Moving Design: Spaces of Transportation
# Moving Design: Spaces of Transportation

## Abstract

Focusing on the design issues involved in two key types of transportation environments—context sensitive solutions and transit-oriented development—the report investigates design benefits measured in aesthetic and humanistic terms. These include issues of community identity, appearance, scenic quality, and cultural value. These characteristics are difficult to measure, more difficult to quantify, and even more difficult to cast in terms of monetary costs and benefits. Despite the difficulty of measuring it, design is an important element for the success of transportation projects and should not be overlooked. It is critical that we be able to measure the qualities of design so we can discuss it in a systematic and reliable way.

In order to capture important details and reflect a range of potential definitions of good design, this report examined case studies in three regions—in Northern Virginia, the Saint Louis Metropolitan area and Missouri, and Northern California. In each it tested six approaches to measuring design quality: using a short score sheet rating tool and a longer inventory, eliciting the opinions of design experts and some of the users and creators of the spaces, using standardized drawing and mapping techniques to compare designs, and by assessing photographs.

**Transit-oriented development,** **context sensitive solutions,** **urban design,** **architecture,** **landscape architecture,** **visual assessment**
Moving Design:
Spaces of Transportation

Report #4 in the Series:
Moving Communities Forward

Final Report

Prepared by:
Ann Forsyth
Justin Jacobson
Katie Thering

Department of Landscape Architecture
University of Minnesota

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Preface

Well-designed transportation projects demonstrate the potential to shape a community in ways that go far beyond the project’s original purposes. Anecdotal evidence and advocacy exist on behalf of the benefits of well-designed transportation projects on communities, yet there is little organized quantifiable or qualitative data, nor is there a comprehensive guide for communities to maximize or integrate the diverse benefits that well-designed transportation projects can bring.

Recognizing this lack of data about the role of design in transportation, Congress authorized a study in Section 1925 of the 2005 Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) to achieve two goals: (1) begin to measure how well-designed transportation projects can bring multiple enhancements to communities in terms of economic development, health and the environment, visual identity and design, public participation, and public safety; and (2) provide communities, designers, transportation officials, and policymakers a set of principles and practices to adapt to their unique situations and needs.

The Moving Communities Forward research team employed a case study-based approach, analyzing nearly 30 transportation projects that represent a broad spectrum of regions, demographics, and project types. The research team identified key principles and practices that designers and others can use—in the context of their unique situation and environment—to realize multiple enhancements to their communities.

Funding for the study was derived from a grant to the American Institute of Architects (AIA) from the Federal Highway Administration (FHWA), authorized by Congress in SAFETEA-LU. In 2006, the AIA selected the Center for Transportation Studies (CTS) at the University of Minnesota to conduct the pioneering research study.

To address the interdisciplinary issues raised by the study, CTS assembled a research team drawn from multiple fields. Research was allocated to five research projects; a sixth project synthesized the study's key findings into a single document highlighting major themes and recommendations:

1. Promoting Economic Development
2. Improving Health and the Environment
3. Designing Great Places
4. Fostering Civic Participation
5. Making Communities Safer
6. Study Synthesis

Results of this research are available in a series of reports on the Moving Communities Forward Web site: www.movingcommunitiesforward.org. The site also includes a summary report submitted by the FHWA to Congress in September 2007. The Web site is part of a coordinated outreach effort designed to share the research findings and recommended practices with transportation and design professionals, policymakers, and the public.
THE AMERICAN INSTITUTE OF ARCHITECTS
RK STEWART, FAIA
2007 President

CHRISTINE W. MCENTEE
Executive Vice President/Chief Executive Officer

PAUL T. MENDELSOHN
Vice President, Government and Community Relations

Project Managers
DAVID T. DOWNEY, ASSOC. AIA, CAE
Managing Director, Center for Communities by Design

ANDREW L. GOLDBERG, ASSOC. AIA
Manager, Federal Affairs

Report Design
PAM DEL CANTO
GRETCHEN MAXWELL

CENTER FOR TRANSPORTATION STUDIES
UNIVERSITY OF MINNESOTA

ROBERT JOHNS
Director, Center for Transportation Studies

LANCE M. NECKAR
Professor, Landscape Architecture, CTS Faculty Scholar/Fellow, University Institute on the Environment

Research Team

Economic
JOHN S. ADAMS (Principal Investigator)
Professor, Geography/CTS Faculty Scholar/Co-Director, University Metropolitan Consortium
BARBARA J. VANDRASEK, Research Associate, Geography/CTS Scholar

Health and the Environment
JOHN CARMODY (Principal Investigator)
Director, Center For Sustainable Building Research
VIRAJITA SINGH, Senior Research Fellow, Center For Sustainable Building Research
CHRIS PETIT, Research Assistant, Center for Sustainable Building Research

Visual Design
ANN FORSYTH (Principal Investigator)
Professor, Architecture/Director, Metropolitan Design Center/CTS Faculty Scholar
JUSTIN JACOBSON, Research Assistant
KATIE THERING, Research Fellow, Metropolitan Design Center

Public Participation
CARISSA SCHIVELY (Principal Investigator)
Assistant Professor, Urban And Regional Planning, Humphrey Institute Of Public Affairs/CTS Faculty Scholar
MEAGAN BEEKMAN, Research Assistant
CYNTHIA CARLSON, Research Assistant
JENN REED, Research Assistant

Public Safety
GARY A. DAVIS (Principal Investigator)
Professor, Civil Engineering/CTS Faculty Scholar

Staff
LINDA PREISEN
Director of Research Administration
PAM SNOPL
Managing Editor
CHAD RATHMANN
Program Coordinator

ABOUT THE AMERICAN INSTITUTE OF ARCHITECTS

The American Institute of Architects (www.aia.org) is the voice of the architectural profession and the resource for its members in service to society. As AIA members, more than 80,000 licensed architects in over 300 state and local chapters express their commitment to excellence in design and livability in our nation's buildings and communities. Members adhere to a code of ethics and professional conduct that assures the client, the public, and colleagues of an AIA-member architect's dedication to the highest standards in professional practice.

ABOUT THE CENTER FOR TRANSPORTATION STUDIES

The Center for Transportation Studies' (www.cts.umn.edu) mission is to serve as a catalyst for transportation innovation through research, education, and outreach. CTS works with University of Minnesota faculty in over 25 disciplines to advance knowledge in a variety of transportation-related research areas. In 1997, CTS first became involved with transportation and urban design issues in its leadership of a major interdisciplinary effort, the Transportation and Regional Growth Study, which produced new understandings of the relationship between transportation and growth in the Twin Cities area. CTS has also worked closely with the Minnesota Department of Transportation and local governments in advancing Context Sensitive Design/Solutions practices through the development of training courses and web resources, which have helped Minnesota to be recognized by FHWA and AASHTO as a leading state in applying Context Sensitive Design/Solutions.
Credits

Metropolitan Design Center Team
Ann Forsyth, Project Director and Principal Investigator
Justin Jacobson, Research Staff
Katie Thering, Graphics and Design Coordinator
Laura Baum, Research Assistant
Bonnie Hayskar, Editor
Lukas Van Sistine, Mapping Lead

Additional assistance from
Amanda Johnson, Nishi Mishra, Whitney Parks, and Joanne Richardson

Participatory Assessment Team, University of British Columbia
Wendy Sarkissian, Participatory Assessment Lead
Rebecca Bateman, Participatory Assessment, Research Assistant
Jeff Deby, Participatory Assessment, Research Assistant

Technical Review
Kristen Day, Visual Assessment Expert


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At the University of Minnesota, Ann Forsyth was the project director and principal investigator for this report, took many of the photographs, visited most sites at least twice, and drafted several sections of the report. Justin Jacobson, was the main research staff person taking a lead on selecting cases and drafting that section of the report, as well as contributing in other important ways to the research and writing. Katie Thering coordinated graphics and design, doing much of the initial layout. Ann, Justin, and Katie, with assistance from Laura Baum for visual assessment, did the fieldwork. Lukas Van Sistine worked diligently to create the maps. Laura Baum was an extremely able research assistant and drafted some sections of the report, including the visual assessment approach. Wendy Sarkissian, an award-winning expert in participatory processes, was responsible for drafting the appendix on participation, assisted by Rebecca Bateman and Jeff Deby. Kristen Day, an expert in visual assessment reviewed the report as did Amanda Johnson from the Metropolitan Design Center. Bonnie Hayskar was the copy editor. Additional assistance came from Amanda Johnson, Nishi Mishra, Whitney Parks, and Joanne Richardson.

We would like to thank Carissa Schively, lead on the citizen-participation team in the larger study, for various helpful activities.
Jetty connecting land and water transportation in Sydney, Australia.
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Public art and outdoor dining are integrated with traffic calming in Davis, California.
Transportation environments can provide space for social interaction, as is demonstrated with children taking a ferry in Stockholm and cyclists waiting for the rain to stop in the Netherlands.
Executive Summary

Overview: The Benefits of Good Design in Transportation Environments: Assessing and Enhancing Design

The big question behind this project is how good design can benefit transportation environments. Focusing on the design issues involved in two key types of transportation environments—context sensitive solutions (CSS) and transit-oriented development (TOD)—it investigates design benefits measured in aesthetic and humanistic terms. These include issues of community identity, appearance, scenic quality, and cultural value. These characteristics are difficult to measure, more difficult to quantify, and even more difficult to cast in terms of monetary costs and benefits. Despite the difficulty of measuring it, design is an important element for the success of transportation projects and should not be overlooked. It is critical that we be able to measure the qualities of design so we can discuss it in a systematic and reliable way.

In order to capture important details and reflect a range of potential definitions of good design, this report examined case studies in three regions—in Northern Virginia, the Saint Louis Metropolitan area and Missouri, and Northern California. In each it tested six approaches to measuring design quality: using a short score sheet rating tool and a longer inventory, eliciting the opinions of design experts and some of the users and creators of the spaces, using standardized drawing and mapping techniques to compare designs, and by assessing photographs.

The six approaches to measuring design converged on a similar overall picture of each of the case-study areas. At a more specific and detailed level the different assessment techniques each provided a slightly different lens with which to view these pictures. Some provided inventories of what was in each place—densities of businesses or urban design features. Others gave a sense of the history and use of the areas. Together they provided a more rounded and multi-faceted view of the design qualities of each place.

This summary provides an overview of key findings, methods, and cases, and concludes with a design toolkit for creating better transportation environments.
Key Findings

Study findings on the benefits of good design in a wide range of transportation environments revolve around four key topics. The findings are dealt with in more detail in section D below. Topics include:

Methods: Different places have different strengths. Using multiple design assessment methods—from audits to mapping—is essential in identifying, assessing, and honoring this diversity of design qualities.

Processes and time: Great places develop over decades with the participation of many people, but their uses vary from day to day. This issue of time is key. While good environments are built well to start with, they are made better with redevelopment and good maintenance as well as active use over time.

Places: Design at a human scale is the first principle outlined in the American Institute of Architects (AIA) 2005 report Livability 101 and a key feature of the well-designed places in this study. Also important were well connected areas that accommodated many uses, offered variety and choices, and that felt safe.

Facilities: Facilities for pedestrians, cyclists, transit users, and motorists can be designed in ways that protect the most vulnerable users and provide options for all.
Research Approach and Measures

Toward a Multi-Method Approach

This is not the first study to look at visual issues related to transportation. The fields of environment and behavior, environmental psychology, and urban design have created a number of urban design assessments to measure qualities of place (Nasar 1998). Such assessments have most recently received a surge of new funding and interest from those concerned with measuring environments for walking and cycling (Moudon and Lee 2003).

These measures of visual issues related to transportation vary along a number of dimensions. The choice of methods involves tradeoffs tied to different goals and priorities.

They vary in level of detail and complexity:
- Checklists measure the presence or absence of different elements.
- Rating scales quantify design characteristics.
- Holistic assessments of complete environments are more qualitative but potentially more comprehensive (e.g. tours, videos, workshops).

While simple, quantitative approaches may be easy to administer they may miss some of the more complex qualities of design captured by holistic assessments.
They also vary in terms of who does the rating:

- Participatory/educational approaches have users and other lay people do the rating and assessment.
- Designer-oriented approaches have design experts as raters and evaluators.
- Field-based checklists/surveys may be used by a variety of people including users, design experts, and trained raters.
- GIS-based and automated measures and simulations typically require a high level of expertise and are conducted by trained raters or experts. Some simulations are, however, used as the basis of participatory approaches.

Assessments administered by lay people can be conducted by community volunteers and can encourage community involvement and tap into local knowledge. GIS and other expert measures can provide more detailed information about design and planning.

There are several levels of assessment or evaluation:

- Identifying features—identifying and articulating visual or place character.
- Measuring features—quantifying or counting features of the place in some way.
- Evaluating features—adding an evaluative component either in comparison to other scenes and places or creating some kind of scoring system.

Each level provides a different amount and type of information.

The time at which the assessment is done also varies:

- Prospective evaluations evaluate interventions before they occur and if evaluation is involved involve simulations or models of the future. This might involve drawing or computer modeling for visual assessment.
- Retrospective evaluations are conducted on a completed project.

The use of these techniques depends on the goals of the specific assessment.

Different approaches have different strengths. For example, an inventory that checks for the presence or absence of a feature like a street tree is likely to be easy to replicate but does not say much about how a space is used. A technique that has people evaluate whole scenes may be able to distinguish between places that are more or less liked, but it may be difficult to tell why; is it the vegetation or the street lamps or a personal characteristic of the rater? In undertaking an assessment of the visual environment for transportation projects, it is crucial to consider the specific goals of the project and its evaluation.
The Methods in this Study

This report acknowledges the different strengths of various methods, and seeks to integrate them. In this study, we rely on six, in particular: two kinds of checklists—an score sheet and an inventory; two participatory assessments; and two primarily graphical techniques. In evaluating the visual environment of the case-study projects the report demonstrates different ways that design can be measured and how such information can be used to enhance transportation projects.

A. Score Sheet

The urban design score sheet was developed to assess commercial and main street type environments like those found in many transit-oriented development areas and context sensitive solution projects (Ewing et al. 2005a, 2005b, 2006). The tool creates scores for the urban design qualities of imageability or how memorable a space is; enclosure or how much a street feels like an outdoor room; human scale; transparency or the visibility of activities beyond the street edge, such as through windows; and complexity or visual variety. Its strength is in creating scores for these design dimensions, allowing comparison across different places or different areas within the same place.

B. Inventory

The Irvine Minnesota Inventory is an urban design inventory (Day et al. 2006; Boarnet et al. 2006). While the inventory is very long, it is quick and easy to fill out and is thus highly reliable. It was developed for measuring urban design elements related to walking but is also the most comprehensive of published instruments on features of streets. It has strengths and weaknesses compared with the urban design score sheet described above. Unlike the score sheet it does not have a built-in evaluation component. Rather, individual researchers decide how they will make composite scores out of all the information they collect. This allows flexibility but adds additional work. This tool may be best for those who seek reliable ways to measure specific features of the visual environment such as landscaping or land uses.
C. Design Workshop

The design workshop is a participatory evaluation technique. Design experts, led by a researcher or workshop leader, participate in a workshop to evaluate the visual environment of one or more places. The workshop takes a few hours. Depending on the number and complexity of sites dealt with, this technique requires one to two weeks of additional work prior to the workshop to prepare background maps, graphics, and briefing materials for the experts. It provides a holistic or comprehensive assessment of the places—what is good about them and what can be improved. It relies on people who are already very familiar with the places in question and can delve deeply into complicated issues such as community character. This technique is well suited to identifying aspects of the places which should be preserved or improved. It is less well suited as a technique for systematic research.

D. Participation/Community Representatives

There are many different participatory techniques to elicit opinions about visual issues. For this report we used a similar process to the design workshop. Instead of involving design experts, however, we worked with representatives of cities, community groups, transit users, police, transportation workers, and other professional groups. This allowed us to elicit opinions without needing to identify and engage members of the general public. However, if working on an actual project it would be important to seek input from a variety of audiences to gain input, opinions, and build expertise of users of environments. The background report outlines a wide range of such tools for varied groups of the public, from children to adults. Such methods are effective for assessing the design perceptions and preferences of those who actually use and manage transportation environments.

E. Mapping

For projects that seek to compare environments, it is useful to compare their physical scale and

Ballston station is an example of mixed use transit-oriented development.
pattern. We used variations on figure ground mapping, including measures of street patterns and intersections, to create maps of each of the case-study environments. With the advent of online mapping, and particularly of Google Earth, it is now relatively inexpensive to prepare maps to scale. In addition, we developed some analysis from geographic information systems (GIS) mapping. These included measures of mixed use.

F. Visual Assessment/Photography

Assessing visual impacts has a long history. The Moving Design project modified a method produced for the Bureau of Land Management in the 1970s (Shepphard and Newman, 1979). This method focuses on six issues: color contrast, form contrast, line contrast, texture contrast, scale contrast, scale dominance, and spatial dominance. The original method focused on the potential impacts of proposed projects, however, the method used for this project assesses the overall contrast of an existing scene. Visual assessment techniques are well suited both for research projects and for projects that seek to make recommendations about specific designs.

Strengths and Weaknesses of the Methods at a Glance

Each of the methods used to assess these environments has different strengths and limitations.

- The urban design score sheet develops scores for key urban design concepts of relevance to commercial streets, which is useful for comparing places in terms of these concepts.
- The inventory provides great detail on the character of places and can be used in a wide variety of environments.
- The design workshop provides a focused but comprehensive view of design quality.
- Various participatory techniques both elicit information and build capacity among members of the public to debate issues of design.
- Mapping provides an understanding for the basic structure of streets and blocks and can be expanded to examine other topics such as destinations.
- The visual contrast worksheet allows a quick assessment of photographs focused on visual variety.
Cases

The design principles and issues outlined in earlier sections are common to projects in a wide variety of situations. The project examined cases in three regions: in Washington, DC, and Northern Virginia; in the St. Louis area of Missouri and Illinois as well as Boonville in central Missouri; and in Northern California in Oakland and Davis. The goal of these case studies was to explore in more detail the uses of these methods for measuring the built environment.

Case studies were selected to demonstrate good design in a range of locations and situations.

- Several of the cases include affordable housing development near station areas, most notably Fruitvale, California and Emerson Park, Illinois.
- Others involve revitalized shopping streets often reached from a train station—for example at Clarendon in Virginia, Barracks Row in the District of Columbia, Delmar Loop in St. Louis, and International Boulevard near Fruitvale in California.
- Some have major office development, including Rosslyn and Ballston in Virginia and the 12th Street area in Oakland.
- A number of projects preserve historic landscapes and buildings, including Virginia Route 50 and a park in Booneville, Missouri.
- Many have mixed use areas.

The eleven case-study sites listed below are outlined in more detail in part three of this report.

<table>
<thead>
<tr>
<th>Major Cases</th>
<th>State</th>
<th>Type</th>
<th>Major Retail</th>
<th>Affordable Housing</th>
<th>Historic Preservation</th>
<th>Mixed Use</th>
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</thead>
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<tr>
<td>12th Street/Oakland City Center</td>
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<td>TOD</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Ballston</td>
<td>VA</td>
<td>TOD</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Barracks Row</td>
<td>DC</td>
<td>CSS</td>
<td>x</td>
<td></td>
<td>x</td>
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<tr>
<td>Boonville</td>
<td>MO</td>
<td>CSS</td>
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<tr>
<td>Clarendon</td>
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</tr>
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<td>Davis</td>
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<td>CSS</td>
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<td>Delmar Loop</td>
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<td>TOD</td>
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<td>TOD</td>
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<td>x</td>
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<tr>
<td>Route 50</td>
<td>VA</td>
<td>CSS</td>
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<td>x</td>
</tr>
</tbody>
</table>
All cases demonstrate the capacity of well-designed transportation infrastructure to enhance a sense of place in terms of community identity, scenic quality, and cultural value.

In addition to these cases, the background report draws on research and observation by the study team and others across the globe. Illustrations come not only from North America but from Europe, Japan, and Australasia. While the United States has many examples of well-designed environments around transportation facilities, international comparisons are also valuable for demonstrating a wider range of possible design contexts and solutions.

**Design Toolkit**

One-size-fits-all solutions to design problems certainly do not fit all, as the tastes and needs of varied users are rarely the same, and are sometimes even in direct conflict. Instead, it is perhaps better to think of a good design toolkit — or a set of good, not necessarily “best” practices, each with particular effects in particular situations. Selecting from different parts of the toolkit, people responsible for the design of places can mix and match solutions to problems. Good design, then, is not as much a product but a process of assessing, selecting, and implementing of a wide number of individual design interventions.

As was explained earlier, the toolkit of design and measurement practices has four main parts: methods, processes and time, places, and facilities. Within each of these parts principles for good design are identified. These principles are drawn from the results of this study of visual issues as well as from a number of exemplary reports on urban design aspects of transportation. These design principles are summarized below.
**Ballston:**
The Ballston station area includes significant office and retail areas as well as a wide variety of housing options. It is notable for the diverse mix of uses in this area.

**Barracks Row:**
8th Street Barracks Row is one of Washington D.C.’s oldest commercial neighborhoods. The area was a winner of the Great American Main Street Award in 2005.

**Boonville:**
The Cobblestone Street Interpretive Park opened in 2000 and demonstrates that modern transportation needs can be achieved without sacrificing local concerns for historic preservation and place promotion.

**Clarendon:**
The first plan to specifically deal with Clarendon was released in 1984 and articulated a vision for Clarendon as an “urban village,” meaning greater development around the station while maintaining the strong sense of place.

**Davis:**
The City of Davis, California has a well-earned reputation as America’s leader in supporting and encouraging bicycle transportation.

**Delmar Loop:**
The MetroLink in this area preserved and extended the existing commercial activity in the area from University City across the municipal border to the station in the City of St. Louis.
**Emerson Park:**
In Emerson Park, transit-oriented development was brought to the area through community activism and has been used to spark redevelopment in the economically troubled City of East St. Louis.

**Fruitvale:**
The proposal for a transit village at Fruitvale grew out of a Community Design Symposium between BART and Fruitvale community leaders in which both tried to work together to figure out a common solution to their respective problems.

**Oakland City Center/12th Street:**
Oakland’s downtown has different parts with distinctive characters. This ongoing transformation demonstrates the challenges and benefits of implementing transit-oriented development in an already established area.

**Rosslyn:**
The Rosslyn station is the gateway to Arlington County on the Metro, and the eastern most station in the TOD corridor.

**Route 50:**
Set in a very scenic part of northern Virginia, just beyond the outer edges of the Washington DC metro area, Virginia Route 50 is a lovely tourist drive that demonstrates the many benefits of thoughtful design that takes citizen input into account.
Methods

1. Use multiple assessment tools to tap multiple concepts

While converging on a generally similar picture of each of the case-study areas, the different assessment techniques each provide different information about the visual environment of the place. Some techniques identify elements within the place—such as street furnishings—and others assess design quality. There is no one best method for visual assessment. A best practice is to use multiple methods of assessment.

2. Understand that different concepts are relevant to different places

The various assessment tools measure a variety of urban design features from imageability, or how memorable a site is, to whether there is pedestrian lighting present. Of course, places differ and not all places stive for the same qualities. There are many definitions of good design. It is important to focus on understanding the particular character of a place in order to decide which concepts are relevant and which aspects of design should be measured.
Processes and time

3. Appreciate that planning and developing great places takes time

Many of the best-loved places in the world are the product of decades, if not centuries, of development and redevelopment. This was equally true for the locations in this study. Designers and community representatives all remarked on the decades-long processes of redevelopment. It is virtually impossible to jump-start a development from nothing to a fully built, well-designed place in a few years. What sometimes looks like fast development is often misleading, as the development is merely the physical culmination of years of planning.

4. Engage the public, as well as designers, as collaborators and work with activist energy

Community members need to live with the results of development and redevelopment and can be allies or opponents. In long-term transportation projects with multiple buildings and projects, it is worth making local residents and business groups into partners. Their buy-in can be important when weathering inevitable setbacks. While community process can slow down design and implementation, it can also improve it by connecting design to community values and helping residents have a sense of ownership in creating and maintaining these places. It is also important that community members be provided with knowledge about design so that they can be informed partners in these discussions.
5. Program spaces for use
A design is a physical space. Programming is about use. Successful places have appropriate activities occurring at different times of the day, week, and year. Of course not all places need to have constant activity, but appropriate programming can increase use, safety, and sense of place.

6. Invest in maintaining spaces
A number of studies have found that high levels of maintenance are appreciated by viewers and can make places more attractive. Too often paths, trails, and other pedestrian and biking facilities are installed without long-term maintenance plans. In addition, wear and tear increases as places become popular, adding to the maintenance burden.

Places
7. Design at a human scale
Designing at a human scale is the foundation of creating a great place. This means design that contains elements of similar size to parts of the human body and design that is meant to be viewed by people at walking pace. Human scale is measured explicitly in the urban design score sheet, was referred to by workshop participants, and is a key component of the AIA 2005 livability principles. This does not preclude places with tall buildings and intensive development. Rather, it stresses that design of the areas that people inhabit—such as sidewalks, plazas, and transit stations—should be scaled to be usable and interesting to people moving at walking speed.
8. Provide public spaces that accommodate a variety of uses and users

Successful transportation environments attract people moving through them. Public spaces – places where people can stop, sit, and gather – are often ignored in transportation projects, where the emphasis is on moving people around. Good public spaces are ones where people like to stop and sit to read a newspaper, eat a lunch, or meet friends. They also provide places for people from different groups to either interact or stake out territory without overly bothering others.

9. Use design and programming strategies to increase safety

Personal safety is at the base of successful public spaces and is critically important for encouraging use in transportation environments. Programming and use of spaces is vitally important. Many of the case-study areas were well used and had successful formal and informal policing of spaces. Specific design strategies can improve safety and the perception of safety and thus make the spaces more likely to be used including lighting, delineating public and private space, ensuring visibility, and limiting the potential for entrapment.

10. Allow for variety and complexity

Transportation environments that have a high level of consistency, as well as those with much variety and complexity, can provide a positive sense of place. In the United States, however, regulation tends to make areas uniform and so particular attention is needed to promote visual variety and a diversity of uses. Strategies include allowing mixed-use strategies and providing flexible design guidelines.

11. Create connections between spaces

It is important to make great transportation environments but it is also important to connect them to the broader urban fabric. All the case-study areas had well-connected street patterns relevant to their locations. The transit-oriented development areas in particular had similar patterns of streets and relatively small blocks allowing multiple options for movement. Buildings, however, did not always connect well to the outdoors and sidewalks were not always continuous for pedestrians. Cyclists had even more challenges finding comfortable paths.
Facilities: Facilities for pedestrians, motorists, cyclists, and transit can all exhibit good design. This pedestrian bridge over a roadway at Millennium Park in Chicago reflects the avant garde architecture of the park.

**Facilities**

12. *Design sidewalks and crosswalks, for appropriate pedestrian use*

Creating spaces that encourage walking depends partially on proper design of spaces reserved for pedestrians, and partially on places where pedestrians intersect with other users, especially motorists. From sidewalks to crosswalks, successful places have appropriate facilities.

13. *Create spaces for bicycles and bike parking*

Bicyclists are another type of transportation user whose presence and needs should be accounted for in the design process. Designing for bicyclists can be difficult, because in some ways their needs are similar to those of pedestrians, in other ways to drivers, but in still other ways, their needs are unique. Overall, bicycle infrastructure is part of a system that includes paths and parking.

14. *Integrate transit and transit facilities into the urban pattern*

The design of bus and rail facilities is complicated, as various needs and constraints must be properly balanced. A transit facility is a transition point between various modes, as people park cars and bikes and walk before heading on to mass transit. People also
transfer between routes or types of transit. Modern transit facilities, especially in the case of transit-oriented development add shoppers, workers, and residents to this mix creating an even more diverse set of demands and expectations on transit facilities. These challenges also bring opportunities. Transit naturally brings people together, a key goal of urban designers seeking to promote vibrant street life. Transit can also serve as the impetus for economic or community development in a place, as investments in transit offer a chance to pursue other, complementary goals.

15. Do not forget, but do not overemphasize, car movement and parking

A number of design elements for streets can be used to create more walkable places, while simultaneously making the urban or suburban environment safe for drivers, as well. Many of these entail slowing down or restricting traffic to a more suitable level for the areas through which they pass. Reduced levels of service should be compensated for in other ways, however, such as by enhancing traffic capacity on parallel or nearby streets.

Conclusion

Good design and planning—both process and product—involves using this toolkit in a way that is responsive to context and can be appreciated by different publics. Over time design can be a catalyst for other benefits.
Part One: Introduction
Mockingbird Station in Dallas demonstrates transit oriented development around a new rail station.
Spaces of Movement:

The Big Question: How to Measure the Benefits of Good Design for Transportation Environments

The big question behind this project is how good design can benefit transportation environments. This report explains the design issues involved in two key types of transportation environments—context-sensitive solutions and transit-oriented development. Part of a cluster of studies examining such issues as economic returns, green building, safety, and democratic or civic value, this report focuses on how to measure those design benefits measured in aesthetic and humanistic terms. This includes the issues of community identity, appearance, scenic quality, and cultural value. These are difficult to measure, more difficult to quantify, and even more difficult to cast in terms of monetary costs and benefits. Despite the difficulty of measuring it, design is an important element for the success of transportation projects and should not be overlooked. It is critical that we be able to measure the qualities of design so we can discuss it in a systematic and reliable way.

In order to capture important details and reflect a range of potential definitions of good design, this report examined case studies in three regions—in Northern Virginia, the Saint Louis Metropolitan area and Missouri, and Northern California. In each it tested six approaches to measuring design quality: using a short score sheet rating tool and a longer inventory, eliciting the opinions of design experts and some of the users and creators of the spaces, using standardized drawing and mapping techniques to compare designs, and by assessing photographs.

This project has four components:

First, in chapters one and two, it explains how to assess design benefits, focusing particularly on the design characteristics of two types of environments: context-sensitive solutions and transit-oriented development. It develops specific tools and emphasizes approaches that are clearly documented and easy to use. It discusses the benefits, drawbacks, and appropriate uses of each tool.
Table 1.1. The eleven case-study sites listed above are outlined in more detail in part three of this report.

<table>
<thead>
<tr>
<th>Major Cases</th>
<th>State</th>
<th>Type</th>
<th>Major Retail</th>
<th>Affordable Housing</th>
<th>Historic Preservation</th>
<th>Mixed Use</th>
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</thead>
<tbody>
<tr>
<td>12th Street/Oakland City Center</td>
<td>CA</td>
<td>TOD</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Ballston</td>
<td>VA</td>
<td>TOD</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
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<tr>
<td>Barracks Row</td>
<td>DC</td>
<td>CSS</td>
<td></td>
<td>x</td>
<td>x</td>
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</tr>
<tr>
<td>Boonville</td>
<td>MO</td>
<td>CSS</td>
<td></td>
<td></td>
<td>x</td>
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</tr>
<tr>
<td>Clarendon</td>
<td>VA</td>
<td>TOD</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Davis</td>
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<td>CSS</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
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<tr>
<td>Delmar Loop</td>
<td>MO</td>
<td>TOD</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Emerson Park</td>
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<td>TOD</td>
<td></td>
<td>x</td>
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</tr>
<tr>
<td>Fruitvale</td>
<td>CA</td>
<td>TOD</td>
<td>x</td>
<td>x</td>
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<tr>
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<td>VA</td>
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<td>x</td>
<td></td>
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<td>x</td>
</tr>
<tr>
<td>Route 50</td>
<td>VA</td>
<td>CSS</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

The tools are then applied in several metropolitan areas. In order to place the design qualities in context, in chapter three the report provides some detail about these metropolitan areas in the form of case studies and in chapter four it reports the results of the study’s visual investigations. Case studies were selected to demonstrate good design in a range of locations and situations. The cases include train station areas in Arlington, Virginia; in the St. Louis metropolitan area both in Missouri and Illinois; and in Oakland, California. Cases also include examples of context sensitive solutions in northern Virginia; the District of Columbia; Boonville, Missouri; and Davis, California. Since this study had a short time frame, it relied on cases where previous design research existed.

- Several of the cases include affordable housing development near station areas, most notably Fruitvale in California and Emerson Park in Illinois.
- Others involve revitalized shopping streets often reached from a train station—for example at Clarendon in Virginia, Barracks Row in the District of Columbia, Delmar Loop in St. Louis, and International Boulevard near Fruitvale in California.
- Some have major office development including Rosslyn and Ballston in Virginia and the 12th Street area in Oakland.
- A number of projects preserve historic landscapes and buildings, including Virginia Route 50 and a park in Boonville, Missouri.
- Several include mixed-use strategies.

All show some of the capacity of well designed transportation infrastructure to enhance a sense of place.
Development and redevelopment projects in case-study locations demonstrate principles of mixed use, pedestrian orientation, and urban intensification—all key aspects of transit-oriented development. Examples include: Clarendon (1, 2, 3); Delmar Loop (4, 5); Fruitvale (6, 7, 8); and Downtown Oakland (9).
They also vary in terms of who does the rating:
  • Participatory/educational approaches have users and other lay people do the rating and assessment.
  • Designer-oriented approaches have design experts as raters and evaluators.
  • Field-based checklists/surveys may be used by a variety of people including users, design experts, and trained raters.
  • GIS-based and automated measures and simulations typically require a high level of expertise and are conducted by trained raters or experts. Some simulations are, however, used as the basis of participatory approaches.

Assessments administered by lay people can be conducted by community volunteers and can encourage community involvement and tap into local knowledge. GIS and other expert measures can provide more detailed information about design and planning.

There are several levels of assessment or evaluation:
  • Identifying features—identifying and articulating visual or place character.
  • Measuring features—quantifying or counting features of the place in some way.
  • Evaluating features—adding an evaluative component either in comparison to other scenes and places or creating some kind of scoring system.
Each level provides a different amount and type of information.

The time at which the assessment is done also varies:
  • Prospective evaluations evaluate interventions before they occur and if evaluation is involved involve simulations or models of the future. This might involve drawing or computer modeling for visual assessment.
  • Retrospective evaluations are conducted on a completed project.
The use of these techniques depends on the goals of the specific assessment.

Different approaches have different strengths. For example, an inventory that checks for the presence or absence of a feature like a street tree is likely to be easy to replicate but does not say much about how a space is used. A technique that has people evaluate whole scenes may be able to distinguish between places that are more or less liked, but it may be difficult to tell why; is it the vegetation or the street lamps or a personal characteristic of the rater? In undertaking an assessment of the visual environment for transportation projects, it is crucial to consider the specific goals of the project and its evaluation.
Beyond the main cases, this study more briefly examined TOD development in other locations in the United States and elsewhere. Illustrations on this page come from San Francisco, California (1, 9); Sydney, Australia (2); Addison Circle in suburban Dallas, Texas (3); Cambridge, Massachusetts (4); Vallingby in suburban Stockholm (5); Almere, near Amsterdam (6); Chicago, Illinois (7); and Mockingbird Station in Dallas, Texas (8). Such cases allowed the study team to investigate a wider variety of design strategies and contexts than was available in the main cases.
Projects that use context-sensitive solutions often use at least one of the “flexible design elements” which are listed fully later in this chapter. These include bicycle facilities (3,8), crossing islands (9), crosswalks (1,9), curb extensions (2,5), landscaping (2,5,9), medians (2), roundabouts (2,5), parking (6,7), and transit facilities (4). Examples come from case studies and elsewhere and include Virginia Route 50 (1), Dubbo, Australia (2), Chicago, Illinois (3), Minneapolis, Minnesota (4), Inverell, Australia (5), Canberra, Australia (6), Washington DC (7), Davis, California (8), and Taree, Australia (9).
In chapter five, the report proposes lessons for better urban design in relation to context-sensitive solutions and transit-oriented development. These lessons are drawn from two sources—earlier work on best practices in context-sensitive solutions and transit-oriented development and the research carried out in this study. Lessons include both measurement and design, and range from tips for simplifying audits to advice on sidewalk design. Overall, design can make an important difference in creating a sense of place, increasing the fit of transportation facilities into their contexts and enhancing community acceptance of these spaces of movement.

The remainder of this introduction covers three main topics: it introduces the general issues raised in measuring design qualities of transportation environments, outlines the different approaches to defining design benefits, and then specifies the design issues of context-sensitive solutions and transit-oriented development.
The Focus: Measuring Design Qualities for Context-sensitive Solutions and Transit-oriented Development

This report focuses on two important types of transportation environments. Context-sensitive solutions emerged in the late 1980s in response to concerns that transportation projects were not enhancing the quality of life in communities (Lazzara and Arrigoni 2004). As will be explained later, key legislation, reports, and conferences in the 1990s turned the debate toward the possibility of transportation planning, design, development, and maintenance taking more account of local culture, history, and ecology. The US Federal Highway Administration (US FHWA) set a goal of each state developing a CSS policy by the end of 2007. Once called context-sensitive design, the change in terminology represented a focus on the participatory process to create and maintain a solution rather than the specific design outcome. Typical projects include traffic calming, highway design that respects historical main streets, and open spaces developed around highways.

Transit-oriented development is the current terminology for land development integrated with transit stations, stops, and lines. While there is a range of definitions, in general TOD involves creating a critical mass of development near the stops and lines using design features that foster access.

These two types, CSS and TOD, represent a range of environments. Some are primarily linear and experienced at some speed and others are more compact and pedestrian-oriented. Measurement may occur prospectively, before the transportation facility is built, or retrospectively, that is after it has been constructed. In developing tools capable of distinguishing between better and worse designs in such varied conditions, two additional issues are raised. First, can someone else repeat the measure and come up with similar findings? Second, is the tool or instrument measuring what it is intended to measure? These issues, termed reliability and validity, are crucial for creating useful tools. It is rare for one measurement tool to do well in measuring very different kinds of places. Investigators frequently combine different kinds of measurement approaches in order to create a comprehensive understanding of a place.

While it can be tempting to create new measures for each specific project or place, much is to be gained from developing, refining, and testing measures that can be used
Chinatown in San Francisco has a distinctive sense of character and place. Visually complex with a jumble of colors and electrical wires, its cultural identity is visible through such features as signage and street life.

in multiple locations. This is the approach of this study. The project tested and refined existing measures—some usable prospectively and all appropriate for retrospective measures. They are explained in more detail in chapter two and appendix A.

The Potential Benefits of Good Design:
Complications of Measuring Design

What is Design?
In order to measure something, it is important to define what it is. The term design refers both to things (objects or outcomes) and a method of thinking and problem solving (Lawson 2006). Forsyth and Crewe (2006) explain these two different meanings in the environmental design fields:

In its narrow sense [design] refers to the artistic process of creating new forms and the artistic quality of those forms. This is typically the definition of design judged in design awards, particularly in architecture. In the broader sense design may encompass a wider range of activities to do with creating the designed environment—technical, social, environmental—and not just the artistic aspects. In both definitions, design is essentially creative, although, as more elements are considered, some of the creativity is in meshing together often-disparate elements and may be more akin to “problem solving.” (c.f. Crewe and Forsyth 2003).
This report examines design outcomes in transportation environments, the physical world put into place through a design process. This includes several dimensions:

- aesthetics and scenic quality—the visual character of places,
- community identity—the sense of place, and
- cultural value—how environments reflect the way of life of various groups of people, including their histories.

