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Making Streets into Complete Streets: An Evidence-Based Design Manual

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Making Streets into Complete Streets: An Evidence-Based Design Manual

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MAKING STREETS INTO COMPLETE STREETS: AN EVIDENCE-BASED DESIGN MANUAL

Final Report

NITC-TT-539

by

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16. Abstract

The predominant approach toward street function on major roads in the United States is to emphasize mobility and throughput of vehicles. The "Complete Streets" movement challenges some of this paradigm, emphasizing that streets should accommodate multiple modes of travel and should often be considered destinations themselves. Often, efforts to transform streets into Complete Streets face resistance from both professional communities of traffic engineers and from the public that their design will reduce throughput and vehicle flow..Complete Streets advocates, in some cases, counter that while their designs often create pedestrian and cycling space from areas that were previously occupied by automobiles, that throughput is often not impacted and that flow can actually improve.

This project's aim was to document a variety of existing and implemented examples of Complete Street improvements from around the country, visually document their design and context, and compare actual outcomes in order to create an evidence-based design guide for transportation planners, traffic engineers, policymakers, and communities across the country. The goal is to make it easier for communities to use the evidence from other communities to help make decisions about retrofitting their streets to better support multimodal options and the creation of placemaking with their streets. Complete Streets policies are being adopted all across the country, but local officials have few documented guidebooks to help them think about how to retrofit streets based on best practices. This project fills this gap.

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DISCLAIMER

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EXECUTIVE SUMMARY

The predominant approach toward street function on major roads in the United States is to emphasize mobility and throughput of vehicles. The "Complete Streets" movement challenges some of this paradigm, emphasizing that streets should accommodate multiple modes of travel and should often be considered destinations themselves. Often, efforts to transform streets into complete streets (or from mobility-based to accessibility-based designs) face resistance from both professional communities of traffic engineers and from the public that their design will reduce throughput and vehicle flow. Complete Streets advocates, in some cases, counter that while their designs often create pedestrian and cycling space from areas that were previously occupied by automobiles, that throughput is often not impacted and that flow can actually improve.

One example of this conflict is in the concept of the "road diet," where a four-lane road (two lanes in each direction) with no median or bike lanes is turned into a two-lane road (one lane in each direction), a center turn median and two bike lanes. Removing two automobile travel lanes seems like it would reduce automobile throughput, but supporters of road diets believe that the increased flow achieved with left-turning vehicles using the center median actually maintains or improves upon previous throughput numbers because flow is improved on the through lanes.

This project's aim was to document a variety of existing and implemented examples of Complete Street improvements from around the country, visually document their design and context, and compare actual outcomes in order to create a design toolbox for transportation planners, traffic engineers, policymakers, and communities across the country. The goal is to make it easier for communities to use the evidence from other communities to help make decisions about retrofitting their streets to better support multimodal options and the creation of placemaking with their streets. Complete Streets policies are being adopted all across the country, but local officials have few documented guidebooks to help them think about how to retrofit streets based on best practices. This project fills this gap.

1.0 INTRODUCTION

1.1 BACKGROUND

The predominant approach toward street function on major roads in the United States is to emphasize mobility and throughput of vehicles. The Complete Streets movement challenges some of this paradigm, emphasizing that streets should accommodate multiple modes of travel and should often be considered destinations themselves (McCann, 2005; Burden and Litman, 2011; Seskin. 2011). Often, efforts to transform streets into Complete Streets (or from mobility-based to accessibility-based designs) face resistance from both professional communities of traffic engineers and from the public that their design will reduce throughput and vehicle flow. Complete Streets advocates, in some cases, counter that while their designs often create pedestrian and cycling space from areas that were previously occupied by automobiles, that throughput is often not impacted and that flow can actually improve (Seskin, 2011).

One example of this conflict is in the concept of the road diet, where a four-lane road (two lanes in each direction) with no median or bike lanes is turned into a two-lane road (one lane in each direction), a center turn median and two bike lanes. Removing two automobile travel lanes seems like it would reduce automobile throughput, but road diet supporters believe that the increased flow achieved with left-turning vehicles using the center median actually maintains or improves upon previous throughput numbers because flow is improved on the through lanes. Moreover, supporters of these types of retrofits often claim that they are catalysts for adjacent land use change and increase private investment in such land.

