Creating Complete Roadway Corridors: The AASHTO Guide to Transportation Landscape Architecture and Environmental Design

NCHRP Project 15-33 Status Report
AASHTO Standing Committee on Design
Technical Committee on Environmental Design

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Creating Complete Roadway Corridors:
The AASHTO Guide to Transportation Landscape Architecture and Environmental Design
Presentation Outline

Project Status

Summary of Substantial Changes

Outline of 2016 Guide
  Introductory Sections
    Chapter 1: Evolution of Complete Corridors
    Chapter 2: Principles of Complete Corridors
    Chapter 3: Defining Complete Corridors
    Chapter 4: Elements of Complete Corridors
    Chapter 5: Examples of Complete Corridors
    Chapter 6: Completing the Corridor
  Appendices

Questions and Discussion
Project Status
TRB and NCHRP Project

2000 – 2004
TRB AFB40 committee attempts volunteer revision - Proved to be overwhelming task.

2006 – 2010

2011 -2012
Previous NCHRP contractor attempts revision – submitted version not approved by NCHRP panel, TRB AFB40 Committee or by TCED through informal ballot.

2012- 2014
TCED and AFB40 solicit for additional funding.

January 2015 - May 2016
Current contractor “edits” previous incomplete version through second NCHRP contract. Six TCED members invited to technical advisory panel. Final version developed for formal AASHTO balloting.
Summary of Substantial Changes
Changes from 1991 Publication

The new guide …

- Provides comprehensive guidance for the planning and designing of complete roadway corridors.
- Promotes design flexibility by emphasizing how different types of roadways and different types of settings require different solutions.
- Promotes an interdisciplinary approach to the planning and design of roadways.
- Promotes the continuous engagement of all stakeholders, especially regulatory authorities, public officials and the general public, during all aspects of roadway planning, design, construction, maintenance, and operations.
Changes from 1991 Publication

The new guide …

• Redefines its primary objective from one focused mostly on the conservation and mitigation of natural resources to one based on the holistic planning and design of roadways that are fully integrated with their social, economic, and environmental settings.

• Expands its audience and accessibility by using lay language.

• Examines four commonly accepted roadway types — Freeway, Highway, Road, and Street — rather than using technical categories such as functional class.

• Examines four landscape setting types — Remote, Rural, Suburban, and Urban — rather than using technical categories as defined by ecological studies, zoning or political boundaries.
Changes from 1991 Publication

The new guide …

Examines 16 distinct corridor types as a cross between the four types of roadways and four types of settings.

Provides a prototypical example for each of the 16 types of corridors.

Expands the number of design elements discussed to 28.

Discusses for each individual design element, the principles directing its general use as well as a more detail discussion for adapting its use to specific types of roadways and settings.

Focuses on roadways, eliminating discussions of airports, ports, railroads and non-roadway transit.
Outline of 2016 Guide
Outline of 1991 Guide

Introductory Sections
Chapter 1: Integration of Landscape and Environmental Design in Transportation
Chapter 2: Landscape and ED Elements
Chapter 3: Environmental Design
Chapter 4: Landscape and Geometric Design
Chapter 5: Construction Considerations
Chapter 6: Roadside Management
Chapter 7: Highway Related Areas
Chapter 8: Airports, Transit, Ports, Rail
Chapter 9: Joint Development

Outline of 2016 Guide

Introductory Sections
Chapter 1: Evolution of Complete Corridors
Chapter 2: Principles of Complete Corridors
Chapter 3: Defining Complete Corridors
Chapter 4: Elements of Complete Corridors
Chapter 5: Examples of Complete Corridors
Chapter 6: Completing the Corridor
Appendices
Introductory Sections

Foreword
- Why use this guide
- How to use this guide
- Who should use this guide

Preface
- Why an updated guide was needed
- Acknowledgement of past guidance
- List of associated manuals

Introduction
- Summarizes content
- Provides disclaimer that the 16 corridors on which the guidance is based are “just a set of analytical tools; a starting point for understanding how to best fit a roadway into its environment.”
Chapter 1: Evolution of Complete Corridors