How to measure good design also depends on a theory of design value. As is outlined in the next chapter, the dimensions of aesthetics, identity, and culture can be assessed through different lenses or theories, including those based in psychology and perception, the study of physical form, and theories of a sense of place; and those based on user satisfaction or relating to characteristics of the people in a place.

How we choose to measure design has important implications for what we learn about places. An example, taken from Lawson’s *How Designers Think*, shows the implications of an underlying theory for measuring design. It also demonstrates the dangers of using only one measure of performance to judge good design:

Perhaps it is because design problems are often so intractable and nebulous that the temptation is so great to seek out measurable criteria of satisfactory performance. . . . Regrettably numbers seem to confer respectability and importance on what might actually be quite trivial factors. Axel Boje provides us with an excellent demonstration of this numerical measuring disease in his book on open-plan office design (Boje 1971). He calculates that it takes on average about 7 seconds to open and close an office door. Put this together with some research which shows that in an office building accommodating 100 people in 25 rooms on average each person will change rooms some 11 times in a day and thus, in an open-plan office, Boje argues, each person would save some 32 door movements or 224 seconds per working day. Using similar logic Boje calculates the increased working efficiency resulting from the optimal arrangements of heating, lighting and telephones. . . . The unthinking designers could easily use such apparently high quality and convincing data to design and office based on such factors as minimizing ‘person door movements.’ But . . . would that 7 seconds saved be actually used
productively? What other, perhaps more critical, social and interpersonal effects result from the lack of doors and walls? So many more questions need answering before the simple single index of ‘person door movements’ can become of value in a design context.

Lawson identifies that a key problem with measuring good design is that increased precision does not necessarily improve the quality of the assessment as measurement may focus on a dimension of design that, while measurable, is unimportant or even counterproductive. Using multiple methods for assessing design, an approach called triangulation; this study demonstrates a number of shared values, as well as some areas of difference.

Visual Issues in Transportation Environments

These issues about measurement in turn need to be applied to transportation environments. As is demonstrated by the list adjacent, ground transportation environments are diverse. This project focuses on two types. TOD is a distinctive environmental type. CSS represents an approach to design rather than a specific form of environment and may incorporate a number of different kinds of environments. These are dealt with below. The two types were selected to represent current trends in developing and redeveloping cities, although there are many other important forms of transportation environments from bridges and scenic highways to trails and airports.

Examples of Ground Transportation Environments

Transit in Broader Context
- Context-sensitive solutions (CSS)
- Transit-oriented development (TOD)
- Community design (road and street layout)

Discrete/point facilities
- Train stations
- Bridges
- Pedestrian infrastructure
- Bike facilities
- Traffic calming

Corridors
- Highways and freeways
- Scenic byways and roads
- Pedestrian and bike trails
Context-sensitive Solutions: Visual Issues

While road design that respects local culture, history, and topography is hardly new, CSS is a relatively novel approach to designing, constructing, and maintaining transportation projects in the United States. It adds the voices of multiple stakeholders, including local community groups, advocates of historic preservation and environmental protection, property owners and local officials to what has traditionally been a discussion dominated by engineers and federal and state transportation officials. With the support of the US FHWA, state departments of transportation (DOTs) have begun adapting to this new way of managing transportation, resulting in a number of projects across the country that demonstrate the inherent value in cooperative, consensus-building projects that take local conditions into account.

Definitions

The US FHWA defines CSS as:

. . . A collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. CSS is an approach that considers the total context within which a transportation project will exist. (US FHWA 2006)

It is important to stress that CSS does not define a particular transportation product, such as TOD or a scenic roadway. Rather, CSS is a process for improving transportation design, building, and maintenance. CSS is a relatively new term for this approach, and has largely replaced another term, context-sensitive design (CSD). CSD accurately reflects the initial stages of a transportation project, but narrowing the concept to

“Flexible Design Elements” Used in CSS Projects

- Barriers and clear zones
- Bicycle facilities
- Bridges
- Crossing islands
- Crosswalks
- Curb extensions
- Interchanges
- Landscaping and amenities
- Lane widths
- Medians
- Roundabouts
- Parking
- Public utilities
- Shoulders
- Sidewalks
- Transit facilities

Source: Context Sensitive Solutions.org, 2005
While CSS is a term used in the United States, these examples in Sweden and the Netherlands show similar techniques that address the needs of local communities in transportation projects. They include dedicated cycle lanes (2,3,6), roundabouts (7), speed tables (8), and narrow streets (1,3,4,5,9).
Australian cities are known for their traffic calming using many identical approaches to CSS in the United States. The images above illustrate a range of traffic calming solutions in Australian towns. Features include bump outs (1,3,4,7,9), medians and traffic islands (2,5,8), roundabouts (3), special crosswalks (2,6,9), and landscaping (all).
“design” does not take into account the stages after design, including construction, maintenance, and operations (NCHRP 2002, 3). CSS is a more inclusive term and has been adopted widely, although CSD is still used in contemporary sources, along with the compromise term of CSD/CSS.

History and Implementation

CSS developed as a response to perceived problems with the previous approaches to transportation projects. The traditional way of doing transportation projects was dominated by civil engineers and transportation officials. Typically, the main focus or overarching goal of such projects was to obtain the highest levels of transportation capacity and safety at the lowest possible cost (Moler 2002). As such, solutions to congestion or safety problems were often seen as primarily questions of engineering, such as making a crowded street wider or making a dangerous curve straighter. While these are sensible and understandable goals, this approach had some drawbacks, namely that local conditions, say for preserving scenic beauty or making the area safe for other users, were not taken into account. In the 1960s and 1970s, many transportation projects were criticized for pursuing engineering goals that were at odds with the needs and priorities of the communities and citizens near the projects. Such conflicts included questions of historic preservation, environmental protection, noise, aesthetics and other quality of life issues in urban, suburban and rural settings (Swope 2005).

The passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 codified some of these concerns. The Act required oversight of transportation projects that affect historic, scenic, and cultural resources, signaling that the previous conversation limited to engineers and officials would need to include other agencies and groups (NCHRP 2002, 2). By the late 1990s, an alternative approach was taking shape. US FHWA’s publication of the manual Flexibility in Highway Design in 1998 urged state DOTs to adopt a new framework for highway planning and construction. The Maryland DOT State Highway Administration (MDSHA) was another early advocate for CSS and hosted an influential conference, entitled “Thinking Beyond the Pavement,” which brought together state DOT representatives, US FHWA officials, plus various community stakeholder groups (State of Maryland 1998).

US FHWA selected Maryland, Connecticut, Kentucky, Minnesota, and Utah as five pilot states to define, implement, and institutionalize what was then referred to as
context–sensitive design. These states along with the US FHWA and other governmental agencies and national organizations, such as the American Association of State Highway and Transportation Officials (US AASHTO), National Trust for Historic Preservation, National Park Service, and Project for Public Spaces, then came together to form a network for sharing best practices and developing the institutional framework for CSS (CSS 2005). Information about this network is available at http://www.contextsensitivesolutions.org/.

A very wide variety of transportation projects have been carried out using CSS principles and methods. Forty-five states have at least one CSS project, and the numbers of states involved and total projects is growing. The settings for CSS projects are diverse, as the case studies in this report demonstrate. There are projects in rural corridors (such as Route 50 in northern Virginia), small towns (Cobblestone Interpretive Park in Boonville, Missouri), and even large cities (Barracks Row in Washington, DC). CSS projects are designed for multiple types of users, including motorists, pedestrians, bicyclists, and transit users, and ideally include the needs of people who live and work near the project, along with people from out of the area or who are just passing through. Every CSS project is defined by the inclusion of at least one “flexible design element” (see text box p. 42), though many projects incorporate more than one.
The Role of Good Design in CSS

The products of CSS are shaped by the interests and values of multiple participants. Issues of safety, efficiency, and fiscal prudence have always been central to transportation projects, but with the arrival of the CSS approach, more concerns have been added to the list, including the local economy, aesthetics, and historic, cultural, and environmental preservation. CSS interventions are often fine grained—for example, better design of sidewalks, added street trees, curb “bump-outs,” or preserved fences along a scenic road. While some CSS projects include building something new, many involve a lack of change, for example when a highway is not widened in a historic downtown or farming area. Sometimes preserving what’s already there is the best intervention to make.
Transit-oriented Development: Visual Issues

Development facilitated by transit is as old as the technologies themselves. In the past few decades, however, TOD has emerged as a popular and influential planning concept in the United States. In the most basic terms, TOD is a strategy that attempts to integrate public-transportation investments and land-use practices in order to create walkable, diverse neighborhoods in both center city and suburban settings. TOD principles have become influential among policy makers, urban planners, and transit officials, and projects have been implemented in a wide array of cities across the country. This section introduces TOD, its history and implementation, and its relation to urban design.

Definitions

Proponents of TOD provide a variety of definitions of the concept and use a variety of terms including “transit villages” and “transit-friendly design.” The definition advanced by architect and planner Peter Calthorpe is, however, typical and conveys the basic themes of TOD:

A Transit-oriented Development is a mixed-use community within an average 2,000-foot walking distance of a transit stop and core commercial area. TODs mix residential, retail, office, open space, and public uses in a walkable environment, making it convenient for residents and employees to travel by transit, bicycle, foot, or car. (Calthorpe 1993, 56)
Similarly, transportation scholar Robert Cervero identifies the core principles of TOD’s as: mixed-use development that is close to and well served by transit, and furthermore, is conducive to transit riding (Cervero 2002, 6). Many advocates distinguish between TOD and development that is merely transit adjacent, not fully integrating transit and land-use planning, though the distinction is a matter of degree (Tumlin and Millard-Ball 2003).

TODs can function in both center city and suburban settings, the main difference being the degree of density in each place (Calthorpe 1993, 57). TODs are usually based on rail service, either light rail or commuter rail, but bus-based TODs also exist, as in the Uptown District of San Diego (Parker and Meyer 2000).

History and Implementation
Calthorpe, Cervero, and others are responsible for the increasing influence of TOD from the 1990s, but the origins actually go back much further. In the nineteenth century, expanding rail and streetcar systems provided the infrastructure for transit-oriented suburban development in the United States. In particular, the typical streetcar-oriented development patterns that defined many American cities, including Boston, Cleveland, and Philadelphia, serve as precursors for TOD (Warner 1962). To a certain extent, the forms of these cities even today exhibit the legacy of land development based on mass transportation.
TOD is common in Europe. Image 7 illustrates an innovative bus rapid-transit system in Almere, the Netherlands. Other illustrations focus on areas served by heavy and light rail.
The modern TOD concept also shares much in common with the turn-of-the-twentieth-century idea of the “Garden City,” in which more or less self-sufficient suburbs are centered on commuter train stations (Howard 1985 [1902]). The similarity between the contemporary idea of TOD and more traditional urban forms is strong, and in many ways, TOD is really a repackaging of what was for many years the typical form of center city and suburban development in the United States.

TOD’s “revival” has been spurred by dissatisfaction with some features of presently dominant land-use forms. Postwar, automobile-based suburbanization has benefits, but has also been seen as a culprit in causing some interrelated problems concerning existing land-use patterns: economically-declining cities, residential areas without retail or service opportunities nearby, and a lack of decent housing alternatives to the standard suburban house.

TOD offers potential for growth of alternative land-use types, including more mixed-use facilities, non auto-dependent housing and small-scale retail. At the same time, TOD has been promoted as an improvement in transportation as well. Increased transit service can ease traffic congestion on highways, improve air quality, and accommodate Americans for whom driving is either impossible or economically prohibitive. Whether or not low-density suburbanization is indeed the key to these problems, TOD has been seen as providing an opportunity to address interrelated land-use and transportation issues simultaneously (Dittmar and Ohland 2004, 5-15).

A few metropolitan counties, states, and regions have stood out as leaders in implementing TOD and several are featured as cases. Arlington County, Virginia, has been at the forefront and, indeed, efforts in the 1970s to coordinate the county’s land-use plans with the construction of the Washington Metro system are notable for anticipating the larger TOD movement that came in the 1990s. In retrospect, Arlington County has been duly recognized as a model and national innovator. On the state level, California has made TOD a core of statewide transportation principles. Such commitment to TOD has been codified in the state’s Transit Village Development Planning Act of 1994 that encourages local governments to pursue TOD when developing or revisiting land-use plans and, importantly, provides financial assistance for doing so (Cervero 1998, 8). Finally, TOD in the St. Louis metropolitan area is notable for the political structure that
TOD in Sydney, Australia, is the result of decades of metropolitan planning focusing development around rail stations and encouraging what is called urban consolidation. These illustrations come from central Sydney (1,2,3,4,9), a new station area development in suburban Wolli (5), the major employment center of Parramatta (7), and the central area of North Sydney (8).
TOD in Japan responds to a market demand for accessibility. These illustrations come from central Tokyo (1,4,5,8,9), Tsukuba (2,7), and Sendai (3,6). Japan certainly has sprawling suburbs but also has a very significant amount of high-density development around transit. It is well-known internationally for its high transit ridership figures.
Millennium Park, Chicago, a place with no residents and few workers, is not a high-density location, but is still well served by transit due to its location adjacent to the central business district and its status as a popular recreational and tourist destination.
governs the transit system. Officials from Missouri and Illinois have pursued TOD plans throughout the system, demonstrating the potential of TOD to serve as a key part of regional development across state boundaries.

The Role of Good Design in TOD

TOD seeks to accomplish a number of interrelated goals for different types of users. Ideally, TODs, as mixed-use areas, provide places for people to live, work, shop, and relax. Affordable housing often has a place in TOD—such households are attracted to transit access and are likely to have fewer cars and more space-efficient dwellings, meaning that they can take full advantage of the transit orientation. Such areas should be accessible by transit, but also by pedestrians and bicyclists, without excluding the automobile. Aesthetically, TOD’s should be inviting and attractive to many types of users, each of whom may have different standards and different reasons for using the space. Furthermore, TOD’s must meet these goals in ways that do not sacrifice efficiency, access or convenience, nor conflict with the larger community goals. Balancing these different uses depends crucially on urban design. A good design can bring the diverse functions and users together, whereas good intentions with poor design execution can wind up being no improvement, or possibly even a detriment, to the urban or suburban surroundings.
San Francisco’s downtown density is of a level supporting transit with many attached housing units and closely-spaced commercial buildings. This street also demonstrates a number of livability features such as human scale and visual variety.

Design can help make some features of higher densities fit into an existing, less intensively developed context and bring amenities that provide benefits for existing and new residents. While many features of TOD are at a planning or policy scale, design can help make these policies work better on the ground. The following guidelines are typical of some of the more detailed recommendations for TOD design and management.

- The transit-oriented development lies within a 5-minute walk of the transit stop, or about a quarter-mile from stop to edge. For major stations offering access to frequent high-speed service this catchment area may be extended to the measure of a 10-minute walk.
- A balanced mix of uses generates 24-hour ridership. There are places to work, live, learn, relax, and shop for daily needs.
- A place-based zoning code generates buildings that shape and define memorable streets, squares, and plazas, while allowing uses to change easily over time.
- The average block perimeter is limited to no more than 1,350 feet. This generates a fine-grained network of streets, dispersing traffic and allowing for the creation of quiet and intimate thoroughfares.
- Minimum parking requirements are abolished.
- Maximum parking requirements are instituted: For every 1,000 workers, no more than 500 spaces and as few as 10 spaces are provided.
- Parking costs are “unbundled,” and full market rates are charged for all parking spaces. The exception may be validated parking for shoppers.
- Major stops provide bike stations, offering free attended bicycle parking, repairs,
Both TOD and CSS are examples of a multi-dimensional approach to transportation planning and design. They rely on good decisions to create places rather than just transportation facilities. This market is in a plaza adjacent to a train station in suburban Stockholm.

and rentals. At minor stops, secure and fully enclosed bicycle parking is provided.

- Transit service is fast, frequent, reliable, and comfortable, with a headway of 15 minutes or less.
- Roadway space is allocated and traffic signals timed primarily for the convenience of walkers and cyclists.
- Automobile level-of-service standards are met through congestion pricing measures, or disregarded entirely.
- Traffic is calmed, with roads designed to limit speed to 30 mph on major streets and 20 mph on lesser streets. (Siegman 2003, 17)

Both TOD and CSS are examples of a more multi-dimensional approach to transportation planning and design. They focus on creating places rather than just transportation facilities. CSS emphasizes the process of developing and redeveloping transportation environments. TOD has more emphasis on the product, the place that is created. Both can benefit from good design.
Great Smoky Mountains
Part Two: Measuring Design
Parkways emerged in the nineteenth century demonstrating the connection between road design and scenic quality and the potential for road design to embrace the sense of place in urban areas. The parkway shown above is in Minneapolis, Minnesota along the Mississippi River and features pedestrian and bike paths, parking facilities, roadways, and open space.
Measuring Design

To harness the potential of design to improve transportation environments we must be able to assess the quality of design. Visual assessments of transportation environments have received significant attention since the 1960s. This chapter reviews how transportation visual-impact assessment methods have evolved and outlines work on urban design and landscape quality. While drawing on similar sources, visual impact assessment and urban design assessment form two different traditions of design measurement. The chapter then examines the areas where there appear to be shared visual preferences and where there are differences among people. Where there are differences in preferences it is particularly important to have a common language for communication. Finally, it outlines the multiple-method approach used in this study. Different places vary in their design strengths and weaknesses. By using multiple methods it is possible to identify important design qualities and to assess areas for improvement.

A History and Typology of Visual Assessments and Evaluations in Transportation

Roads and Rails
The view from the road, or the view of the road, has not always been the focus of systematic attention. However, with the expansion of transportation technologies in the nineteenth century—ferries, trains, and higher capacity roads—attention started to be turned toward the visual character of transportation. Much of the problem in the early years of the nineteenth and early twentieth centuries stemmed from polluting transportation modes, such as coal-fired trains. Expanding road and rail systems were often seen as opportunities for good design. Early railway suburbs, such as Llewellyn Park, New Jersey (1850s), and Riverside, Illinois (1870s), are part of the history of good design of transportation environments. Parkways or landscaped limited-access roads emerged in the nineteenth century and expanded in the twentieth, showing the connection between road design and scenic quality. The work of such people as Frederick Law Olmsted on the Boston parkway system of the 1880s, various engineers and commissioners on the New York parkways of the 1920s, and Benton MacKaye’s proposal for highways without towns of the 1930s, are still remembered as landmarks in the evolution of modern urban design.
Such positive proposals reflected not only the opportunities of transportation systems but also a negative reaction to increasing urban congestion. *The City*, a movie produced by the American Institute of Planners in 1939, and with narration written by Lewis Mumford, exemplifies this contrast. The movie quite vividly compares the squalor and congestion of center-city streets, and dirty railroads with the free-flowing traffic of parkways in new planned communities. In subsequent decades, as postwar development boomed, many began to feel that transportation systems were not living up to their potentials and, in fact, were causing visual blight on the country.

The 1956 highway program that created the interstate highway system was a key event in the history of road building, expanding on the existing federal and state highway programs (Nivola 1999, 13; Gelfand 1975). As highways expanded, a wave of popular books criticized the related problems of suburban growth. James Rouse, the developer of the first indoor speculative shopping mall (in the 1950s), as well as the first downtown festival market (in the 1970s), exemplifies this critique in a passage from 1966:

> Our cities grow by sheer chance—by accident, by whim of private developer and public agencies. A farm is sold and begins raising houses instead of potatoes—then another farm. Forests are cut; valleys are filled; streams are buried in storm sewers. Kids overflow the schools; a new school is built. Churches come up out of the basements. Traffic grows, roads are widened, front yards cut back. Service stations, Tasty-Freezes, hamburger stands pockmark the old highway (a good spot for a strip shopping center, and somebody builds it). Traffic is strangled; an expressway is hacked through the landscape and this brings cloverleaves (now there is a spot for a regional shopping center and somebody builds it, too). Then office buildings, high-rise apartments, and so it goes. (Rouse 1966, 2-3)
It should be noted that this kind of criticism is a recurring refrain in commentary about suburban growth in the United States. As Forsyth (2005) points out, similar criticisms were being made more than four decades later by those adhering to the urban design approach called New Urbanism:

. . . For the past fifty years, we Americans have been building a national landscape that is largely devoid of places worth caring about. Soulless subdivisions, residential ‘communities’ utterly lacking in communal life; strip shopping centers, ‘big box’ chain stores, and artificially festive malls set within barren seas of parking; antiseptic office parks, ghost towns after 6 pm; and mile upon mile of clogged collector roads, the only fabric tying our disassociated lives back together. . . . (Duany et al. 2000, x)

In spite of recurring criticism, however, not all commentary on the visual quality of transportation environments has been negative. Even after the 1956 highway legislation there was hope that it could be a force for positive redevelopment of urban areas. The 1959 book, Cities in the Motor Age, was compiled by Wilfred Owen of the Brookings Institution, for example, after a 1957 conference sponsored by the Connecticut General Insurance Company. This four-day conference posed the question, “How can we increase the efficiency and livability of our cities through the national highway program” (Owen 1959, x). The conference was somewhat hopeful about this potential, if the program could be reclaimed from the highway engineers (Forsyth 2002). Overall, transportation infrastructure has received a great deal of criticism from urban thinkers, although it has also provided hope for those seeking to develop and redevelop urban areas.
View from the Road

In the 1950s and 1960s, professional attention started to be focused on the visual character of roads. The View from the Road (1964), a monograph by Donald Appleyard, Kevin Lynch, and John R. Myer, was an influential early example of such investigations. The report focuses on the dynamic visual experiences of automobile riders. The authors argue that the metropolitan highways of the 1950s and 1960s were ugly and incomprehensible and that city design should be used to improve the visual experiences of highway users. The authors list eleven visual elements of the highway landscape, which are relevant to the highway user:

- elements of attention—objects that capture attention of passengers in the front seat,
- sense of motion—of self and surrounding objects,
- road alignment,
- the motion of the field—the different visual relationships between objects as one moves to and past them,
- the sense of space—in the roadway itself, for example the difference between being in a road cut and driving on a ridge,
- the extension of self—related to moving fast through a landscape,
- goal approach—movement towards specific objects,
- orientation,
- meaning,
- rhythm and continuity, and
- sequential form.

The authors discuss the drawbacks of existing techniques to model visual impacts, such as drawings, photographs, and three-dimensional models, and suggest their own linear notation scheme, which graphically represents the visual field as one moves along a highway. Their diagrams convey movement and location along a vertical base line, which is read from top to bottom. Additional graphical elements represent sight lines, direction of movement, relative speed, enclosure, scale, light, gateways, points of decision, and landmarks. The authors apply their methods to an imaginary highway project in Boston, illustrating how the diagrams can be used to analyze visual impacts.
Roads can help define a sense of place in rural areas, small towns, suburbs, and parks. Examples are from Japan (1,5), United States (2,3,4), and Australia (6,7,8,9). These cases demonstrate several different features including views from the road, a sense of enclosure, and more localized landscaping. Much work on visual assessment of roads has focused on scenic areas such as images 1,2,3, and 9. However, as this report demonstrates, such assessment can be used in other kinds of places.
Buildings and roads often exist in relation to each other. These examples include planned communities and shopping areas in Poundbury, England (1,7), Country Club Plaza, Missouri (5), and Kingsport, Tennessee (9); shopping streets in Rockridge, California (4), Stillwater, Minnesota (6), and Parramatta, Australia (8); and central city areas in Stockholm, Sweden (2), and Madison, Wisconsin (3). Urban design assessment tools, dealt with later in the chapter, are well suited to assessing these kinds of environments.
This street on a hillside in Nara, Japan, creates a strong sense of enclosure due to the minimal building setbacks, narrow street, and canopy trees.
Visual Assessment of Roads

The *View from the Road* was an early attempt to examine road aesthetics and, while its actual notations were not widely used, the issue of the visual character of highways did receive increasing attention. This included not only the view *from* the road but, increasingly, the view *of* the road. In subsequent decades significant attention was paid to developing visual assessment methods, particularly methods of assessing the visual impacts of new facilities. As the 1988 report *Visual Impact Assessment for Highway Projects* outlines:

> Federal legislation took its first notice of highway esthetics by protecting scenic road and parkway views. Billboards and junkyards along interstate and primary highways next drew attention. The initial funding for cleanup was followed by limited funding for roadside beautification. Up to this point, the mid-60s, the view from the road received all the attention. The significance of the view of the road began to emerge with the Historic Preservation Act of 1966. (US FHWA 1988, 3)

Other legislation followed that highlighted the importance of aesthetic issues in highway development. These included Section 4(f) of the Department of Transportation Act (1966) and the National Environmental Policy Act (1969) that introduced environmental impact statements (US FHWA 1988, 3). By 1978, the US Department of Transportation had started a Design, Arts, and Architecture in Transportation program that “goes beyond the conservation of existing scenic resources and requires that environmental impact statements document the consideration of design quality in projects that involve public use areas or sensitive locations, such as parks or historic areas” (US FHWA 1988, 4).
This street in Philadelphia, Pennsylvania, uses colorful and distinctively-shaped signage to create a sense of place. The building is a public market. Issues such as form and color are among those measured in the 1979 Prototype Visual Impact Assessment Manual developed for the Bureau of Land Management and in the 1988 report, Visual Impact Assessment for Highway Projects developed by the U.S. Federal Highway Administration.
By the late 1970s, a number of federal agencies became interested in visual assessment. An example manual from this period is the *Prototype Visual Impact Assessment Manual* prepared for the Bureau of Land Management by research staff from State University of New York, Syracuse, and University of California, Berkeley, under Richard Smardon and Donald Appleyard at those institutions (Shepphard and Newman 1979). As a prototype manual, not tested at the time for reliability and validity, it focused on a seven-part classification of visual elements, arranged in order of importance. This includes basic issues, such as scale, line, form, and color, differentiated by whether dominance or contrast is most important visually (Shepphard and Newman 1979, v). These elements could be used with visual simulations to assess the visual impacts of proposed projects as part of Visual Resource Management (VRM) (Shepphard and Newman 1979, 1).

Another report, *Visual Impact Assessment for Highway Projects* (US FHWA 1988), was built on this and other work and designed to help provide visual assessments of a variety of highway projects primarily as background to environmental impact statements. It uses a model related to VRM systems employed by many federal agencies at the time, as well as the 1979 *Prototype Visual Impact Assessment Manual*, referred to previously.

Richly illustrated with a variety of checklist and assessment tools, the report distinguished among eight key physical features of visual character, four under the heading of pattern elements and four examining pattern character. These concepts are listed below and illustrated on following pages.

**Pattern elements:**
- form—visual mass, bulk, or shape;
- line—horizons, silhouettes, edges—includes built forms;
- color; and
- texture—coarseness of the surface.

**Pattern character:**
- Dominance—elements are dominant due to position, contrast, extent, or pattern elements;
- Scale—visual scale depends on size, position, and pattern elements;
- Diversity—number and variety of pattern elements; and
- Continuity—uninterrupted flow of pattern elements
  (US FHWA 1988, 40, 43).
This building, the National Museum of Australia in Canberra, features the visual elements of color, dominance, and scale. These are key design qualities measured in the 1988 U.S. Highway Administration’s *Visual Impact Assessment for Highway Projects*.
The literature on visual impact assessment, including the US FHWA report *Visual Impact Assessment for Highway Projects*, distinguishes between eight key elements of visual character.

**Form:** “The mass or shape of an object or of objects, which appear unified” (Shepphard and Newman 1979, 8).

**Line:** “The path, real or imagined, that the eye follows when perceiving abrupt differences in form, color, or texture, or when objects are aligned in a one-dimensional sequence. Usually evident are the edge of shapes or masses in the landscape” (Shepphard and Newman 1979, 10).

**Color:** *Hue* is what is typically called “color,” that is, whether an element is yellow, blue, green, and so forth. *Chroma* is “the degree of color saturation or brilliance, determined by the mixture of light rays. It is the degree of grayness of a color, ranging from pure (high chroma) to dull (low chroma).” *Value (color)* is “the degree of lightness of darkness, caused by the intensity of light being reflected, ranging from black to white” (Shepphard and Newman 1979, 6).

**Texture:** “The aggregation of small forms or color mixtures into a continuous surface pattern; the aggregated parts are enough they do not appear as discrete objects in the composition of the scene” (Shepphard and Newman 1979, 12).
**Continuity:** This element encompasses the uninterrupted flow of pattern elements (US FHWA 1988, 43).

**Dominance:** “With other things equal, light, warm, bright colors in a scene will ‘advance’ and tend to dominate dark, cool, dull colors, which ‘retreat.’ Dark next to light tends to attract the eye and become a visual focal point” (Shephard and Newman 1979, 6).

**Scale:** “The proportionate size relationship between an object and the surroundings in which it is placed” (Shephard and Newman 1979, 14).

**Diversity:** This includes the number and variety of pattern elements (US FHWA 1988, 43).
These topics provide a language for describing views of relevant landscapes, however they do not necessarily indicate landscape quality (US FHWA 1988, 47). Impact, however, can be assessed in terms of change in character, both positive and negative.

As the report indicated, many people look at roads, versus look out from them. The two groups, termed highway neighbors and highway users, have, however, quite different interests and needs as is contrasted in the table on page 68 (US FHWA 1988, 65, 66).

### Table: Highway Users vs. Highway Neighbors

<table>
<thead>
<tr>
<th>Physical</th>
<th>Psychological</th>
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<tbody>
<tr>
<td>Maximum acuity</td>
<td>Desire for visual detail</td>
</tr>
<tr>
<td>Comprehensive field of vision</td>
<td>Viewer costs</td>
</tr>
<tr>
<td>No constraint on vision</td>
<td>Visual problems</td>
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<td></td>
<td>Source: US FHWA 1988, 66</td>
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<table>
<thead>
<tr>
<th>Highway Neighbor</th>
<th>Highway User</th>
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<tbody>
<tr>
<td>View of the Road</td>
<td>View from the Road</td>
</tr>
<tr>
<td>Physical</td>
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As the report indicated, many people look at roads, versus look out from them. The two groups, termed highway neighbors and highway users, have, however, quite different interests and needs as is contrasted in the table on page 68 (US FHWA 1988, 65, 66).
While there has been some development of visual-style assessment to take advantage of new developments in computing technologies, such as GIS and image processing software, basic principles of pattern elements and pattern character are still in place (e.g., Bishop 2002; Gobster and Chenoweth 1989; Menegaki and Kaliampakos 2006). This report uses one method modeled on a simplified form of highway visual assessment and outlined later in the chapter.

**Urban Design, Landscape Scene, and Place-base Qualities**

While highways have received a great deal of attention in terms of their visual impacts, the field of visual assessment is of course larger than the assessment of impacts of highway projects. Several types of urban design and landscape assessment have been developed to examine the character of places more generally. Some focus particularly on natural areas and others on urban design; together they provide a range of assessment tools relevant for transportation projects that are more place focused than large highway projects. These include CSS and TOD.

There are several underlying bodies of theory and empirical research that form the basis for understanding good design as measured in urban-design landscape assessments.
As well as carrying vehicular traffic, streets are public places. These photos illustrate a variety of uses of streets. All carry vehicles, although images 7 and 9 focus on sidewalks; image 5 is a pedestrian mall that only allows service vehicles; and image 6 is a road temporarily closed for a marathon.
psychological theories emphasizing human perception of the visual environment. These theories emphasize what is seen as pleasing to viewers. Much of the literature on assessment of natural or green areas fits in this category;
• aesthetic theories emphasizing physical form (e.g., proportional systems);
• theories about a sense of place and responsiveness to context, including a number of theories related to good urban design, such as Alexander et al.’s (1977) Pattern Language, Kevin Lynch’s (1981) Good City Form and Jacobs and Appleyard’s (1987) urban design manifesto. This also includes research on what it is to create a sense of place, or particular types of places, such as main streets (Ewing et al 2005; Green 2000). Some of this is highly quantified, but much is more qualitative and holistic; and
• work on usability and user satisfaction exemplified by the areas of environmental psychology, environment and behavior research, and post-occupancy evaluation. Key work includes analyses of public places, green spaces, and housing developments (Cooper Marcus and Sarkissian 1986; Cooper Marcus and Francis 1998; Kaplan et al. 1998; Zeisel 2006).

The first two bodies of literature, that is psychological and aesthetic theories, are the basis for much of the highway visual-assessment work dealt with earlier in this part of the report. Accordingly, this section focuses on the latter two. They have many overlaps, however work on the sense of place frequently takes a designer’s view, even if that is informed by close observations of people in places, and work on satisfaction is grounded in the perspectives of the users of places.
During the 1950s and 1960s, as work on the perception of highways started, so too did more general work on the experience of places. Like work on highways, studies of urban design quality started at least in part because there was a perception that the modern designs of the time—in central cities and in suburban areas—were not meeting the needs of urban inhabitants. As is explained below, there is also significant variation in how different people perceive and use spaces, but there are also similarities. It provides important insights about how to measure the design character of urban places including transportation environments such as streets, paths, and station areas.

Some work, like that of commentator J. B. Jackson, was largely descriptive. Designers also started to propose alternative ways of thinking about the city, however. Lynch’s (1960) *Image of the City* is an early example that drew on interviews with middle-class professionals in Los Angeles, Boston, and Jersey City to create a theory of the visual sense of place. The research involved participants describing and drawing the downtowns of those cities. While Lynch included maps in the book’s appendices demonstrating differences in perceptions between lay and expert observers, Lynch sought to find the common or shared mental image of American cities. In doing this he developed a language of the elements of an imageable or memorable city:

(1) paths, along which one travels, (2) nodes, of activities, identifiable (3) districts, their (4) edges, and their (5) landmarks.
On following pages: Lynch (1960) described several physical features of a imageable or memorable area, elements that help make it distinctive. Other non-physical features such as the social character or history also contribute. Whyte (1980) in Social Life of Small Urban Spaces observed people using spaces in major cities. He developed some guidelines for vibrant public spaces including sitting space. Here we focus on key environmental concepts transferable to transportation environments. Whyte himself focuses on the relationship of these physical features and vibrant streets.

Access to green space in an urban environment contributes to a sense of place.

As he remarked, such legible cities potentially had many benefits:

Obviously a clear image enables one to move about easily and quickly: to find a friend’s house or a policeman or a button store. But an ordered environment can do more than this; it may serve as a broad frame of reference, an organizer of activity or belief or knowledge. . . . Like any good framework, such a structure gives the individual a possibility of choice and a starting point for the acquisition of further information. . . . A vivid and integrated physical setting, capable of producing a sharp image, plays a social role as well. It can furnish the material for the symbols and collective memories of group communication. (Lynch 1960, 4)

*Image of the City* was tremendously influential as it provided a language for describing a sense of place, based on concepts extracted from his research. Lynch himself, however, went on to develop a theory of good city form based on a wider set of dimensions: vitality, or the support of human life; sense, the dimension related to imageability; fitness for human uses; access to information and services; control by users; cost efficiency; and justice in the distribution of costs and benefits (Lynch 1981, 118-19).

On following pages:

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Whyte (1980) in Social Life of Small Urban Spaces observed people using spaces in major cities. He developed some guidelines for vibrant public spaces including sitting space. Here we focus on key environmental concepts transferable to transportation environments. Whyte himself focuses on the relationship of these physical features and vibrant streets.
Paths. “Paths are the channels along which the observer customarily, occasionally, or potentially moves. They may be streets, walkways, transit lines, canals, railroads” (Lynch 1960, 47).

Edges. “Edges are the linear elements not used or considered as paths by the observer. They are the boundaries between two phases, linear breaks in continuity: shores, railroad cuts, edges of development, walls” (Lynch 1960, 47).

Districts. “Districts are the medium-to-large sections of the city, conceived of as having two-dimensional extent, which the observer mentally enters “inside of,” and which are recognizable as having some common, identifying character ” (Lynch 1960, 47).

Nodes. “Nodes are points, the strategic spots in a city into which an observer can enter, and which are the intensive foci to and from which he is traveling. They may be primarily junctions, places of a break in transportation, a crossing or convergence of paths…. Or the nodes may simply be concentrations…. ” (Lynch 1960, 47).

Landmarks. “Landmarks are another type of point-reference, but in this case the observer does not enter within them, they are external. They are usually a rather simply defined physical object: building, sign, store, mountain” (Lynch 1960, 48).
Sun. “The quality of the experience...can be much greater when there is sun. For then you have choice—of sun, or shade, or in-between. The best time to sit beneath a tree is when there is sunlight to be shaded from” (Whyte 1980, 42).

Wind. “What people seek are suntraps. And the absence of winds and drafts are as critical for these as sun” (Whyte 1980, 44).

Trees. “There are all sorts of good reasons for trees, but for climatic reasons alone we should press for many more of them....” (Whyte 1980, 46).

Water. “Water should be accessible, touchable, splashable” (Whyte 1980, 49).

Food. “If you want to seed a place with activity, put out food.... Food attracts people who attract more people” (Whyte 1980, 50, 51).
Others were looking at similar issues related to good city form. In the late 1970s, *A Pattern Language*, by Alexander and colleagues, drew on the emerging research on urban environments, including their own, to propose a set of archetypes or patterns for good places. Many patterns work at an urban scale. For example, the accessible green pattern promotes access to green space; the small public squares pattern advocates plazas of a scale that do not feel deserted; and the network of paths and cars pattern proposes both separating and intersecting the paths of pedestrians and vehicles. Similarly, William Whyte’s Street Life Project, started in 1970 and described in his 1980 book, *Social Life of Small Urban Spaces*, drew on observations of spaces in New York, notably using time-lapse photography, to provide guidelines for public places. This work highlighted the importance of:

(1) sun, (2) shelter from wind, (3) trees, (4) water, and (5) food.

Again, it provided a humanistic view of good design and was also closely connected to work on user satisfaction.

Subsequent decades brought a number of manifestos from Jacobs and Appleyard’s *Towards an Urban Design Manifesto* of 1987 (Jacobs and Appleyard 1987) to the Charter of the New Urbanism ratified by the Congress of the New Urbanism in 1996 (Congress for the New Urbanism 1996). These documents deal with a variety of scales from the block to the region, as well as connection of people and place. They are less concerned with a theory of the city or a method of understanding it and instead propose concrete principles for reshaping the urban fabric. They also reflect the significant practical experiences of their authors.

In this tradition, the recent AIA 2005 report, *Livability 101*, outlines ten principles for livable communities. These bring together the findings and propositions of many of the earlier works in accessible language. The principles also reflect a strategy of creating flexible spaces that appeal to a variety of users. The principles include human scale, choice or variety, mixed-use, urban preservation, transportation options, vibrant public spaces, neighborhood identity, environmental protection, landscape conservation, and good design (AIA 2005, 54-5).
Overall, these principles provide a strong tradition of values for good design and provide a basis for evaluating better and worse environments.