What is lacking in professional practice – for traffic engineers, transportation planners, public policymakers, community organizations, and citizens alike – is an evidence and performance-based guidebook that links various types of street redesigns with different types of performance. Existing studies tend to concentrate on the hypothetical, either in design or assessment (Bochner, Daisa et al., 2011; Carlson, Greenberg et al., 2011; Elias, 2011; Tiwari and Curtis, 2012), or provide individual case studies that are limited in use for communities that want to explore a range of potential retrofit options (Carlson, Greenberg et al., 2011; Dock, Greenberg et al., 2012; Sanders and Cooper. 2012). These conceptual ideas or limited case studies do provide some grounds for rethinking the design and function of streets, but are often insufficient to provide guidance for practitioners and communities that want to base decisions on actual, completed and successful projects from a range of street and land use contexts.

This evidence-based guidebook consists of the performance of actual streets from across the United States that have been retrofitted in some way to be transformed from an exclusively automobile-centered design to ones that accommodate multimodal movement. From our knowledge and extensive national outreach, such a guidebook does not exist.

2.0 INTENTION, METHODOLOGY & PROCESS

2.1 INTRODUCTION

The objectives of this project were fairly straightforward:

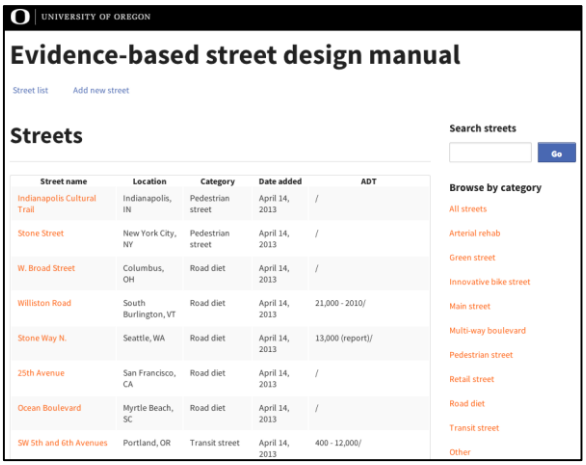
1. To identify *existing* examples across the United States from a variety of regions and built environment conditions of street redesigns that qualify as Complete Streets;
2. To document their existing conditions, including right-of-way, transportation and design elements, vehicle throughput, vehicular accident rates, relationship to the surrounding street network, cross sections, photos, and other post-construction outcomes;
3. To translate this information into a guidebook for professionals (in particular, traffic engineers and transportation planners), policymakers, community groups, and citizens to make evidence- and performance based decisions on street redesigns; and
4. To distribute this handbook nationally.

In addition, the overarching approach to communicating this range of information was to do so in a visually rich, easily accessible and understandable manner that allowed all stakeholders to engage with material of importance to them, while also giving each stakeholder access to information that other stakeholders tend to focus on in their decision-making processes. Thus, the project's intention was to create a resource that can both engage a wide variety of community stakeholders in street retrofit decision making *and* providing each stakeholder an opportunity to understand how others make decisions.

2.2 DEVELOPING GUIDEBOOK CONTENT

The research team developed the guidebook content in several ways, including engaging national partners, conducting stakeholder interviews, soliciting stakeholder and professional feedback, requesting potential street nominations from professionals, and scanning popular press and online sources for potential streets to include in the book. The primary method for collecting potential streets to include in the guidebook was through an online data entry portal that was widely advertised nationally (see Figure 1 for sample screenshots).

Figure 1: Online Solicitation of Street Case Studies



Directors of the Complete Streets Coalition (which became part of Smart Growth America during this project), the League of American Cyclists, and the Association for Pedestrian and Bike Professionals all offered guidance as to content they thought would be useful to their national constituencies of transportation professionals. They also provided feedback about ways of communicating such information they felt would be effective and helpful in assisting communities to make changes to their own streets. Each sent a letter out to their broad constituency or membership lists of professionals, soliciting participation in suggesting good streets to include in this guidebook and other feedback as relevant.

In addition, the research team engaged engineers and designers from local and state government and the private sector with a history of working on street retrofit projects similar to those envisioned to be part of the resource guide. Each key informant provided feedback throughout the project, from broad framing to specific design details (see
Table 1 for a full list of the primary contributors).

