized cities as the places where we edit the interstate system, two goals are achieved that are vital for any infrastructure project that endeavors to be an environmental, cultural, and economic springboard for the 21st century. First, the benefits of the project must impact the lives of a large number of people. Second, the benefits of the project must be widely dispersed geographically. The mid-sized city provides a mechanism through which both of these goals are automatically achieved.

The intersection of the Interstate Highway System and the mid-sized city was chosen for important structural reasons as well. In many ways this project is about undoing the damage inflicted when a particular infrastructure, the interstate highway, collided with an incompatible construct, the city.<sup>3</sup> It is in mid-sized cities that the wounds of this collision are most apparent – in many cases the healing scars have not yet formed despite the intervention of many decades of time. It is here also that the resulting difficulties can be identified and dealt with most easily. Often in larger cities, the interstate has been subsumed by the accretion of urban growth such that the surgery necessary to allow for the healthy functioning of each has become very difficult (though still necessary in the long run.) This project then is concerned with a very specific set of infrastructural conditions – mid-sized cities already having bypasses as part of the Eisenhower System – that provide for the efficient restructuring of the relationship between these two entities (Figure 3).

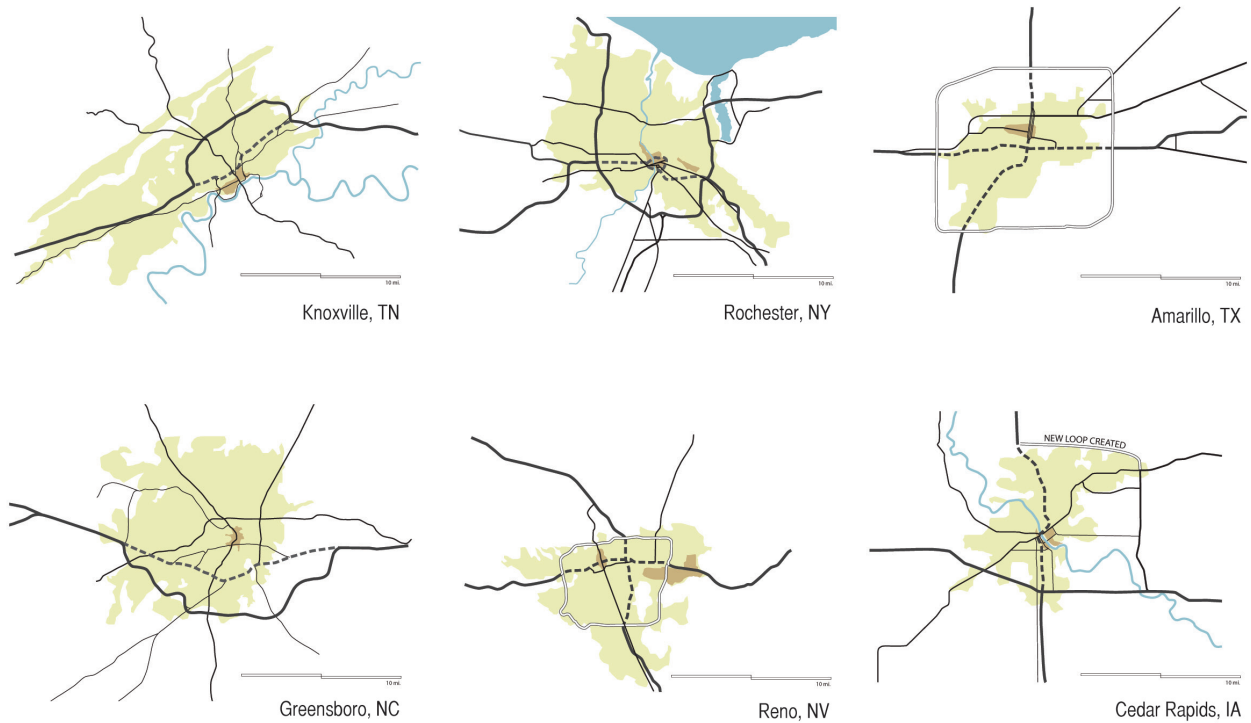


Figure 3: Interstate typologies - Billings, MT; Rochester, NY; Amarillo, TX; Greensboro, NC; Reno, NV; Cedar Rapids, IA. Dashed lines indicate urban segments that could be removed without impacting interstate connectivity.

In these locations the work of the project is very straightforward, though profound. Long-distance traffic will use the bypass to move around the city. Within the bounds of the bypass the interstate right-of-way will be recaptured as an integral part of the city rather than as a portion of a sprawling continental infrastructure. This newfound urban land will then be used to introduce infrastructures vital to the greening of the American city: the reconnection of historic street grids, efficient and diverse transit options, waterway and habitat protection zones, sustainable urban drainage systems, decentralized green power generation, a system of small schools, a network of public parks, urban agriculture, and significant opportunities for transit oriented infill development.