As Southworth explains, new computer databases and technologies are also making some of this measurement easier and visualization software, while time-consuming, is opening up new possibilities for assessing options before they are built (Southworth 2003). This study took advantage of the availability of Google Earth photography for mapping of study areas, locating street segments to audit, and provide imaging for discussion in the design workshop. Some data are still mainly available at a local level, however, and do not yet tap into issues, such as the meaning of places, and so direct participatory and field methods are still of great use.

**Majority and Minority Views**

While these studies, manifestos, charters, and principles have been very influential and important, and can provide a useful basis for measurement of the environment, one of the reasons for needing to measure the visual environment is because of differences in views about what constitutes good design and its benefits. It is a truism that different people value aspects of design differently and some of these differences are purely personal matters of taste. Other differences relate to socially important variables, however, such as income, location, education, and heritage.

A key issue is the difference between expert and user views. As Nasar (1998, 17) aptly states, citing numerous studies of the mismatch in perceptions between designers and the public: “Research on the evaluative image of the city might have little practical value if design professionals shared the values of the public and delivered those values in designs and plans. This is not the case.” Because designers may not themselves share the visual preferences of non-designers we cannot necessarily rely on designers to make appropriate design decisions that will have broad appeal. Visual assessment techniques can provide design decision matters with useful input on perceptions of other populations. In addition, in designing transportation environments, transportation and design professionals may also differ from each other in terms of their visual preferences.

Numerous studies have examined this issue of whether architects, planners, and the public assess buildings differently, with results suggesting that design professionals and
These images illustrate many of the AIA’s ten principles of livable communities. Captions are quotes (AIA 2005 54-5).

1. **Design on a Human Scale**: Compact, pedestrian-friendly communities allow residents to walk to shops, services, cultural resources, and jobs and can reduce traffic congestion and benefit people’s health.

2. **Provide Choices** . . . and 3. **Encourage Mixed-use Development**: Integrating different land uses and varied building types creates vibrant, pedestrian-friendly, diverse communities.

4. **Preserve Urban Centers**: Restoring, revitalizing, and infilling urban centers take advantage of existing streets, services, and buildings and avoid the need for new infrastructure. This helps to curb sprawl and promote stability for city neighborhoods.

5. **Vary Transportation Options**: Giving people the option of walking, biking, and using public transit, in addition to driving, reduces traffic congestion, protects the environment, and encourages physical activity.
6. Build Vibrant Public Spaces: Citizens need welcoming, well-defined public places to stimulate face-to-face interaction, collectively celebrate and mourn, encourage civic participation, admire public art, and gather for public events.

7. Create a Neighborhood Identity: A sense of place gives neighborhoods a unique character, enhances the walking environment, and creates pride in the community.

8. Protect Environmental Resources . . . and 9. Conserve Landscapes: Open space, farms, and wildlife habitat are essential for environmental, recreational, and cultural reasons.

10. Design Matters: Design excellence is the foundation of successful and healthy communities. (AIA 2005, 54-5)
the public often disagree. In a study of designs for a new visual-arts center at Ohio State University, Nasar and Kang (1989) compared the official jury ranking of designs to the assessments of a sample of students, faculty, and alumni. They found that the public evaluations differed significantly from those of the ‘expert’ jury. Their findings suggest “potential problems in the reliance on architectural experts to judge public reactions” (Nasar and Kang 1989, 464).

Devlin (1990) surveyed eighty residents of Chicago on their architectural opinions of two office buildings and compared the results to professional assessments of the buildings, as published in architectural publications. She found that the non-architects used different categorization schemes when interpreting the architecture and also used a more limited range of categories. As a result of these findings, Devlin suggested that architects should place more emphasis on the categories non-architects identify as important, such as “building detail, size, color, and material” (Devlin 1990, 242). In a study in England, Hubbard (1997) examined whether members of the public, planning students, and planning officers differed in their assessments of fifteen commercial redevelopment schemes. He found significant differences between the public and the planning officers, though differences were not significant among planning officers.

Studies examining assessments of different home styles have also found differences between architects and the public. In a study of 285 adults in Los Angeles, California, and Columbus, Ohio, (65 of them architects), Nasar found that the public and the architects differed significantly in their assessments of six home styles. In addition to differing from the public in their personal assessments, the architects were also unable
Architects find high-style buildings, such as this example, also in Almere, to be more pleasant and coherent than do non-architects (Nasar 1998).

to predict how the public would respond (Nasar 1989, 255). In a similar study, Devlin and Nasar (1989) surveyed 20 architects and 20 non-architects on their assessments of a sample of high-style and popular-style homes. They found that architects rated the high-style architecture as more meaningful, clear, coherent, pleasant, and relaxing than the popular-style architecture, while non-architects rated them exactly the opposite, with popular-style rating higher than high-style (see also Gifford et al. 2002).

Nevertheless, some researchers have found differences between public and designer views to be slight or non-existent. In a meta-analysis of many previous studies, Stamps found high correlations between views of different groups with some exceptions, for example, children and designers have different views (Stamps 1999). Overall, while some people prefer to see commonalities and others differences, both are correct—there is a core of common perceptions, but some key differences that are important to measure.

Similar findings occur in work on green space, also a key component in transportation environments. Some of this work focuses on finding broadly-shared perceptions, needs, and values; and other work delves more deeply into how people differ in these areas. These two approaches are not necessarily at odds, as studies of the natural or vegetated environment find both significant commonality and important differences among people. In an area of particular relevance to CSS, for example, a great deal of attention has focused on whether people prefer to look at more built or more vegetated scenes, what kinds of vegetation types are preferred, and whether there are important differing views.
As Forsyth and Musacchio (2005, 34-5) outline, there are a number of broadly-shared preferences for vegetated views, many of which are cross-cultural. These include:

- presence of water;
- trees that are spreading, as in an acacia shape (which is a vase-shape with a relatively open fine-textured canopy);
- savanna appearance with “a high overstory canopy, without any significant middlestory” (Gobster 1994, 65);
- smooth ground covers;
- high-maintenance levels with a relatively manicured look;
- either an absence of buildings or buildings that do not stick out; and
- a balance between open areas and a sense of enclosure, that is a space that its neither a vast open field nor a dense, impenetrable forest where it is hard to orient oneself and where criminals might lurk (Balling and Falk 1982; Gobster 1994; Kaplan and Kaplan 1989; Kaplan et al. 1998; Raffetto 1993; Schroeder 1989; Ulrich 1986).

As Forsyth and Musacchio (2005) outline, however, a more recent set of research studies has uncovered a number of differences among people in how they perceive and experience the environment.

- While spreading trees are most liked, people around the globe also prefer the trees that they grew up with (Sommer 1997, 153).
- Urban, low-income, African American, and child populations tend to like neater appearing green

The images above illustrate preferred aesthetic elements. From top to bottom: overstory with no understory in Dallas, Texas; water in Nara, Japan; and a highly manicured field in Kentucky.

• Professionals and activists working in parks, landscape, horticulture, forestry, and other environmental fields have distinctive likes and dislikes, often different from the general public. They frequently like more vegetation and some like a wilder look.

• People also have entirely personal tastes that they can satisfy in part by the landscape designs of the environments that they choose to settle in or near. Even in new developments such landscapes are diverse, from the very manicured to designs focused on maintaining existing vegetation in a fairly natural state (Forsyth and Musacchio 2005).

There may be many reasons for these differences—personal preferences and psychology, cultural understandings, education, and exposure to different environments. These findings highlight an important distinction, however, that while measures about the visual environment and sense of place may tap into areas of broad agreement, there are often significant minority views.

**Toward a Multi-method Approach**

The general fields of environment and behavior, environmental psychology, and urban design have thus created a number of urban-design assessments to measure these qualities of place (Nasar 1998). Such assessments have most recently received a surge of new funding and interest from those concerned with measuring environments for walking and cycling (Moudon and Lee 2003).

These inventories and measures vary in a number of dimensions.

They vary in level of detail and complexity:

• Checklists measure the presence or absence of different elements.
• Rating scales quantify design characteristics.
• Holistic assessments of complete environments are more qualitative but potentially more comprehensive (e.g. tours, videos, workshops).

While simple, quantitative approaches may be easy to administer they may miss some of the more complex qualities of design captured by holistic assessments.
They also vary in terms of who does the rating:
- Participatory/educational approaches have users and other lay people do the rating and assessment.
- Designer-oriented approaches have design experts as raters and evaluators.
- Field-based checklists/surveys may be used by a variety of people including users, design experts, and trained raters.
- GIS-based and automated measures and simulations typically require a high level of expertise and are conducted by trained raters or experts. Some simulations are, however, used as the basis of participatory approaches.

Assessments administered by lay people can be conducted by community volunteers and can encourage community involvement and tap into local knowledge. GIS and other expert measures can provide more detailed information about design and planning.

There are several levels of assessment or evaluation:
- Identifying features—identifying and articulating visual or place character.
- Measuring features—quantifying or counting features of the place in some way.
- Evaluating features—adding an evaluative component either in comparison to other scenes and places or creating some kind of scoring system.

Each level provides a different amount and type of information.

The time at which the assessment is done also varies:
- Prospective evaluations evaluate interventions before they occur and if evaluation is involved involve simulations or models of the future. This might involve drawing or computer modeling for visual assessment.
- Retrospective evaluations are conducted on a completed project.

The use of these techniques depends on the goals of the specific assessment.
Table 2.1 indicates examples of each kind of study.

Different approaches have different strengths. For example, an inventory that checks for the presence or absence of a feature like a street tree is likely to be easy to replicate but does not say much about how a space is used. A technique that has people evaluate whole scenes may be able to distinguish between places that are more or less liked, but it may be difficult to tell why; is it the vegetation or the street lamps or a personal characteristic of the rater? In undertaking an assessment of the visual environment for transportation projects, it is crucial to consider the specific goals of the project and its evaluation.

The Methods in this Study
This report deals with these different strengths by using several of these techniques to assess transportation environments: two kinds of checklists (a score sheet and an inventory), two participatory assessments (one involves designers and one community representatives), and two primarily graphical techniques. These six techniques are explained in more depth in the results chapter and appendix A.
### Underlying Approach

<table>
<thead>
<tr>
<th>Psychological theories/perception</th>
<th>Environment and behavior research</th>
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<tr>
<td>Aesthetic theories/physical form</td>
<td>Art-historical criticism</td>
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<tr>
<td>Sense of place/good urban design</td>
<td>Livability assessments</td>
</tr>
<tr>
<td>Usability/user satisfaction/</td>
<td>Post-occupancy evaluation</td>
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### Detail and complexity

| Checklists | Audits |
| Rating scales | Rating of each block in San Francisco on a five-point scale for the 1970 urban design plan (Southworth 2003). Various visual assessment measures (e.g., Schauman 1988a, 1988b) |
| Holistic assessments | Design juries |

### Who rates the environment

| Participatory/educational (users do rating) | These include ratings using photographs, videos, and tours (Nassauer and Larson 2004) |
| Designer-oriented (experts) | Focus groups of experts; design juries |
| Field-based checklists/surveys (users, experts, trained raters) | Walkability assessments; urban design inventories |
| GIS-based and automated measures and simulations (trained raters, experts) | Interpretation of aerial photography |

### Levels of evaluation

| Identifying features | Work taking preferences expressed through participation or research exercises—e.g., people’s letters of protest over a development, or photo-sorting and rating exercises, and performing content analyses to identify features (e.g., Green 2000a, 2000b). More quantified assessment of street scenes using cross-classified, random-effects models to identify main-street characteristics (Ewing et al. 2005b) |
| Measuring features/quantifying | Audit and inventory tools that count or measure features (Day et al. 2006; Boarnet et al. 2006; Ewing et al. 2005a); GIS-based tools (Menegaki and Kaliampakos 2006) |
| Evaluating features | Design juries |

### Time

| Prospective | Simulation studies; plan critiques |
| Retrospective | Post-occupancy evaluations |
Conclusion

Since the 1960s, researchers and others have developed a rich array of design evaluation approaches. Today, several different visual assessment and urban design theories provide complementary insights into how to design transportation environments. Some focus mainly on visual issues such as color, complexity, and dominance. Others are more concerned with urban design features and qualities related to how people use environments including such elements as paths, landmarks, sun, and water. Some are more oriented to use by designers and others tap into the concerns and preferences of users of spaces. Together they provide a rich vocabulary for describing and assessing various design types and strategies such as transit-oriented development and context-sensitive solutions.

This study drew on this base of understanding about the visual environment to select six different tools for assessing transportation environments, from score sheets to workshops and mapping. It tested them in three regions. The next two chapters first describe the specific cases in these regions and then the specific outcomes of the six assessment tools. Each tool draws on different topics.

- The score sheet, inventory, workshops, and participatory approaches draw on work on livability and urban design.
- The mapping and photographic visual assessment are based on the tradition of visual impact and urban form analysis.

Overall, well-designed transportation environments can make an important contribution to the visual quality and livability of human settlements. Having a common language for assessing the particular strengths of roads, station areas, bridges, and other transportation related places can do much to further public debate about such important concerns.
Downtown Oakland, California
Part Three:
Cases
New housing development around Clarendon provides a variety of housing types and styles within walking distance of the Metro.

“The question is, why didn’t other parts of the metropolitan area embrace the wisdom... of the planning process that went on here to embrace density”.

From Design Workshop—Community Representatives
Cases

The design principles and issues outlined in earlier sections are common to projects in a wide variety of situations. To better explore the range of issues, however, the project examined cases in three regions: Washington, DC, and Northern Virginia; St. Louis area of Missouri and Illinois as well as Boonville in central Missouri; and Oakland and Davis in Northern California. This chapter first deals with the TOD cases and then CSS.

The cases draw on existing reports, primary sources, field visits, and information from the design workshops conducted for this study with architects, landscape architects, and community representatives. They examine the history and design character of each station area or CSS project. The cases provide important background on the areas that is crucial context for part four that presents the results of assessing the design quality of the spaces in six different ways through the score sheet, inventory, design workshop, participatory assessment, mapping, and photographic visual assessment. Not every case was assessed using every technique but the full array of approaches were used in each region. Between them, the case studies in part three and the visual assessments in part four provide important information about design’s relationship to the success of transportation environments.

Where are these quotes from? Quotes in the remainder of the report come from the design workshops for both design professionals and community representatives. Participants were tape recorded and their comments transcribed. They were also given the opportunity to write “signed” quotes to be published with their names. Both types of quotes are included in the report. Quotes are from the specific areas being described. Some focus on strengths and others present challenges.
Transit-oriented Development: Washington, DC, and Virginia

Washington, DC Metro System Background

The Washington, DC area Metro has been called the nation’s premier transit system (Marshall 2004). Operated by the Washington Metropolitan Area Transit Authority (WMATA), which also manages an extensive bus network, Metro is currently the country’s second largest system in terms of geographical extent behind New York and serves approximately 42 percent of commuters in the urban core (WMATA 2006). In addition to the impressive levels of service delivery, WMATA has also proven to be a vital element of the region’s economic health. The Urban Land Institute estimates Metro’s contributions to the Washington region at around $20 billion since its inception in 1976 (McNeal and Doggett 1999). Transit investments, especially ones involving public/private-partnered developments, have created measurable land-value increases, above and beyond the initial investments in transit (Cervero 1994).

Planning for Metro began in 1967 and the first service was launched in 1976. Since then, the Washington, DC, area has become one of the country’s least-automobile-dependent metropolises (WMATA 2006). Innovative land-use planning strategies in Metro-serviced communities have gone hand in hand with the construction and expansion of WMATA, creating a mutually reinforcing relationship between transportation investments and
The Rosslyn-Ballston corridor promotes livability and pedestrian safety. Wide sidewalks, street-level retail, small parks, and green streets create inviting atmospheres for pedestrians.

“The reason that it’s working is because there’s someplace where pedestrians can walk to.”

From Design Workshop—Community Representatives
economic development. Nowhere is this more true than with Arlington County, Virginia, which is a national pioneer in contemporary TOD planning. As an early implementer of TOD planning, Arlington County has demonstrated that TOD planning can be successful, but also confirms that the process can be a rocky one. This section reviews three particular TOD sites, and examines the design challenges and lessons from each as background for examining the visual environment in these settings.

Coordinating Transportation with Land-use in the Rosslyn-Ballston Corridor

Virginia’s Arlington County experience with planning for integration between Metro transit service and nearby land-use planning began in the 1970s, even before the Metro was built. County planners saw the arrival of Metro as a chance to update the county’s general land-use plan and establish a new vision for the future development of the county. Arlington had long been in the shadow of Washington, DC, but Arlington planners published a series of planning visions calling for a bolder profile. One, essentially exploratory, document called “R-B ‘72” initiated the conversations by laying out a series of different growth scenarios for the region, including a limited growth model, an aggressive growth model, as well as a balanced approach (County of Arlington 1972; Parris 1989). This 1972 document had two interesting provisions, however, which would be the guiding principles for future growth regardless of which future path was chosen. First, existing single-family and apartment neighborhoods were to be preserved. Second, any future growth would be mixed-use and concentrated near Metro stations (Parris 1989).

Although it wasn’t called TOD at the time, this was clearly the introduction of TOD principles to Arlington County. Land-use plans were centered on the Rosslyn-Ballston Corridor, which includes five stations now along Metro’s orange line: Rosslyn, Court House, Clarendon, Virginia Square, and Ballston-MU (Marshall 2004). The line was

Located at the Metro stop at Clarendon, this small park helps orient people getting on and off the Metro.
Residential areas adjacent to the Ballston station provide residents with many housing options. The proximity to transit allows residents to easily commute to other areas within the metropolitan area. While participants in the design workshops noted that the area is ethnically diverse they were concerned that lower-income workers were being priced out of the area.

“It has been so successful that it is now a very attractive place. Real-estate prices are up. It’s a very homogeneous community.”

From Design Workshop—Community Representatives
opened in 1979, with TOD planning principles already in place to guide development. A particular strength of these early visions was that they simultaneously conceptualized development within the context of a large-scale district, defining both a medium-scale corridor and more focused developments around stations. Over the past thirty years, the initial visions of the 1972 document have generally been followed, and the ability to lay out a plan and then keep to it over the long-haul is generally recognized as a model practice. Since the completion of the Orange Line, Arlington County’s TOD strategies have resulted in the construction of 21 million square feet of office/retail/commercial space along with 22,500 residential units (Zucker 2003). The US Environmental Protection Agency (US EPA) estimates that such development at typical suburban densities would require over fourteen square miles, yet the Rosslyn-Ballston corridor consumes just two square miles (US EPA 2006). Meanwhile, approximately 50 percent of the area’s residents commute by Metro, and many goods and services are available to residents on foot.

In this study, design-workshop participants also stressed that it is a pleasant area to live, work, shop, and dine in, as shown by the rapidly increasing real-estate prices in the area. One person described the area as “very lively, very safe, very clean, very walkable, [with] lots of opportunities to eat and shop and socialize.” Planners
## Metro and Rosslyn-Ballston Corridor Facts & Key Dates

- 106.3 miles of tracks, linking 86 stations in Virginia, Maryland and the District of Columbia
- Currently there are five lines, and a sixth line should be completed by 2015
- 206 million annual rail trips, in a metropolis of 3.5 million people
- Fare box recovery is 58 percent, with other revenue coming from rent receipts

Sources: WMATA 2006; State of Virginia 2006

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>1961</td>
<td>Arlington County adopts general land-use plan for Rosslyn redevelopment</td>
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<tr>
<td>1967</td>
<td>WMATA created</td>
</tr>
<tr>
<td>1969</td>
<td>Construction of Metrorail begins</td>
</tr>
<tr>
<td>1970</td>
<td>Rosslyn-Ballston Corridor has 22,000 jobs, 5.5 million sq. ft. of office space and 7,000 housing units.</td>
</tr>
<tr>
<td>1972</td>
<td>Production of “RB ‘72” planning document. Intended to be the impetus for public discussion on the corridor’s future, this document presented a variety of future growth scenarios, all of which had two common principles in common: 1) preservation of existing single-family and apartment neighborhoods and 2) concentrated, mixed-use development near (in circles of quarter-mile radius) Metro stations.</td>
</tr>
<tr>
<td>1973</td>
<td>The corridor’s first public/private land-development project, the Rosslyn Metro Center, is initiated. Rosslyn Center sets a model for private development on WMATA-owned land in coordination with transit investment.</td>
</tr>
<tr>
<td>1976</td>
<td>First phase of Metrorail begins</td>
</tr>
<tr>
<td>1977</td>
<td>Rosslyn Sector Plan completed. Calls for a long-term expansion in office space from 4.5 million sq. ft to 7.5 million.</td>
</tr>
<tr>
<td>1977</td>
<td>Rosslyn Metro opens.</td>
</tr>
<tr>
<td>1979</td>
<td>Orange Line to Ballston opens.</td>
</tr>
<tr>
<td>1980</td>
<td>Ballston Sector Plan adopted, with aims of creating a “new downtown” for central Arlington with significant expansion of office space and residential units.</td>
</tr>
<tr>
<td>1984</td>
<td>Clarendon Sector Plan adopted (amended in 1990). Outlines concept of the station area as “urban village,” allowing for increased development around the station while maintaining single-family home neighborhoods.</td>
</tr>
<tr>
<td>1991</td>
<td>Average daily ridership for Rosslyn, Court House, Clarendon, and Ballston stations is 31,644.</td>
</tr>
<tr>
<td>1992</td>
<td>Rosslyn Station Area Plan Addendum, which highlights need to coordinate zoning regulations with existing transit infrastructure, is adopted.</td>
</tr>
<tr>
<td>1996</td>
<td>Creation of the C-O-Rosslyn zoning district, which inscribes recommendations made by 1992 addendum into zoning codes. Maximum densities are raised significantly.</td>
</tr>
<tr>
<td>2001</td>
<td>Final leg of original 103-mile Metrorail network is completed.</td>
</tr>
<tr>
<td>2002</td>
<td>Rosslyn-Ballston Corridor wins awards for Smart Growth design from EPA and AIA.</td>
</tr>
<tr>
<td>2005</td>
<td>Average daily ridership for Rosslyn, Court House, Clarendon, and Ballston stations is 77,653 (cf. 1991).</td>
</tr>
<tr>
<td>2006</td>
<td>Rosslyn-Ballston Corridor has 94,000 jobs, 23.5 million sq. ft. of office space and 24,500 housing units. (cf. 1970).</td>
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</tbody>
</table>

Sources: Parris 1989; County of Arlington 2005; Henry 2006a, 2006b, 2006c; WMATA 2006
have promoted a wide variety of livability features, including pedestrian safety and traffic calming, building small parks, widening sidewalks, and encouraging small-scale, street-level retail (US EPA 2006). The identity of the area has been promoted through the use of pedestrian-friendly and attractive streetscape standards in effect throughout the whole corridor (County of Arlington 2004). Arlington County’s strategies and success have garnered national attention, including the 2002 National Award for Overall Excellence in Smart Growth from the US EPA (US EPA 2006), and the Overall Excellence Award from the American Institute of Architects, also in 2002 (AIA 2002).

Partnerships between WMATA and private developers also boosted economic growth along the Rosslyn-Ballston corridor. From the very beginning, WMATA has taken a prominent role in development decisions on and adjacent to its stations, and supplements its fare box returns with rent receipts paid by developers and concessionaires operating on WMATA-owned land. The first of these partnerships, the Rosslyn Center, began in 1973 and is now one of the area’s signature projects (McNeal and Doggett 1999). A second major project is Ballston Metro Center, a 712,000-square-foot, twin-tower project that features a hotel and luxury housing on top of an integrated bus and rail station (Miller 1993). Other joint-development projects have followed, and when combined with “incentive zoning” and higher densities allowed by general sector plans, have led to the resurgence of the residential and commercial tax bases of the area (Davis 2003; Henry 2006b).

“The excellence in planning has outpaced the excellence in architecture by more than a generation. As each sub-market matures, architecture will both lead and reinforce the qualities of space and life in the community.”

Michael Foster, FAIA
MTFA Architecture, Inc.
Ornamental trees in bloom along the Rosslyn-Ballston Corridor allow urban residents to experience seasonal change. Well-lit sidewalks enhance pedestrian safety.

“As a woman on my own, I will walk anywhere in Arlington at any hour and not think about it . . . It’s amazing how clean and safe and pleasant it is.”

From Design Workshop—Community Representatives
The mixed-use model of development, which was fundamental to most Rosslyn-Ballston Corridor planning, has served Arlington very well. High density concentrated in “bulls eyes” around Metro stations with attention to alternative transportation modes, such as bicycling and walking, has produced live, learn, work, shop, and play environments. They are green, diverse, vibrant, safe, livable, and organic. This model will be more relevant as we move forward into the 21st century.”

Julie Mangis, Executive Director
Ballston-Virginia Square Partnership, Inc.
The Rosslyn-Ballston corridor demonstrates the strength of long-term planning (Barnett 2002, 13). It also illustrates how station-area redevelopment has evolved from the earliest redevelopment at Rosslyn, dominated by reinforced concrete, to the most recent around Clarendon Station with a more-cozy brick theme. In addition, corridor-wide redevelopment efforts have also allowed individual-station areas to maintain their own senses of place. Rosslyn has developed as an impressive “gateway,” Clarendon has successfully maintained its small-scale feel as an “urban village,” and the mix of uses at Ballston makes it Arlington’s “new downtown.” One design-workshop participant indicated that the area’s most notable quality was the fact that while there was a sense of “consistency in the sense of quality, there are [also] different personalities of each area.”

Many of the challenges that Arlington planners have faced have been related to Arlington’s status as a pioneer. When the new planning approach took shape in the 1970s, there were few models to follow, no plans to consult or ideas to borrow. One concern has been in making sure that high-density office towers not eliminate other uses, as actually turned out to be the case in Rosslyn. Other challenges focused on visual character. For example Clarendon has exemplified the problem of trying to keep a smaller-scale feel, despite ever-stronger development pressures. Meanwhile, Ballston demonstrates the opportunities and challenges involved with economic development based around transit.

In addition, success has brought challenges. As design workshop participants noted, for example, spillover parking in residential areas meant that Arlington County was a national leader in the 1970s in establishing resident-permit parking, winning a Supreme Court case to allow its system. More recently, as the areas around the stations have redeveloped, prices have increased making affordability a challenge. Arlington County uses a large number of tools, including requiring affordable units or cash contributions from larger developments, providing density bonuses for affordable units, and providing financial resources for developing units (County of Arlington 2006). While not strictly about the visual environment, the issue of affordable housing has much to do with the livability, diversity, and vitality of places.
Rosslyn Station Area.

“I see Rosslyn as the Manhattan of Washington, DC, in the future”

From Design Workshop—Designers
Rosslyn Station Area

Overview
Rosslyn is the gateway to Arlington County on the Metro, and the eastern-most station in the TOD corridor. In the 1960s, the area was depressed and full of marginal uses but Rosslyn is now one of the region’s premier locations for commercial and high-density residential uses (Henry 2006b). The turnaround has been the result of a long-term development strategy based on incentive zoning to encourage dense development centered on the Metro station (Parris 1989). Rosslyn now contains almost 8 million sq. ft. of office space, almost 5,000 residential units and over 2,000 hotel rooms (County of Arlington 2005). The visual environment in Rosslyn’s TOD has met with mixed success, however.

Planning and Development History
The warehouse and industrial landscape of 1960s Rosslyn was a prime example of the on-going deterioration of Arlington County’s non-residential tax base (County of Arlington 1967, 4). In attempts to revitalize Rosslyn’s business sector, Arlington County planners eschewed the popular “urban renewal” strategy backed by federal dollars in favor of a long-term strategy based on private development near the soon to come Metro stations (Collins 1980). The Rosslyn Sector plan, completed in 1977, added to earlier visions for the area and called for an increase of 3 million sq. ft. of office space, as well as for a greater mix of residential, retail and office uses near the planned station (Ward 1991; Henry 2006b). The County’s strategy provided greater freedom to develop at higher, and hence, more profitable, densities as long as future developments conformed to the County’s larger planning vision of mixed-use development that would be transit-based, not automobile-based. Key to this strategy was the use of “incentive zoning,” whereby developers were given density bonuses for installing particular features, like public plazas or allowances for bus stops, in their plans (Ward 1991).

Rosslyn’s experience in building a high-density commercial core has not been without flaw or controversy. In some ways, Rosslyn has become almost too successful as a site for high-density development. Rosslyn is the most built-up of any area along the Orange Line, and the mass of tall buildings, and the early lack of attention to pedestrians, have made the area less pleasant for pedestrians than the others. One design-workshop

“It’s really clear that Arlington learned some lessons from Rosslyn.”

From Design Workshop—Designers
participant noted that the high buildings have blocked out much of the sunlight, and indicated that emerging from other stations was much better. In addition, space has become so valuable in Rosslyn that many smaller, less profitable uses have been pushed out, further detracting from the vibrancy of street life. Finally, some see Rosslyn’s gain as occurring at Washington, DC’s expense. The original plan for the nation’s capital called for monumental buildings and uninterrupted vistas, but the multi-story office towers of Rosslyn now form a backdrop quite different than Pierre L’Enfant imagined (Stewart 1980, 4). There is also a certain irony involved—Rosslyn’s success at encouraging tall buildings has only been possible because of height restrictions within the district itself that make the Rosslyn-style streetscape next to impossible (Barnett 2004, 14-7).

**Design Issues**

The initial impetus was redeveloping an area that had been run down. Eventually, as growth strengthened, this needed to be managed, as there was a great deal of demand for office space from government and affiliates. Transit provided an opportunity to increase numbers of people without overwhelming the area with parking. It has been successful in doing this. In the design workshops conducted for this study, architects and others pointed to some distinctive buildings and works of art, but in the early years somewhat less attention was paid to the street-level environment. While Rosslyn has the ingredients of a successful mixed-use area, the streetscape lacks human scale. Rosslyn was an early example of TOD and subsequent projects have learned from some of its mistakes.
“Everybody was very concerned about the heights, but at the same time, you had a lot of citizen buy-in and I think that comes from the Arlington [participatory] process.”

From Design Workshop—Community Representatives
The Courthouse Station sits between Rosslyn and Clarendon stations. Civic and government buildings are mixed with retail and residential. While one of the more austere parts of the corridor it still contains many pedestrian-oriented areas.
“The success of Arlington Rosslyn-Ballston Metro Corridor is in the way it accommodates diverse people—families, singles, workers, visitors—and provides them all with a lively and safe community to enjoy.”

Emily Cassell, Marketing Director
Arlington Convention and Visitors Service
Clarendon Station Area.

“The Arlington Orange Line Corridor has promoted a diverse mix of development use that attracts a diversity of populations that come to work/shop/recreate and live. It is a work in progress that will require patience and further personal vision.”

David Kitchens, Principal
Cooper Carry
Clarendon Station Area

Overview
Midway between Rosslyn and Ballston, the area around Clarendon Station differs in character from the high-rise landscape of Rosslyn, and the more shopping-oriented land-use pattern around Ballston. Although Clarendon has its share of large office buildings and apartment towers, this area features a significant number of small businesses and single-family houses within walking distance of the station. In addition, while Rosslyn and Ballston are mature zones, Clarendon still has space for expansion and development, making this area one of the main targets for current and future private investment (Henry 2006a). The design challenge for Clarendon is thus still an open one: how to maintain the sense of a small, comfortable place while incorporating further economic development.

Planning and Development History
Clarendon’s land-use pattern prior to transit-oriented planning was dominated by small- and medium-scale retail along the corridor, with a number of detached single-family homes and small apartment buildings in the surrounding areas. While not as run down as Rosslyn during the 1960s and 1970s, the construction of the capital beltway and a number of suburban shopping malls contributed to commercial decline in the Clarendon area and residential flight (Henry 2006a).

Revitalization strategies for Clarendon followed the template laid out by the Rosslyn plan, but with a twist. Instead of the focus on large-scale projects like the Rosslyn Center or on dramatically increased density maximums, Clarendon’s revitalization has been focused on smaller-scale development. The result has been on-going commercial revitalization, led by small-and medium-sized businesses, and strengthening of its residential neighborhoods. This development is still relatively intense, however, compared to national suburban averages with many new apartments in the range of four to ten stories.
In Clarendon’s urban village, people of all income levels, ages, and household make-ups can walk to work, shop, and play. Clarendon’s superior physical environment also attracts tourists, shoppers, and other visitors, who are encouraged to leave their cars or arrive by Metro or bicycle. From the street-level walkability and well-designed buildings to the character and charm of its public art, people see Clarendon as a destination. Clarendon’s older buildings provide a sense of community and honor the time when Clarendon was Arlington’s first downtown. The integrity of surrounding low-density residential neighborhoods is protected and higher density tapers up from neighborhoods to Clarendon’s core. Residents, visitors and workers can walk in safety and comfort regardless of the time of day.

Source: County of Arlington (Va.) 2006, 2.3.

“Those few blocks of street in Clarendon Commons feel pretty good . . . there really is a certain charm to it.”

From Design Workshop—Designers

Clarendon Commons provides a mix of uses including houses and stores.
“What makes the Clarendon Commons successful is the individuality and the design of the retail there, because everything else is just kind of a background.”

*From Design Workshop—Designers*
Moving Design

The first plan to specifically deal with Clarendon was released in 1984 and articulated a vision for Clarendon as an “urban village,” meaning greater development around the station while maintaining the strong sense of place inherent to the single-family houses and modest apartment buildings (Parris 1989). The Clarendon plan funneled development initiatives to one focal point—the block that includes the Olmstead Building and Clarendon Metro Park—but did not significantly raise density maximums elsewhere (Henry 2006a). A new plan released in 2006 has built upon these visions and also revisited the long-term planning goals of the earlier document. The 2006 plan underscores the importance of maintaining quality of life while pursuing economic development and updated the “urban village” plan to reflect the presence of even greater pressure for economic development (County of Arlington 2006; 2.3).

Design Issues

Key issues for early planning included revitalizing commercial/retail uses, without abandoning the existing residential character. In addition, as a mixed-use area there is significant retail, so parking was a challenge, relieved partly by relying on transit. Overall, as a TOD developing only recently, Clarendon has learned a great deal from earlier developments and is more human in scale. In particular, Arlington has become more sophisticated about design standards for buildings and pedestrian infrastructure, standards that can help preserve and enhance the visual environment.
“Metro out here was built cut and cover...which meant that a whole central block of Clarendon was destroyed in creating the Metro, and it took a long time for Clarendon to come back.”

From Design Workshop—Community Representatives
The Virginia Square Station area lies between Ballston and Clarendon, creating a continuous corridor along the Orange Line. It is dominated by tall buildings near the train station. Wide sidewalks and tree-lined streets help create a pedestrian-scaled environment.
“Arlington County has crafted a vision for its future that incorporates public transportation, private development, and community interaction to form a sustainable lifestyle that will be able to adapt to future challenges. The Ballston-Rosslyn corridor reflects a New Suburbanism, combining the convenience of public transit with a broad range of housing types and work opportunities in a walkable environment.”

Tom Massey, AIA Principal
Jacobs Advance Planning Group
Ballston is the westernmost station in the corridor. There is a diverse mix of land uses in the area, including office buildings, a shopping mall, a mix of housing types, and green spaces.
Ballston Station Area

Overview
The Ballston-MU Station area is the western terminus of the TOD corridor and has become the “new downtown” for Arlington County, attracting national attention in venues such as the Wall Street Journal (Parris 1989; Templin 1998). Revitalization efforts in this area have dovetailed with planning for Metro, and local land-use regulations and economic incentives were reworked to take advantage of the emerging transit system (Miller 1993). The Ballston Metro Center is the signature development here, and combines seven stories of hotel space, eighteen stories of condominiums, a thirteen-story office building, mall, atrium, and parking garage all on one city block at a metro station (Johnakin 1991, 16). Its most distinguishable characteristic now is the diverse mix of uses in this area. Visually it mixes large office buildings, enclosed green spaces, and an enormous variety of housing types from high rise condominiums to nearby single family houses. This visual variety is striking.

Planning and Development History
Ballston’s status until about the 1960s was as the downtown of Arlington County and a major regional hub. But, like so many thriving American centers at the time, its prosperity declined in the face of suburban expansion in the 1970s and 1980s. In response, revitalization efforts began in 1980. Planners wanted to take advantage of the construction of Metro’s Orange Line, and as at Rosslyn, emphasized mixed-use development. Planners termed their new strategy for Ballston as trying to create a “new downtown” in Arlington County (Henry 2006c).

Since the plan’s implementation, Ballston has indeed experienced a rebirth and the station area is pedestrian-friendly and lively, with a mixture of residential and commercial uses. This took some time, as one of the design-workshop participants explained: “We waited a long time for housing to materialize, and it came in a big way, but we stuck with the plan, we didn’t convert everything to office and eventually things materialized: mixed-use, grocery stores, and so on.”
The Ballston area has also emerged as a magnet for science-and technology-related organizations, such as the National Science Foundation and the Office of Navy Research. In addition, various national non-profit organizations and financial services companies have located here, helping to create a very strong economic base in the area. On the street level, a number of planning interventions have helped humanize the streetscape, though problems for pedestrians still remain. On the positive side, Welburn Square, across the street from the Metro entrance, has become a particularly nice place in the community and hosts a popular art market (Arlington Arts 2007). On the negative side, the area is still crossed by several wide, suburban-style boulevards that make crossing the street a difficult task (Marshall 2004).

**Design Issues**

Like Rosslyn, Ballston has significant office development and a number of large roads that need to be integrated into the overall development (Marshall 2004). While it also has several well-designed open spaces, including the natural garden of the Nature Conservancy, these are not as visible as they might be. The area, however, as a whole is an interesting mix of intensive development in the station area and nearby leafy yet compact suburbs.

“In the built-environment, sense of place is enhanced by density when it’s done with care for the pedestrian experience—buildings close to the sidewalk, frequent access (doors), windows that allow visual access into and out of the building, and light.”

_Roni Freeman, Executive Director_  
_Clarendon Alliance_
“If you don’t get out and walk in Ballston, you miss the best places, because a lot of them are hidden.”

From Design Workshop—Community Representatives
“When people don’t ride [the train], I say you ought to get your family and get on at one area and go through underneath the city. The tunnels are 100 years, 150 years old. Then go across the East Bridge, which is so architecturally significant. And then go to a rural area . . . I mean there’s so many segments for somebody just to have an adventure ride.”

From Design Workshop—Community Representatives
Transit-oriented Development: St. Louis Metropolitan Area

St. Louis Metrolink Background

St. Louis's MetroLink light-rail system is not one of the nation’s most extensive, but has earned a reputation as one of the best (Alschuler and Smith 1997). Planning for the system began in 1990, and the first line, linking Lambert-St. Louis International Airport in the west with East St. Louis, Illinois, was completed in 1994 (Bi-state Metro 2006a). A second line called the “Cross-county Extension” branches south off of the main line and opened in August of 2006. The system is much smaller than Washington, DC’s or Oakland’s (described later in the report) in terms of geographical extent and number of stations, but is an instructive case to examine the role that transit can play in supporting economic growth. This section focuses on two stations in particular: Delmar Loop, where a transit facility has helped complete the commercial revival of an urban neighborhood, and Emerson Park in east St. Louis, where transit has been used as a residential redevelopment strategy. Both are lower-density environments than the Rosslyn-Ballston corridor. They use street scaping, public art, and significant new building to enhance the visual environment.
New buildings are beginning to be constructed around the Wellston Station, however, it primarily functions as a park-and-ride stop for commuters.