Table 1: Key Project Informants

Name	Organization	Type
Andy Clarke	President, League of American Cyclists	National membership

Name	Organization	Type
Kit Keller	Executive Director, Association for Pedestrian and Bike Professionals	National membership
Stefanie Seskin	Deputy Director of the National Complete Streets Coalition	National nonprofit
David Nelson	Project for Public Spaces	National nonprofit
Michael Ronkin	Consultant (former State Bike/Ped Coordinator)	Private sector
Sheila Lyons	Oregon DOT Bike/Ped Coordinator	Public
Gary Obery	Oregon DOT Traffic Engineer	Public
Tom Larsen	Eugene Traffic Engineer	Public
Chris Zahas	Leland Consulting Group	Private sector
Kaarin Knudson	Rowell Brokaw Architects	Private sector
Michele Reeves	CIVILIS Consultants	Private sector

Through this process, it became clear that there were many divergent directions the project could go, and the research team decided to focus and select case studies that were both "normal" and connected to placemaking and commercial activity. In terms of "normal" streets, the approach was to find examples from across the country of fairly typical streets, development patterns, concerns, and eventually, solutions. There have been many "signature" projects from around the country where very substantial street changes have taken place (e.g., turning Times Square into a pedestrian mall), but the focus of this project was to find examples that many communities of different sizes, locations, and political tendencies could learn from. Each example may not win redesign competitions, but the collection of completed projects can give readers a deep understanding and insight as to what might be possible in their own communities. The second main criteria for selecting streets to include was to focus on projects that had a placemaking quality, usually related to street-oriented commercial activity. In most cases, the street project had a partial goal of creating "place" that enhanced economic vitality of street-oriented businesses, while also addressing transportation throughput and multimodal transportation access.

Figure 2: Nationwide Collection of Streets in Guidebook

To further demonstrate the geographic and typology diversity of completed street projects in the guidebook, Table 2 organizes some of them in a “fun fact” manner.

Table 2: "Fun Facts" about Guidebook Streets

Smallest Metro Population: 15,499 Courthouse Square, Sulphur Springs, TX **Largest Metro Population**: 22,214,083 8th and 9th Avenues, New York City, NY **Narrowest Right of Way**: 50 feet Pine and Spruce Streets, Philadelphia, PA **Widest Right of Way**: 146 feet Pennsylvania Avenue, Washington, D.C. **Highest Average Daily Traffic**: 50,000 E. Washington Avenue, Madison, WI / 28th Street, Boulder, CO **Lowest Average Daily Traffic**: 3,500 Courthouse Square, Sulphur Springs, TX **Slowest Speed**: 15 mph Lancaster Boulevard, Lancaster, CA **Highest Speed**: 40 mph Aurora Avenue N., Shoreline, WA

As case studies were formatted into a near final form, the project team again reached out to our national partners and key informants for their peer review of the content, visual representation, and perceived usefulness of the information presented. All of these stakeholders were informed throughout the project process and gave periodic feedback to help steer the project; their thoughts were insightful and invaluable to help make this a nationally relevant and useful resource. Three public presentations to transportation and local planning professionals were also given, one in April 2013 (WSRO/ACT/ToGo Conference in Vancouver, WA) and two in September 2013 (the Oregon Planning Institute and the Oregon Transportation Summit). The intent was to share the work to date, solicit feedback, and ensure that the resource being developed was fulfilling a professional need. The feedback was overwhelmingly positive and many offered suggestions for future guidebooks, including focusing on rural street transformations, state highway transformation within urbanized areas, and intersection retrofits within a Complete Streets context.

2.3 DISSEMINATION OF INFORMATION

Once the resource guide is complete, multiple copies will be distributed to the stakeholders mentioned previously, including to their membership per request and contingent on supply. In addition, business cards of interested professionals throughout Oregon were collected at the conference presentations. Additional outlets for dissemination will be pursued, including the national network of federal agency staff and professionals maintained by the University of Oregon's Sustainable Cities Initiative, as well as the national network reached through NITC's communications efforts.

3.0 THE GUIDEBOOK

3.1 HOW TO USE THE GUIDEBOOK

The guidebook can be used in multiple ways. First, communities that are thinking about retrofitting some of their commercial streets to enhance bicycle, pedestrian, or transit facilities and/or to enhance the placemaking and commercial activity alongside a retrofitted street design can seek out specific examples in the book that most closely resemble their project. Street examples in the guidebook are grouped by generalized type, making it easy for users to immediately focus on street types of most relevance to their own needs. These street types include: Road Diets, Arterial Rehabs, Urban Mixed Use, Main Streets, Bike Streets, and Transit Streets. Such examples can provide direct insight into what is possible and can also provide a contact point for followup if desired.

Second, many users will wish to see the collection of case studies in their entirety to get a full range of possibilities. As mentioned earlier, the streets presented in the guidebook are fairly "normal" – the projects highlighted are typically not extraordinarily unique endeavors. Thus, users who seek out the entire collection of examples will be able to envision a whole host of opportunities within their community, given that many of the examples could be found in most communities of any size across the country.