Historic Influences

- Presents an inventory of roadway history
- Describes roadways purpose and value
- Traditional roadway values are still pertinent
Chapter 1: Evolution of Complete Corridors

Future Influences
- NCHRP Report 750, Volumes 1-6
- Systems Approach to Scenario Planning
- We decide our future

Recognizing trends and identifying emerging issues
Chapter 1: Evolution of Complete Corridors

Synthesis

- Building roadways to preserve the values of our heritage and to create the society we desire

Combining the studies of history and the future
Chapter 2: Principles of Complete Corridors

Suggests Foundational Practices
  Engage stakeholders
  Employ interdisciplinary teams
  Consider multiple modes

Achieves Holistic Outcomes
  - Fosters community values
  - Ensures regulatory compliance
  - Provides technically appropriate transportation solutions

Establishes a Comprehensive Framework
Chapter 3: Creating Complete Corridors

Landscape Setting + Roadway Type

Rural + Highway
Chapter 3: Creating Complete Corridors

Corridor Type
Rural Highway
Chapter 3: Defining Complete Corridors

Landscape Setting

Remote | Rural | Suburban | Urban

Freeway
Highway
Road
Street
Landscape Settings

• “Limiting the definition of the landscape setting to being either urban or rural fails to address the enormous differences in settings that exist within these definitions, such as between urban San Francisco, California and suburban Plano, Texas. Both qualify as “urban” under the Green Book but one is a compact historic city, the other a more recent low-density development, each with quite separate distinguishing characteristics”

• “Similarly, the Village of Woodstock, Vermont, with a population of about 1,000, would be considered rural by the Green Book, which would apply the same label to the remote and virtually unpopulated Saguaro National Park in Arizona”
A **transect** is a theoretical concept used to define an idealized spectrum of human settlement patterns and land uses ranging from those that are dominated by the natural environment to those that are dominated by the built environment.
Roadway Types

• “This [Green Book] classification system is primarily focused on only accommodating motorized vehicles and is frequently too general to be useful to a planner or designer. . . .”

• “Many states and local units of government, therefore, use other classification systems with many more categories in an attempt to have a more nuanced approach to planning and design”
### Roadway Types

#### Comparison of Roadway Classification Systems

<table>
<thead>
<tr>
<th>Labels used in this guidance</th>
<th>Common labels used by the general public</th>
<th>AASHTO Functional Class</th>
<th>Labels used in ITE/CNU CSS Manual</th>
<th>Labels used in NACTO Urban Street Design Guide</th>
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</thead>
<tbody>
<tr>
<td>Freeway</td>
<td></td>
<td>Principal Arterial X</td>
<td>Minor Arterial X</td>
<td>Major Collector X</td>
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<td>Highway</td>
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<td>Alley X</td>
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</table>
A Different Point of Departure

- “Roadway designers must be aware that the landscape settings [roadway types] through which the roadway passes may not only vary from segment to segment but that the landscape setting [roadway type] in a particular segment may be transitional between these four settings [types] or even a unique amalgamation of them”

- “Again, these four roadway settings [types] are only meant as a point of departure for thinking about how to best integrate a roadway into [its context]”
To create a complete corridor, it is prudent to examine how design elements fit the corridor type and how they are used in corridors identified in adjacent cells above. For example, a retaining wall planned for a rural highway should be evaluated for best design characteristics for a rural setting, as well as for freeways, highways and roads in remote, rural and suburban settings. By examining a range of closely related design solutions, the most appropriate solution may be discovered.
Chapter 4: Elements of Complete Corridors

**Roadway**

- **Principal Elements**
  - Geometrics
  - Lanes
  - Recovery Area
  - Intersections & Interchanges
  - Pavement
  - Bridges

- **Supporting Elements**
  - Retaining Structures
  - Noise Abatement
  - Guardrails and Barriers
  - Medians
  - Fences
  - Signs
  - Lighting
  - Utilities
  - Parking
  - Toll Structures

**Roadside**

- **Principal Elements**
  - Grading
  - Shoulders, Sidewalks and Trails
  - Drainage
  - Soils
  - Vegetation
  - Vegetation Management
  - Wildlife