In each region the study team used six methods to assess the visual environment; a score sheet, an inventory, design workshops, participatory assessments, mapping, and photographic visual assessments. Results are reported in part four but quotes from the workshops with design professionals and community representatives are used throughout the report.
**Metrolink and St. Louis Cases Facts and Key Dates**

- 46 miles of tracks, linking 37 stations in Missouri and Illinois
- Service on the first line linking Lambert-St. Louis International Airport began in 1993, a second line, which branches south off the main line, opened in 2006
- 16.6 million annual rail trips
- Fare box recovery in 2005 was 23 percent, sales taxes from St. Louis City and County, the St. Clair County, Illinois, Transit District, and federal and state grants and subsidies

Sources: Bi-state Metro 2005 and 2006

1966 Original streetcar network in St. Louis ceases operations.

1986 Arts in Transit (AIT) program begins, intended to integrate public art into existing (bus) and future (light rail) transit systems.

1990 Construction from Lambert Airport to 5th & Missouri Station in East St. Louis begins

1993 First stage of MetroLink opens and carries approximately 30,000 passengers daily for the first month. Estimates had been set at around 17,000.

1993 St. Clair County passes a referendum that creates a ½-cent sales tax to fund MetroLink expansion.

1994 Proposition M, which provides a ¼-cent sales tax for MetroLink expansion, passes in St. Louis City and County with support over 60 percent.

1998 St. Clair County extension project begins

2001 St. Clair County extension opens

2003 Cross-county MetroLink extension begins

2006 MetroLink ridership for fiscal year 2005-6 is 16,573,948, with a weekday average of 46,417.

2006 Cross County Extension opens

Sources: Arts in Transit 2006; Bi-state Metro 2006a; Citizens for Modern Transit 2006a
Coordinating Transportation with Land use in St. Louis

MetroLink was initially constructed without much thought given to coordinating land use planning and transit, in contrast to what had been done in the Rosslyn-Ballston corridor (Citizens for Modern Transit 2006a). Initially, MetroLink was viewed as transportation infrastructure, with an emphasis on serving as many patrons for as little cost as possible. The main MetroLink line was built on what had been a railroad corridor (Willis 1997, 11). This helped keep costs down, minimized conflicts with other types of transportation, and also made implementation more efficient and less politically troublesome. For economic development, however, this strategy has been less than ideal, since the transit line runs through many areas of St. Louis and East St. Louis that have few residents or commercial opportunities. As one design-workshop participant explained: “Our system for the most part is to reutilize abandoned railroad corridors and that’s been easy, but it doesn’t always get you the prime station location you want.”

In the past decade or so, however, more attention has been paid to maximizing MetroLink’s impact on economic development and TOD strategies have taken hold. Urban planners, institutions and private investors have all recognized the benefits of concentrating investment around transit stations. Several stations that were already the sites of a significant level of development are being retrofitted according to TOD principles in order to enhance economic development, with plans for more in the works (Citizens for Modern Transit 2006a, 2006b). MetroLink’s role in these retrofit TODs has not been to single-handedly spark a massive redevelopment, but to stabilize particular areas. One design-workshop participant commented that while ten years ago certain parts of St. Louis were on the brink of massive disinvestment, MetroLink’s arrival has made the places economically stable and signaled that the area would remain economically viable. In some cases, of course, MetroLink has really sparked an economic revival. The Central West End Station, for example, has been the focal point for over $300 million in neighborhood investment over the past few years, including luxury apartment towers, hotels, and the Washington University Medical Center (Citizens for Modern Transit 2006c).
MetroLink has created an economic revival near some of the stations. Over the past few years, the Central West End Station has invested over $300 million in housing and retail.

A second type of TOD investment in and around St. Louis has been on sites that had little or no development before the construction of the transit stations. The St. Clair County, Illinois extension of 2001 has been a catalyst for new residential construction and some commercial construction. New development within a half mile (or ten-minute walk) of the line has come to $441 million, including almost 1,500 new residential units (Citizens for Modern Transit 2006c). It is clear that investment in transit can create a locational advantage for sites that were previously considered too peripheral for many commuters, employers and investors.

A challenge for MetroLink and for TOD around some stations has been to assure its riders that commuting by light rail is a safe, reliable and even enjoyable experience. Like many American cities of the once-industrial Northeast and Midwest, St. Louis fell on hard times beginning in the 1950s as many residents, businesses and jobs relocated to suburbs. Outward flight left behind central neighborhoods with a smaller tax base and fueled a vicious cycle of urban problems leading to further disinvestment and so on (Sandweiss 2001). Police have used a variety of strategies to limit crime and nuisance behavior at stations. MetroLink has played a part in encouraging a rediscovery of the city, and while much work remains to be done, MetroLink has won praise for its rider-friendly policies (Miller 1996). MetroLink has a solid record of on-time service, and has consistently cut rider complaints from one year to the next (Willis 1997; Bi-state Metro 2005).

One innovative strategy that MetroLink has used to increase ridership and encourage TOD has been an ambitious program to use public art as a way to improve the transit experience. The Arts in Transit (AIT) program began in 1986 with the original intention of bringing art to the bus system, but really blossomed in the late 1980s with the coming of MetroLink (Adams 1994). AIT has commissioned dozens of artists since its creation and has so far created more than 150 public art installations at or near MetroLink stations (Arts in Transit 2006). The goal has been to make transit use more aesthetically appealing and customer friendly “through a place-making approach that integrates public art and urban design with community and enhancement initiatives” (Arts in Transit 2006).
“Youth culture from the university . . . populates the area. They’re on the street, they’re in the record shops . . . the boutiques, and restaurants.”

From Design Workshop—Community Representatives
Delmar Loop

Overview
The Delmar Loop area is an exemplary case study for showing how transit investment and TOD principles can fit into the pre-existing fabric of the city and enhance the visual environment. “The Loop” is a shopping strip of just under a mile in length, stretching from the Delmar Station in the east, through a redeveloping part of St. Louis and into a fairly established part of the municipality of University City.

Unlike the following case of Emerson Park, the role for the MetroLink in the Delmar Loop area was to preserve and extend the existing commercial activity in the area from University City across the municipal border to the station, rather than serving as a type of wholesale change (Howland and Dunphy 1996, 44-5). As one design workshop explained, “Delmar Loop was a connect-the-dots” project. After almost ten years in place, it is clear that the MetroLink station has been instrumental in bringing people though the St. Louis part of the street and has improved the customer base for commercial development. Development along Delmar in the other direction, to the east, is starting. Several design interventions have contributed to the redevelopment to date including improved sidewalks, wayfinding signage, landscaping, and public art.

Planning and Development History
The Delmar Loop gets its name from the streetcar turnaround that used to give the area its identity up until the 1960s. During the streetcar era, this location was a popular place for shopping and entertainment, but went into decline after the streetcar system ceased operating. In the 1970s, though, the area recovered somewhat and began to gain a reputation for its diverse collection of small businesses. When the MetroLink station opened in the mid-1990s, this area was surviving but not thriving, though the potential was there for a renaissance. Located near two popular St. Louis landmarks, Washington University and Forest Park, Delmar Loop also had an established stock of small-and mid-sized commercial properties, plus a steady presence of college students from the nearby Washington University. According to several design-workshop participants, the addition of MetroLink served as a catalyst for economic development, and housing values and commercial rents in the area have increased.

According to one design-workshop participant, Delmar Loop has now become the model for other neighborhoods and municipalities in the area. The end result has
been an aesthetically unified and vibrant commercial district with adjacent transit. The area is home to one art cinema, twelve live entertainment venues, over a dozen arts-related organizations, and over forty restaurants and eating places (Loop Special Business District 2006a). According to virtually every design-workshop participant, the redevelopment of the Pageant Theater, was a crucial move. Its owner, Jow Edward, was described as “the Pied Piper of The Loop. He’s responsible for the development. He’s a cheerleader.” Sharing parking with the MetroLink station, the theater helped fill the gap between the station and the more developed part of the Delmar Loop. Further vitality comes from the annual The Loop in Motion Festival held every fall, in addition to a winter ice festival that began in 2006 (Loop Special Business District 2006b).

Delmar Loop Station’s role in directly changing the physical landscape of the neighborhood has been minimal, however. Unlike Ballston or Oakland City Center, in which a transit stop is the focal point of a development, Delmar Loop Station is actually located just off of the main commercial strip, and there has been no need for a massive reconstruction project to integrate a transit facility with an existing commercial fabric. Similarly, nearby leafy residential areas with older houses and existing apartments have not changed much. The location of the station was determined by the existence of the old railroad line on which it was built, whereas the neighborhood became originally prosperous due to its placement on a streetcar line. There is thus some mismatch between the station and the development area, though certainly the distance between the two is not very great.
“It has been fun to watch Delmar develop toward MetroLink. And what’s most fun is the story is not finished. [There are] more good things to come.”

Tom Shrout, Executive Director
Citizens for Modern Transit
Still, transit planners have been aware of the need to integrate the transit experience with the neighborhood as a whole. Streetscape renovations and the use of common signage throughout the area have improved pedestrian access between the station and the popular Delmar Boulevard. The streetscape project widened sidewalks, installed landscaping and used decorative paving to create a unified theme for the neighborhood (Bi-State Metro 2006b). As for the station itself, attractive public art and the widespread use of landscaping has helped soften what would otherwise be a more austere experience. In addition, land near the station owned by Washington University may well be redeveloped in the future as may more land to the east of the station (the main Delmar Loop area is to the west).

Design Issues
Much has been done to fill the gaps between the station and the University City part of Delmar Boulevard. Gaps remain, however. The pedestrian realm has been improved with wide sidewalks on many parts of the street and all-day on-street parking that buffers pedestrians and slows traffic. Pedestrians must still cross some busy cross-streets, however, and crossing Delmar itself near the station is not simple.

This study has focused on Delmar west of the station, but the area east of the station is starting to redevelop and could contribute to a larger redevelopment area. This will raise further questions about using design to link the areas to the east and west of the station. Overall, as is discussed in the next part of the report, Delmar Loop exhibits a number of positive urban design qualities including human scale.
“I think there’s this idea that a transit station has to be hard, it has to be concrete, it has to be stone . . . but take the Delmar Station. Well, it’s landscaped all the way up to the platform . . . and there’s a nice kind of comforting feeling about being able to experience that when you are getting ready to take something that’s so industrial as a train.”

From Design Workshop–Community Representatives
“Planning’s been going on for a long, long time. People have struggled to get some recognition for the Emerson Park area, funding for the area, interest in development in the area.”

From Design Workshop—Community Representatives
Emerson Park

Overview
Emerson Park in East St. Louis represents a very different TOD strategy than that of Delmar Loop. In the previous case, a transit station was added to an area that already had a number of assets for economic redevelopment, but that needed a little push in the right direction. In the case of Emerson Park, TOD has been used to spark redevelopment in one of the nation’s most economically troubled cities. In Emerson Park, TOD design principles have been a key part of a broad effort to reverse a longstanding cycle of economic decline.

The Emerson Park Development Corporation and other non-profit organization have undertaken a variety of measures to improve the quality of life in East St. Louis; including youth job programs, housing rehabilitation, neighborhood clean-up projects and playground construction (ESLARP 2007). The implementation of the MetroLink station has played a key role in this transformative process. Not only has MetroLink improved transportation access to Emerson Park, but MetroLink’s presence has led to an increase in private and public investment in the area. MetroLink made a direct contribution to the area by investing in an office building at the station (Bi-state Metro 2006). In addition, the existence of the train station has been important in encouraging private-sector housing development, which has supplemented 400 units of affordable housing paid for by federal sources (Citizens for Modern Transit 2006).

Planning and Development History
East St. Louis has long been one of the poster children for American urban decline (Kozol 1992). Shifting patterns of industrial production and employment caused an essential abandonment of the area, while the physical landscape was littered with the remains of industrial production: railroads, dilapidated factories and industrial pollution. Between 1960 and 1990, the population of East St. Louis decreased by more than 50 percent, setting in motion a vicious cycle of flight, reduced tax revenues, service decline, flight, and so on. By the late 1980s, almost half of the residents lived below the
federal poverty levels and the unemployment rate hovered around 25 percent (Reardon 2003, 3). The environmental crisis in East St. Louis also became quite serious, with many area children suffering from the effects of lead poisoning (ESLARP 2007).

Despite the economic difficulties in the area, many local residents have worked hard to establish a better future for Emerson Park. In 1985, a group of local women concerned with the number of missing manhole covers and broken streetlights got together to form the Emerson Park Development Corporation (EPDC). Initially, the focus was on fixing tangible problems like the missing manhole covers, but eventually the EPDC blossomed into a very strong community-development corporation concerned with broader issues of economic decline and revitalization, employment and quality of life. In 1989, EPDC came into contact with officials and academics from the University of Illinois, and the two parties quickly formed a working partnership to address the area’s many problems. The East Saint Louis Action Research Project (ESLARP) was born, with the goal of using the University’s expertise in architecture, landscape architecture and urban planning to further community goals (EPDC 2007).

EPDC and ESLARP came together to create a neighborhood improvement plan that first broached the idea that public transportation could be used as an economic development tool (EPDC 2007). The first round of MetroLink transit development did not include many stops on the Illinois side of the Mississippi River and the initial plans for extension through East St. Louis had the line skipping Emerson Park. Political lobbying by local residents succeeding in getting MetroLink to rethink the alignment, and the Emerson Park Station was completed in 2001. Since its opening, it has provided nearby residents with better access to job opportunities in central St. Louis plus farther east in Illinois (ESLARP 2007).
Development in Emerson Park

**Parsons Place Phase 1:** 174 units, multifamily, mixed income
- **Developer:** McCormack Baron Salazar + Emerson Park Development Corporation
- **Management:** McCormack Baron Ragan
- **Architect:** Kennedy Associates
- **Contractor:** The Korte Construction Company
- **Financing:** Illinois Housing Development Authority, Southwestern Illinois Development Authority, City of East St. Louis, The Enterprise Community, Greater St. Louis Empowerment Zone, State of Illinois, Illinois First Program, EDA, Danforth Foundation, Bank of America, FNMA. (McCormack Baron 2006)

**Parsons Place Phase 2:** 102 units, multifamily, mixed-income, rental
- **Developer:** McCormack Baron Salazar + Emerson Park Development Corporation
- **Equity Partner:** U.S. Bancorp Community Development Corporation
- **Management:** McCormack Baron Ragan Management Services
- **Architect:** Kennedy Associates
- **Contractor:** The Korte Construction Company
- **Financing:** Illinois Housing Development Authority, Southwestern Illinois Development Authority, City of East St. Louis (McCormack Baron 2004)

**River City Place:** 12 units, single family
- **Developer:** River City Homes, a joint venture between Emerson Park Development Corporation and Charles Vatterott Construction
- **Contractor:** Charles Vatterott Construction
- **Special Assistance and Support from:** West Pointe, Illinois Housing Development Authority, City of East St. Louis, CDBG Operation Corporation, Sustainable Neighborhood Initiative/Danforth Foundation, RHEDA, Federal Home Loan Bank (site notice 2006)

**Central City Apartments:** 84 units, including 35 public-housing units, 40 tax-credit units, and nine at market rate.
- **Developer:** East Lake Management and Development Corporation
- **Land Owned by:** East St. Louis Housing Authority and City of East St. Louis
- **Funding from:** East St. Louis Housing Authority, Federal Home Loan Bank, City of East St. Louis, Illinois Housing Development Authority (Ortbals 2004)
Housing has been the most noticeable positive benefit of MetroLink’s presence. Ten years ago, Emerson Park was mostly filled with dilapidated and abandoned housing. In 1991, the first phase of housing was completed in the form of the Parsons Place project. This includes 174 mixed-income, townhome-style housing units. This development was selected by Good Jobs First as one of the twenty-five best examples of TOD as a promoter of affordable housing and living wage jobs (Grady and LeRoy 2006). More housing has gone up since Parson’s Place, and Emerson Park boasts 342 new housing units since 2001 (EPDC 2007). One of these housing developments, River City Place, opened in 2005 and represents the first private-housing development built in East St. Louis in thirty years (St. Louis Front Page 2001). According to one design-workshop participant, all this housing would not have been possible without the presence of the train station.

According to both the EPDC and ESLARP, MetroLink’s willingness to reroute the line to serve this once struggling community has been a key part of its revival. For residents, many of whom do not own cars, the train makes job opportunities available that otherwise would not be. It also lowers commuting time and costs, which is of tremendous support for low-and middle-income families. It is an interesting example of TOD that is primarily residential, harking back to early railroad suburbs. While some TOD proponents favor mixed use, transit allows a variety of different station-area types connected by the transit service. In all, Emerson Park is an inspiring story of neighborhood-based redevelopment that puts the capacities of transit to best use.
Design Issues

As one resident remarked during a site visit to Emerson Park, it is an oasis of redevelopment. As such, there are still issues related to how the redevelopment connects to surrounding areas, as these areas have suffered from serious disinvestment and lack of maintenance of public infrastructure, such as streets and sidewalks. Thus, while the housing immediately adjacent to the development is well-served by streetlights and sidewalks, there are missing connections to other areas.

The station area is to the north of a major highway and highly visible. As one design-workshop remarked, it could be seen as “a giant advertisement for Metro” for motorists stranded in peak-hour traffic. That highway also presents a barrier to redevelopment to the south, however, again posing issues of how to connect the pieces.

Finally, the story of Emerson Park’s revitalization is one of heroic grassroots action over several decades and against tremendous odds. This is largely invisible to a casual visitor, however. Public art might be a medium for interpreting this inspiring history and making it accessible to all. It could help further enhance the visual character of the area while also celebrating the important work of community activism.
The West End Station area, St. Louis, Missouri is surrounded by a large hospital complex and provides access to the vibrant Euclid Avenue area.

“I think the Central West End Station is a shining example, because you have neighborhood and institutional support for what’s occurred there.”

From Design Workshop—Community representatives
“The contemporary transit-focused station design has had a positive impact on the region.”

Angela Feddersen Heinze, AIA
STL architect
The Stadium Station in St. Louis, Missouri, provides access to the Busch Stadium.
“Many people think of MetroLink from a quality of life standpoint. It’s how I get to the Cardinal games. It’s how I get to the Rams games. . . . But it is just as valuable as a way that we can move the workforce around the region.”

From Design Workshop—Community Representatives
“We need to think about rail-transit stations and their environs as places for people, and not places that emphasize the movement of buses and cars.”

David Early, Architect CA
Transit-oriented Development: San Francisco Bay Area, California

San Francisco Bay Area Rapid Transit Background
Since its opening in 1972, Bay Area Rapid Transit (BART) has served as a vital transportation link in one of the nation’s most dynamic regional economies. For most of its existence, BART’s primary mission has been focused on transportation efficiency, and been designed to serve as a high-speed commuter-rail system linking residential suburbs to job centers in downtown San Francisco and Oakland. Since the 1990s, however, new pressures in the region for more housing, office space and commercial opportunities have pushed BART to rethink its mission. Planning and design concerns have been elevated in importance, with a greater emphasis on station design and how stations fit in with surrounding areas. Previous BART stations were designed primarily to accommodate park-and-ride patrons. As one design-workshop participant explained, one of the worst of these was “built like a nuclear fallout shelter in the middle of an urban wasteland.” New and redesigned BART stations are dubbed transit villages, however, and emphasize creating pedestrian-accessible and comfortable stations at the heart of denser neighborhoods with a mix of uses. BART has faced several challenges in the process of implementing this new paradigm, including how to balance community needs with transportation requirements and how to fit into an already well-established urban pattern.

Coordinating Transportation with Land-use in California and the East Bay
The transit village movement in California is now more than a decade old, and so the impact of TOD-planning ideals is visible in many stations throughout the region. This was not always the case, however. According to one former member of BART’s board of directors, BART’s early efforts focused very little on neighborhoods adjacent to the stations, as BART station planners’ concern seemed to stop at the edges of the expansive parking lots (Bernick 1996). Some BART stations still demonstrate this mindset, and while they may serve commuters efficiently, are viewed by some as foreboding. The most positive interpretation is that they are land banks for future development.

Perspectives on land use and transportation, and the link between the two, began to change in the early 1990s and for a variety of reasons. Traffic in many urban California areas had become unbearable in places and prompted a search for transportation alternatives. Population pressures also created stresses on existing transportation
infrastructure, housing and open space. Faced with high real-estate prices, developers also began exploring the use of higher densities for residential and commercial uses and even mixing them as a way to compensate (Ohland 2001). In response, the concept of transit villages emerged as a way of addressing several of these problems at the same time. Supporters argued that transit villages, essentially synonymous with TOD areas, would address congestion by enhancing public transportation alternatives, improve the supply of housing by allowing for higher density housing near stations, and improve the quality of life overall by creating attractive, safe, and vibrant transit-accessible areas for people to live, work, and shop (Cervero 1996).

Efforts to promote transit villages in California gained incredible momentum in 1994 when Governor Pete Wilson signed the Transit Village Development Planning Act (Bates 1994). The bill encourages cities and counties to adopt transit-village planning principles in parts of their jurisdictions within a quarter mile of current or planned mass-transit facilities. The act also provided financial incentives for cities and counties to implement such plans in the form of technical assistance from other agencies, but had no provision for transfer of funds to cities and counties to implement transit-village plans (Bates 1994).
Oakland Facts & Key Dates for BART and Case-study Stations

- 43 stations on five lines
- Covers 104 miles, in four counties, and links west and east sides of the San Francisco Bay
- Average daily ridership: 323,000 weekday exits
- Fare Box recovery is 53 percent, with additional revenue from advertising, parking fees and property leasing.

Sources: BART 2005, 2006a, 2006b

1962 Voters approve BART plan. Total cost of the system was projected at $996 million, the largest single locally initiated public works project in the United States to date.

1964 Construction begins.

Late 1960s Using urban renewal funds and the powers of eminent domain, multiple blocks in downtown are seized, razed and reassembled in order to create the Oakland City Center. Plans called for an indoor shopping mall, high-rise office buildings and a hotel. The first new building on the redeveloped site opens in 1973.

1972 First day of service

1974 Transbay Tube opens, linking San Francisco with the East Bay.

1989 Major earthquake strikes Bay Area, resulting in the closure of several area highways, and, most importantly, the Bay Bridge. BART is undamaged and continues service, and serves as the vital link connecting the two sides of the bay until the reopening of the bridge six weeks later.

1991 BART announces plans to build a multi-level parking facility adjacent to Fruitvale Station. Some community residents oppose the plan.

1994 California passes Transit Village Development Planning Act, which requires cities and counties to apply transit village principles—higher density, mixed-use, pedestrian and bicycle access, etc.—to any development plans for areas within a quarter mile of a current or planned mass-transit facility. Act provides no funding to carry out these plans.

1999 Groundbreaking for Fruitvale Transit Village. $100 million project will turn an existing nine-acre parking lot into a mixed-use, high-density transit village.

2003 Expansion of BART to San Francisco International Airport

2004 Fruitvale Village opens.

Since the passage of the act, California has indeed become a leader in establishing transit-oriented developments. The California Department of Transportation (Caltrans), in conjunction with local governments and transit agencies across the state, has built twenty-one transit villages by 2007, with more on the way (Parker and Mayer 2007). From 1990 to 2000, California invested about $14 billion in mass transportation, with TOD principles in place to guide land-use planning at all new stops and in the redesign of existing ones (Parker and Arrington 2002). TOD projects are now found in and around Los Angeles, Oakland, Sacramento, San Diego, San Jose, and San Francisco (Parker and Mayer 2007). TOD planning has been popular in each of these areas, but perhaps nowhere more than in Oakland, which now touts itself as the national leader in TOD planning (City of Oakland 2003).

Oakland is also notable for its approach in dealing with two challenges related to TOD implementation. The first of these has been how to balance the needs of local residents with the needs of commuters, as was the case with the Fruitvale Station in the early 1990s. The second of these has been how to insert TOD principles into an already well-developed area, as was the case with the 12th Street/Oakland City Center project in downtown. Design has been a crucial element of both plans.
The area around the Oakland City Center Station demonstrates variety in terms of a number of principles that are the focus of visual impact assessment including form, texture, and diversity.
The Fruitvale Transit Village area links the BART station to the vibrant retail district on International Boulevard (7,9). It demonstrates many of the AIA’s ten principles of livable communities including human scale, choice and variety, mixed use, preservation of urban centers, transportation options, vibrant public space, and neighborhood identity.
Fruitvale

Overview

The redevelopment of the Fruitvale Station area began with a debate over the use of transit as a system for long-distance commuters versus its use by neighborhood residents. With some phases yet to come, the end result is the Fruitvale Transit Village, a $100 million, twenty-acre development project centered on the Fruitvale BART station with neighborhood retail, affordable housing and places for community interaction on land that had previously been parking lots. Built and managed by a local community-development corporation (CDC), the Fruitvale Transit Village demonstrates the benefits of coordinating local economic growth concerns with regional transit planning. This colorful and vibrant mixed-use project has spurred the revitalization of the surrounding neighborhood, a center for Oakland’s Latino community.

Planning and Development History

Like Emerson Park in East St. Louis, the Fruitvale case exemplifies the important role that transit can play in economic revitalization of an economically depressed area (Olson nd, 1). Fruitvale was once one of Oakland’s poorest neighborhoods, following a familiar pattern of urban disinvestment and decline in the 1960s and 70s (Unity Council nd). The Unity Council formed as a CDC in 1964 to reverse these trends and to represent the interests of Latinos in the area. Economic prosperity and security were at the top of its list (Unity Council nd, 1). BART planners and local residents clashed in the early 1990s, when BART officials broached a plan to provide more parking for the Fruitvale Station in order to increase the number of park-and-ride commuters. Locals resisted, led by the Unity Council, fearing that more parking would harm the economic vitality of the area and create more dangerous “dead space” when the cars were gone at night. Local residents argued that station redesigns should pay primary attention to the needs of people who live near them, not to those of out-of-area commuters. The local residents also asserted that rather than BART harming the area’s economic base, it could help it. Faced with strong local opposition, BART withdrew its plans and entered into dialogue with the community to try to resolve the disputes.

The proposal for a transit village grew out of a Community Design Symposium between
BART and Fruitvale community leaders in which both tried to work together to figure out a common solution to their respective problems: BART needed more parking for the commuters, Fruitvale citizens wanted a strengthened economic future for their community (Olson nd, 2). The Unity Council formed a development corporation to promote the construction of new retail, office and residential space in the area, but ran into the problem of land assembly—the land that the development corporation wanted most was BART property, specifically nine acres of parking lot adjacent to the station. A “land swap” in 1998 solved that problem, and BART exchanged the existing parking lots for another parcel on the opposite end of the station. Furthermore, the Unity Council helped BART obtain a $7.3 million federal grant to construct a larger parking facility on its new site (Unity Council nd; US FHWA nd).

Construction began in 1999 and the Fruitvale Transit Village opened in May 2004 (Unity Council nd). The project totals 255,000 sq. ft., and contains a variety of uses: 114,500 sq. ft. of office space, 40,000 sq. ft. of neighborhood retail, 47 housing units, a library, medical clinic, senior center, and child-development center (City of Oakland 2003). It has received some praise as a fine example of how to integrate transit concerns with community and economic development (Renne 2005, 2). According to one design-workshop participant, Fruitvale can serve “as a model for what can come as a result of community vision, particularly when you consider what the area was beforehand.” The design of the village is attractive, and features ample planter boxes, places to sit, and outdoor tables for coffee and lunch. Ground-level retail forms a corridor leading
“Remember to link the whole neighborhood around the station, not just the station. Both Fruitvale and 12th Street have the basic elements that would make them great places in the future. But we need a common vision that is focused on publicness. A great public pedestrian experience is based on creating a great outdoor urban room that is safe, inviting, diverse, and beautiful.”

Madeline Zayas-Mart
Oakland Planning Commissioner
from the station to International Boulevard, a busy thoroughfare with other neighborhood shops. Housing is built on the outer edge of the development, as well as above several of the shops.

At the same time, the Fruitvale Transit Village still faces some challenges. For instance, all parts of the project are within easy access to the station, though one particular design flaw has limited accessibility of the village for BART users. The parking lots and bus bays are on opposite sides of the station to the transit village, meaning many commuters who use the station as a park-and-ride facility, or who connect to bus routes, go to and from their cars or buses without passing the retail area (Strickland 2006). In this regard, the transit village has failed to take complete advantage of the benefits of the station, much to the disappointment of many people who had high hopes for the area. Partly for this reason and partly because retail space has been over-supplied in relation to market demand, the retail portion of the larger project has had growing pains. Housing has been another disappointing element of the project. Planners initially wanted several hundred housing units in the project, but due to budget constraints at the time, the initial construction included just forty-seven. However, 400 more housing units are now in the planning phase and their completion will likely mean a boost for the retail properties in the project (Unity Council nd). Unity Council and BART officials are confident that the project will eventually be a financial success, though they admit that the results so far have been somewhat disappointing for merchants (Unity Council nd; Strickland 2006).

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**Project Goals for Fruitvale Village**

- To strengthen existing community institutions and catalyze neighborhood revitalization—physically, economically and socially.
- To reduce poverty, build assets, and contribute to the local economy—by providing a stable source of jobs and income.
- To encourage and leverage public and private investment.
- To enhance choices for neighborhood residents, including services and retail choices.
- To provide high-quality, affordable housing.
- To improve the perception and reality of safety.
- To beautify a blighted area.
- To increase BART ridership and reduce traffic and pollution.
- To be sustainable and environmentally sound.

Source: Unity Council n.d.
Design Issues

While the transit village does provide an attractive and convenient link to nearby International Boulevard, the transit village development is in a different direction from the large park-and-ride lots and the bus bay, meaning commuters don’t take advantage of the nearby shopping as much as hoped. Combined with the major highway a few blocks south of the station, it also limits the development to what design-workshop participants called a “180 degree” site. As another participant remarked of Fruitvale and the 12th Street/Oakland City Center stations, “At the center of them is very carefully designed pedestrian space, but then you wander a block in any direction and you hit these hideous traffic sewer streets, and you hit bad buildings and blank façades.” Over time these design flaws may be dealt with through additional development and better design and planning, but such improvements seem to have taken longer at BART than the other systems.
Oakland City Center Station area includes the City Center development itself, as well as the Old Oakland Historic District, Chinatown, a large business district, and new housing.
12th Street/Oakland City Center Station

Overview
The City Center TOD project covers twelve city blocks in downtown Oakland focused around one of BART’s busiest stations, however this redevelopment is only one part of a vibrant area that includes a historic district and Chinatown. This area has long been the home of the city’s skyscrapers and is its greatest concentration of office space. The problem for this area was that it was solely a “9-to-5” city. The vitality so evident during working hours disappeared when the workday ended and was nonexistent on weekends. A redevelopment strategy that called for the development of a shopping area in the midst of office buildings and establishing better connections with the bustling Chinatown area and the Old Oakland Historic District has been implemented to transform this area into a “24-hour” city – meaning a place that serves workers, shoppers, residents, tourists and others at different times in the day (City of Oakland 2003). The issue of design is at the heart of this ongoing transformation and Oakland City Center’s approach demonstrates the challenges and benefits of implementing TOD in an already established area.

Planning and Development History
Oakland City Center got its start as an urban renewal project initiated in the late 1960s. Federal urban renewal funds and an extensive use of eminent-domain powers allowed for the removal of the existing, modest downtown in hopes of reversing the area’s economic decline. The success of this effort was inconsistent at best. A few skyscrapers were built in the 1970s and 80s, and department stores and some other retail attracted some shoppers, but has been short of expectations and not justified the millions spent on redevelopment efforts (Walker 1997).

The end result of the urban-renewal era City Center project was a landscape of many large office buildings, with little in the way of urban livability and street life. Dominated by large office buildings and massive parking structures with few shopping opportunities, small parks or cafes, this area has been unpleasant for pedestrians. The area also contained few housing units or recreational sites, and attracted few visitors
other than office workers. At the same time, however, it is clear that downtown Oakland had its charms, as well. The BART station is one of the most popular in the system, and is a transfer station accessible by three lines (BART 2007). Design-workshop participants also pointed out that downtown has several pleasant public plazas, is relatively close to Lake Merritt as well as the San Francisco Bay, and is within walking distance of Chinatown and Old Oakland—an area of brick Victorian hotels from the 1870s (Old Oakland Historic District 2006). The task of creating a more vibrant downtown, then, had been in how to link these places to take advantage of their presence.

The recent redevelopment of City Center as a BART transit village has been designed to use a transit station as a centerpiece to create a pedestrian-friendly area, and to add in more residential and small retail units (Parker and Mayer 2000). One key to broadening the appeal of City Center was the partial redesign of the BART station itself. This included adding landscaping, installing public art, new streetlights, and benches (Parker and Mayer 2000). “City Square,” a corridor-style plaza leading to the BART station, was renovated and is now home to various small businesses, including cafés, lunch places, and small shops. The area is now more inviting to pedestrians, and provides cozy spaces out of the shadows of the large office towers.

The addition of more housing to the area has been the second key to City Center’s transformation. The push from transit officials to make housing a larger part of the areas near the station dovetailed with efforts by City of Oakland officials to increase high-density housing in the downtown district as a whole. Former mayor Jerry Brown launched the “10K Housing Initiative” in 1997 to encourage 6,000 new housing units and 10,000 new residents in Oakland. Part of this process has been a streamlining
of the development process and a recalibration of the zoning laws to allow for more high-density apartments (Ohland 2001). One design-workshop participant, an architect and developer, praised City Hall’s “willingness to be flexible in terms of code interpretation” and to “speed up approvals, zoning issues and variances” that kept costs down and allowed a project to be affordable enough to build. As of 2006, almost 11,000 units have been built (City of Oakland 2006). Several high and medium-density residential buildings have been constructed quite close to the BART station (Parker and Mayer 2000). With more residents, the small-sale shopping areas have more potential customers, creating in turn an area that is more appealing to possible tenants. In the end, attention to design has been a crucial factor in creating this positive feedback loop and broadening downtown’s appeal.

**Design Issues**

Oakland’s downtown has different areas with distinctive characters that together form a vibrant urban center. A number of barriers divide them, however. Different racial and ethnic groups tend to inhabit different parts of the downtown, demonstrating social barriers. Other barriers, however, are amenable to design solutions, such as busy streets, inadequate sidewalks, blank walls, and large buildings like the convention center. Over time it will be important to deal with these design issues.

In addition, the significant amount of office space in the downtown, including many government agencies, creates large areas inhabited primarily from 9-5, Monday to Friday. Finding places for resident-oriented businesses will be important as more people move to the area. Oakland is well-located in the region for housing, and good design could make it even more attractive to new residents.
Rockridge, California, has a vibrant main street that centered on the BART station. The area demonstrates a human scale and visual variety.
“It costs as much to buy a house in Rockridge as it does in Piedmont, where you actually have a top-tier school system. People do it because they like the main-street vibe and they like to be able to walk to BART.”

From Design Workshop—Designers
In Walnut Creek’s downtown there are restaurants, the creek, wide sidewalks. It’s great for strolling, it feels safe... And it’s gradually growing towards the BART station.

*From Design Workshop—Community Representatives*
“They’ve got a ton of new expensive condos and new expensive retail in downtown Walnut Creek and it’s all about a half mile away from the BART station, but the connectivity just isn’t there at all.”

From Design Workshop—Designers
The twenty-four mile section of Virginia Route 50 dealt with in this report is set in an attractive rural landscape.
Context-sensitive Solutions in Several States

Transit-oriented development has specific design features related to the need for intensive development near transit. In contrast context-sensitive solutions are more varied in scope and scale. The remainder of this chapter examines for such varied projects—a twenty-four mile stretch of road in a rural area of Virginia, a one-mile long main street in the center of Washington, DC, a park beneath a bridge at the end of an historic main street in rural Missouri, and a district-wide approach to traffic calming and planning for bicycles in a college town. These different contexts mean that the design strategies are quite distinctive. However, they achieve many of the AIA’s 2005 livability principles including human scale and neighborhood identity. Historic preservation and adaptive reuse is often part of such projects also enhancing visual diversity and texture.

Virginia Route 50

Overview

Set in a very scenic part of northern Virginia, just beyond the outer edges of the Washington, DC, metro area, Virginia Route 50 is a lovely tourist drive that demonstrates the many benefits of thoughtful design that takes citizen input into account. The portion of Route 50 that has been redesigned according to CSS principles is twenty-four miles long, located approximately forty-five miles west of Washington, DC and passes through the Virginia towns of Paris, Upperville, Middleburg, Aldie, and Lenah. The CSS project, “Traffic Calming Measures for Route 50 in Loudoun and Fauquier Counties,” cost $16.25 million and was funded by TEA-21 and the Virginia Department of Transportation (VDOT) (Gaillard 2005). The redesign of Route 50 was launched as a demonstration project with the hope that the lessons learned from the process and the results can inspire future road-redesign projects.
Planning and Development History

Route 50 passes through the Virginia Piedmont countryside, in an area rich in historical significance. A young George Washington surveyed some countryside near the town of Upperville and memorials to both the American Revolution and Civil War are located at a number of places along the route (Route 50 Corridor Coalition, 2007). The corridor is also imbued with scenic value, and home to beautiful views of the foothills of the Blue Ridge Mountains. With such rich history and beauty, Route 50 is a popular place for tourists, and also is the main road for many area farmers.

In addition, Route 50 is an important road for through traffic, some of it going to and coming from the Washington, DC, metropolitan area located just forty-five miles to the east (Gaillard 2005). Faced with problems of safety, aggressive driving and a transportation demand that was outstripping the capacity provided by what was then a two-lane rural road, VDOT officials proposed an expansion of Route 50. Their plan called for an enlargement to a four-lane divided highway, which would ideally make the route safer for motorists and better able to meet growing traffic demand (Gaillard 2005).

Local residents, business owners and farmers expressed much concern that such an expansion would harm the area’s scenic value and local economy based on tourism and farming. They did acknowledge that the road needed improvement, as well, citing problems of excessive speed and aggressive driving by motorists passing through. Furthermore, heavy traffic on the road was causing harm to the area’s tourism industry, due to noise pollution and unsafe conditions for pedestrians. Many concerned citizens came together to form a coalition to propose an alternative—one that could improve safety along the route while at the same time maintaining, or even enhancing, the area’s scenic and economic value (Route 50 Corridor Coalition 2007). TEA-21 funding provided $13 million to pursue such a compromise, and in time, the “Traffic Calming Measures for Route 50 in Loudoun and Fauquier Counties” took shape. The project stressed the need to include local concerns and transportation concerns in the renovation of Route 50 (Oldham and Vaughan 2004).
Key Dates in Virginia Route 50

1994 Virginia Department of Transportation (VDOT) proposes a plan to expand Route 50 from a two-lane road to a multi-lane divided highway.