Third, the guidebook includes some basic information about streets, some of the terminology engineers and planners use to think about streets, the purpose of streets, and some other basic relevant concepts that can provide basic education to a range of professionals, policymakers, and community stakeholders who are inevitably involved when redesigning streets is on the local agenda.

3.2 THE GUIDEBOOK SECTIONS

3.2.1 Front Matter

The guidebook begins with a series of introductory pages designed to orient users to the use of the guidebook, explain some basic transportation planning and engineering concepts, and help community stakeholders, including transportation professionals, understand multiple concepts of transportation decision making. In the end, the guidebook's purpose is to help communities use evidence from completed projects elsewhere to better inform their own street retrofit decision making, and to do so with broad community input that can understand projects using the same base knowledge and terminology. The front matter is designed to provide this common orientation to all users throughout a community, including transportation planners and engineers, policymakers, and community stakeholders at large.

Several key subsections in the front matter introduce basic concepts like average daily traffic (ADT), peak traffic, right-of-way, design vs. posted speeds, and more. As with the presentations of the street case studies, these front matter subsections are designed to be visually appealing and easily accessible by a wide variety of users. Figure 3 is an example of a page that describes the

street cross section, including how easy and/or expensive it is to manipulate or change different aspects of the street.

Figure 3: Street Cross Section Explanation

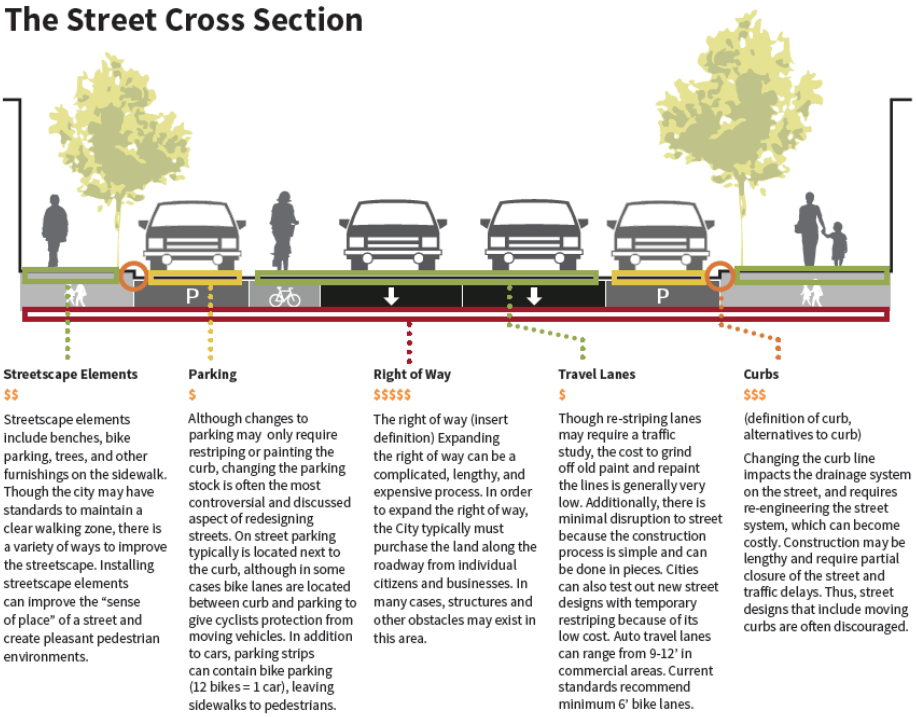


Figure 4 provides an example comparing street design and the potential speed of travel on differing streets with similar posted speed limits. The purpose of examples such as these within the front matter is to help users of the guide understand that street design influences both transportation access, comfort, safety, and the placemaking qualities of different designs. There are often tradeoffs between each of these factors, and guidebook examples such as this one offer an opportunity for community stakeholders, professionals, and policymakers to understand how to think of such tradeoffs.

Figure 4: Design vs. Posted Speed illustration

Also within the front matter is a sample four-page spread of a case study street that highlights each information element on the page to point out its purpose. Each case study street is presented in the same visual format, with some information similarly included in all cases with other information customized to the unique set of circumstances being shared. The "How to use this guide" section orients users to the different elements they will be seeing in the remainder of the guide (see Figure 5).