- **Supporting Elements**
  - Park and Ride Lots
  - Rest Areas
  - Roadside Furnishings
  - Gateways
  - Public Art
Design Element Attributes

• Guiding Principles explains how the design element can contribute to creating a complete roadway.
• General Considerations provides basic and universal design parameters for using the element.
• Setting Considerations examines each design element under conditions specific to each type of setting (remote, rural, suburban, and urban).
• Subsequently, each setting is further divided into guidance specific to a particular roadway type (freeway, highway, road, and street).
Design Element Example: Pavement

- **Guiding Principles**
  - Typically PCC or bituminous; Concrete or brick pavers considered for special applications on lower volume streets, e.g. ped crossings

- **General Considerations**
  - Common Design Considerations:
    - Surface treatments: Textures, Color, Scoring
  - Environmental Considerations
    - Reducing Runoff Impacts
    - Reducing Heat Impacts
    - Reducing Noise Impacts
    - Reducing Energy Consumption

- **Setting Considerations**
  - Remote: Permeable and quiet pavements should be considered
  - Suburban: Different surface treatment to distinguish parking from travel
Design Element Example: Pavement

Enhanced Pedestrian Crosswalk
Lake Oswego, OR

The crosswalk blends across the street creating a well identifiable pedestrian zone. Bollards loosely identify the roadway boundary. Brick or concrete unit pavers are often set into the pavement at intersections, providing color and textural changes that delineate pedestrian routes and special districts. They are also useful in marking amenity zones or carriage walks in suburban and urban settings.

Photo: www.pedbikeimages.org/Dan Burden

Permeable Parking Lot
Cupertino, CA

Permeable pavement systems significantly reduce stormwater runoff, reducing the need for large detention ponds.

Photo: HNTB
Chapter 5: Examples of Complete Corridors

- Selected best examples from the original 24

- Expanded narratives by:
  - Identifying which CSS principles were demonstrated by work done in the corridor.
  - Identifying which design elements were innovatively used.
## Chapter 5: Examples of Complete Corridors

<table>
<thead>
<tr>
<th>Freeway</th>
<th>Highway</th>
<th>Road</th>
<th>Street</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote</td>
<td>1-70, Glenwood Canyon, CO</td>
<td>Exit Glacier Road, Kenai Fjords National Park, Seward, AK</td>
<td>Zuni Canyon Road, Cibola National Forest, NM</td>
</tr>
<tr>
<td>Rural</td>
<td>Suncoast Parkway, Hillsborough and Citrus Counties, FL</td>
<td>Illinois Route 29, Sangamon County, IL</td>
<td>NM Highway 14, Turquoise Trail, Santa Fe to Albuquerque, NM</td>
</tr>
<tr>
<td>Suburban</td>
<td>1-10 Papago Freeway, Phoenix, AZ</td>
<td>US Routes 27 and 68, Paris Pike, Paris and Lexington, KY</td>
<td>Colony Road, Charlotte, NC</td>
</tr>
<tr>
<td>Urban</td>
<td>Freeway Park over 1-5, Seattle, WA</td>
<td>US Route 71, Bruce R. Watkins Drive, Kansas City, MO</td>
<td>The Embarcadero, San Francisco, CA</td>
</tr>
</tbody>
</table>
Sample Case Study: Paris Pike

Corridor EXAMPLES
Suburban Highway
Paris-Lexington Road, US-27/68 - Kentucky

Summary
Location: Paris and Lexington, KY
Setting: Suburban
Roadway: Highway

Key Elements:
- Lanes
- Guardrails
- Utilities
- Visual Impact Assessment

Functional/Design Characteristics:
- Project involved widening roadway from two to four lanes, adding a divided median and greatly improving safety.
- Lanes: 4 lanes
- Length: 12.5 miles
- Right-of-way: 160 – 500 feet
- Minimal roadway
- Grass shoulders
- Smaller clear zone averages
- Hedgerow plantings
- Minimal cut and fill
- Plank fences
- Limited access
- Relocation of utilities

Social/Environmental Characteristics:
- Project respects the natural topography and bluegrass landscape.
- An inter-local cooperative agreement was signed to regulate land uses along the corridor.
- Extensive coordination with community and land owners.