1995 Route 50 Corridor Coalition forms to protest VDOT plans and to develop alternatives. Coalition members and other local residents voice concerns of needing to protect local tourism industry and rural countryside, while at the same time ensuring the route is safe for motorists.

1996 Corridor Coalition publishes a report for an alternative to VDOT plan, one that calls for traffic calming and enhancement of rural scenery.

1998 Alternative plan receives $13 million in federal funds (secured under TEA-21) and is to be considered a demonstration project for CSS design. VDOT contributes $3.25 million.

1999 Task Force formed to implement plan and charged with coordinating input from local citizens, elected officials and transportation officials.

2001 Design team for Route 50 renovation forms, begins charette process with stakeholders to refine the conceptual plan developed in 1996.

2004 Construction begins.

Sources: Oldham and Vaughan 2004, Gaillard 2005, Route 50 Corridor Coalition n.d.

A number of smaller settlements feature historical buildings and landscapes. Landscapes, scenery modified by humans, can contribute to a sense of place.
Construction began in 2004, and will continue until 2009 (Gaillard 2005; Route 50 Corridor Coalition 2007). The project’s goal was to address community and transportation concerns by calming traffic and enhancing safety, while at the same time protecting the scenic and historical amenities of the area. A traditional safety-enhancement road project might have solved the transportation problem of multiple uses by widening the road to improve capacity, and by separating functions. In this case, widening the route was not desirable since many of the farms that border the route have centuries-old stone walls that local residents wanted protected.

**Design Issues**

Several new individual design elements have been implemented along the route, including the use of turf shoulders (instead of gravel), timber guardrails (instead of steel), bulbouts, and islands. All of these have improved the corridor’s safety characteristics by slowing traffic to speeds reasonable for the area, and have simultaneously enhanced the idea of a rural road, thereby maintaining the area’s sense of place. Implementation of the project has demonstrated the importance of being attendant to local concerns and the positive benefits of context-sensitive design (Oldham and Vaughan 2004; Gaillard 2005).

Overall, the renovation has preserved rural character, appealing to tourists but also maintaining a historical aesthetic.
More than 300 people contributed to the Route 50 Corridor Coalition’s vision statement for the redesign of Route 50. In workshops, participants articulated the following four principles as their “Community Vision”:

1. Travelers will be informed that they are arriving and leaving distinctive areas through the use of entrance features. This is the first measure in adjusting the perception and driving behavior of motorists. The areas include The Mosby Heritage Area, Aldie, Middleburg, and Upperville.

2. The feeling of the road between the towns will be different from the rest of Route 50, and the feeling of the main streets will be different from that of the road, so that motorists are further encouraged to “drive differently” as they approach the various areas. The entrance features will, therefore, indicate a meaningful transition.

3. The maximum posted speed limits between the villages will be 50 mph and within the villages, 25 mph. Transition areas will be posted at 35 mph.

4. Traffic-calming measures will be used in the villages, not to impede traffic, but to help self-enforce the desired speeds and to accommodate pedestrians, cyclists, and other non-motorized users. These measures must be placed no more than 300 to 400 feet apart to function properly, that is, to keep drivers from speeding up between them.

Source: Route 50 Corridor Coalition 2007.
Barracks Row stretches from the Market Street East Metro Station south for approximately one mile along Eighth Street. The project features an enhanced streetscape with wide sidewalks and decorative lights.
Barracks Row

Overview
Eighth Street Barracks Row is one of Washington, DC’s oldest commercial neighborhoods. Stretching from Pennsylvania Avenue to M Street SE, Barracks Row is located in an area that has, until very recently, been on the less well-maintained side of Capitol Hill. Local business owners began attempting to reverse the physical and economic decline in the early 1990s and by 1999 had formed a partnership with the District Department of Transportation (DDOT) to create a comprehensive and attractive streetscape to encourage investment, while preserving the area’s rich history. Using CSS methods, the joint efforts of transportation planners and local business owners and residents have helped to transform the area into one of the city’s most vibrant neighborhoods (National Trust 2005).

Planning and Development History
Located between the Capitol and the Anacostia River, the eighth Street Corridor was for most of its history one of the city’s main commercial areas. The Navy Yard was built south of M Street in 1799, and in 1801, Thomas Jefferson chose this area for the first barracks for the Marine Corps. From these early days up until World War II, the area thrived, but by the 1960s, a series of historical developments took their toll on the local economy. These included a decline in employment at the Navy Yard, suburban flight and the construction of an elevated highway that bisected the area in 1962. In the following years, Eighth Street suffered through a familiar pattern of economic disinvestment and physical decline (Barracks Row Main Street 2007).

In the early 1990s, some local merchants banded together to form a non-profit organization in order to promote the revitalization of the area. The Business Row Business Alliance (since
renamed Barracks Row Main Street) sought advice from the National Trust Main Street Center and then requested funds from the DDOT for physical redevelopment of the street. The years of economic decline produced a decline in the quality of the street’s infrastructure: the pavement, curbs, lighting, and landscaping all needed improvement. DDOT agreed to fund a study of the area, and worked with the US FWHA to fund a renovation (Salay 2004).

CSD methods of involving the community in the redesign were prominent at the beginning and then throughout the streetscape improvement project (Context Sensitive Solutions 2005). Public meetings were held early on to determine the scope and goals of the project, and additional working sessions were organized to discuss specific elements of the new streetscape design. Approximately 200 people were surveyed during the process for their input. During construction, merchants and construction representatives met regularly, and updates with the general public were arranged every other month (Salay 2004).

The project was completed in December 2003 (see text to right). The tangible accomplishments of the renovation project included the installation of new, decorative sidewalks, bicycle racks, streetlamps, and a series of landscaping improvements, such as the planting of ninety-two American elm trees. A nearby public park also underwent extensive reconstruction. The physical improvements have transformed the once struggling area into a pedestrian-friendly corridor with much greater commercial activity (Context Sensitive Solutions 2005). The streetscape renovations cost a total of $8.5 million, but that public investment has generated an additional $10.5 million from private sources (Barracks Row Main Street 2007). The area has also received national recognition for the turnaround, and was a winner of the Great American Main Street Award in 2005 (National Trust 2005).
Key Dates for Barracks Row

1799  Navy Yard built. Thomas Jefferson establishes the first post for the Marine Corps at Eighth and I streets in 1801. Eighth Street becomes one of the city’s main commercial corridors.

1950s-1960s  A variety of factors, including job loss at the Navy Yard, suburbanization and highway construction, damage the corridor’s economic vitality. Many small-business owners leave the area.

Early 1990s  Merchants along Eighth Street meet and form a non-profit organization called the Barracks Row Business Alliance (later renamed Barracks Row Main Street) to address the economic and physical decline of the corridor.

1999  Barracks Row Business Alliance coordinates with National Trust Main Street Center to further redevelopment efforts, also approaches the DDOT to see if physical environment of the street can be improved. DDOT launches a streetscape study in 2000.

2002  District of Columbia launches its own Main Street promotion program and names Eighth Street Corridor one of its first revitalization targets.

2003  DDOT completes streetscape improvement efforts; final cost is $8.5 million.

2005  Barracks Row wins the 2005 Great American Main Street Award from the National Trust for Historic Preservation.

Sources: National Trust 2005, Salay 2005, Barracks Row Main Street 2007
Design Issues
A key concern for the streetscape project was to recreate the area as a special place with an identifiable historical character. It has used a number of design strategies, including attractive sidewalk design, to achieve this goal.

Barracks Row Main Street estimates that the $8.5 million in public investment has spurred $10.5 million in private investment in the area. A question remains, however: does the area serve tourists and gentrifiers or has there been continuity with earlier residents?

Accomplishments of the Barracks Row Project:
Since 1999, there have been 51 façades restored; 40 signs replaced through private dollars; 43 net new businesses have opened, including business expansion through 12 new outdoor cafes; an addition of 198 net new jobs have been created; 3 new traditional buildings have been constructed [and] a self-guided history trail was recently installed to interpret the neighborhood.
Source: Barracks Row Main Street 2007.
Wide sidewalks and a bicycle shop attract those interested in active transportation.
The Cobblestone Street Interpretive Park is tucked under a bridge crossing the Missouri River at Boonville, Missouri. The cobblestones were part of the original main street leading to the river crossing and were uncovered during planning for bridge reconstruction.
Boonville, Missouri

Overview

Boonville, Missouri, is a small town on the Missouri River, approximately ninety miles east of Kansas City. The area thrived as a center of steamboat traffic before and during the Civil War and became home to the first paved street west of St. Louis sometime in the 1830s. The cobblestone street was then rediscovered in 1989, during plans to build a new bridge over the Missouri River at Boonville. A complex planning process involving multiple stakeholders worked to preserve the area’s historic character in the process of building the new bridge. The Cobblestone Street Interpretive Park opened in 2000 and demonstrates that modern transportation needs can be achieved without sacrificing local concerns for historic preservation and place promotion (Context Sensitive Solutions 2005).

Planning and Development History

Beginning in the 1830s, Boonville was a thriving steamboat stop along the Missouri River and a center of regional trade. The busy wharf area, paved with cobblestone, was particularly important, but fell into disuse with the construction of the railroad in 1869. Soil gradually accumulated over the cobblestone, reaching four feet over the northern end. The southern end of the street was uncovered during the construction of a bridge in 1924, but nothing was done to uncover the rest of the street or to properly preserve the exposed section (Neuman et al. 2002).

The Missouri Department of Transportation (MoDOT) began planning efforts for a new bridge over the Missouri River in 1989. Members of a local historic preservation society (Friends of Historic Boonville) asked MoDOT to consider the historic value of the site
in the bridge planning process, and eventually this collaboration led to a broad-based planning effort that also included the Missouri Department of Natural Resources, the City of Boonville, Missouri Historic Preservation Office and local citizens. MoDOT took a CSD approach that combined community planning, inter-agency coordination and field investigations to produce a collaborative plan that would not just preserve the site but enhance it.

The Cobblestone Street Interpretive Park was completed in August 2000. The park combines interpretive displays of the site and area’s history along with displays of the original cobblestones and limestone curbs and ditches. The bridge was built as planned, but with special construction techniques that protected the historic site in the process. Special rubber-tired equipment was used, for example, to minimize damage to the cobblestones. Interpretive signs were also added to the park to convey the area’s history to visitors (Neuman et al. 2002).
### Key Dates in Boonville

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>1830s-1860s</td>
<td>Heyday for steamboat era in Boonville. Cobblestone street (laid c1830) is first west of the Mississippi.</td>
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<tr>
<td>1869</td>
<td>Arrival of railroad to Boonville, wharf area falls into disuse.</td>
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<tr>
<td>1924</td>
<td>Construction of the Old Trails National Highway Bridge uncovers a portion of the cobblestone streets and wharf, but little is done to preserve the historic character of the area.</td>
</tr>
<tr>
<td>1989</td>
<td>Missouri Department of Transportation (MoDOT) plans to build a new bridge over the Missouri River at Boonville, Cobblestone street is uncovered.</td>
</tr>
<tr>
<td>1989</td>
<td>A local historical preservation society (Friends of Historic Boonville) works with MoDOT to preserve and enhance the historical site during the construction of the bridge. The Missouri Department of Natural resources, the City of Boonville and other stakeholders are also involved in the design process.</td>
</tr>
<tr>
<td>2000</td>
<td>Cobblestone Street Interpretive Park opens in August.</td>
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</tbody>
</table>

Sources: Neuman et al. 2002.
The Cobblestone Street Interpretive Park lies below a traditional main street. It is directly under the photographer’s position in image 7. Originally the street would have extended down to the river.
Design Issues

The Boonville Cobblestone Street Park is tucked away under a bridge, screened from the Katy Trail Bike Path and without directional signage. It is divided from the river by train tracks. This makes it a quiet and seldom used place, but in that sense quite peaceful. When the study team visited the first time, a lone cyclist was sitting and reflecting on the view of the Missouri River and informed the team that in the last few days the only other people he had encountered in his daily trips to the park were people passing by the park and crossing the train tracks to fish.

The park’s planning and design process shows that transportation needs of a DOT can be met at the same time local needs are taken into account. The park is also a testament that historical sites can be enhanced using the CSD/CSS process, incorporating diverse stakeholders, as the park makes the cobblestone street’s history more visible than it would be without DOT involvement. The design is very modest, however, with no directional signage from the main road. Additional signage might encourage more people to visit this important historic site.

Lessons Learned from Cobblestone Street Park

- Local stakeholders are the key to identifying and preserving local historic and other cultural resources. A commitment to work with them can yield projects of great value and pride.
- This project also illustrates that the job of a DOT goes beyond the mere provision of safe and efficient transportation. Seizing opportunities to preserve and enhance a community are what CSD/CSS is all about.

Source: Neuman et al. 2002
Davis, California, is a national leader in terms of traffic calming and bicycle infrastructure.
Overview
The city of Davis, California has a well-earned reputation as America’s leader in supporting and encouraging bicycle transportation. In 1966, Davis became the site of the country’s first-ever bicycle-only lanes. In the roughly forty years since, Davis has pioneered a number of innovative street designs that allow for bicycles, cars and pedestrians to co-exist, all while allowing for efficient transportation around town, supporting economic development and maintaining the small town’s high quality of life (Context Sensitive Solutions 2005).

Planning and Development History
The City of Davis is located in the northern portion of California’s premier agricultural zone, the Central Valley, and lies about ten miles west of Sacramento. Home to almost 65,000 people, Davis is most famous as the site of California’s main agricultural university, the University of California, Davis, and students make up almost half of the city’s total population. As a quintessential college town, the popularity of bicycles around town is not all that surprising, and the area’s generally flat topography and mild climate are further reasons why Davis has become known as America’s most bicycle-friendly city (League of American Bicyclists 2005).

These natural advantages have been reinforced by a forty-year history of town planning that has consistently made bicycle-based transportation a priority. The spectacular
growth of Davis from a small agricultural hamlet up until the 1950s to a thriving college town now has meant that local citizens and officials have had to work hard to maintain the balance between development and quality of life. This issue came to a head in the 1960s, when university enrollment had gone from 2,000 in 1959 to almost 7,000 by 1966, with another 5,000 more students expected by 1969 (Lott 2003). The 1966 Davis City Council elections were focused on this subject of growth, with a strong faction urging the city to favor bike lanes over the more usual approach of financing more road construction. Two pro-bike councilors were elected and helped solidify official support for bicycle transportation. In the first meeting of the new council, these new members pushed through measures to create bike-only lanes on a few downtown streets. The bike lanes were the first ever in the United States (Takemoto-Weerts 1998).

The early years of bicycle-friendly traffic planning were not easy, and many of the design and engineering innovations were done on a trial-and-error basis. According to Dale Lott, one of the citizens in the pro-bike movement since the early 1960s, much of the process was dealing with errors and answering seemingly simple questions, such as how wide to make the bike lanes, how to direct car and bike traffic when both need to make turns, and where to put car parking (Lott 2003). Gradually, the City of Davis worked its way through these practical problems, and in the mid 1970s, the US FHWA used Davis as its model case for developing national standards for bicycle transportation and town planning (Takemoto-Weerts 1998).

Over the years, public provision of bike lanes on regular city streets and dedicated bike paths has grown, and now, in an area just under ten square miles, there are fifty miles of bike lanes and fifty-two miles of bike paths (City of Davis 2006). Over 90 percent of all collectors and arterial streets in the city have either a bike lane or a parallel bike path (City of Davis 2006). The main design challenge for Davis urban planners and engineers
Timeline: Davis

1966 Two pro-bicycle candidates are elected to City Council. One of the first pieces of business is to create bike lanes (the first ever in the United States) on several downtown streets.

1972 US FHWA issues a request to create national standards for bicycle facilities. A contracting firm and the University of California, Davis, team up to produce such a guide, using Davis as the model.

2000 Putah Creek Bike Path, which crosses under Interstate 80 and connects south Davis to the rest of the city, opens.

2005 Davis named the most bicycle friendly city in the United States and the first platinum-level award winner by the League of American Bicyclists.


The bollards in this street prevent through vehicular traffic, while allowing bicycles and pedestrians to pass.
\textit{MOVING DESIGN} has been configuring the transportation network to serve cars, bicycles, and pedestrians. This challenge has been met through advance planning, but also through retrofitting already existing streets to multiple uses, as needs have arisen.

The downtown area, which is also adjacent to the densest part of the University campus, has been the focus of much of the urban-design innovations. One example, cited by Context Sensitive Solutions as exemplary, is the planted buffers used to separate sidewalks, bicycle lanes and roads in the downtown area (Context Sensitive Solutions 2005). Another example of using good design to improve transportation while serving larger civic goals has been the construction of the Putah Creek Bike Path just south of downtown. South Davis had traditionally been cut off from the rest of the city by the presence of Interstate 80. A dedicated bike underpass opened in October 2000, re-linking South Davis with the rest of the city and the University (Dorn 2001).

\textbf{Design Issues}

The City of Davis is a national leader in design solutions for bike/car coexistence problems. Turn lanes, cyclist visibility, road sharing, and parking have been key issues to be resolved. In addition many traffic calming strategies are in use. The area has combined these transportation features with attractive landscaping and public art, to create a human scaled environment with a strong visual identity.
Conclusion
The case studies demonstrate a wide range of transportation-related environments in very different places. All were selected because they have been recognized as models. Most focus on creating more livable, imageable, human-scaled environments. Many add attention to specifically visual dimensions such as form, line, color, texture, dominance, scale, diversity, and continuity. In the next chapter we explain how they were evaluated in terms of their design characters.
Part Four: Measuring Environments
Cyclists participate in evaluating a neighborhood street in Minneapolis, Minnesota.

Table 4.1. Major cases and the tools used to evaluate each

<table>
<thead>
<tr>
<th>Major Cases</th>
<th>Score Sheet</th>
<th>Inventory</th>
<th>Design Workshop</th>
<th>Participation/Community Representatives</th>
<th>Mapping</th>
<th>Visual Assessment</th>
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Measuring Transportation Environments

This report used six different tools to measure the case-study environments. These included the:
- urban design audit—a score sheet,
- Irvine Minnesota Inventory of urban design features,
- design workshop,
- participatory workshop with community representatives,
- mapping, and
- visual assessment using photographs.

Each tool was based on an existing method or instrument. While many investigators develop unique tools for each project, there are many research advantages in using existing tools. First, information from one study can be compared with another when the identical method is used. Second, existing tools have often been tested for reliability (will the same method produce consistent results?) and validity (are they measuring the right thing?). The main contribution of this report is to compare how different tools assess the same environments. It shows that different lenses or tools focus on particular aspects of the designed environment.

We tested six tools in the main case-study areas, as shown in table 4.1. Some tools were tested in all case studies—such as mapping—and others in a few case studies. In the case of participatory tools, we tested only one approach, though many different approaches are described in appendix B. The tools are appropriate for actual design and development projects and we did not wish to fatigue participants by having them test many different tools in a research project. Instead, we performed a similar exercise to the design workshop with non-designers as a way of demonstrating one kind of tool with a group not professionally involved with design.

The methods are all described briefly in chapter two and in more detail in appendices A and B. Overall, these are very different tools. Some come up with scores, some counts, and others more holistic assessments from different viewpoints. Each contains an important part of the picture.
Score Sheet

What It Is

The urban-design score sheet—called the Measurement Instrument for Urban Design Qualities Related to Walkability—measures the important urban-design concepts of imageability, enclosure, human scale, transparency, and complexity (Ewing et al. 2005a, 2006). The score sheet, weightings, a description of how the tool was developed, and instructions about locating field manuals and score sheet background materials are included in appendix A.

The score sheet focuses on the visual quality of the urban environment, and is particularly strong in assessing commercial districts in towns and cities. Its emphasis is whether or not places feel walkable and on a human scale. As such, it is particularly appropriate for measuring the many of TOD areas in this study. It is less useful as a tool for measuring residential, rural, or open space areas and many of the questions are not appropriate for those settings. The tool was created with funding from the Active Living Research program of the Robert Wood Johnson Foundation. Its sophisticated development process, however, did not test how it predicted walking, but rather how it measured the five key urban-design concepts.

The final score sheet measures imageability, enclosure, human scale, transparency, and complexity. The team developing the score sheet considered other urban-design issues to be important, as well. They were not able to measure them with confidence, however. These more challenging topics included legibility or a sense of clear orientation in space; linkage or visual connections; and coherence or a sense of order (Ewing et al. 2005a, 6-7). The score sheet is also distinctive in coming up with a weighted score for each design concept so that specific segments can be compared with each other. The weighting was developed through a complex process that involved analyzing video clips for their content and using an expert panel to rate different qualities. This is very useful in
practice. Intuitively, the scores also seemed to make sense to the observers in this study. The actual weightings, however, seemed rather precise given the complexity of some of the concepts, e.g., multiply the number or courtyards by 0.41 and major landscape features by 0.72 and add a constant of 2.44. It is unlikely that a place with a score of 4.0 on one dimension is much different to one with a score of 4.5, particularly if there are different raters and given the difficulty in assessing some features, such as the proportion of sky in one’s field of view. Care should be taken in interpreting the findings and in particular places with slightly different scores may actually be quite similar.

How the Design Score sheet Was Used

The *Moving Design* project used the score sheet to assess ten street segments around three station areas: Clarendon in Virginia, Emerson Park in Illinois, and Fruitvale in California. Two different investigators performed the score sheet, although only one auditor worked in each place. It was initially screened in Davis, California, by a third investigator.

The five concepts in the score sheet each produce a separate score and so, in reporting results we deal with each one separately. We prepared a number of simple descriptive statistics. The mean or average score is simple to calculate—add up all scores and divide by the number of scores. A single high or low score, however, can push the average up or down. For many purposes, a better measure of central tendency is the median, where half the scores are above and half below. We also examined the maximum and minimum scores, and the standard deviation. This last is a measure of the spread of the scores—a low standard deviation means scores were similar and a higher one means they were more diverse.

The scores should be interpreted as relative to each other—there isn't a set “top score” for any concept as the scores are based on weighted numbers of features and some places might have very large numbers of features, such as planters or items of street furniture. Similarly, some weightings are negative, so it is entirely possible to have a score below zero. Given that the case-study areas were all chosen as examples of good design, it is not surprising that many scores are quite similar to each other. The differences are informative, nonetheless.
Imageability: This measures how memorable a space is. As the score sheet’s developers explain: “Imageability is the quality of a place that makes it distinct, recognizable, and memorable. A place has high imageability when specific physical elements and their arrangement capture attention, evoke feelings, and create a lasting impression” (Clemente et al. 2005, 6). The physical features measured to assess imageability include:

1. number of courtyards, plazas, and parks (both sides, within study area),
2. number of major landscape features (both sides, beyond study area),
3. proportion historic building frontage (both sides, within study area),
4. number of buildings with identifiers (both sides, within study area),
5. number of buildings with non-rectangular shapes (both sides, within study area),
6. presence of outdoor dining (your [observer’s] side, within study area),
7. number of people (your side, within study area), and
8. noise level (both sides, within study area).

Scores are created by taking the observations, multiplying by set weightings, and adding them up for a total. Higher scores are better. As can be seen in the score sheet results table, Fruitvale has one highly imageable segment pulling up its average score, but in terms of median imageability the three areas were similar (ranging from 2.3 to 2.7) with Clarendon the highest in terms of median scores.
Table 4.2. Score sheet results and descriptive statistics for test in ten segments around three station areas

<table>
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<tr>
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<th>Mean</th>
<th>Median</th>
<th>Max.</th>
<th>Min.</th>
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<th>4</th>
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<th>7</th>
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<td>6.8</td>
<td>3.3</td>
<td>4.6</td>
<td>3.1</td>
<td>3.7</td>
<td>7.8</td>
<td>3.7</td>
<td>4.2</td>
</tr>
</tbody>
</table>

Audited segments in Clarendon (top left), Emerson Park (top right), and Fruitvale (bottom).

Key
- Station location
- Audited segments
Enclosure: This concept refers to the extent to which a space, such as a street, is enclosed by buildings and vegetation, potentially creating outdoor rooms. As the score sheet developers explain, “Enclosure refers to the degree to which streets and other public spaces are visually defined by buildings, walls, trees, and other elements. Spaces where the height of vertical elements is proportionally related to the width of the space between them have a room-like quality” (Clemente et al. 2005, 14). While in public debates, openness is often seen as a value, many of the most well-loved places in urban areas actually have a sense of enclosure. Streets lined with tall canopy trees, for example, can feel more comfortable than a large parking lot with little vegetation. A rule of thumb is that a room-like feeling occurs when the “walls” of the street are as high as the street is wide.

Five physical features are measured and weighted to describe the degree of enclosure:

1. number of long sight lines (both sides, beyond study area),
2a. proportion street wall (your [observer’s] side, beyond study area),
2b. proportion street wall (opposite side, beyond study area),
3a. proportion sky (ahead, beyond study area), and
3b. proportion sky (across, beyond study area).

Clarendon scored highest in terms of enclosure and Emerson Park the lowest. This reflects the different situations where Clarendon had the tallest buildings of the three areas and Emerson Park had one side of the area dominated by a surface parking lot. In addition, many of the street trees in Emerson Park were newly planted. Over time they will mature and provide more enclosure. An elegantly designed and popular park, however, may also lead to low-enclosure scores. Part of the reason for Emerson Park’s lower score is the presence of a park, though the park is attractive and a valued part of the community.
Enclosure is a key concept measured by the urban design score sheet. The top image shows streets and paths enclosed by trees, the middle image a street and sidewalk enclosed by buildings, and the bottom street with little enclosure. While many public debates about design reflect appreciation for open landscapes, enclosure can help create a more human-scaled environment. Images come from Nara, Japan; Kentlands, Maryland; and the St. Louis Metropolitan area.
Human Scale: This concept refers to environments designed at a similar scale to that of the human body and designed to be perceived by people on foot. The score sheet developers provide more detail: “Human scale refers to the size, texture, and articulation of physical elements that match the size and proportions of humans and, equally important, correspond to the speed at which humans walk. Building details, pavement texture, street trees, and street furniture are all physical elements contributing to human scale” (Clemente et al. 2005, 18). Physical features measured in assessing this human scale range from sidewalk planters to building heights:

1. number of long sight lines (both sides, beyond study area),
2. proportion windows at street level (your side, within study area),
3. average building heights (your side, within study area),
4. number of small planters (your side, within study area), and
5. number of pieces of street furniture and other street items (your side, within study area).

The human-scale scores were similar for Emerson Park and Fruitvale, but higher for Clarendon. While intuitively all are human scale, Emerson Park and Fruitvale are both “180 degree” stations meaning one side is dominated by bus bays and a parking lot, lessening the proportion of windows or the number of planters or items of street furniture that may contribute to human scale. In fact, Fruitvale had the street segments with the highest maximum human-scale measure and the lowest minimum, demonstrating the enormous variety in the area in terms of human scale.
Transparency: Whether people can see human activity beyond the edge of the street or other public space is the core issue in measuring transparency. As the score sheet developers explain, “Transparency refers to the degree to which people can see or perceive what lies beyond the edge of a street or other public space and, more specifically, the degree to which people can see or perceive human activity beyond the edge of a street or other public space. Physical elements that influence transparency include walls, windows, doors, fences, landscaping, and openings into midblock spaces” (Clemente et al. 2005, 24).

This concept is perhaps the most difficult in the score sheet to define. It is based on the idea that a sense of enclosure is a good thing, and that sheer openness does not provide human scale, but that people need to connect to activities beyond the street. Features measured in assessing transparency include:

1. proportion windows at street level (your side, within study area),
2. proportion street wall (your side, beyond study area), and
3. proportion active uses (your side, within study area).

The “street wall” refers to buildings fronting the street. A more continuous street wall actually increases transparency in this definition because it is measuring views beyond the edge of a clearly defined street space. The term “active uses” has a specific meaning in this score sheet: “Active uses are defined as shops, restaurants, public parks, and other uses that generate significant pedestrian traffic. Inactive uses include blank walls, parking lots, vacant lots, abandoned buildings, and offices with no foot traffic. For residential uses, assume apartments and attached housing units (townhomes, row homes, etc.) to be active” (Clemente et al. 2005, 26).
Transparency is a difficult concept and is measured in terms of windows, a continuous street wall (to provide enclosure that can be punctured to provide transparency), and active uses. It is not equivalent to openness. In the terms of the urban design score sheet, the image at the top lacks transparency due to blank walls and a lack of active uses; the middle image lacks transparency due to an absence of windows, large building setbacks, and a lack of enclosure; and the image on the bottom is highly transparent with a strong street wall and windows to active uses. All three images are from Japan.
Again, Clarendon had a high transparency score partly because it had many buildings and uses giving it high scores for street wall and activity. Emerson Park was at the other extreme, because the measurements favor main-street-style commercial streets. Emerson Park has significant building setbacks, a large number of duplexes and triplexes, and fewer traditional apartments and row homes, all contributing to a lower score in this category.

**Complexity:** This concept focuses on visual variety. As the score sheet developers explain: “Complexity refers to the visual richness of a place. The complexity of a place depends on the variety of the physical environment, specifically the numbers and kinds of buildings, architectural diversity and ornamentation, landscape elements, street furniture, signage, and human activity” (Clemente et al. 2005, 28). While some might object that complexity could merely mean clutter, complex places are attractive because they are not sterile. Concepts measured to develop the score for complexity include the following:

1. number of buildings (both sides, beyond study area),
2a. number of basic building colors (both sides, beyond study area),
2b. number of accent colors (both sides, beyond study area),
3. presence of outdoor dining (your side, within study area),
4. number of pieces of public art (both sides, within study area), and
5. number of people (your side, within study area).

Places with outdoor dining, public art, and colorful buildings—the three elements with the highest weighting (0.42, 0.29, and 0.23 vs. the next, accent colors, at 0.12)—scored highest for complexity. Clarendon and Fruitvale had the same median complexity scores and Emerson Park was only a little lower. Mean scores do tell a different picture, however, with Fruitvale being the highest. Mean or average scores are more sensitive to one or two very high or low values than are medians (the middle scores). The difference may be due to the fact that a different rater looked at Clarendon and Emerson Park vs. Fruitvale. More likely though is that the higher average complexity score in Fruitvale is attributable to a large amount of public art on one segment, a large number of buildings on another, and a large number of accent colors on a third. Intuitively, to an observer, Fruitvale is a complex area with vivid colors along International Boulevard and in the transit village area itself. In contrast, Clarendon has a more muted palette and Emerson Park, as a primarily residential area, has fewer pieces of art, no outdoor dining, and fewer people. Both had less variation among segments in complexity.
In the urban design score sheet complexity is measured in terms of number of buildings, colors, outdoor dining, public art, and people. The Fruitvale, California, area (top) has some places of high visual complexity. Clarendon, Virginia, (bottom) has lower complexity.
Evaluation of the Urban Design Score Sheet

Strengths

- The score sheet comes up with an overall weighted score for each dimension making it easy to directly compare different places. This is very helpful.
- The final scores make sense to people who have visited the places and seem to accurately depict similarities and differences among the places. The audit seems to accurately measure what it claims to measure.
- The score sheet measures a number of fairly complex urban-design concepts in a clear and comprehensible way.
- For those wanting to use the measure themselves for practical or research purposes, the one page form is easy to manage in the field and can be reformatted to allow multiple segments or blocks on each sheet, saving paper and making it even easier to use.

Challenges and Limitations

- The score sheet is much more time consuming than it first appears as it involves extensive counting (e.g., the number of items of street furniture) or challenging judgments (the number of long sight lines or the percentage of sky). This makes it time consuming and means that different raters might create different scores for the same place.
- Some items vary greatly with time and weather, particularly number of people. This means that places will be assessed differently based on when measurements are taken. While the weighting on these topics is low, they are still counted.
- Some items refer to one side of the street, some to both, and some to areas beyond the street and keeping track of these can be tricky.
- The score sheet is focused on commercial streets and is less applicable to other kinds of environments.
- While the score sheet comes up with a very precise number to represent each key urban-design dimension, the complexity of filling in the form made the study team feel that this precision may be misstated. There is a certain amount of judgment inherent in using the sheet that may not be apparent to those seeking merely a score to one or two decimal places.
Inventory

What It Is

The second tool tested in this study of the visual character of transportation environments was an urban design inventory. The Irvine Minnesota Inventory is a checklist that measures the presence of urban-design and environmental features and their attractiveness (Day et al. 2006). Like the urban-design score sheet, it was developed as part of the Robert Wood Johnson Foundation-funded Active Living Research program as a measure of walkable environments. Like the urban design score sheet, however, it was not initially tested in terms of how well it predicted walking. Instead, it was developed to measure key concepts related to topics considered important by those doing research in urban design and environment and behavior studies.

The inventory focuses on several issues, such as accessibility or ease of movement, pleasurable or overall attractiveness, and perceived safety both from traffic injuries and from victimization by crime. Typically, questions ask whether features are present or absent and their relative quantity (some, few, none). The audit has few questions about quality, though it does contain a limited number of questions about whether a space is attractive or unattractive. The questions are typically much easier to answer than those in the urban-design score sheet. At over 170 questions, it is quite long, but typically not all questions would be answered for every audit.

It is designed to be used by researchers coming from different theoretical frameworks and so the developers of the inventory assumed researchers would select variables...
that reflect their specific research questions and develop their own weightings. Thus it was assumed that specific studies would only use a small subset of the inventory questions related to their individual needs. While there is no guidance about how to select questions, it would be assumed that researchers with computerized land-use data available would likely not use the land-use questions. Given the absence of guidance on how to edit the inventory, we used it in its entirety.

The range of questions also means that this inventory can measure a variety of environments—including quite low-density and single-use areas. The exact questions are included in appendix A. Specific topics dealt with in the inventory include:

- barriers
- bicycle lanes
- buildings
- dogs
- driveways
- freeways
- land uses
- lighting
- maintenance
- neighborhood identification
- olfactory character
- parking
- safety
- sidewalks—presence and amenities
- steepness
- street characteristics
- street crossing
- street trees
- traffic features
- views
- windows
How the Inventory Was Used

The *Moving Design* project used the inventory in the same ten segments as had been audited with the urban-design score sheet: Clarendon in Virginia, Emerson Park in Illinois, and Fruitvale in California. Three different investigators undertook the inventory one in each study area. The paper version was used.

The inventory provides counts of different features or characteristics of place. To investigate the inventory results, we examined five statistics for each of the three locations, using a similar approach to that in the urban-design score sheet. Some features were measured for the ends of each street separately and in this analysis these were combined.

What the Inventory Showed

Overall there were striking similarities in the inventory measures as can be seen in the summary statistics in appendix A. In the TOD cases we examined, there were many cases where there were no features present—there were no schools, museums, major nature features, posted speeds, or post offices, but also no big-box or drive-through uses, no impassable roads or freeway ramps, and no heavy industries. Given that we selected the environments because they are good examples of the same kind of place—a transit-oriented development area—these similarities make sense.
There were differences, as well. Some differences reflect the more residential and neighborhood character of Emerson Park and its more challenging economic circumstances, compared with the more mixed-use and commercial uses in Clarendon and Fruitvale. For example, Emerson Park had fewer marked pedestrian crossings and traffic lights and more lower-density housing types and front porches. It also had abandoned buildings and vacant lots while the others did not. All had street trees, but Clarendon’s were more mature and shaded the sidewalks better.

Some differences in scores may be due to the different raters. For instance, Emerson Park received the highest score for attractiveness and interesting architecture and Fruitvale the lowest but as can be seen from illustrations of the areas, all three are attractive. Differences in scores are likely due to rater differences and indicates a failure in training for this particular inventory. However, as most of the inventory is more quantitative—merely indicating if a feature is present or absent, for example—the reliability of other questions is extremely high (Boarnet et al. 2006).
Emerson Park (top) received the highest score for attractiveness and interesting architecture and Fruitvale (bottom) the lowest, with Clarendon (middle) in the middle. As can be seen from illustrations of the areas, all three are attractive.
Evaluation of the Irvine Minnesota Inventory

**Strengths**

- This is an easy inventory tool to learn and questions are straightforward. This helps increase reliability.
- The inventory is lengthy and comprehensive and can be used to measure a variety of environments, not just urban commercial streets, which are the focus of the urban-design score sheet.
- It is flexible in that individual questions can be extracted to make shorter inventories tailored to specific questions.
- It is also possible to create indicators of different characteristics of the environment. An indicator of disarray could be constructed, for example, from questions about vacant lots, abandoned buildings, litter, and graffiti.

**Challenges and Limitations**

- In developing the inventory, the authors dropped some items with low reliability. This means that there are some problematic omissions, however. While the inventory asks about parking structures, for example, it does not ask about parking lots.
- The complete inventory is long even if each question is easy to fill in. It is difficult to know, however, where to shorten it.
- The final results involve a very long list of counts or ratings that requires quite a bit of additional work to make usable. Users of the tool must be prepared to develop their own system for creating urban design indicators or measures.
Design Workshop

What It Is

Transportation environments are often visually complex and also reflect a particular historical, social, policy, and planning context. The design workshop captures a more comprehensive and multifaceted picture of the environment than can be assessed from score sheets and inventories. The design-workshop approach involves a group of designers, drawn from AIA members and other professionals, answering a set of questions in a group setting. The technique separates designers from non-design professionals. Research cited earlier shows that in some issues—particularly high-style design—architects have views about buildings that are different from those of the general public. Architects tend to like more experimental aesthetics (Nasar 1998). This is to be expected as they have significant additional training in design. This workshop process aimed to identify some of the specific characteristics of the architects’ views in the area of transportation environments. Much earlier work had focused on architects’ views of particular buildings, but in this study we focused on the larger context of urban design.

The method also drew on work in health-impact assessment (Ison 2002; Scott-Samuel et al. 2001; Design for Health 2007). These methods that focus on the health of a community emphasize preparing materials before workshops and reporting after them. The design workshops were held toward the end of the study and drew on the base of research to that time.

How the Method Was Used

The workshops focused on the case-study sites within the metropolitan areas and related to the geographical scope of the host AIA branches. In the Washington, DC, area, this included the three case-study stations in Arlington—Rossyln, Clarendon, and Ballston. In St. Louis this was the Delmar Loop area. Emerson Park in Illinois and, thus a different AIA area, was also included. In northern California, the cases were 12th Street/Oakland City Center and Fruitvale stations.

In each metropolitan area, the local chapter of the AIA created a list of interested participants and organized meeting times and spaces. There were between five and eight participants in each meeting. The principal investigator for this study facilitated the
conversations, while one member of the research team took notes. A representative of the national AIA office also attended. Conversations were taped and transcribed.