This is an intervention that is simultaneously surgical and massive, focused and far-reaching. It is, in a way, an audacious proposal, but no more audacious than the proposal for the Eisenhower System itself. That proposal has not only come to pass but has become so rooted in the fabric of our lives that taking the nearby on ramp and traveling across multiple states is so commonplace as to be completely unremarkable. It is the hope of this project that a sustainable lifestyle underpinned by the new infrastructures will one day be equally unremarkable for millions of Americans in mid sized cities across the country.

The first portion of this work, describing the cultural and historical context, is already in development in the form of several papers and theoretical proposals. Several of these are outlined in the section “Funding and Outlets” below. Building on the work of Greening North Knoxville, the analysis and proposal portions of the work will first be conducted using Knoxville as a test case. This work entails significant compilation of technical information on the various infrastructures proposed and development of a visualization regime that will allow one to understand the complex interactions of these systems. The visualization regime, in turn, will allow one to develop guidelines about how and where the infrastructures will be located, thus informing the design solutions central to the final stage of research.

The lessons of the Knoxville study will then be applied to selected American cities. These are tentatively identified as Rochester, NY; Amarillo, TX; Greensboro, NC; Reno, NV; Cedar Rapids, IA; and Billings, MT. However, the final list will be compiled following a study of urban interstate typologies at the commencement of the release period. Cities will be selected based on the existing highway configuration’s capacity for rerouting of through traffic without requiring additional highway construction. For each selected city the analysis methodology developed on the Knoxville test case will be adapted and applied yielding data that will guide a subsequent urban design proposal for that city.

Urban design proposals that make up the final phase of the research represent a synthesis of the work of the first two phases. These proposals will be presented in planimetric, perspective, and diagrammatic formats in order to both document the technical results of the proposals and provide compelling visions of the types of urban space that are proposed by this project. This is a vital portion of the work intended to lend the power of visual argument to the weight of the written portions of the research. This designed portion of the project provides the possibility of synthesizing the earlier quantitative and qualitative efforts into a proposal that responds to multiple parameters ranging from environmental, to social, to technical.

## Funding and Outlets

This line of inquiry has led to multiple publications and presentations. To date, only limited funding has been sought for its support, but several funding sources have been identified and requests will be made as the research matures. The work supported by the RFP grant led directly to the paper “Visualizing Sustainability in Urban Conditions”, which was presented at EcoArchitecture 2008: the Second International Conference on Harmonisation Between Architecture and Nature and published in *Eco Architecture II: Harmonisation between Architecture and Nature*.

On the promise of the follow-on research project, The Highway and the American City, I was selected as one of twelve recipients campus-wide of a Chancellor’s Grant for Faculty Research from the University of Tennessee. This award will provide release from one course in the fall of 2010 for the purposes of both advancing the research and applying for external funding. The College of Architecture and Design has also supported the development of the project with a Graduate Research Fellowship. I have been invited to present the preliminary stages of this research initiative in a paper entitled “Editing Eisenhower: Rethinking the Urban Segments of the U.S. Interstate Highway System” at EcoArchitecture 2010: the Third International Conference on Harmonisation Between Architecture and Nature. This paper outlines in broad terms the third part of the work of this project, the proposal of alternate urban designs to replace the urban segments of the interstate system in an effort to make cities more environmentally progressive. This is accomplished through the suggested insertion of green infrastructures such as distributed renewable energy harvesting, sustainable urban drainage systems, district combined heat and power systems, small schools, light rail, bike systems, neighborhood parks, urban agriculture, and district composting operations. A paper outlining the cultural history portion of the work is currently under review for inclusion in The Sustainable City 2010: Sixth International Conference on Urban Regeneration and Sustainability. This paper, entitled “The Highway and the American City”, explores the history of the difficult relationship between car and the city in the U.S. as one primarily of a struggle for primacy between the infrastructure of the highway, which prioritizes speed and individual safety and experience, and types of ‘gentle infrastructures’ that support the intricate interactions of people in a rich urban environment. Multiple conference and journal outlets have been identified for the other portions of the work as they are developed.

- <sup>1</sup> For the purposes of this research the term “highway” is used broadly to denote a road whose primary design goal is the efficient transmission of high volumes of automobiles and includes roads labeled by similar terms such as “expressway” and “interstate”.
- <sup>2</sup> U.S. Census Bureau at <http://factfinder.census.gov>
- <sup>3</sup> See for example: Fullilove, M., *Root Shock: How Tearing Up City Neighborhoods Hurts America*, Random House, New York, 2004.