Significance
The Paris-Lexington Road is hailed as a landmark project for various reasons: how it inspired a community to stand up to state and federal transportation agencies, how context sensitive design helped preserve cultural and physical features, and the role of landscape architecture in roadway design dramatically improved the quality of the environment. After a roughly three-decade conflict between property owners, other stakeholders, Kentucky Transportation Cabinet (KYTC), and FHWA on addressing safety without sacrificing scenic beauty, this 12.5 mile road through Kentucky's bluegrass country was widened from a two to a four lanes with a divided median.
# Sample Case Study: Paris Pike

## Suburban Highway (?)

<table>
<thead>
<tr>
<th>Landscape Setting</th>
<th>Road Type</th>
</tr>
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<tbody>
<tr>
<td>“The primary characteristic of a suburban landscape setting, differentiating it from urban and rural settings, is the balance between structures and green space. There are significantly more structures, mostly houses and commercial buildings, in suburbs than there are in rural landscapes. Yet there is more green space, both private and public, in a typical suburban neighborhood than in a typical urban one. Water bodies, especially wetlands and streams, are more frequently seen in suburban settings than they are in a typical urban landscape”</td>
<td>“A principal or minor arterial or major collector roadway with, characteristically, multiple lanes and frequently, in populated areas, adjacent parallel service roads; crossings, especially major ones, can be grade separated, although signalized and unsignalized at-grade crossings acceptable; opposing traffic divided by median, barrier, or pavement markings; access controlled and typically only at crossing roadways; high speed; high volume; mostly for motorized traffic although active transportation allowed but usually not encouraged; parking typically prohibited. Typically a state or occasionally a county or local facility”</td>
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</table>
## ROADWAY DESIGN ELEMENT GUIDANCE BY SETTING

<table>
<thead>
<tr>
<th>Guiding Principals</th>
<th>General Considerations</th>
<th>Setting Considerations</th>
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<tr>
<td></td>
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<td><strong>Primary Roadway Elements</strong></td>
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<td>Geometrics</td>
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<td>Lanes</td>
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<td>Intersections &amp; Interchanges</td>
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<td>Intersections 4-30</td>
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<td>Pavement</td>
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<td><strong>Supporting Roadway Elements</strong></td>
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<td>Retaining Structures</td>
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<td>Noise Abatement</td>
<td>4-80</td>
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<td>Guardrails &amp; Barriers</td>
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<tr>
<td>Medians</td>
<td>4-95</td>
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<td>Fences</td>
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<td>Signs</td>
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<tr>
<td>Toll Structures</td>
<td>4-129</td>
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</tr>
</tbody>
</table>

Sample Case Study: Paris Pike
Sample Case Study: Paris Pike

Visual Quality Guidance
The choice of guardrail or barrier should be dependent on the performance that is needed and the context in which they are being located. Regardless of setting, three design criteria related to their impacts on the experience of visual quality by travelers should affect the choice of a specific guardrail or barrier.

The first visual criteria for selecting a guardrail or barrier appropriate to its setting is to respond to the desire for the traveler to view the landscape immediately adjacent to the roadway. Although this desire is fairly common in remote settings, it also can occur wherever views of adjacent property or scenery are especially desirable. This may include views of water bodies, historic buildings, or other picturesque settings. In such locations, it is essential to pick a guardrail or barrier that permits views from the height of an adult traveling in a typical car. As previously noted, several see-through options are beginning to emerge around the country.

The second visual criteria for selecting a guardrail or barrier for a complete corridor is to coordinate the visual character of the guardrail or barrier with other design elements. This can be a particular concern if the guardrail or barrier is attached to another design element, like a retaining wall or noise wall. Even if the guardrail or barrier is essentially alone in the landscape, it is still advisable to integrate (or artistically contrast) the visual character of the guardrail or barrier into the context of the area, using materials, forms, colors, textures, and patterns that are typical to either the adjacent native or cultural landscapes.