Each workshop focused on key questions using an agenda outlined in appendix A. Questions included the following, although the open format resulted in wide-ranging conversations:

- How would you describe these sites to a colleague or a community member?
- What works well about these areas?
- What could be improved?
- Do they take advantage of the train stations or other transportation infrastructure?
- Overall, do they demonstrate good design [compared with others]?
- What is most important or most memorable about these areas?
- What are some key lessons for the future?

Participants were also supplied with an aerial photograph of the station areas, as well as a PowerPoint file and poster showing photographs of the areas. Participants were promised anonymity for comments in the workshop, but could also write signed comments for the report. These attributed quotes are featured in the report.
Oakland Case-study Sites

Fruitvale Station Area

12th Street/Oakland City Center Station Area

Posters with illustrative photos of the case-study areas were prepared for each site. More images were presented in PowerPoint format. In addition, large aerial photographs were placed on the table for participants to refer to.
What the Method Showed

Conversations among participants dealt with many issues and even among designers there were differing views. Several themes emerged, however, and are dealt with below. These are congruent with wider debates in the design professions:

- **Critical edge:** Unless pressed to find the positive, designers focused on areas where further design could solve problems rather than areas that were already working well.
- **Buildings vs. places:** Designers were conscious of a number of great buildings that did not necessarily make great places but were important in themselves. Conversely, some places were well planned but had few significant or interesting buildings.
- **Policy, planning, and programming:** Designers generally appreciated good planning and programming to support design.
- **Livability principles:** While not promoting a specific architectural style, designers saw areas that exemplified the AIA’s livability principles as successful, even though such places can have little distinctive architecture.
- **Bohemian, middle- and upper-middle-class street life:** To designers, strong places maximized the potential for street life for particular groups.

**Critical edge:** Designers are typically employed to solve problems in the built environment by changing it. As such, designers are accustomed to identifying problems. This was evident in the design workshops where the design groups were much more ready to identify areas with problems than areas that were already great places. In pages and pages of transcripts, there were only a few unequivocally-positive comments. When asked to describe the three focus train stations in northern Virginia, for example, one designer complained, “I find it hard sometimes to distinguish the three actually. I don’t know what reaction other people have, but I don’t, I guess I don’t feel it has a character.” Another explained, “The Ballston area . . . had some good ideas about the planning there, but . . . they made some concessions to the developers and it’s not as people-friendly and user-friendly as it started out to be.” In contrast, these designers were more positive in thinking about the future. As one said of the rather austere Rosslyn station area, for example, “I see Rosslyn as the Manhattan of Washington, DC, in the future.”
Good buildings did not always make pleasant places. Above, some of the streets in the Ballston area are too wide for pedestrians to comfortably cross. Below, the Rosslyn Station area is home to many office buildings, some of which are distinct architecturally but that do not necessarily create human-scaled environments.
Buildings vs. places: The architects noticed good buildings, however, even if they were not in great places. Architects are experts in building design and they demonstrated this by recognizing the work of their colleagues as buildings in a specific location, as representatives of an approach to design, and as part of the body of work of a person or firm. They could place buildings in the context of the history of architectural design and of development in their regions.

At times, though, there was little relation between the designed buildings or landscape architects liked, the firms and designers they respected, and the places they admired. When there was, designers rarely saw the design as being the only factor in the success. When describing the well-liked redesign of the road median in International Boulevard near Fruitvale by Jacobs MacDonald, for example, two designers from Cityworks—a widely respected firm run by two University of California, Berkeley faculty—remarked:

Speaker 1: Alan Jacobs’ dimension of the median is very successful in terms of traffic flow. It was a very interesting idea. I mean this . . . used to be Highway 101 East. It was a huge arterial and the intervention of the median has actually given that place a sense of identity.

Speaker 2: The streetscape is very successful, but even if they didn’t do that intervention, that’s still a very viable retail corridor. It’s one of the more successful in the city, I would say, in terms of occupancy. I mean, you don’t see a lot of vacancies there.
Policy, planning, and programming: Designers also mentioned issues of planning, policy, and programming enhancing or stopping their capacity to design good places. In Oakland, participants talked about the “willingness on the City’s part to be able to be flexible in terms of code interpretation and planning code issues that was enormously important.” In St. Louis they decried institutional barriers to creating better places, such as the problem of bureaucratic red tape in getting access to smaller streetscape improvement grants. In northern Virginia, they pointed out that architecture and planning were not the same: “In Arlington, the planning vision really works, and planning as a trade is a participatory collaborative business. . . . Great architecture is not a participatory process. You would not tell a great artist to paint by numbers and negotiate.” Supportive planning and policies were helpful, but did not necessarily lead to good design.

Participants also noted, however, that appropriate policies and programming could improve the uses of space quite apart from design. In northern Virginia, designers praised the place-making qualities of the local farmers’ market, since “people tend to love that, and there is nothing architecturally that has been done, really.” In St. Louis, designers mentioned the importance of policies allowing on-street parking in busy areas to buffer pedestrians from cars and to slow traffic.

Livability principles: Places described in more positive terms certainly represented a number of the AIA livable-community principles outlined in chapter two, including human-scale design, choices in activities, mixed use, preserved urban centers, varied transportation, vibrant public spaces, neighborhood identity, and a balance of nature and development space. The last AIA livable communities principle, “design matters,” is a complex one. Certainly designers thought that design mattered in the sense of excellent design of individual buildings and places. It was surprising how much of the conversation about great places focused on the other principles, however.
In northern Virginia, designers and others pointed to the area in and around an urban lifestyle shopping center, the Market Common at Clarendon, as having a sense of place and human scale in spite of what was perceived as generic design: “Those few blocks of street feel pretty good compared to the way Ballston feels, where it’s a little too spread out, or the way Rosslyn feels . . . there really is a certain charm to it.”

As another commented:

There’s a lot of good about the planning that’s gone on here. And quite frankly . . . the good planning . . . doesn’t demand that every building has to be iconic. So what’s happened is, is you’ve got a lot of background buildings, and those are important too, and I think that’s why everything kinda just blends in. . . . What makes the Clarendon Commons thing successful is the individuality and the design of the retail there, because everything else is a background.

Overall, architects appreciated how many of the AIA livability principles contributed to place-making, even in the absence of distinctive architecture.
Bohemian, middle- and upper-middle-class street life: While interested in the work of design in making public places, the architects were typically captivated by places with lots of bustling street life and these areas often had rather modest architecture and very basic pedestrian facilities, such as sidewalks and streetlights.

The station areas in northern Virginia were in a higher-income, jobs-rich area. Fruitvale and Emerson Park had largely Latino and African-American residents respectively; and Delmar Loop had a strong contingent of students. In the design workshop, architects were generally positive about these spaces, although some stated that the largely residential character of Emerson Park did not promote street life.

The 12th Street/Oakland City Center Station is used by various population groups—downtown workers, residents and workers from Chinatown, and many low-income transit riders waiting for buses. Designers often value social diversity, but designers, like others, have different views about who should be accommodated in particular places. This was not just an issue raised by designers—the Oakland community representatives also brought it up—but the designers suggested some solutions. The Oakland City Hall
Plaza, designed by Pyatok Architects with YH Lee Associates, used a number of key features that allowed people from very different social groups to co-exist in a common space. One of the designers remarked on this coexistence between people “panhandling” and “regular” people:

I walk back and forth across the edge of the plaza every day at lunchtime. There are people panhandling and there are people hanging around, but the design of the plaza is such that with all those little compartmentalized [areas], the changes of levels and the way the plaza sort of grades down, [with] edges with little seating areas in them, there are actually places for people to be that are sort of enough out of sight that they don’t frighten away the regular people. And I think, you know, that’s really an unheralded, but spectacularly successful public-space design.
Designers have a positive reaction to places such as this market set up along a road. These spaces are inhabited by people and full of activity even though the space was not specifically designed for such uses. This example is in Amherst, Massachusetts.
On the whole, as middle-and upper-middle-class professionals, designers liked places inhabited by people like themselves, but could point to successful places appreciated by others.

**Evaluation**

*Strengths*

- This approach captures a broad and multi-faceted view of an environment not limited to questions on a score sheet or inventory. A well-rounded and in-depth perspective on a place can be obtained in just a few hours.
- The structured questions force participants to focus on both strengths and challenges of an area, while still allowing them to raise other issues.
- The group format allows people to build on each others’ comments and thus is efficient in terms of time.

*Challenges and Limitations*

- Like other methods of this type, it is based on personal impressions and is very reliant on the selection of people for the workshop. One should be careful not to over-generalize.
- Designers have a particular viewpoint, one that appreciates unique and distinctive architecture and tends to downplay urban design beyond the scale of the building. While valuable, it is important to supplement this particular perspective with other sources of information.
Community Representatives Design Workshop

What It Is

The design workshop described above focuses on eliciting expert opinion on urban form, visual issues, and transportation projects. At the same time, such expert users are only a small percentage of the people who influence and use such places. The views of community representatives, public officials, transit advocates, real-estate agents, and housing specialists are just a few of the many types of non-specialist perspectives that are also needed to complement the point of view offered by designers. The possible methods for gaining such perspectives are infinite (a few are suggested in appendix B). Some methods record views about issues, such as appearance and sense of place, while others build capacity to engage in design conversations. To highlight how views about visual environments may vary among different groups, this study repeated the method and particular questions of the design workshop using a different audience. Using the same method to ask the same questions about the same sites had the additional benefit of allowing the study team to compare and contrast views from expert and non-expert users.

How the Method Was Used

As with the designer group, in each area the local AIA contacted a list of key people in various non-architecture fields, who for simplicity sake we call community representatives. There were between seven and ten people in each group. Groups included a range of professionals representing transportation planners and transportation agencies, community and private developers, civic and neighborhood associations, local commissions and elected officials. As is explained in appendix A we had also hoped for maintenance workers, but none were available. Other techniques might reach a broader public, but these groups had the advantage of being particularly well-informed about the places in question.

What the Method Showed

Like the design workshop in the previous section, the conversations in these meetings were wide-ranging. While the design experts seemed to share a common viewpoint of which designs were good and which were not, owing perhaps to their common professional education and background, the myriad views of the non-expert groups proved that what is a nice place for one person is often not for another. Despite the variation, several themes emerged from the conversation:
Factors beyond physical design: Community representatives pointed to many factors beyond design that made great places. Participants were generally positive about quite intense development, but also appreciated human-scale details. Continuity and connections in pedestrian infrastructure: As residents and workers, participants commented on connections between places and on such features as bike trails. Safety: Personal safety using spaces was a key issue. Community activism and participation: Many participants were community activists, elected representatives, and civic leaders, and felt that participation had helped design. Time: While designers frequently complained about how slow development had been to come, the group of community representatives were particularly articulate about how making great places can sometimes take decades.

Factors beyond design: In general the non-designers were more positive than designers about the neighborhood character of the study sites, though not necessarily about the physical design. While designers tended to focus on specific places in the physical environment, the non-designers tended to focus on the whole area and saw both what worked and what did not. Many participants highlighted issues like transportation convenience, economic-development potential, housing affordability, political feasibility, and even the importance of urban grocery stores. Local residents were also important from youth culture in Delmar Loop to long-term activists in Emerson Park. Concerns about providing convenient, affordable housing were central to both the Emerson Park and Fruitvale developments, so their success or failure in living up to those goals was a primary topic of conversation. The picture that emerged from these sessions was that achieving “good design” depends on many other factors.
Having a diverse group of people from different professional backgrounds helped elucidate this complicated process, and showed that achieving a good result often involves trade-offs. In the meeting in Oakland, for example, one participant brought up the fact that the downtown area was not safe for pedestrians and that city officials should use streetscape improvements to improve the area for pedestrians. In response, someone who worked in that city’s planning office pointed out that doing so involved a non-trivial commitment of several million dollars, and that the city’s dilemma was which projects to prioritize, given limited financial resources. In the process of this exchange, the group as a whole came to see that “good design” was not just a wish list, but something demanding complicated choices among various constraints.
Human scale: In the context of large metropolitan areas and large buildings, many of the case-study areas stood out for their human scale. As a participant from northern Virginia explained:

We typically describe them as urban villages, and I think that’s really caught on throughout the county and even people within the neighborhoods. I think of them that way. They’re very lively, very safe, very clean, very walkable, lots of opportunities to eat and shop and socialize and all those things . . .

In contrast, Rosslyn did not have a similar sense of scale. As another participant explained:

Rosslyn’s a strange station. Even the surroundings are strange. You come out of the station onto the street . . . There’s no natural flow from the station into the neighborhood. One has to sort of look around, figure out where to cross . . . it’s not a friendly streetscape as you come out of there compared to the others. . . . Rosslyn is . . . still a driver/commuter place. A lot of cars, buses. You know, it is two one-way streets on either side of the station. Whereas Ballston and Clarendon you are in a neighborhood. . . .
Others talked about the benefits of community gathering spaces in Fruitvale and art in Delmar Loop. In all, people praised design features scaled to the dimensions of the human body and to be appreciated by those moving at walking pace.

Continuity and connections in pedestrian infrastructure: There were several cases where different people from different backgrounds all expressed a common opinion. Pedestrian concerns stood out. Criticisms of lack of continuity of the pedestrian realm were common across all station areas. As one participant in Oakland explained:

> When I think about both areas . . . they’re really disjointed to me, actually. At the center of them is very carefully designed pedestrian space, but then you wander a block in any direction and you hit these hideous traffic sewer streets, and you hit bad buildings and blank façades.

In northern Virginia, participants lauded nearby bike paths and criticized poorly-maintained sidewalks. Arlington planners focused a great deal of care on station entrance design and less initially on sidewalks between stations. There were similar problems in other locations.

Good sidewalk design could be very useful in terms of features, such as width, lighting, and activity.
Safety: Personal safety from crime was also a key issue mentioned in each of the groups. In general, the case-study areas were perceived as safe, though this had not always been the case. Participants felt that at some stations safety was due to design features, such as good sight lines at Emerson Park, but in many there was more active policing, as well. In addition, as places became more actively used they were seen as safer. A St. Louis participant explained that Delmar Loop’s level of safety evolved over time:

When it first opened about fifteen years ago . . . the area wasn’t that vibrant or active. I wouldn’t even use the station really during the day. Then ten years ago, I started even using park-and-ride, but really wouldn’t use it as a walking station . . . But today, even at nighttime . . . I will use that station, because it is a more vibrant area where there’s safety in numbers, it’s active. . . . It’s a great area in that it does still have a Bohemian feel, which is kind of eclectic and trendy. It’s diverse, which is great. All different people, different classes and races and socioeconomic backgrounds come together, which you don’t see too often in other locations. I mean, it’s the ideal urban neighborhood.

People in northern Virginia were particularly effusive about how safe the area was, fostering and in turn enhanced by an active local street life. In this quite transient area—with many people moving in and out for government jobs—this was particularly
Community activism and participation: As community leaders and professionals interacting with the wider public, the groups had much to say about participation and community leadership. Some specific individuals were identified—for example Joe Edwards, owner of a key theater in Delmar Loop. At other times groups of activists or citizen boards were important, for example a number of boards and groups who had fought so that development could reflect community values in northern Virginia. Emerson Park is a particularly striking example. What made it extraordinary was the story of activism over several decades that had brought investment, including the MetroLink stop, to this distressed area. As two participants explained:

Speaker 1: This [area] has had community activity for thirty years to try to move forward and, and they’ve done that. The grassroots activists have been responsible, I think in large part, for getting the State of Illinois to invest in their enterprise-zone activity and all kinds of activity.

Speaker 2: And even getting the station . . . this neighborhood group knowing that they were a very distressed area, they fought for that station to be there, because it could have stayed on the other side of the highway.

Time: All the station-area development/redevelopment projects discussed by the groups of community representatives had taken years if not decades to start and many were not finished. This element of time meant people had to decide to develop now in one way, or to wait and develop in another. This issue of timing had a large affect on places. As one participant explained:

In Ballston . . . literally, the long-range planning was developed and nothing happened for a period of time. However, that probably played in our [local] favor. In the meantime, Rosslyn was already developed largely in the ‘50s and ‘60s and so the arrival of the Metro was more of a ‘oh well, you know, here’s the Metro now’ . . . in this canyon of office buildings that had already been developed. In Ballston, we waited until after the Metro arrived and then the developmental occurred.
In Oakland, even given all the redevelopment to date, one participant described the downtown as “teetering on this sort of cusp of what it’s going to become, this kind of world-class city” or something else. Given the decades-long process of creating great places, the future in this location was very much an open question.

**Evaluation**

*Strengths*

- Like the designer workshop, this is a holistic or comprehensive assessment. Other participatory techniques, some of which are outlined in appendix B, may have different goals, such as enhancing visual literacy and troubleshooting particular issues.
- Having a wide array of participants reinforces the fact that place-making, design, and urban form are tremendously complex concepts and can illuminate different parts that matter in designing good places: housing, public finance, politics, legal issues, etc.
- Although there is currently much energy behind the participatory-planning movement, lay opinions are not often considered in the process of urban design. Including more of the “public” in the design and assessment of public spaces and facilities is important.

*Challenges and Limitations*

- Many experiences are widely shared by many different types of people. Many are not, however, and so the composition of the group in the workshop will affect the outcomes.
- All participatory techniques take time, and produce complex “results.”
- Like the expert design workshop, the quality and characteristics of the information gathered is largely a function of the composition of the group. The limitations of this technique must be acknowledged.
- Bringing together many different perspectives together makes for lively discussion, but can also lead to conflict and disagreement. Great care must be taken to ensure that the discussion stays on track.
While many visual and urban design assessment techniques involve visiting sites others can be conducted using photographs and maps.

**Mapping Analyses**

**What It Is**

In the *Moving Design* study, mapping was used to compare street patterns and business activity in the areas. The pattern of streets and blocks in particular are the basic starting point for urban design. Businesses, housing, and public spaces are key destinations in the urban fabric.

**How the Method Was Used**

We used Google Earth imagery and Photoshop to create figure-ground maps for a 1600 m or approximately one sq. mile area in each case-study location. While such maps sometimes feature built versus unbuilt locations, we instead mapped streets versus blocks. The rest of the study involved other ways of looking at built form but this approach emphasizes street connections and walkability. We calculated a number of simple statistics—intersection density and block size. Both excluded water from the land area calculation.

In addition, we used a database of businesses—ESRI Business Analyst—to compare how many businesses were around stations or in key areas of the CSS examples. This allowed us to capture a measure of economic activity. There are many other potential measures of the built environment. The edited manual *Built Environment and Physical Activity: GIS Protocols* lists dozens, with particular focus on places of movement and destinations (Forsyth 2005a). Destinations are among the simplest features to measure.

To allow comparison, we calculated several statistics including numbers of intersections per hectare in each one 1600 m sq. area; and the density of businesses in a 400 m (approximately one quarter mile) and 800 m (approximately one half mile) distance around stations.
What the Method Showed

As can be seen from both the maps and the intersection counts, the transit-oriented development cases are very similar to each other in terms of street pattern. All but two areas had block sizes from 1.5 to 2.5 hectares. Rosslyn was somewhat larger on average at 3.34 ha, and rural Route 50 had very large blocks.

However, the business counts do show a great deal of variation. Oakland’s 12th Street/City Center station has a very high density of businesses per hectare, while Emerson Park has a very low density. Even in Northern Virginia, Rosslyn has more businesses than the other stations. Places laid out with a similar pattern of blocks and streets have very different characters because of their differing levels of business activity.
As can be seen from these figure-ground illustrations, street patterns in the TOD areas are similar. Buildings—(not shown)—do have some more variation but typically successful TOD areas have small blocks and fewer large roads which helps create a human scale.
CSS Cases
Clockwise, from top left: Virginia Route 50; Barracks Row, Washington DC; Boonville, Missouri; and Davis, California.

These cases have more varied street patterns than the TOD cases, reflecting the more diverse contexts in which CSS projects occur.
TOD Cases
Top row, left to right: Rosslyn, Clarendon, and Ballston

Middle row, left to right: Delmar Loop, and Emerson Park

Bottom row, left to right: 12th Street/Oakland City Center, and Fruitvale.

Station location

These reverse figure-ground diagrams emphasize the space of the street.
CSS Cases
Clockwise, from top left: Virginia Route 50; Barracks Row; Boonville, Missouri; and Davis, California.
### Table 4.3. Statistics around Case-study Sites

<table>
<thead>
<tr>
<th>Cases</th>
<th>Buffer Distance</th>
<th>Density = Businesses per hectare</th>
<th>Buffer Distance</th>
<th>Density = Businesses per hectare</th>
<th>Intersections per hectare</th>
<th>Average Block size in hectares</th>
</tr>
</thead>
<tbody>
<tr>
<td>12th Street/Oakland City Center, California</td>
<td>400 m</td>
<td>21.6</td>
<td>800 m</td>
<td>38.9</td>
<td>0.76</td>
<td>1.52</td>
</tr>
<tr>
<td>Ballston MU Station, Virginia</td>
<td>400 m</td>
<td>4.5</td>
<td>800 m</td>
<td>9.6</td>
<td>0.53</td>
<td>2.21</td>
</tr>
<tr>
<td>Barracks Row, Washington, DC</td>
<td>400 m</td>
<td>5.3</td>
<td>800 m</td>
<td>12.7</td>
<td>0.53</td>
<td>2.12</td>
</tr>
<tr>
<td>Boonville, Missouri</td>
<td>400 m</td>
<td>1.5</td>
<td>800 m</td>
<td>1.9</td>
<td>0.54</td>
<td>2.14</td>
</tr>
<tr>
<td>Clarendon Station, Virginia</td>
<td>400 m</td>
<td>4.1</td>
<td>800 m</td>
<td>11.1</td>
<td>0.69</td>
<td>1.81</td>
</tr>
<tr>
<td>Davis, California</td>
<td>400 m</td>
<td>N/a</td>
<td>800 m</td>
<td>N/a</td>
<td>0.39</td>
<td>2.49</td>
</tr>
<tr>
<td>Delmar Loop, St. Louis</td>
<td>400 m</td>
<td>1.1</td>
<td>800 m</td>
<td>1.7</td>
<td>0.59</td>
<td>1.96</td>
</tr>
<tr>
<td>Emerson Park, East St. Louis, Illinois</td>
<td>400 m</td>
<td>0.3</td>
<td>800 m</td>
<td>0.2</td>
<td>0.43</td>
<td>2.33</td>
</tr>
<tr>
<td>Fruitvale Station, Oakland, California</td>
<td>400 m</td>
<td>2.3</td>
<td>800 m</td>
<td>4.3</td>
<td>0.42</td>
<td>2.25</td>
</tr>
<tr>
<td>Rosslyn Station, Virginia</td>
<td>400 m</td>
<td>6.1</td>
<td>800 m</td>
<td>16.9</td>
<td>0.36</td>
<td>3.34</td>
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<td>Virginia Route 50</td>
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<td>0</td>
<td>800 m</td>
<td>0</td>
<td>0.03</td>
<td>28.78</td>
</tr>
</tbody>
</table>
Evaluation

Strengths

- The figure ground mapping method allows a very graphical display of similarities and differences in the basic urban structure of a place. While it does not provide three dimensional information, it allows analysis of one of the more stable aspects of the built environment. Buildings come and go in a cycle of decades. Street patterns last centuries and greatly affect how easy it is to move about in the space as well as key elements of urban design and visual character such as enclosure and human scale.
- Basic measures related to the figure-ground maps such as intersections per hectare allow more systematic comparisons.
- Supplementing these maps with other data—in this case businesses per hectare—allows even more interesting comparisons. It would be possible to do this for dozens of other variables (e.g., Forsyth et al. 2007).

Challenges and Limitations

- The figure ground mapping—even using Google Earth and Photoshop instead of hand-drawn techniques—is still time consuming.
- The GIS measures provide a wealth of data but preparing data can be expensive either in purchase price or time to obtain and prepare for use. Expert users of GIS software are also needed.
Visual-contrast Assessment Worksheet

What It Is

Visual-impact assessment had a heyday in the 1970s and 1980s when significant attention was paid to developing tools for measuring the visual aspects of transportation environments, particularly roads. As explained in chapter two and in appendix A, we used a modified version of an assessment tool developed for the Bureau of Land Management (BLM) (Shepphard and Newman 1979). This tool is based on a number of key concepts, including form, line, color, texture, dominance, scale diversity, and continuity. It has a particular emphasis on visual contrast. It was developed to assess the visual impacts of developing new facilities such as roads. However, like the urban design score sheet the technique creates a score that can be used to compare different scenes rather than change over time in one place.

Our changes to the BLM method were an attempt to simplify the measurement, which would better reflect our use in assessing contrast within a scene rather than a change within a scene. Specifically the BLM version separated land/water, vegetation, and structures in the visual elements section of the worksheet. We instead combined them together into one category. The scale and spatial-dominance category descriptors were changed to reference the entire scene, not one altered/added object.

A high rating means that there is a great deal of variety. A low rating indicates there is a great deal of similarity or harmony. Scenes with both high and low values can be attractive.

How the Visual-contrast Assessment Worksheet Was Used

A modified version of the spreadsheet was used and is included in appendix A, complete with a key that enables fairly accurate scoring. It deals with the following topics:

- color—hue (red, blue, etc.), value (lightness or darkness), chroma (saturation);
- form—geometry (square, triangle, circle etc), complexity (simplicity/regularity vs. complexity/irregularity), orientation (relation to horizontal or to points of compass);
- line—boldness (visual strength), complexity, orientation (relation to horizontal or to points of compass);
Visual-contrast assessments evaluate images on color, form, line, texture, scale, and dominance. The above image of Poundbury, England, illustrates many of these features.

- texture—grain (scale of sub elements form coarse to fine), density (spacing of elements), regularity (distribution, evenness), internal contrast (e.g., in color);
- scale—proportion of landscape setting (how big an object is relative to the entire visible setting), scale contrast (relative size of different objects), proportion of field-of-view (related to field of view of a camera or human eye);
- scale dominance—how dominant a feature is, from dominant to insignificant; and
- spatial dominance—a combination of
  o spatial composition—landscape composition (panoramic, enclosed, with a distinctive feature, a clear focal point, or canopied, etc.)
  o spatial position—the prominence of an element due to its elevation and location in the landscape
  o backdrop—does the foreground stand out or is it inconspicuous?

We used the scoring sheet to assess eight photographs from four locations, two from each place. We used the locations that had been audited and inventoried—Clarendon, Emerson Park, and Fruitvale. We added Virginia Route 50 as a classic rural highway. A more robust analysis aiming to capture the typical character of a place would use more photos. However, our aim was to investigate if the technique was a useful way to compare places, given prior use focused on change over time. This study focused on whether the scores would actually vary between places that looked different.
Images used in the Visual-contrast Assessment Worksheet. Numbers correspond to table 4.4. The locations are Clarendon, Virginia (1,2); Emerson Park, Illinois (3,4); Fruitvale, California (5,6); and Route 50, Virginia (7,8).
What the Audit Showed

One rater assessed eight sites and another five of the same sites. The table represents the scores by the rater who assessed all eight images. With the exception of image six, where slight differences in rating led to a large difference in the overall score due to weighting, there was a great deal of agreement for the five contrast scores and far less in the dominance scores. Thus we focus on the contrast scores to be more reliable.

Fruitvale has more visual contrast or variety overall than the other areas. The urban-design score sheet had similar results and showed that among all case-study sites, Fruitvale had the greatest complexity, a measure of variety. The places with the least contrast were the two segments of Virginia Route 50, a more historical part of Clarendon with older buildings, and a newer section of Emerson Park with a unified group of apartments designed to look like large houses. Both kinds of areas are attractive.

Table 4.4. Visual-contrast Assessment Results

<table>
<thead>
<tr>
<th></th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
<th>Virginia Route 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image number</td>
<td>1 2 3 4</td>
<td>5</td>
<td>6 7 8</td>
<td></td>
</tr>
<tr>
<td>Color contrast</td>
<td>6 3 6 9</td>
<td>9 3 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Form contrast</td>
<td>4 2 2 4</td>
<td>2 2 2 3</td>
<td>3 3 0 1</td>
<td></td>
</tr>
<tr>
<td>Line contrast</td>
<td>2 2 2 3</td>
<td>3 1 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texture contrast</td>
<td>2 2 2 3</td>
<td>2 6 4</td>
<td>1 2</td>
<td></td>
</tr>
<tr>
<td>Scale contrast</td>
<td>4 4 4 3</td>
<td>3 4 4 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contrast score</td>
<td>18 13 16</td>
<td>14 24 27 10</td>
<td>14 14</td>
<td></td>
</tr>
<tr>
<td>Contrast score reviewer 2</td>
<td>18 11 15</td>
<td>19 13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scale dominance score</td>
<td>8 8 6 12</td>
<td>8 8 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spatial dominance score</td>
<td>6 4 4 6</td>
<td>6 4 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall score</td>
<td>32 25 26</td>
<td>26 42 41 22</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>
Evaluation

Strengths

- The method draws attention to a number of purely visual issues, such as color and line.
- It can be used with photographs, and is relatively fast, making it convenient to use.

Challenges and Limitations

- Because such methods were originally developed to assess visual impact of an intervention, it is not easily used to examine visual character. The first five scores, however, all focused on visual contrast and are useful in measuring that concept.
- The perspective and scale of a particular photograph make a huge difference in scores.
- In this version of the worksheet, color, scale and form are weighted most heavily. The original manual recommends changing these to fit with the regional context, but exactly how to change them is not clear.
- The dominance scores were less reliable mostly because they were developed to assess an intervention into the landscape. It would be appropriate to drop them.
- This method is of limited value in assessing overall design quality.
Toward an Overview of Visual Assessments

Each of the methods used to assess these environments has different strengths and limitations.

- The urban-design score sheet creates scores for key urban-design concepts of relevance to commercial streets.
- The inventory provides great detail on the character of places and can be used in a wide variety of environments.
- The design workshop provides a focused, but comprehensive view of design quality.
- Various participatory techniques both elicit information and build capacity among members of the public to debate issues of design.
- Mapping provides an understanding for the basic structure of streets and blocks and can be expanded to examine other topics, such as destinations.
- The visual-contrast worksheet allows a quick assessment of photographs focused on visual variety.

The case studies were all chosen because they were seen as national models. The different assessment techniques provide windows into their different strengths.

Which method to use would depend on the situation and it would be useful to use multiple methods at once. For example, if examining a commercial street the urban design score sheet creates useful scores. To obtain a richer sense of place it could be combined with mapping and a participatory technique. For other kinds of environments, however, the Irvine Minnesota Inventory is a more flexible tool.

In addition the results themselves indicate that successful TODs share many similar characteristics such as imageability, enclosure, and a fine-grained street pattern. CSS projects are set in more diverse areas, reflecting their emphasis on context. Many successful places have modest individual buildings but a strong urban form resulting from underlying planning including such features as a sense of enclosure, human scale, and the vitality of diverse activities.

The next chapter of the report draws on these findings and other research on designing transportation environments to provide a set of principles for good design.
Tokyo, Japan
Part Five: Best Practices
Better Transportation Environments

This project examines how to measure good transportation environments, focusing on CSS and TOD. Emphasizing issues of visual appearance, it investigates how to measure such topics as identity, sense of place and scenic quality. As the report has demonstrated, different approaches to measurement emphasize different aspects of these environments.

In addition to the work in this study on measurement, several exemplary reports have drawn together the experiences of designers working on TOD and CSS. This section reviews these sources to provide a summary of measurement and design recommendations.

The concept of a “best practice”—some tried and true standard method that will deliver good results—is somewhat of a misnomer, however. “One size fits all” solutions to design problems certainly don’t fit all, as the tastes and needs of varied users are rarely the same, and are sometimes even in direct conflict. Instead, it is perhaps better to think of a good design toolkit—or a set of good, not necessarily “best” practices, each with particular effects in particular situations. Selecting from different parts of the toolkit, people responsible for the design of places can mix and match solutions to problems. Good design, then, is not as much a product, some “thing” that we can all agree on, as it is a process of assessing, selecting, and implementing a wide number of individual design interventions.

This chapter focuses on four key topics—methods, processes, places, and facilities. It provides fifteen principles related to good design. These are:

**Methods**

1. Use multiple assessment tools to tap multiple concepts.
2. Understand that different concepts are relevant to different places.
Processes
3. Appreciate that planning and developing great places takes time.
4. Engage the public, as well as designers, as collaborators and work with activist energy.
5. Program spaces for use.
6. Invest in maintaining spaces.

Places
7. Design at a human scale.
8. Provide public spaces that accommodate a variety of uses and users.
9. Use design and programming strategies to increase safety.
10. Allow for variety and complexity.
11. Create connections between spaces.

Facilities
12. Design sidewalks and crosswalks for appropriate pedestrian use.
13. Create spaces for bicycles and bike parking.
14. Integrate transit and transit facilities into the urban pattern.
15. Don’t forget, but don’t overemphasize, car movement and car parking.
Methods

Principle 1. Use multiple assessment tools to tap multiple concepts.

While converging on a similar picture of each of the case-study areas, the different assessment techniques each came up with a slightly different perspective. Some provided inventories of what was in each place—densities of businesses or urban-design features. Others gave a sense of the history and use of the areas. There is no one best method and, in fact, a best practice would be to refrain from using one method. In summary:

- Use several different techniques to capture a sense of place. An inventory can provide information about what is in the place, for example, and interviews or discussion groups can provide a sense of its development over time or the locally-defined sense of place.
- Tools that come up with precise scores can be very handy, but may also provide a false sense of confidence. Use them in conjunction with other assessment methods for a more complete picture.

Principle 2. Understand that different concepts are relevant to different places.

The various assessment tools measured a variety of urban-design features from imageability, or how memorable a site was, to the presence of pedestrian lighting. Places differ, of course, and so there are many definitions of good design. As was demonstrated in the previous chapter, for example, areas with both high and low levels of visual contrast can be attractive. Wide roads can be designed to maximize vehicular speeds or as boulevards with spaces for pedestrians and cyclists, as well as cars.

- Focus on understanding what kind of place an area is and what measures are relevant. The definition of transparency used in the urban design score sheet, for instance, is most relevant to main-street commercial areas, and this concept is less critical for other types of attractive and vital places. Be sure to fit the tools to the key questions about a place—what specific information is needed?

“Different stations serve different roles. . . .”

Tim Rood, CD & A, Architect CA
Areas with a great deal of visual contrast and complexity and with very little contrast and complexity can both be seen as attractive. It is important to interpret the findings of the various visual assessment tools in terms of the kinds of places that are being evaluated. These examples are from New York and the Great Smoky Mountains.
“We waited a long time for housing to materialize, and it came in a big way, but we stuck with the plan. We didn’t convert everything to office and eventually things materialized: mixed use, grocery stores, and so on.”

*From Design Workshop—Community Representatives*
Principle 3. Appreciate that planning and developing great places takes time.

Many of the best loved places in the world are the product of decades if not centuries of development and redevelopment. This was true for these transportation-related locations as designers and community representatives both remarked on the decades-long processes of redevelopment. It is virtually impossible to jump start a development from nothing to a fully built great place in a few years. As design-workshop participants stated repeatedly, what sometimes looks like fast development is often misleading as the development is merely the physical culmination of years of planning. Some examples illustrate how the long view shapes one’s understanding of a place:

- Good design can at times be achieved through changes to zoning and building codes in order to further transportation goals. This is especially true for TOD, which by definition involves integrating transportation with land-use planning to create a mixed-use, higher-than-average-density area centered on a transit station. Zoning only guides development, however, and it does not cause development to occur. Realization of the vision behind the zoning can take decades.
- Parking lots near transit stations can seem to be a waste of space, but alternatively may be seen as a land bank. They preserve a building site until more intensive development is possible. Rarely is intensive development marketable in the first few years of the life of a transit system or stop.
Principle 4. Engage the public, as well as designers, as collaborators and work with activist energy.

Community members need to live with the results of development and redevelopment and can be allies or opponents. Bringing residents on board so their energy can be used to shape development rather than prevent it was a key lesson from these areas. In northern Virginia, community groups watched over design issues and bought into the basic planning idea of high density around the train stations. In Emerson Park, activists brought the MetroLink station to their neighborhood.

- In long-term redevelopment programs with multiple buildings and projects, it is worth making local residents and business groups into partners. Their buy-in can be important when weathering inevitable setbacks.
- While community process can slow down design, it can also improve it. It is also important that community members be provided with knowledge about design, however, so that they can be informed partners in these discussions.
- Current residents are not necessarily the residents of the future. Finding ways to represent the differing interests of these two groups is a key challenge.

Formal elections are one way to influence planning.
“Provide more funding to community-planning processes and diversify the planning and design of communities. . . . If you don’t fight for affordable, family sized units, who will? Or, more specifically, who can?”

Joel Ramos

Transportation and Land Use Commission (TALC), CA
A design is a physical space. Programming is about use. Successful places have appropriate activities occurring at different times of the day, week, and year. Of course not all places need to have constant activity, but appropriate programming can increase use, safety, and a sense of place.

- Weekly activities, such as farmers’ markets or weekend concerts, can bring new people to a place, such as a parking lot, a less used street, or a transit plaza.
- Annual events, such as festivals, provide identity for a place.

A number of studies have found that high levels of maintenance are appreciated by viewers and can make scenes appear more attractive (Nassauer and Larsson 2004, 94). Too often paths, trails, and other pedestrian and biking facilities are installed without long-term maintenance plans. In addition, as places become popular, wear and tear increases adding to the maintenance burden.

- Ensure that there are plans for maintaining transportation infrastructure. In places with heavy public use, this is likely a public responsibility.

“There is a farmers’ market . . . and people tend to love that, and there is nothing architecturally that has been done.”

From Design Workshop—Designers
Transit centers as civil places need to be managed, maintained, and programmed in order to create real places.”

Anko Chen, Architect, CA
This garage is designed at a human scale in that it has elements at the scale of the human body including the garage door windows and cuppola.

Places

Principle 7. Design at a human scale.
Measured explicitly in the urban-design score sheet, referred to by civic representatives, and a key component of the AIA livability principles, human scale is at the base of great places is. This does not preclude places with tall buildings and intensive development. Rather, human-scaled design has the following characteristics:

• Design so that the areas that people inhabit—such as sidewalks, plazas, and transit stations—are scaled to be usable and interesting to people moving at walking speed.
• Create a system for considering the spaces beyond the buildings when designing urban places—sidewalks, streets, and blocks are key to the scale of the building.
• Provide human-scale details, such as architectural features, on buildings, street furniture, and plantings.

Principle 8. Provide public spaces that accommodate a variety of uses and users.
Successful transportation environments attract people moving through them. Public spaces—places where people can stop, sit, and gather—are often ignored in transportation projects, where the emphasis is on moving people around. Pleasant and inviting public spaces, however, provide a wide array of benefits to individuals and communities alike. Good public spaces are ones where people like to stop and sit to
“It’s a pedestrian-friendly environment, and there are things to see. The scale of buildings is small and you go by a lot of different things at a slow pace.”