Figure 5: Sample Page: "How to use this guide"

3.2.2 Guidebook Streets

The core of the design guide is a collection of over 20 completed street retrofit projects from across the country, presented in a consistent, visually accessible manner available to multiple community stakeholders in communities of all sizes throughout the country. Case examples are grouped into the following general street typologies:

- Road Diet: A road diet attempts to rebalance streets by usually substituting two car lanes with a center median and bike lanes.
- Arterial Rehab: Busy, multilane streets, often referred to as arterials, crisscross the landscape of our cities and suburbs. Alongside these wide thoroughfares, fast food restaurants, strip malls, and grocery stores take advantage of the high volume of car traffic these streets were originally designed to carry. Examples here demonstrate how arterials can be rehabilitated to better accommodate other modes and improve the aesthetics of the area.
- Urban Mixed Use: Streets in this category play host to a diverse mix of uses. These uses can change along the length of the street, with each block having a different character. The uses may also be different from building to building, or within the same building. Streets in this section of the guidebook demonstrate how improvements to the public right-of-way can further grow and support that diversity and energy.
- Main Street: Main streets serve as important symbols in a community. The streets in this category have historically served as the center of town, the place people went to shop, meet friends, and attend community events. Prior to the redesigns documented in this guide, each of these streets went through periods where they no longer served as that community hub. These examples show what some communities have done to change the street to bring back some of the historic main street feel and function.
- Bike Street: Cycling, and the need for dedicated bicycle infrastructure, is on the rise in the United States. These streets demonstrate a variety of ways cyclists can be accommodated on all types of streets, from simple bicycle lanes to an eight-mile world-class urban trail.
- Transit Street: Transit streets emphasize buses and trains and employ designs that make it easy for people to use them.

Each open-faced page of the guidebook includes an aerial view of the street, a cross section of the right-of-way segmented by use and function, a figure-ground sketch of the adjacent street

network and building context, a description in text and images of specific street treatments, the actual current ADT of the design, and a report as available on vehicular accident rates within the study areas. Upon completion, a user will be able to access the information in a variety of ways, including by street design, by right-of-way, by ADT, or by other elements that may be available.

3.2.3 Guidebook Back Matter

Following the presentation of street examples, citations and resources for further investigation are clearly presented. While this guidebook is designed to orient a wide variety of community stakeholders to the range of possibilities for street redesigns, it is also intended as a resource where community stakeholders can find people or projects to follow up with as necessary. The information in the back matter portion of the guide is designed to assist in this way.

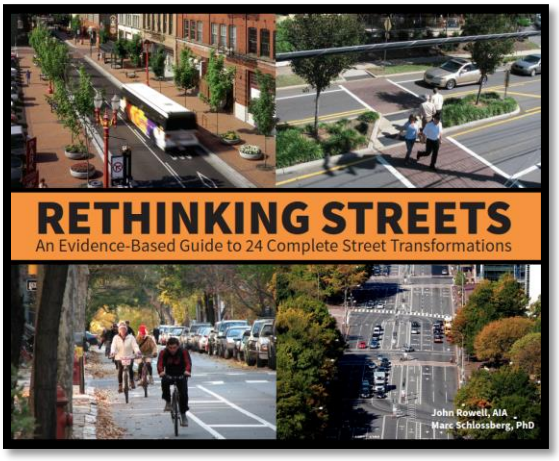
4.0 CONCLUSION

Many communities across the country are re-examining their streets, how they function, who they serve, and how they can be improved to serve more functions than throughput for motorized vehicles. While such throughput is, of course, an important function of a transportation network, for decades street design has favored that function over multinodal access or the placemaking qualities of streets. The Complete Streets movement of the last decade has helped move these issues more into the mainstream, with many local and state legislatures adopting some variation of Complete Street polices. Yet, when actual projects at the local level become considered, they often face opposition from neighbors or from commercial interests. Common fears include the belief that congestion will increase, neighborhood cut-through will occur, and businesses will be negatively impacted.

What has not existed is an evidence-based street design guide to help local professionals, policymakers, and other community stakeholders see how other communities have proceeded with similar projects and what the transportation and economic impacts have been. Thus, rather than having a guidebook of hypothetical design alternatives, this guidebook presents already completed projects that show before-and-after conditions, contexts around the project, and different transportation and economic performance metrics. The goal is to reduce some of the fear of the unknown within local transportation decision making and to provide a common language to all the stakeholders that inevitably come together when redesigning important streets in their community.

Throughout the process of developing this guidebook, it continually became clear that such a guidebook does not exist and that one is desperately desired. Moreover, it became clear that there is an interest in several additional evidence-based street guidebooks that focus on: 1) complete intersections; 2) retrofits of state roads within urban areas; 3) rural street retrofit projects; and 4) "signature" street retrofit projects.

Figure 6: Potential Guidebook Cover



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