The third visual criteria for selecting an appropriate guardrail or barrier is to be aware of the beneficial effect it may have on a driver’s experience. This is particularly true for median barriers that may effectively mask head light glare from oncoming vehicles or allow vegetation to grow closer to the roadway. However, the benefit that these positive effects may have must be weighed against traveler safety and inadvertently creating a boring visual tunnel.

Some aesthetic guardrails, barriers, and bridge railings developed by FHWA’s Federal Lands Highway Division and the National Park Service working in collaboration have been successfully tested under NCHRP Report 350 guidelines, although not formally acknowledged as being acceptable for use on the National Highway System (NHS). When utilizing these barriers or designing a yet untested barrier, it is prudent to emulate factors that made other designs acceptable by utilizing information from the AASHTO Roadside Design Guide.
Sample Case Study: Paris Pike

A fence affects the visual quality of a setting. The selected fencing materials and forms need to complement the visual character of the roadway's other design elements and the roadway's landscape setting while minimizing any adverse visual impacts to neighbors and travelers (see Visual Quality in Chapter 6: Completing the Corridor).

The materials, forms, and colors of the posts and fence material should reflect the visual character of its surroundings. Appropriate fences may range from being rustic in a remote setting to ornamental in an urban one. A split rail fence in a remote setting along the Blue Ridge Parkway in North Carolina, a white painted plank rail fence in a suburban setting on the Paris Pike in Kentucky, or an ornamental fence on a bridge in urban Riverside, California are appropriate because their materials, forms, and colors copy neighboring examples. Studying and copying the visual character of indigenous fences will help the designer integrate the roadway corridor with its adjacent landscape.

Visually, the placing of a fence is as important as the visual character of its physical components. Fences are constructed of posts supporting fencing material. In remote and rural locations, posts, post spacing, and fencing material usually remain uniform for the length of the fence, mimicking the consistency of the landscape. In architecturally more formal and highly differentiated urban settings there is frequently more variety in the fence, especially in the design of posts. For example, it is fairly common in urban settings, to insert larger masonry posts at regular intervals between a uniform set of consistently spaced metal posts. The larger masonry posts are frequently used to mark the ends of a bridge rail, a property corner, or simply to provide some variety in the visual rhythm of the fence.

The fence material in urban settings tends to be either a woven wire or a railing. Occasionally both materials are used, such as on a bridge rail where the railing provides sufficient impact resistance and the woven wire keeps dangerous objects from being tossed from the bridge.

Fencing is typically a subordinate design element and is usually not designed to attract attention. Complementing other design elements allows fencing to recede. Ornamental fencing should be used where it is either desirable to attract attention to the detailing of the fence or conversely, to avoid attracting attention to a strictly utilitarian fence in an otherwise ornamental landscape.

To mask fencing, it can be placed behind or in roadside vegetation. Unless establishing right-of-way limits, fencing does not need to be placed uniformly on the right-of-way boundary or the same distance from the roadway pavement. In some locations, it may be more aesthetically pleasing to weave the fencing in and out of vegetation or otherwise undulate its alignment. If possible, to avoid drawing attention to it, do not place fencing on the crest of a hill or roadside embankment.
Chapter 6: Completing the Corridor

• Modal Considerations
  • Pedestrians
  • Bicycles
  • Transit
  • Motor Vehicles

• Demographic Considerations
  • Recognizing and Responding to Community Differences

• Tools for Completing the Corridor
  • Public Engagement
  • Visual Impact Assessment
  • Performance Measures
Next Steps

Proposed SCOD Review Process (separate reviews)

1. **Primary TC receives document**
2. **Primary TC reviews document**
3. **Author compiles comments & revises document**
4. **Other TCs receive & review document** (4 weeks)
5. **Primary TC considers comments** (2 weeks)
6. **Author compiles comments & revises document**
7. **Primary TC ballots document**
8. **SCOD receives & reviews document** (4 weeks)
9. **Primary TC considers comments** (2 weeks)
10. **Author compiles comments & revises document**
11. **SCOD ballots document** (4 weeks)
12. **SCOH ballots document** (4 weeks)

*If changes are significant, Primary TC may re-ballot after SCOD review.*
Questions? Comments?