Design Workshop—Designers
read a newspaper, eat a lunch, or meet friends. As the design workshops held for this study illustrated, public spaces also provide places for people from different groups to either interact or stake out territory without overly bothering others. Transportation infrastructure can enhance public spaces, increasing accessibility and use. Streets, parking lots, and areas around transit stations can also serve as settings for organized activities, such as farmers’ markets, concerts, festivals, and the like. Such activities can be promoted by the inclusion of several design elements:

• Street furniture can be used to create a sense of a “public living room” by creating a variety of places for people to sit and talk. Benches and ledges at sitting height can be clustered for maximum effect, but can also be distributed to create a series of “nooks” for small groups or individuals. Moveable seating, where feasible, allows people the greatest freedom over how to use the space (State of Washington and Energy Outreach Center 1995; Transit Cooperative Research Program 1997, 148).

• A unified design of street furniture, light fixtures, sidewalk treatments, and banners or signs can highlight a particular site or segment as a special gathering place (Institute for Transportation Engineers 2006, 100).

• Installing community-oriented public art helps contribute to the visual diversity of public spaces. Artwork can be functional and be used as street furniture (Transit Cooperative Research Program 1997, 145).

• Above all, public spaces should be flexible, and allow for many different types of users and activities at different times. A small plaza can be a great lunch time spot on weekdays, a place for a farmers’ market on Saturday mornings, for example, and then the main stage for an annual festival (Transit Cooperative Research Program 1997, 143). Parking lots can be converted to flea markets on the weekends.
Principle 9. Use design and programming strategies to increase safety.

Personal safety is at the base of successful public spaces. Programming and use of spaces is vitally important. Many of the case-study areas had successful formal and informal policing of spaces. Having people using places to provide “eyes on the street” is very important. There are some design principles that can improve safety and the perception of safety, however, and thus make the spaces more likely to be used (Wekerle and Whitzman 1995; City of Toronto and Wekerle 1992). While this is a large issue, topics of relevance include:

- Lighting—in order to make places seem cared for, increase visibility and, thereby, enhance the potential for positive surveillance, provide adequate lighting in all places where people are meant to be at night.
- Access control—distinguish between public places where people are meant to be and those where they are not through strategies, such as fencing, lighting, and landscape.
- Visibility—Ensure there are adequate sight lines.
- Movement—Avoid tunnels and narrow paths that potentially funnel pedestrians into the path of an attacker without means of escape; avoid other entrapment spots or isolated areas.

"Security should be a part of planning.”

Sgt, John S. Schickesanz
St. Louis Police Department

Many stations in the St. Louis MetroLink system incorporate positive design features for safety, including clear sight lines.
Principle 10. Allow for variety and complexity.

Places that have a high level of consistency, as well as those with much variety and complexity, can provide a positive sense of place. In the United States, however, regulation tends to make areas uniform and so particular attention is needed to promote visual variety and a diversity of uses.

- Building-design guidelines can create a sense of place for pedestrians. They include promoting a common building style or theme, requiring complementary colors, encouraging windows (especially at the ground level) or other architectural elements. Establishing a common look along a street or at a site can be good but is not the only method for creating a vibrant, attractive street. Some of the most interesting and popular streets are heterogeneous and seemingly inconsistent (State of Washington and Energy Outreach Center 1995).
- Mixed use is fundamental to many urban-design projects. Integrating residential, commercial, transportation, civic, recreational, and even light industrial use is vital to creating healthy and active streets and neighborhoods. In TOD projects, mixed use is a must, and helps to create the complex pattern of different users needed to make transit work. Pedestrian streets benefit from the presence of many different types of destinations located close together, including retail stores, restaurants, offices, housing, libraries, and parks (Greenberg 2004, 59-70).


While it is important to make great places, it is also important to connect them. All the case-study areas had well-connected street patterns relevant to their locations. The TOD areas in particular had similar patterns of streets and relatively small blocks allowing multiple options for movement. Buildings did not always connect well to the outdoors, however, and sidewalks were not always continuous for pedestrians. Cyclists had even more challenges finding comfortable paths.

- In designing places, make sure that the structure of streets and blocks provides multiple options for pedestrians moving from place to place. Even if vehicular movement is limited, provide pedestrian cuts-through.
- Make sure sidewalks are continuous, sufficiently wide and in good repair. Incomplete, narrow or hazardous sidewalks, especially when problems force walkers closer to traffic, are almost as daunting as not having sidewalks at all (State of Washington and Energy Outreach Center 1995).
- Vacant lots, parking lots and other gaps detract from the pedestrian experience. Where walking is being promoted, in-fill of such gaps by encouraging new users or transforming the gaps into assets is important (Transit Cooperative Research Program 1997, 145).
These two streets—one in San Diego, California, and one in Letchworth, England—both provide a coherent sense of place, although their architectural styles are quite distinct.
Facilities

Principle 12. Design sidewalks and crosswalks for appropriate pedestrian use

Sidewalks: Many center-city and suburban design projects begin with the needs of pedestrians first and foremost in mind. In some design projects, the problem is how to revive a formerly bustling neighborhood shopping street, and bringing back foot traffic is an important step for such areas. In other cases, designers must balance the needs of motorists and pedestrians, while making sure not to sacrifice the safety of either party. Another common problem is accessibility, such as when a highway or railroad tracks create an obstacle for anyone not in a car.

A number of design elements can help make walking safer, more pleasant and more convenient. These include:

- Landscaping barriers, such as planting strips, trees, and raised flower boxes, create a physical buffer between the street and the sidewalk and help create a conceptual buffer, delineating the territory of the “driver” from that of the “walker.” Green barriers also improve the aesthetics of the street, reduce impervious surface area and, in some climates, can provide space for snow storage (US FHWA 1998, 83).
- Street furniture, such as benches, lampposts, public telephones, mailboxes, and drinking fountains, also can be used as barriers, separating pedestrians from traffic. They serve the practical needs of pedestrians and make places more visually interesting, furthermore. (Institute for Transportation Engineers 2006, 108)
- Allowing for active uses of the sidewalk, such as street vendors and sidewalk dining, encourages pedestrian activity and can create a sense of safety and vitality in some areas (Greenberg 2004, 71).
Sidewalks and crosswalks come in many shapes and sizes. In the United States crosswalk markings are typically minimal (2,5). However, in some areas more distinctive and visible markings are used including zebra crossings (1,3) and various patterns using pavers and paint (7,8). Similarly sidewalks can be designed for a variety of users including a shared street in Houten, the Netherlands (6).
Crosswalks: Creating spaces that encourage walking depends partially on proper design of spaces reserved for pedestrians, and partially on places where pedestrians intersect with other users, especially drivers. A well-designed crosswalk, whether at the corner or in the middle of the block, provides benefits to both pedestrians and drivers by creating good sight lines, keeping speeds appropriate to the space and by maintaining a sense of separation, even when drivers and walkers are physically quite close to one another. Some design elements to consider for crosswalks, particularly in heavily-used areas, are:

- Locate crosswalks at all intersections, and in the case of especially long blocks, in the middle of blocks, as well. All crosswalks should have ramps (US FHWA 1998, 125).
- Use special features to distinguish the crosswalk from the rest of the roadway. Most commonly, such features are visual, such as painted white or yellow lines, or zebra striping. Different surfaces, e.g. brick, cobblestone or patterned concrete, can also be used to distinguish crosswalks (US FHWA 1998, 125).
- Curb extensions, also called bulbouts, neck downs or nubs, can also be used to increase the available space at corners where pedestrians tend to concentrate and shorten the distance needed to cross. They make waiting pedestrians more visible to drivers and create a perceptual barrier between the roadway and the rest of the sidewalk (Institute for Transportation Engineers 2006, 172; State of Washington and Energy Outreach Center 1995).
Providing marked pedestrian areas on the street is a key design strategy. This colorful mural decorates a street intersection in St. Paul, Minnesota.

Bicyclists are another type of transportation user, whose presence and needs should be accounted for in the design process. Designing for bicyclists can be difficult, because in some ways their needs are similar to those of pedestrians, in other ways to drivers, but in still other ways, their needs are unique. Ideas for design for bicyclists include:

- Use bike paths (dedicated bikeways, separated from traffic) and bike lanes (portions of roadways reserved for bicycles), depending on conditions and the types of users (AASHTO 1991).
- Bike paths and lanes should be integrated in a larger system, called a bike route, allowing for travel by bicycle within a larger island. A scattered or inconsistent system of paths and lanes should be avoided (State of California 1993, 8-23).
- Accommodate bicycles users in public spaces, near transit stations and elsewhere by providing bike storage racks, lockers and ramps where necessary (Transit Cooperative Research Program 1997, 145).
Bicycle parking is an important topic that is often overlooked. These examples include street-side and garage parking in (clockwise from top left) Utrecht and Amsterdam, the Netherlands; Stockholm, Sweden; and Chicago, Illinois. The Stockholm example has a green roof and the Amsterdam parking garage is adjacent to the main train station.

The design of bus and rail facilities is complicated, as various needs and constraints must be properly balanced. A transit facility is a transition point between various modes, as people park cars and bikes and walk before heading onto mass transit. People also transfer between routes or types of transit. Modern transit facilities, especially in the case of TOD, add shoppers, workers, and residents to this mix, thereby creating an even more diverse set of demands and expectations on transit facilities.

These challenges also bring opportunities. Transit naturally brings people together, a key goal of urban designers seeking to promote street life. Transit can also serve as the impetus for economic or community development in a place, as investments in transit offer a chance to pursue other, complementary goals. Good design elements for transit facilities include:

- Reinforcing the role that transit can play in creating public spaces. A transit facility can serve as the central feature of a place, and its open spaces can serve as public spaces for transit users and non-users alike (Transit Cooperative Research Program 1997, 148).
- Since many of the goals of a transit facility are the same as that for a walkable street, many of the strategies that support pedestrian activity, such as slowing traffic, creating a sense of place through unified design, and installing street furniture, can be used in transit areas, as well (Transit Cooperative Research Program 1997, 58).
- Providing amenities for transit riders. These include places to sit, public telephones, and shelter from the rain, sun, and wind. Maps showing the station area, the surrounding neighborhood, and where to find connections to other transit routes are also important.
Principle 15. Don’t forget, but don’t overemphasize, car movement and car parking.

Traffic: A number of design elements for streets can be used to create more walkable places, while simultaneously making the urban or suburban environment safe for drivers, as well. Many of these entail slowing down or restricting traffic to a more suitable level for the areas through which they pass. Reduced levels of service should be compensated for in other ways, however, such as by enhancing traffic capacity on parallel or nearby streets. There are various design issues to consider.

- Excessively wide streets create barriers for walkers and enable high vehicle speeds. Narrowing the roadway is a first step towards making more pedestrian-friendly streets (Institute for Transportation Engineers 2006, 118).
- One-way medians narrow a roadway and add many benefits. They can serve as pedestrian islands to provide refuge when crossing wide streets and boulevards. They can also divide the opposing directions of traffic and create buffers for left-turn lanes, thereby improving safety conditions for drivers. Finally, attractively landscaped medians, with lighting fixtures or other urban-design features, can makes roadways more visually appealing and add to a sense of place (Institute for Transportation Engineers 2006, 120).
- Speed tables, which are like speed bumps but wider, can help slow traffic, and signal to drivers that they are entering a pedestrian area (State of Washington and Energy Outreach Center 1995).
- Traffic circles and raised islands within intersections can slow traffic, force drivers to be more alert to traffic patterns and reduce accidents (State of Washington and Energy Outreach Center 1995).
Parking: As ubiquitous as cars are on the American landscape, cars are not as common as parking places. Figuring out places and ways to store cars when they are not in use, while still making parking convenient for shoppers, visitors and employees, is a major challenge of urban design. When not placed well, parking lots and structures can sever neighborhoods and create dead spaces. Good design can avoid these problems, and also contribute to other goals.

- On-street parking helps lessen the need for vast parking lots, but can also help create walkable streets by serving as a buffer between the traffic lanes and sidewalks (State of Washington and Energy Outreach Center 1995).
- When larger parking areas are required, placing them behind or to the side of buildings is recommended. To create and maintain a healthy street, parking should never be between buildings and the front property line (Greenberg 2004, 73).
- Create parking spaces that can be shared by different uses over time. In some of the case studies, park-and-ride lots associated with transit were used for nighttime theater parking and for weekend markets.

Conclusion

There isn’t a single recipe for creating a well-designed transportation environment, but there are a number of principles that can use used in ways relevant to the context. Over
These photos of parking lots—from East St. Louis, Illinois, and Philadelphia, Pennsylvania—demonstrate the power of art to turn a surface lot into a place. The Philadelphia lot is also smaller but a network of such lots can provide significant numbers of parking spaces.

“When infill projects are developed in an urban area, step outside the box, not only designing the building, but taking into consideration neighborhood connections.”

Suzie Lee
YHLA Architects, Inc., CA
From the suburbs of Dallas, Texas.
Appendix A: Assessment Approaches
The urban-design score sheet is particularly suited to assessing commercial areas such as this one in Stillwater, Minnesota.
Six Approaches to Assessing Design Quality

Note: This appendix was prepared by Ann Forsyth, Laura Baum, and Lukas Van Sistine.

A. Score Sheet

What It Is
The urban-design score sheet (our term, the authors use the rather longer “Measurement Instrument for Urban Design Qualities Related to Walkability”) is a measure developed by Reid Ewing, Otto Clemente, Susan Handy, Ross C. Brownson, and Emily Winston to assess the visual environment in commercial and main-street-type environments like those found in many TOD areas and CSS projects. Tested for validity (truthfulness) against the judgments of an expert panel, and for reliability (agreement between raters) as a checklist, it develops scores for the urban-design qualities of imageability, enclosure, human scale, transparency, and complexity. These dimensions were found to be both important and measurable (Ewing et al. 2005, 2006).

In creating this tool, the authors rely on a conceptual framework that focuses on the relationship between the built environment and walking behavior. In discussing this issue, the authors break this relationship down into three parts (ranging from more to less objective): physical features of the built environment, urban-design qualities, and individual reactions. In their research for the urban-design score sheet, the authors examine two of these three parts, specifically, the link between physical features and urban-design qualities.

The authors developed the tool using a nine-step process that included video clips of urban environments and an expert panel, in order to establish operational definitions of urban-design qualities.

Tool Development Steps: (Ewing et al. 2006, S227)
1) recruitment of a panel of urban design and planning experts;
2) creation of a library of video clips of streetscapes;
3) selection of video clips;
4) rating of urban-design qualities of streetscapes by the expert panel;
5) measurement of physical features of streetscapes through a content analysis of
   video clips;
6) inter-rater reliability testing of physical measurements and urban-design quality
   ratings;
7) statistical analysis of relationships between physical features and urban-design
   quality ratings;
8) selection of qualities for operationalization; and
9) development of operational definitions and measurement protocols for urban-
   design qualities based on statistical relationships.

Why It Was chosen
While ostensibly about measuring design to provide walkability, this inventory has
not been tested in terms of how it predicts walking but rather in terms of how it agrees
with expert designers’ assessments of qualities of space, such as imageability, enclosure,
human scale, transparency, and complexity. As such it is really an urban-design
assessment tool. In this project we test it for this purpose—as a general urban-design
score sheet tool.

Building on the earlier visual assessment literature, its strength is assessing these more
qualitative topics through a score sheet.

How Long It Takes and Who Does It
Training involves reading field manuals, as well as practicing on a small number of
segments. The estimated time for training and practice is four to five hours.

A comparison of audit tools by Kristen Day reports this tool takes twenty minutes per
segment in fieldwork. Our own experience indicates that a little time may be shaven off
this amount, but as it does not include travel to the site, the average might be closer to
twenty minutes. In spite of the short length of the form, it is relatively time consuming
to fill in each question as they involve extensive counting, or more complex judgments
about such features as the length of sightlines.
Steps

The main tool is the urban-design score sheet (shown below), a one-page table with spaces to record values for each of the physical features measured in the field.
- The first column lists these physical features.
- Values for the physical features are recorded in the second column.
- The third column contains a multiplier, derived statistically by the authors.
- The product of the multiplier and the recorded value is recorded in the fourth column.
- The final step requires you to add up all the values from the fourth column for each urban-design quality and add the constant indicated in order to come up with an overall score for each quality.

Other information

Publications include:


The Ewing et al. (2005) urban-design score sheet. This one is filled out for one of the video clips that the tool creation team assessed in order to develop the tool.
When conducting an audit, the manual recommends bringing along multiple copies of the score sheet, a clipboard, writing implements, and chalk, to mark the bounds of the study area.

The study area, the unit of analysis used in the audit, is typically one block long, however, for longer blocks, the authors recommend limiting the study area to 120 paces (about 300 feet) and using chalk to delineate the area.

Depending on the specific feature being measured, the auditor may be asked to record elements on one side of the street, on both sides of the street, within the study area, or visible from the study area. The score sheet indicates which of these dimensions should be used and the manual provides more detailed instructions on how to count different features. The authors stress that measurements need not be perfect, but should be reasonable and consistent, in order to obtain valid assessments of the study area. This is useful as the study team for this report found the score sheet to be relatively complicated to fill out.
B. Irvine Minnesota Inventory

What It Is

The Irvine Minnesota Inventory is the basis for the urban-design inventory. Originally developed as a walkability assessment tool, this tool takes approximately twelve to fifteen minutes per street segment to audit although each TOD area or CSS project is likely to have a number of segments (Day et al. 2006; Boarnet et al. 2006).

Based on an analysis of the literature, the authors identify four factors of the built environment that may influence physical activity: accessibility, pleasurability, perceived safety from traffic, and perceived safety from crime. They use these four domains to categorize the 162 items included in the inventory (some items are in multiple domains).

The authors define the domains as follows (Day et al. 2006, 146):  
- **Accessibility** is the perceived ease with which destinations can be reached and terrain can be traversed during physical activity for travel and/or recreation.  
- **Pleasurability** is the perceived attractiveness of the setting for physical activity for travel and/or recreation.  
- **Perceived safety from traffic** involves individuals' beliefs that limited opportunities exist in the setting for injury from autos or other vehicles.  
- **Perceived safety from crime** involves individuals' beliefs that limited opportunities exist in the setting for crime victimization or harassment during physical activity for travel and/or recreation.

The authors created the Irvine Minnesota Inventory through a literature review, focus-group interviews, field testing, and a panel of experts. These steps were conducted by a team from the University of California, Irvine. It was refined after pilot testing by a team from the University of Minnesota (Day et al. 2006).  
- The *literature review* covered empirical studies, advocacy pieces, and existing audit tools, and was conducted in order to establish a list of environmental features that might influence physical activity.  
- Three *focus-group interviews* were conducted, one each with low-income persons, teens, and nonwhite college students. The interviews, which were intended to solicit previously unidentified elements of the environment related to active living, proved to be less effective than expected and were halted.
• A field survey was conducted in twenty-seven different settings (including new urbanist developments, older urban neighborhoods, suburban residential neighborhoods, and TODs) to identify additional physical features potentially related to active living.

• A panel of experts was used midway through the process to solicit feedback on the draft inventory and its proposed procedures. The panel represented experts from the fields of urban planning, health, GIS, and environmental psychology. Feedback occurred during a two-hour conference call in which experts were asked about missing features and areas for improvement. Several changes were made to the inventory in response to the panel’s suggestions.

• Pilot testing led to changes in layout and rating scales, both of which were simplified.

Why It Was Chosen

This tool is easy to fill out and is thus highly reliable. The Irvine Minnesota Inventory was developed for measuring urban-design elements related to walking, but is the most comprehensive of published instruments on features of streets (Day et al. 2006; Boarnet et al. 2006).

It has strengths and weaknesses compared with the urban-design score sheet. Unlike the score sheet it does not have a built-in evaluation component. Rather, individual researchers need to develop scales from the raw answers. This is allows flexibility, but adds additional work. It is longer than the urban-design score sheet, but the questions are easier to answer, making it faster to fill out.

During 2007 it is being tested for how well it predicts actual walking (predictive validity) although it is a reliable measure of urban-design features whether or not it predicts walking.

How Long It Takes and Who Uses It

Training involves reading a code book and training manual, as well as practicing on a small number of segments. Boarnet et al. (2006) estimate “data collection involved a total of twenty minutes per segment in travel to fieldwork, actual fieldwork, data entry, and proofing.”
The inventory was designed to be used by observers (e.g., college students, community members) who have received eight hours of training. A team leader, preferably with advanced graduate training, is needed to manage the project. Duties for the team leader include preparing for data collection, training the research team, testing for reliability, and overseeing data collection and analysis.

Steps

The training protocol for using this is in a PowerPoint available at: http://webfiles.uci.edu/kday/public/index.html and at http://www.activelivingresearch.org. A codebook explains each question in more depth. The actual layout of the inventory when used in the field is landscape—this minimizes paper use.

In order to do an inventory, the observation team needs a detailed map of each setting, with all streets marked. There are paper versions and a computer version that uses a Tablet PC with Microsoft Access software and the inventory file.

The initial inventory was developed for use with settings (e.g., neighborhoods) and segments. It is most typically used at the segment level. A segment is typically two facing block fronts. The number of segments per setting will differ, but typically ranges from forty to eighty. The team leader follows a sampling procedure to identify the segments that will be observed by the research team.

The observer walks through the setting and can record directly on a tablet PC. (Cookbook 2005, 2). If Tablet PCs are not available, a paper version can be used and may, in fact, be preferred as it is less expensive and less bulky.

The inventory has been tested for reliability using separate recorders and is highly reliable (Boarnet et al. 2006).

Other information
A description of the tool is available at: http://www.activelivingresearch.org/index.php/Irvine_Minnesota_Inventory/334. This page also links to the tool, training manual, and codebook.

Published articles include:
### Neighborhood Identification

1. Are there monuments or markers including neighborhood entry signs that indicate that one is entering a special district or area?  
   - yes = 1; no = 0  
   - mean = 1; med. = 0; st dev = 0.0  

### Street Crossing

2a. Consider the places on the segment that are intended for pedestrians to cross the street. Are these places marked for pedestrian crossing?  
   - yes = 1; no = 0  
   - mean = 1; med. = 0; st dev = 0.0  

2b. What type of marking do the crosswalks have? Mark all that apply.  
   - White painted lines  
   - yes = 1; no = 0  
   - mean = 1; med. = 0; st dev = 0.3  

3. Are there curb cuts at all places where crossing is expected to occur?  
   - yes = 1; no = 0  
   - mean = 1; med. = 0; st dev = 0.0

4. What type of traffic/pedestrian signal(s)/system(s) is/are provided? Mark all that apply.  
   - Traffic signal  
   - yes = 1; no = 0  
   - mean = 1; med. = 0; st dev = 0.0

### Street Characteristics

5. For an individual who is on this segment, how safe (traffic wise) do you think it is to cross the street from this segment?  
   - pretty/very safe = 1; not very safe/unsafe = 0  
   - mean = 1; med. = 0; st dev = 0.0

6. For an individual who is on this segment, how convenient (traffic wise) do you think it is to cross the street from this segment?  
   - pretty/very convenient = 1; not very/inconvenient = 0  
   - mean = 1; med. = 0; st dev = 0.0

### Views

7. Does the segment have banners that identify the neighborhood?  
   - some/a lot = 3; few = 2; none = 0  
   - mean = 1; med. = 0; st dev = 0.3

8a. Is this a pedestrianized street?  
   - yes = 1; no = 0  
   - mean = 1; med. = 0; st dev = 0.3

8b. Is the street a …  
   - one way = 1; two way = 2  
   - mean = 1; med. = 0; st dev = 0.3

9. Is this segment an alley?  
   - yes = 1; no = 0  
   - mean = 1; med. = 0; st dev = 0.3

10. How many vehicle lanes are there for cars? (Include turning lanes).  
   - six or more = 6; five = 5; four = 4; three = 3; two = 2; one = 1; NA (no lanes for car travel) = 8  
   - mean = 1; med. = 0; st dev = 0.3

### Residential

11a. Is this segment characterized by having a significant open view of an object or scene that is not on the segment? The view must be a prominent one.  
   - attractive = 3; neutral = 2; unattractive = 1  
   - mean = 1; med. = 0; st dev = 0.3

11b. How attractive is the open view?  
   - yes = 1; no = 0  
   - mean = 1; med. = 0; st dev = 0.3

### School

12a. What types of land uses are present on this area? Mark all that apply.  
   - yes = 1; no = 0  
   - mean = 1; med. = 0; st dev = 0.3

### Public space

12a. What types of land uses are present on this area? Mark all that apply.  
   - yes = 1; no = 0  
   - mean = 1; med. = 0; st dev = 0.3

### Recreational/leisure/fitness

12a. What types of land uses are present on this area? Mark all that apply.  
   - yes = 1; no = 0  
   - mean = 1; med. = 0; st dev = 0.3
### Moving Design Survey Results

<table>
<thead>
<tr>
<th>Public Building Segment</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community center or library</td>
<td>yes = 1; no = 0</td>
<td>38 (0.0) 39 (0.0)</td>
<td>40 (0.0) 41 (0.0)</td>
</tr>
<tr>
<td>Museum, auditorium, concert hall, theater</td>
<td>yes = 1; no = 0</td>
<td>39 (0.0) 39 (0.0)</td>
<td>40 (0.0) 41 (0.0)</td>
</tr>
<tr>
<td>Post office, police station, courthouse, Department of Motor Vehicles</td>
<td>yes = 1; no = 0</td>
<td>40 (0.0) 40 (0.0)</td>
<td>40 (0.0) 40 (0.0)</td>
</tr>
<tr>
<td>Public building, other</td>
<td>yes = 1; no = 0</td>
<td>41 (0.0) 41 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Institutional</td>
<td>yes = 1; no = 0</td>
<td>42 (0.0) 42 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Religious institution (church, temple, mosque, etc.)</td>
<td>yes = 1; no = 0</td>
<td>43 (0.0) 43 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Hospital, medical facility, health clinic</td>
<td>yes = 1; no = 0</td>
<td>44 (0.0) 44 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Institutional, other</td>
<td>yes = 1; no = 0</td>
<td>0.0 0.0</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Commercial</td>
<td>yes = 1; no = 0</td>
<td>45 (0.0) 45 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Retail stores/restaurant</td>
<td>yes = 1; no = 0</td>
<td>46 (0.0) 46 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Banks/financial service</td>
<td>yes = 1; no = 0</td>
<td>47 (0.0) 47 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Hotel/hospitality</td>
<td>yes = 1; no = 0</td>
<td>48 (0.0) 48 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Car dealership</td>
<td>yes = 1; no = 0</td>
<td>49 (0.0) 49 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Gas/service station</td>
<td>yes = 1; no = 0</td>
<td>49 (0.0) 49 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Commercial, other</td>
<td>yes = 1; no = 0</td>
<td>50 (0.0) 50 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Office/service</td>
<td>yes = 1; no = 0</td>
<td>51 (0.0) 51 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Service facilities (includes insurance offices, funeral homes, dry cleaning, laundromats, etc.)</td>
<td>yes = 1; no = 0</td>
<td>52 (0.0) 52 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Industrial, manufacturing</td>
<td>yes = 1; no = 0</td>
<td>53 (0.0) 53 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Light industrial (e.g., auto paint and auto body repair shops; i.e., clean industries)</td>
<td>yes = 1; no = 0</td>
<td>54 (0.0) 54 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Medium or heavy industrial (e.g., chemical plants, oil wells, etc.)</td>
<td>yes = 1; no = 0</td>
<td>55 (0.0) 55 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Industrial, other</td>
<td>yes = 1; no = 0</td>
<td>56 (0.0) 56 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Transportation center</td>
<td>yes = 1; no = 0</td>
<td>57 (0.0) 57 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Other</td>
<td>yes = 1; no = 0</td>
<td>58 (0.0) 58 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Undeveloped land</td>
<td>yes = 1; no = 0</td>
<td>59 (0.0) 59 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Agricultural land, ranch, farming</td>
<td>yes = 1; no = 0</td>
<td>60 (0.0) 60 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Nature feature</td>
<td>yes = 1; no = 0</td>
<td>61 (0.0) 61 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Other</td>
<td>yes = 1; no = 0</td>
<td>62 (1.1) 62 (1.1)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>12b. How many of the buildings in this segment contain vertical-mixed use, that is, the building has different land uses on different floors of the building?</td>
<td>some/a lot = 3; few = 2; none = 0; NA (no buildings&gt;1 story) = 8</td>
<td>63 (0.0) 63 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>12c. Determine whether any of these distinctive retail types are present (focusing on the form of the building).</td>
<td>Bin/box shops (includes super stores or warehouse stores)</td>
<td>yes = 1; no = 0</td>
<td>64 (0.0) 64 (0.0)</td>
</tr>
<tr>
<td>Shopping mall</td>
<td>yes = 1; no = 0</td>
<td>65 (0.0) 65 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Strip mall/row of shops</td>
<td>yes = 1; no = 0</td>
<td>66 (0.0) 66 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Drive-thru</td>
<td>yes = 1; no = 0</td>
<td>67 (0.0) 67 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>13a. Mark off all types of public space(s) on this area and how attractive it is</td>
<td>Park/playground</td>
<td>attractive = 3; neutral = 2; unattractive = 1; 0 = no space</td>
<td>68 (0.0) 68 (0.0)</td>
</tr>
<tr>
<td>Playing or sport field</td>
<td>attractive = 3; neutral = 2; unattractive = 1; 0 = no space</td>
<td>69 (0.0) 69 (0.0)</td>
<td></td>
</tr>
<tr>
<td>Plaza/square/courtyard</td>
<td>attractive = 3; neutral = 2; unattractive = 1; 0 = no space</td>
<td>70 (0.0) 70 (0.0)</td>
<td></td>
</tr>
<tr>
<td>Public garden</td>
<td>attractive = 3; neutral = 2; unattractive = 1; 0 = no space</td>
<td>71 (0.0) 71 (0.0)</td>
<td></td>
</tr>
<tr>
<td>Beach</td>
<td>attractive = 3; neutral = 2; unattractive = 1; 0 = no space</td>
<td>72 (0.0) 72 (0.0)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>attractive = 3; neutral = 2; unattractive = 1; 0 = no space</td>
<td>73 (0.0) 73 (0.0)</td>
<td></td>
</tr>
</tbody>
</table>

### Other Land Uses

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bars/night clubs</td>
<td>some/a lot = 3; few = 2; none = 0</td>
<td>74 (1.0) 74 (1.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Adult uses</td>
<td>some/a lot = 3; few = 2; none = 0</td>
<td>75 (0.0) 75 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Check-cashing stores/pawn shops/bail-bond stores</td>
<td>some/a lot = 3; few = 2; none = 0</td>
<td>76 (0.0) 76 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Liquor stores</td>
<td>some/a lot = 3; few = 2; none = 0</td>
<td>77 (0.0) 77 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Restaurants</td>
<td>some/a lot = 3; few = 2; none = 0</td>
<td>78 (1.7) 78 (1.7)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Coffee shops</td>
<td>some/a lot = 3; few = 2; none = 0</td>
<td>79 (0.0) 79 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Libraries/bookstores</td>
<td>some/a lot = 3; few = 2; none = 0</td>
<td>80 (0.1) 80 (0.1)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>“Corner” store</td>
<td>some/a lot = 3; few = 2; none = 0</td>
<td>81 (0.0) 81 (0.0)</td>
<td>0.0 0.0</td>
</tr>
<tr>
<td>Art or craft galleries</td>
<td>some/a lot = 3; few = 2; none = 0</td>
<td>82 (0.0) 82 (0.0)</td>
<td>0.0 0.0</td>
</tr>
</tbody>
</table>
### Sidewalks

<table>
<thead>
<tr>
<th>Barrrier Type</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mean</td>
<td>med.</td>
<td>std dev</td>
</tr>
<tr>
<td>Farmers' market</td>
<td>yes = 1; no = 0</td>
<td>83</td>
<td>0.0</td>
</tr>
<tr>
<td>Open field/golf course</td>
<td>yes = 1; no = 0</td>
<td>84</td>
<td>0.0</td>
</tr>
<tr>
<td>Lake/pond</td>
<td>yes = 1; no = 0</td>
<td>85</td>
<td>0.0</td>
</tr>
<tr>
<td>Fountain/reflecting pool</td>
<td>yes = 1; no = 0</td>
<td>86</td>
<td>0.0</td>
</tr>
<tr>
<td>Stream/river/canal/creek</td>
<td>yes = 1; no = 0</td>
<td>87</td>
<td>0.0</td>
</tr>
<tr>
<td>Forest or woods</td>
<td>yes = 1; no = 0</td>
<td>88</td>
<td>0.0</td>
</tr>
<tr>
<td>Ocean</td>
<td>yes = 1; no = 0</td>
<td>89</td>
<td>0.0</td>
</tr>
<tr>
<td>Mountain or hills</td>
<td>yes = 1; no = 0</td>
<td>90</td>
<td>0.0</td>
</tr>
<tr>
<td>Desert</td>
<td>yes = 1; no = 0</td>
<td>91</td>
<td>0.0</td>
</tr>
</tbody>
</table>

### Sidewalks

<table>
<thead>
<tr>
<th>Sidewalk Feature</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highway (elevated or below ground)</td>
<td>no barrier = 0; can be overcome = 1; can be somewhat overcome = 2; can not be overcome = 3</td>
<td>92</td>
<td>0.0</td>
</tr>
<tr>
<td>Railroad track</td>
<td>no barrier = 0; can be overcome = 1; can be somewhat overcome = 2; can not be overcome = 3</td>
<td>93</td>
<td>0.0</td>
</tr>
<tr>
<td>Impassable land use (e.g., gated community, major industrial complex, etc.)</td>
<td>no barrier = 0; can be overcome = 1; can be somewhat overcome = 2; can not be overcome = 3</td>
<td>94</td>
<td>0.0</td>
</tr>
<tr>
<td>River</td>
<td>no barrier = 0; can be overcome = 1; can be somewhat overcome = 2; can not be overcome = 3</td>
<td>95</td>
<td>0.0</td>
</tr>
<tr>
<td>Drainage ditches</td>
<td>no barrier = 0; can be overcome = 1; can be somewhat overcome = 2; can not be overcome = 3</td>
<td>96</td>
<td>0.0</td>
</tr>
<tr>
<td>Road with 6 or more lanes</td>
<td>no barrier = 0; can be overcome = 1; can be somewhat overcome = 2; can not be overcome = 3</td>
<td>97</td>
<td>0.0</td>
</tr>
<tr>
<td>Other</td>
<td>no barrier = 0; can be overcome = 1; can be somewhat overcome = 2; can not be overcome = 3</td>
<td>98</td>
<td>0.0</td>
</tr>
</tbody>
</table>

### Sidewalks

<table>
<thead>
<tr>
<th>Sidewalk Feature</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arcades</td>
<td>some/ much of s'walk covered = 1; no/little covered = 0</td>
<td>103</td>
<td>0.0</td>
</tr>
<tr>
<td>Awnings</td>
<td>some/ much of s'walk covered = 1; no/little covered = 0</td>
<td>104</td>
<td>0.4</td>
</tr>
<tr>
<td>Other</td>
<td>some/ much of s'walk covered = 1; no/little covered = 0</td>
<td>105</td>
<td>0.0</td>
</tr>
<tr>
<td>18a. How many sides of the street have sidewalks?</td>
<td>count 1 or 2</td>
<td>99</td>
<td>2.0</td>
</tr>
<tr>
<td>18b. Is the sidewalk complete on one or both sides?</td>
<td>yes = 1; no = 0; NA = 8</td>
<td>100</td>
<td>1.0</td>
</tr>
<tr>
<td>18c. What is the condition or maintenance of the sidewalk?</td>
<td>under repair = 2; moderate or good = 1; poor = 0</td>
<td>101</td>
<td>1.0</td>
</tr>
<tr>
<td>18d. Is there a decorative or unique paving that covers most or all of the sidewalk on the segment? (e.g., bricks, tile, etc.)</td>
<td>yes = 1; no = 0</td>
<td>102</td>
<td>0.9</td>
</tr>
</tbody>
</table>

### Sidewalks

<table>
<thead>
<tr>
<th>Sidewalk Feature</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle Lanes</td>
<td>yes = 1; no = 0</td>
<td>108</td>
<td>0.1</td>
</tr>
<tr>
<td>20a. Are there bicycle lanes on the segment?</td>
<td>yes = 1; no = 0</td>
<td>109</td>
<td>0.3</td>
</tr>
<tr>
<td>20b. How are the bicycle lanes demarcated?</td>
<td>on road, painted line/reflectors=3; on road physical separation = 2</td>
<td>110</td>
<td>0.6</td>
</tr>
<tr>
<td>21a. Is there a marked mid-block crosswalk for pedestrians?</td>
<td>yes = 1; no = 0</td>
<td>111</td>
<td>0.0</td>
</tr>
<tr>
<td>21b. What type of marking does the crosswalk have? Mark all that apply</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White painted lines</td>
<td>yes = 1; no = 0</td>
<td>112</td>
<td>0.0</td>
</tr>
<tr>
<td>Colored painted lines</td>
<td>yes = 1; no = 0</td>
<td>113</td>
<td>0.0</td>
</tr>
<tr>
<td>Zebra striping</td>
<td>yes = 1; no = 0</td>
<td>114</td>
<td>0.0</td>
</tr>
<tr>
<td>Different road surface or paving (e.g., tiles, colored concrete, marble, etc.)</td>
<td>yes = 1; no = 0</td>
<td>115</td>
<td>0.0</td>
</tr>
</tbody>
</table>

### Sidewalks

<table>
<thead>
<tr>
<th>Sidewalk Feature</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Bicycle Lanes

<table>
<thead>
<tr>
<th>Bicycle Lane Feature</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-Block Crossing</td>
<td>yes = 1; no = 0</td>
<td>116</td>
<td>0.0</td>
</tr>
<tr>
<td>Steepness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steep slope = 2; moderate slope = 1; flat or gentle slope = 0</td>
<td>117</td>
<td>0.1</td>
<td>0.0</td>
</tr>
</tbody>
</table>
### Traffic Features

<table>
<thead>
<tr>
<th>Question</th>
<th>Choices</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>43. What is the posted speed limit on this segment? Only include traffic?</td>
<td>Mark all that apply.</td>
<td>under a freeway overpass = 3; next to freeway = 2; IS a freeway overpass = 1; none of the above = 0</td>
<td>144</td>
<td>0.0 0.0 0.0 0.0 0.0 0.0 0.0</td>
</tr>
</tbody>
</table>

### Street Trees

<table>
<thead>
<tr>
<th>Question</th>
<th>Choices</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>26a. How many street trees are on this segment? (Do not include trees that are not on the public right of way; street trees are typically between the sidewalk and the street or if there is no sidewalk, trees usually line the street)</td>
<td>some trees/trees along most or entire segment = 1; None/few trees = 0</td>
<td>125</td>
<td>0.8 1.0 0.4 0.6 1.0 0.5 0.7 1.0 0.5</td>
<td>126</td>
</tr>
</tbody>
</table>

### Buildings

<table>
<thead>
<tr>
<th>Question</th>
<th>Choices</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>27. How many stories are most buildings on the segment?</td>
<td>heights vary, no predominant height = 0; 0-1 stories = 1; 1-2 stories = 2; 3-4 stories = 3; 5 or more = 4; NA (no buildings) = 8</td>
<td>127</td>
<td>1.8 2.0 0.9 1.0 1.0 0.0 0.9 1.0 0.9</td>
<td>130</td>
</tr>
</tbody>
</table>

### Other features of buildings

<table>
<thead>
<tr>
<th>Question</th>
<th>Choices</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>30. How many buildings on this segment have windows with bars? (proportion)</td>
<td>some/a lot = 3; few = 2; none = 0; NA = 8</td>
<td>133</td>
<td>0.8 0.0 1.0 0.5 0.0 1.1 4.0 4.0 4.2</td>
<td>134</td>
</tr>
</tbody>
</table>

### Garages

<table>
<thead>
<tr>
<th>Question</th>
<th>Choices</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>33b. How prominent are most garage doors when looking at the front of the buildings?</td>
<td>very = 3; somewhat = 2; not very/not visible = 0</td>
<td>134</td>
<td>0.4 0.0 0.8 0.1 0.3 0.1 1.1 0.0 1.4</td>
<td>135</td>
</tr>
</tbody>
</table>

### Parking

<table>
<thead>
<tr>
<th>Question</th>
<th>Choices</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>34b. Looking at the front of the parking structure on the street level floor, what is the predominant use that is visible to you?</td>
<td>parking = 2; varied = 1; not parking other uses = 0</td>
<td>136</td>
<td>0.4 0.0 0.8 0.0 0.0 0.0 0.8 0.5 0.9</td>
<td>137</td>
</tr>
</tbody>
</table>

### Driveways

<table>
<thead>
<tr>
<th>Question</th>
<th>Choices</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>35. How many driveways are visible on the segment?</td>
<td>some/a lot = 3; few = 2; none = 0</td>
<td>137</td>
<td>0.8 0.0 1.0 1.0 1.0 1.1 1.6 2.0 1.2</td>
<td>138</td>
</tr>
</tbody>
</table>

### Maintenance

<table>
<thead>
<tr>
<th>Question</th>
<th>Choices</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>37. How much graffiti is apparent on this segment?</td>
<td>some/a lot = 3; little = 2; none = 0</td>
<td>139</td>
<td>0.3 0.0 0.9 0.0 0.0 0.0 0.0 0.0 0.0</td>
<td>140</td>
</tr>
</tbody>
</table>

### Lighting

<table>
<thead>
<tr>
<th>Question</th>
<th>Choices</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>41. Is there outdoor lighting on the segment? (Include lighting that is intended to light public paths and public spaces.)</td>
<td>yes = 1; no = 0</td>
<td>143</td>
<td>1.0 1.0 0.0 0.8 1.0 0.4 0.8 1.0 0.4</td>
<td>144</td>
</tr>
</tbody>
</table>

### Freeways

<table>
<thead>
<tr>
<th>Question</th>
<th>Choices</th>
<th>Clarendon</th>
<th>Emerson Park</th>
<th>Fruitvale</th>
</tr>
</thead>
<tbody>
<tr>
<td>42. Is there a freeway overpass/underpass connected to this segment?</td>
<td>use number; not posted = 8</td>
<td>145</td>
<td>8.0 8.0 0.0 8.0 8.0 0.0 8.0 8.0 0.0</td>
<td>148</td>
</tr>
<tr>
<td></td>
<td>Clarendon</td>
<td>Emerson Park</td>
<td>Fruitvale</td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------</td>
<td>--------------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>mean</td>
<td>med.</td>
<td>st dev</td>
<td>mean</td>
</tr>
<tr>
<td>Traffic circle/roundabout</td>
<td>yes = 1; no = 0</td>
<td>149</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Median</td>
<td>yes = 1; no = 0</td>
<td>150</td>
<td>0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Angled/on-street parking (that runs along most or the entire segment - does not have to be on both sides of segment)</td>
<td>yes = 1; no = 0</td>
<td>151</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>45a. Is there a cul-de-sac or permanent street closing on this segment?</td>
<td>yes = 1; no = 0</td>
<td>152</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>45b. Is there a pedestrian-access point or cut-through point that allows pedestrians to go from one segment to another (even though vehicular traffic may not be able to)?</td>
<td>yes = 1; no = 0; don't know = 7</td>
<td>153</td>
<td>0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Architecture/Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>46. Rate the attractiveness of the segment (design + maintenance)</td>
<td>attractive = 3; neutral = 2; unattractive = 1</td>
<td>154</td>
<td>2.3</td>
<td>2.0</td>
</tr>
<tr>
<td>47. Does this segment have buildings that appear to be historic? (old + detailed)</td>
<td>yes = 1; no = 0; NA = 8</td>
<td>155</td>
<td>0.2</td>
<td>0.0</td>
</tr>
<tr>
<td>48. How interesting is the architecture/urban design of this segment?</td>
<td>interesting = 3; somewhat interesting = 2; uninteresting = 1</td>
<td>156</td>
<td>1.8</td>
<td>2.0</td>
</tr>
<tr>
<td>Other features of the segment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>49. How many street vendors or stalls are on this segment? (do not count newspaper racks; there must be a person vending)</td>
<td>some/a lot = 3; few = 2; none = 0</td>
<td>157</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>50. Is there public art that is visible on this segment?</td>
<td>yes = 1; no = 0</td>
<td>158</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>51. Are there billboards present on this segment?</td>
<td>some/a lot = 3; few = 2; none = 0</td>
<td>159</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>People</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52. How safe do you feel walking on this segment?</td>
<td>pretty/very safe = 1; not very safe/unsafe = 0</td>
<td>160</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Dogs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53. Are there any loose/unsupervised/barking dogs on this segment that seem menacing?</td>
<td>yes = 1; no = 0</td>
<td>161</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Olfactory Character</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54. Is the dominant smell unpleasant?</td>
<td>yes = 1; no = 0</td>
<td>162</td>
<td>0.1</td>
<td>0.0</td>
</tr>
</tbody>
</table>
C. Design Workshop

What It Is
The design workshop is a participatory evaluation technique modeled on a form of health-impact assessment, as well as on more typical workshops and focus groups. Design experts participate in a workshop that takes a few hours. Depending on the number and complexity of sites dealt with, this technique requires one to two weeks of additional work prior to the workshop to prepare background maps, graphics, and briefing materials.

Unlike the audits, it can provide a holistic assessment of the places—what is good about them and what can be improved. Participants are design professionals, although an identical workshop can be run with non-designers and this was done for this project.

Why It Was Chosen
This is a focused, interactive workshop that maximizes information gleaned from a panel of design experts.

How Long It Takes and Who Uses It
The workshop itself takes two hours. Preparation of materials, in this case much of it already being done for other parts of the report, takes one to two weeks. In addition to those preparing the materials, it requires a facilitator familiar with the area, a note taker, and a transcriber.

Steps
The people involved in a design workshop can either represent a range of experts and stakeholders or a key group. This set of instructions focused on design professionals.

In order for there to be an informed discussion about the area or areas, preparation is key. The following information should be assembled:

- A map of the road or area showing major streets, key landmarks, and contours, if possible.
- Photographs of the road or area showing views of all major streets and plazas. These can either be printed out or available for projection by computer.
• It is also possible to provide results of any interviews with others not at the meeting.

An example format is included.

It might be also appropriate to tour the area, however that is contingent on time of day and year.
Running the Workshop

The following is a prototype agenda with instructions and prompts for a two-hour workshop looking at two areas. If possible, provide food.

1. Overview of project (5 mins.)
2. Overview of session (5 mins.)
   - Focus on visual environment
   - Explain recording and note taking
   - Won’t use people’s names except for the written summaries we’ve set aside time for at the end.
3. Introductions—name and affiliation (5 mins.)
4. Slide show of case study sites—study team (10 mins.)
5. Workshop (1 hour 15 minutes total; potentially stop for a bathroom break)
   - How would you describe these sites to a colleague? (go round once so that everyone gets used to talking). Prompt—what is most memorable about these areas?
   - What works well about these areas? Prompt for: Visual qualities? Function? Fit? Form? Ask for them to point at pictures and map.
   - What could be improved? Prompt for: Visual qualities? Function? Fit? Form? Ask for them to point at pictures and map
   - Do they take advantage of the train stations?
   - Facilitator reflects back basic ideas about each question.
6. Wrap up
   - Last reflections: What is most important or most memorable about these areas? What are some key lessons for the future?
   Gain fame and write something quotable for the final report! (Don’t forget your name if you want to be quoted by name.) (10 minutes)

End 10 minutes early!
Variation: Non-designers

There are many different techniques to elicit non-designer opinions about visual issues. For this report we used a similar process to the design workshop and worked with representatives of cities, community groups, transit users, police, transportation professionals and workers, and other professions. This allowed us to elicit opinions without burdening members of the public.

Typical people to invite to such workshops include:

- architects,
- landscape architects,
- city planners,
- developers,
- traffic engineers,
- elected officials,
- maintenance workers,
- police,
- representatives of a local resident or business association,
- those interacting with visitors to the area such as tourism authorities or visitor bureaus, and
- key users, such as transit riders or representatives of the automobile association.
D. Participatory Visual Assessment

Note, there are a wide variety of participatory visual-assessment techniques. They are dealt with in the appendix B.
E. Mapping

What It Is
In work comparing environments, it is useful to compare their physical scale and pattern. We used variations on figure ground mapping (including work on street patterns and intersections) to create maps of each of the case-study environments.

In addition, using standard GIS protocols, we calculated the number of businesses per hectare around each study area, typically with a 400 and 800 m straight line buffer around each station (Forsyth 2005a).

Why It Was Chosen
With the advent of online mapping, and particularly of Google Earth, it is now relatively inexpensive to prepare maps to scale.

How Long It Takes
Each map takes some hours to prepare but if done in digital format can be transformed in a number of ways.

Creating a Figure Ground
Software used: Google Earth and Adobe Photoshop
Estimated time per map: 9 hours
- 30 minutes with Google Earth
- 30-60 minutes piecing together images in Photoshop
- 7-8 hours drawing map in Photoshop

Steps:
1) Define area of interest and center point
   a) For project team, maps were one mile by one mile square
2) Google Earth
   a) Zoom to center point
   b) From center point, draw a line one half mile to the north. At the end of the line, place a placemark (pushpin). Repeat with lines to the south, east and west, placing placemarks at the end of each line.
c) Using these placemarks, use the line tool to place placemarks at each of the four corners of the area of interest.

d) In order to get images of high enough resolution to trace streets, multiple images must be saved for each area of interest. The project team used 12 images, each from 2,800 feet.
   i) Start from the top left corner, using the placemark as a guide.
   ii) Set elevation to 2,800 ft.
   iii) Place placemarks in corners to identify the extent covered by this image.
       (1) Save image. Use consistent file names.
   iv) Use the navigational arrows in Google Earth to move right for the next image.
   v) Line the image up (using the placemarks) so there is some overlap between what’s covered by the first image and what’s covered by the second.
   vi) Place placemarks in corners to identify the extent covered by this image.
       (1) Save image.
   vii) Proceed through steps 3.d.i-iii until all images have been saved.

3) Open new canvas in Adobe Photoshop
   a) Set canvas size at 39 in. by 39 in. (after cropping, the final image will actually be 38.5 by 38.5).
   b) Use guides and the ruler to create a square of 38.5 in. by 38.5 in. inside the canvas.
   c) Merge Google Earth images in Photoshop
      i) Choose File>Automate>Photomerge.
      ii) Browse for the images to be merged.
      iii) Photoshop will attempt to piece them together. If it is not satisfactory, move the images near to where they should go and Photoshop will snap them into place.
   d) Cut the canvas to remove the margins. It should now be 38.5 in. by 38.5 in.

4) Trace the map in Adobe Photoshop
   a) Tracing streets
      i) Using the Pen Tool, run lines down the center of streets and change the stroke weight to adjust the street width. Use black to stroke the lines.
      ii) The polygon lasso tool can also be used. Select the area and fill with paint bucket tool.
Figure ground maps are useful for understanding street patterns and circulation. These are from Delmar Loop, Emerson Park, downtown Oakland, and Fruitvale.
b) Depicting different types of intersections
   i) Intersections at grade
      (1) Use the Paintbrush tool to make a dot in the center of the intersection
      (2) Use the Circular Erase tool to blur the circle. This gives the intersection a rounded look.
   ii) Intersections at different grades
      (1) For intersections, such as overpasses, where streets do intersect at grade, leave the corners sharp.
   iii) Railroad intersections not at grade
      (1) Include thin lines along the railroad right-of-way.
   iv) Railroad intersection at grade
      (1) Round the corners and include thin lines over the streets.
5) Delete Google Earth layer, flatten images, and invert.
   a) Delete Google Earth background layer.
   b) Choose Layer>flatten image.
   c) Choose Image>adjustment>invert.
6) Save map as a TIFF in Photoshop.
   a) Raise the image resolution to 300 pixels/inch.
   b) File > Save As. Save the image as a TIFF.
F. Visual Assessment: Photography

What It Is

This visual assessment technique is described by Shephard and Newman in the *Prototype Visual Impact Assessment Manual* (1979), which was produced on behalf of the BLM. The report describes a visual-contrast rating system for assessing the visual impact of particular projects and focuses on six issues: color contrast, form contrast, line contrast, texture contrast, scale contrast, scale dominance, and spatial dominance.

It uses a two-part approach, with a basic procedure set up for smaller alterations and a detailed procedure for projects of particular importance or severity. Though the report focuses on the contrast and potential impacts of proposed projects (prospective), the method used for this project assesses the overall contrast of an existing scene (retrospective). The assessment worksheet used in this project was adapted from worksheet three in the BLM report.
Why It Was Chosen
It was chosen as a method of assessment that can rely on photographs, making it simple to use.

How Long It Takes
The adapted procedure used for this project takes five to ten minutes per image, with fifteen minutes needed at the start to familiarize the rater with the scoring scheme. The entire basic procedure, as outlined in the BLM report, takes much longer and involves multiple worksheets.

Steps
Fill out the worksheet according to the key below, circling the relevant response for each section. Record a score in the right-hand column for each visual element (color, form, contrast, line, texture, and scale). Add up the element scores and record the total in the Total Contrast Score box. Record a score for scale dominance and spatial dominance in the right-hand column. Add up the total scores for each section (element contrast, scale dominance, and spatial dominance) and place the total in the Overall Impact Score box. If needed, consult the BLM report for more detailed information on the elements, sub-elements, and rating schemes (Shepphard and Newman 1979, introduction). Chapter two of this report contains definitions of a number of the elements of this rating scheme along with illustrations of these elements.

Worksheet Key

Element Contrast

Color
Sub-elements—hue (red, blue, etc.), value (lightness or darkness), chroma (saturation)
- high: extreme contrast in either value or hue;
- medium: significant contrast in either hue or value;
- low: some contrast in hue or value; and
- none: little or no contrast in both hue and value.
### Visual Contrast Assessment Worksheet

(adapted from Shephard and Newman 1979)

<table>
<thead>
<tr>
<th>Visual Elements</th>
<th>Element Ratings</th>
<th>Element Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color Contrast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Med</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Form Contrast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Med</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Line Contrast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Med</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Texture Contrast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Med</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Scale Contrast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Med</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**Total Contrast Score**

<table>
<thead>
<tr>
<th>Scale Dominance</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Major object in a confined setting and occupies large part of setting</td>
<td>Dominant</td>
<td>12</td>
</tr>
<tr>
<td>Object in a confined setting or major object/area in an unconfined setting</td>
<td>Co-Dominant</td>
<td>8</td>
</tr>
<tr>
<td>Object of significant size but occupies a minor part of the setting</td>
<td>Subordinate</td>
<td>4</td>
</tr>
<tr>
<td>No object dominates the setting</td>
<td>Insignificant</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spatial Dominance</th>
<th>Composition</th>
<th>2-3 ratings of Prominent</th>
<th>1 rating of Prominent or 2 highest ratings Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prominent</td>
<td>Dominant</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Significant</td>
<td>Co-Dominant</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Inconspicuous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Position</td>
<td>Significant</td>
<td>1 highest rating Significant</td>
<td>Subordinate</td>
</tr>
<tr>
<td>Backdrop</td>
<td>Prominent</td>
<td>all ratings Inconspicuous</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Inconspicuous</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Overall Impact Score**
Form
Sub-elements—geometry (square, triangle, circle, etc.), complexity (simplicity/regularity vs. complexity/irregularity), orientation (relation to horizontal or to points of compass);
-high: strong dissimilarity in two or more sub-elements;
-medium: significant dissimilarity in two sub-elements or strong dissimilarity in one sub-element;
-low: considerable similarity in two sub-elements; and
-none: close similarity in sub-elements.

Line
Sub-elements—boldness (visual strength), complexity, orientation (relation to horizontal or to points of compass);
-high: radical changes in edge-type, interruption of skyline;
-medium: significant changes in edge-type, interruption of strong lines in the landscape;
-low: slight changes in edges, minor interruptions of line; and
-none: little or no alteration or interruption of lines.

Texture
Sub-elements—grain (scale of sub-elements form coarse to fine), density (spacing of elements), regularity (distribution, evenness), internal contrast (e.g., in color);
-high: extreme differences in two or more sub-elements;
-medium: significant differences in two or more sub-elements;
-low: slight noticeable differences in sub-elements; and
-none: little or no difference in sub-elements.

Scale
Sub-elements: proportion of landscape setting (how big an object is relative to the entire visible setting), scale contrast (relative size of different objects), proportion of field of view (related to field of view of a camera or human eye);
-high: some object(s) is/are much larger or smaller than surrounding objects;
-medium: some objects(s) is/are significantly larger or smaller than surrounding objects;
-low: some object(s) is/are slightly larger or smaller than surrounding objects; and
-none: objects are similar in scale.
Scale Dominance
- dominant: some object(s) is/are the major element in a confined setting (e.g., valley or basin) and occupies a large part of the setting;
- co-dominant: some object(s) is/are in a confined setting or is/are the major object/area in an unconfined setting (e.g., plain or plateau);
- subordinate: some object(s) is/are of significant size but occupies a minor part of the setting; and
- insignificant: no object dominates.

Spatial Dominance
Spatial Composition Landscape composition (is it panoramic, enclosed, with a distinctive feature, a clear focal point, or canopied)
- prominent: focal, feature, or enclosed landscapes;
- significant: panoramic or weak focal, feature or enclosed landscapes; and
- inconspicuous: canopied, indistinct or obscured landscapes.

Spatial Position The prominence of an element due to its elevation and location in the landscape is rated as follows:
- prominent: ridge or side-slope;
- significant: plateau, bench, valley floor, or plain; and
- inconspicuous: slope toe (the bottom of a steep slope).

Backdrop
- prominent: all or significant portion of element(s) are seen against sky or water;
- inconspicuous: element(s) seen against backdrop of land.
Appendix B: Participation
Appendix B: Methods of Participatory Visual Assessment

Note: This appendix was initially prepared by Wendy Sarkissian, Jeff Deby, and Rebecca Bateman. It was revised by Ann Forsyth and Laura Baum.

This chapter outlines some major approaches to participatory visual assessment used as part of a design or planning process. There are many techniques for incorporating public opinions into transportation planning, or for building knowledge in community members about transportation issues, but only a few deal with the visual environment. Others are more focused on topics such as the function and safety of a place.

This section deals with the following techniques:

- Aesthetic Initiative Measurement System (AIMS)
- Annotation and Analysis workshop
- Awareness Walk
- Choice Catalog
- Design Game
- Neighborhood Assessment and Community Development for Youth
- Photo diary/Day or Week with a Camera
- Photo Survey
- Scenic and Town Character Assessment
- Street Scene Montage with Dots
- Table Scheme Display/Voting with Dots
- Visual Preference Survey with Photos

Sources at the end of each method allow for further reading. Many of the methods appear in multiple sources, however, and we have not been able to list them all.

A number of other techniques used in research could be modified for participation. Given the richness of the participation techniques and issues of resources for analysis raised by some of the research techniques, it is likely that would only be needed in rare
circumstances, however. These include environmental recalls (Sims and Khan 1977); comparison of visual preferences across regions (Nasar and Devlin 2000); specific long-interview techniques (Uzell and Jones 2000); more sophisticated visual-preference analyses (Hanyu et al. 2005; Stamps 1999a, b); simulation of environmental changes using balloons (Segal and Taylor 1989) or images (Evans and Wood 1980); additional checklist and matrix-style visual-assessment techniques beyond those reviewed already in the main report (Rahman 1992). We avoided techniques requiring random samples.
Aesthetic Initiative Measurement System (AIMS)

What It Is
The AIMS assesses the attractiveness of views as seen by passengers in a vehicle being driven down a highway. Participants assign a numerical attractiveness score to the view, and provide descriptions relating to what they saw and what they found attractive or unattractive. The ratings and descriptions are analyzed.

Who Does It
Investigators include a driver, and a trained note taker. Participants must be able to see well enough to notice details of the views. Necessary materials and equipment include a vehicle big enough that all passengers have a view, a questionnaire, and a prepared rating form.

Why It Was Chosen
AIMS was developed to determine what drivers perceive as attractive when they drive along specific stretches of highway, and how design and maintenance of those highways affect viewers’ perceptions.

How Long It Takes
Time will depend in part on the length of the road driven (in this case, 60.5 to 66.5 miles).

Steps
1) Select a study area and identify features of interest in that area.
2) Design the questionnaire about specific features of interest and rating forms.
3) Conduct the survey.
   a) Participants are driven in a van along the target stretches of highway.
   b) Participants call out when they see something they find attractive or unattractive.
   c) A investigator gives the caller a view number and notes the mileage at that point.
   d) On a ratings sheet, the caller and other participants who saw the view and found it noteworthy rate the view on a scale of one to five, and make reference notes.
APPENDIX B: METHODS OF PARTICIPATORY VISUAL ASSESSMENT | 301

E) Every seven-twelve miles the van stops and each caller describes what he or she saw and what was noteworthy. This is recorded by a trained note taker.

F) Other participants who also observed the view are asked for descriptors, which the note taker also records.

G) On the return trip, participants are directed to look for certain characteristics in a given zone based on the questionnaire (for example, plantings, or bridge or wall structures).

H) All participants who noted each view are asked to give detailed descriptions of the view's attractiveness or unattractiveness.

4) The descriptions are compiled and their content analyzed for themes.

5) Investigators analyze the five-point attractiveness ratings relative to the contents of each type of view that emerged from the content-analysis groupings.

Annotation and Analysis Workshop

What It Is
This method uses drawings or photographs of a present streetscape and compares them with illustrations of proposed design changes to that streetscape. The working group then generates a range of likes and dislikes by annotating the illustrations. Sanoff (2000) calls this a “streetscape analysis workshop.”

Who Does It
The method is done in a workshop setting, and would be undertaken by planning or engineering staff in conjunction with community participants. Tools required would be forms illustrating the present and proposed streetscapes with spaces for participants to record personal and group likes and dislikes.

Why It Was Chosen
The method is effective in generating a range of acceptable design interventions that can inform subsequent stages of design development.

How Long It Takes
A workshop would probably require from two to four hours to complete.

Steps
1) Use photographs or drawings to illustrate present and proposed streetscapes
2) Develop printed forms juxtaposing the present/proposed streetscapes, and providing space for listing individual and group likes/dislikes
3) Hold workshop
4) Tabulate results
5) Use results to develop streetscape designs that are within the range of acceptability

Variation: This can also be done with plan proposals.

Before and after sketches illustrate potential streetscape changes.
Visiting higher-density housing and other environments on foot can increase awareness.
Awareness Walk

What It Is
This method uses guided walks as a method of involving community members in the planning process. The walks are designed to stimulate interest in a townscape, discover processes currently shaping the urban environment, encourage critical skills in evaluating the visual quality of urban scenes, and develop skills necessary for analyzing the urban environment.

Who Does It
The method is used by planners, architects, and others involved in urban design, in conjunction with community participants. No tools would be required.

Why It Was Chosen
The method is effective in getting citizens involved in urban-planning issues by serving as an introduction to the planning process.

How Long It Takes
Time required would depend on the length of the walking tour, how many stopping points, etc.

Steps
1) Define the purpose of the walk (this would be done by the individual(s) leading the walk).
2) Determine the route.
3) Advertise the walk and invite public participation.
4) Discuss with participants afterward what they had learned on the walk. It can be helpful to photograph the walk to enhance recall.

Choice Catalog

What It Is
Choice catalogs are collections of options presented on paper. Like a menu, they provide a brief description of the options, illustrated with sketches or photographs. The initial method was developed for use in housing, focused at the level of individual dwelling units and dealing with issues from choices of fittings to overall layout. It has been modified to deal with aspects of the public realm such as street furnishings or playground equipment, however. Interchangeable options can be presented, or options can be assigned a point value and the chooser is limited to a certain number of points for all the chosen options combined.

Who Does It
The options are worked out by design professionals together with a small team of local participants. Participants review the options in the choice catalog and identify their preferred choice(s). This can be done individually or in groups. Costs involve design and printing, and either a place to hold consultation or a method for distributing the catalogues and collecting the results.

Why It Was Chosen
If designed clearly and simply, this method can provide residents with an opportunity to easily make choices in order to customize their dwellings.

How Long It Takes
This can be brief or longer, depending on the number of options and whether individual or group decisions are being made.

Steps
1) Identify the options to be presented.
2) Design the visual presentation of the options.
3) Distribute the choice catalogues (for example, by mail out or at a workshop).
4) Collect the results.
5) Implement the choices.

Source Nick Wates Associates n.d.
A participant chooses from a catalog board of bridge styles.
Design Game

What It Is
Participants place prepared pieces depicting buildings or furnishings on a base map of a site or room. Pieces can be two-dimensional illustrations or three-dimensional models. They select which elements to include, and where to put them. Materials are on hand during the exercise in case new pieces need to be created.

Who Does It
Coordinators must have design skills and materials for making the base maps and pieces. Participants can use this method individually or in groups. Materials for making the base maps and pieces are required, as well as a camera to photograph the participants’ final layouts. One variation sketches the final version, as well. A suitable location must be available to hold the event.

Why It Was Chosen
This method can be useful for participants who might respond more readily to visual stimuli and an active mode of participation. It can also create a more engaging and fun atmosphere.

How Long It Takes
The time depends on the complexity of the area to be designed.
Steps

1) Prepare a base map of the site or room.
2) Prepare cut-out pieces representing items to be fit into the map, to scale.
3) Ask participants to select pieces to be included and arrange them on the base map.
4) Take a photograph of the participants’ final arrangements.
5) Discuss and analyze participants proposed layouts as a basis for sketch designs and costings.

Source Nick Wates Associates n.d.
Neighborhood Assessment and Community Development for Youth

What It Is
This method uses teams of youth participants to inventory, classify, and map neighborhood sites according to assets and needs; formulate projects to address the needs; and select some to undertake.

Who Does It
Young people, in conjunction with adult mentors from local neighborhood organizations, are the participants. Tools required would be a camera (Polaroid is good if you want to use the photos quickly), large flip-charts, colored markers, notepads, pencils/pens, tape, colored stick-on dots, maps of neighborhood, and a video camera (optional).

Why It Was Chosen
This method is particularly fun and effective when engaging youth in thinking about their community, who lives there, and how youth can work together to create positive change in their neighborhood.

How Long It Takes
This process combines several forty-five minute to an hour long sessions. Cost would be inexpensive.

Steps
Note that this was designed to occur in several sessions—the neighborhood tour, making a map of good and bad things, coming up with ideas about how to improve the area, and choosing the best ideas.

1) Tour neighborhood to record good places and those that need improvement.
2) Write about each site and take pictures.
3) Make a map of neighborhood assets and needs.
4) Draw lines around identified sites and number each.
5) Tape lists to map of comments about what’s good/bad about each site.
6) Tape pictures of sites to map.
7) Draw lines from lists and pictures to sites on map.
8) Brainstorm ideas about improving community: kinds of places/activities important for healthy community, what kinds of people live there.
9) Make lists and tape to wall.
10) Divide group into teams of four to six to brainstorm ideas for projects to improve neighborhood.
11) Write what kinds of people for which each project is intended.
12) Choose two people from each team to present lists.
13) Rate each team (judges using scorecards); prizes awarded for team with most total points.
14) Choose best ideas by ranking projects on a matrix according to rating categories (e.g., how fun? how much learning potential? community service?).
15) Decide on top four to seven projects.

Photo Diary/Day or Week with a Camera

What It Is
Coordinators ask participants to take pictures of their neighborhood or daily activities, according to a prompt given to them at a briefing session (for example, “Pretend you are taking pictures to show someone who doesn’t live here what your neighborhood is like”). Participants make diary entries for each photograph, including why they took the photo and any comments about the place or their feelings. The coordinators analyze the photographs and the diaries for themes, checking these with the participants before drawing conclusions.

Who Does It
Coordinators must be able to conduct a semi-structured interview using a consistent format, and analyze the themes in the interview.

Any sighted participants can be involved, including children and youth. Participants for photo-diary methods are often a subset of participants in a larger consultation process (Meth 2003, Bijoux and Myers 2006).

The method requires cameras and access to printing facilities. If collage is used as part of the interview, it can be beneficial to have additional images (from magazines or other publications) available for participants.

Why It Was Chosen
The photo diary can be useful when working with participants who prefer methods that do not involve a lot of reading and writing, or who like physically-active participation or visual imagery. Some research suggests that it works well to overcome language barriers (Dodman 2003, Bijoux and Myers 2006). This method gives more control to the participant than many other participatory methods.

In this method, participants record their activities and impressions at the time they happen and are, therefore, likely to be more accurate than methods that rely on recall of those activities or impressions. Furthermore, the participation rate for photo diaries tends to be very high, near 100 percent (Dodman 2003).
How Long It Takes
The number of hours or days with a camera is determined by the research design, plus an initial orientation and thirty to sixty minutes for an interview at the end.

Steps
1) Design the wording and layout of the diary and the format for the participant briefing.
2) Solicit and brief participants.
3) Participants take photographs and make a diary entry for each photograph (typically between a few hours and a week).
4) Participants give film or files to the coordinator.
5) Examine the photographs for themes.
6) Code and categorize the photographs and diaries.
7) Meet with each participant in a semi-structured interview to check the coordinator’s thematic guesses, and to probe for further information from the participant (the interview may include a collage activity, especially if the participant is a child).
8) Revise the coding of photographs and diaries if appropriate.
9) Analyze the emergent themes.

Photo Survey

What It Is
Small teams of participants photograph their neighborhood in response to a particular question or theme. Each team presents and discusses their selections at a workshop involving all the teams. The photos can also be placed on large sheets of paper or maps for large-group discussion, or for comments to be added with felt pens or adhesive notes. The resulting written comments or spoken discussions can be recorded and later analyzed.

Who Does It
A facilitator is required for the event. Others are required to provide an analysis of the photographs as presented, as well as the discussions.

Six teams of six to eight people each are ideal. Any sighted individuals can participate.

Necessary materials include one camera per team, access to facilities for printing the photos (and processing, if film is used), Polaroid photos, large sheets of paper or maps, adhesive notes, felt pens, and a suitably-sized venue.

Why It Was Chosen
This method provides an opportunity for on-site visual surveying, a hands-on activity for data collection, and participants’ development and articulation of their evaluations.

How Long It Takes
The minimum amount of time for the workshop is 5.5 hours.

Steps
1) Brief the group.
2) Have group agree on objectives, timescales, and themes (e.g., memorable places and images, places to be alone, ugly buildings, threats).
3) Divide group into smaller teams.
4) Have teams go around taking photos.
5) Process film or digital photos (this could be during a lunch break, or between days of the workshop).
6) Arrange photos for presentation, grouping similar photos together
7) Have groups add symbols or words on adhesive notes to record comments, feelings, and evaluations.
8) Exhibit group photo presentations.
9) Have teams present their images and conclusions in the large group or to a greater audience.
10) Record debate and discussion.
11) Photographs, presentations, and recorded discussions may later be analyzed by researchers.

Source Nick Wates Associates n.d.
Scenic and Town Character Assessment

What It Is
This method uses professional and local expertise to assess the scenic quality of rural areas and small towns. The first stage involves a brief, open-ended intercept interview, in which participants are asked about town character. In the second stage a subset of the original participants are asked to identify on a map the sites or views they feel best represent the town’s character. The most frequently identified views are then photographed; and in a final stage, a different set of participants is asked to sort the photographs into piles from most to least scenic.

Town character is identified from the results of the first stage. Highly-valued scenic qualities are identified by assigning a mean value for scenery to each photograph based on the sorting task, and then photographs are examined for distinguishing traits. The results of this method can optionally be used to create a local design statement to guide future development.

Who Does It
Professionals work with local residents to help them identify scenic areas that are valued in their community. Facilitators should have skills in photography, surveying, and interviewing, as well as the ability to facilitate a multi-staged process. Participants are usually residents, but this method could also be used to assess tourists’ impressions. Necessary materials and equipment include a camera, questionnaire, and maps of the area.

Why It Was Chosen
This method is useful in its simplicity and ability to identify residents’ composite perceptions of where they live. The method can be valuable when engaging in planning for towns that are in rapid transition to enable town character to be retained as a core visual identity marker. It is also attractive in that it requires little training or explanation on the part of the participants.

How Long It Takes
The first stage likely takes a few minutes for participants; the second perhaps twenty minutes; and the last stage around ten minutes depending on the number of photographs selected.
Steps

1) Design the research.
2) Take and select photographs.
3) Pilot the survey and revise it, if necessary.
4) Select participants.
5) Conduct the survey (individually or in groups).
   a) Face-to-face interview.
   b) Projective mapping exercise.
   c) Photographic survey.
   d) Photographic sorting task.
6) Compile and analyze the data.

Sources Green, R. 2000b; Nick Wates Associates n.d.
Street Scene Montage with Dots

What It Is
A photomontage of a street is created by assembling photographs of the façades of individual buildings. Participants are asked to note what they do or don’t like—or what they would like to see—on adhesive notes and attach them below the relevant segment. The results can be used as a starting point for discussions, and as data for later analysis. Nick Wates Associates (n.d.) refers to this as an “elevation montage.”

Who Does It
The exercise requires a photographer, and someone to assemble the montage. Note takers or a tape recorder may be desirable for capturing the discussions that ensue from the posted comments. Any sighted, literate participants can do this exercise. Costs involve a camera and film developing or digital printing, or the services of a photographer, as well as presentation boards and adhesive notes.

Why It Was Chosen
This method can be a useful ice-breaker if used at the start of a multi-staged workshop. It generates awareness of the visual issues relating to the study area, and provides an opportunity to gather the opinions of people who may not be comfortable speaking up in a group. It can also be left for an extended period of time as an unattended exhibit.

It should be noted that this process must be used with extreme care because of the potential for residents to pass negative judgments of their neighbors’ properties.

How Long It Takes
A least two days should be allowed for the photography, photo printing, and montage assembly (in addition to the day of the workshop and any post-workshop analysis).

Steps
1) Take photographs of the streetscape to be discussed.
2) Assemble photographs into a photomontage (if both sides of the street are shown, they can be presented on the same presentation board laid flat on a table).
3) Participants place adhesive notes beneath the photomontage to express what they
like, dislike, or would like to see changed.
4) Participants discuss ideas as the adhesive notes mount up, especially around popular segments. Roaming note takers may record some of the discussion points.
5) The adhesive notes and participants’ discussion points may be compiled and analyzed after the activity is over.

**Source** Nick Wates Associates n.d.
Table Scheme Display/Voting with Dots

What It Is
Drawings or models of a proposed development are placed on a table, with key features identified on separate “voting sheets” at the edge of the table. Participants circulate around the table, giving their feedback by placing colored adhesive dots on the voting sheets, for example green for approval, red for disapproval, and yellow for no opinion. Participants can also write in comments on the voting sheets, or on adhesive notes that they then apply on or beside the voting sheet. A spare table with a blank plan could also be provided for participants who want to draw their ideas.

Researchers analyze the ratings (number of dots of each color for each feature) and comments. Note takers could also be present to record discussions around the table, and these notes could also be used as data for the analysis.

Who Does It
Researchers must be able to provide a map, plan, sketch, rendering, or model. Anyone may participate. Large numbers of participants can be accommodated if the display is available for a long period of time.

In addition to the two- or three-dimensional representation, this method requires adhesive dots, adhesive notes, and felt pens.

Why It Was Chosen
The table scheme display can be useful near the beginning of the design process, as an introduction for the participants. It can also be a quick way of getting feedback on rough sketches designed by professionals or at design workshops. It could be a stand-alone method or part of larger workshop. This method is flexible in that it allows participants to give their feedback with or without engaging with other participants.

How Long It Takes
For the participant, this exercise can be executed quite briefly. The amount of time depends on the number and complexity of features for comments and the participants’ desire for thoroughness.
The amount of time for the researcher was not specified in the article, but would include time for development of the plan or model, the exercise itself, and analysis of the data afterward.

**Steps**

1) Create the model or plan.
2) Identify the key features for participants to comment on and prepare voting sheets.
3) Display the model or plan on a table, with voting sheets attached at the outside edges.
4) Provide participants with a written or oral orientation to the exercise.
5) Allow participants time to complete the exercise (optionally with note takers recording discussions).
6) For each feature, tally the votes (adhesive dots) and compile and analyze the comments.

**Source** Nick Wates Associates n.d.
Visual Preference Survey with Photos

What It Is
Participants are shown images comparing similar scenarios with different design features (e.g., bus stops or landscaping designs). They are asked to identify preferred images, rate their preferred option, and explain their reasoning. Paired comparisons and ratings need not both be used, but can provide more information together than either of the tasks alone. It is also possible to provide a list of criteria for rating, such as visual contrast. Design features of the photographs are identified, and multiple regression analysis performed, in order to identify which features are the most important in determining preference.

Who Does It
This method could be used by planners, urban designers, architects and landscape architects, park managers, academic researchers, and any other professionals for whom public perceptions and assessments of spaces are important. Project organizers design the survey and perform analysis on the results. Any sighted, literate person can participate in the survey. Necessary materials and equipment include a camera, questionnaire, clipboard, and statistical-analysis software.

Why It Was Chosen
Architects, landscape architects, and planners often make design decisions based on their own tastes, or their ideas of public preferences. Visual preference surveys gather participants’ own reported perceptions and attitudes toward design features, enabling them to be more closely involved in the development process. To compile the results, statistical methods, such as multiple regression or principal-axis factor analysis, are used to provide more information about the relevant design features and the significance of the results.
How Long It Takes

Time can vary depending on the number of images used, and whether they are shown in a slide-show format or on paper. When slides are used, the slide viewing time ranges from a fraction of a second to thirty seconds, with more time required when viewers are asked to express preferences, rate images, and provide reasoning.

Steps

1) Design the research and submit it to ethics review.
2) Take and select photographs.
3) Pilot the survey and revise it if necessary.
4) Select participants.
5) Conduct the survey (individually or in groups).
6) Compile and analyze the data using multiple-regression analysis.

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