Context Sensitive Design for Nonmotorized Facilities

Norman Cox, ASLA, The Greenway Collaborative, Inc.
Ann Arbor, Michigan

Presentation will be posted on-line Monday

St. Clair County Nonmotorized Guidelines

- Michigan Department of Transportation Project
- Context Sensitive Solutions Directive
- Builds on Three Key Documents:
  - MDOT’s Southwest Michigan Nonmotorized Investment Plan
  - New County Master Plan
  - New Long-Range Transportation Plan

Key Elements of the Project

- Set General Policy
- Define Prevailing Guidelines
- Develop Context Based Guidelines
- Create Decision Support Tools
- Define Appropriate Staff Training and Resources
- Implementation and Funding Guidelines
- Composite Design Guidelines

Nonmotorized Accommodation Policy

FHWA Model:
- Include Bike and Ped. Facilities in New and Reconstruction Projects in Urban Areas – Few Exceptions
- Pave Shoulders in Rural Areas
- Anticipate Future Demand
- Address Crossing the Road
- Get Exceptions at Senior Level
- Use Best Currently Available Guidelines

Bottom Line – Incorporate Bicycles and Pedestrians in All Non-freeway Projects as a Matter of Course

Prevaling Nonmotorized Guidelines

- AASHTO Green Book Calls for Incorporating Bicycles and Pedestrians
- AASHTO Bike and Ped. Guides Incorporated by Reference
  - No Conflicts with Michigan Design Manual or Local Agency Guidelines
  - Little Guidance on Bike Lane Width
  - Minimal Coordination Between AASHTO Guides and Current MUTCD
  - Vague on Some Issues of Context

Eight Landscape Types (Context)

- Rural:
  - Rural Agricultural
  - Rural Residential
  - Rural Activity Center
- Transition:
  - Suburban Fringe/Transitional
- Urban:
  - Suburban
  - General Urban
  - Commercial Center
  - Regional Commercial Center

Some Idea as Duany’s “Transect”, but for the Real World

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Context Based Guidelines
- For Each Landscape, Typical Approaches Are Defined For:
  - Shoulder / Bike Lanes
  - Sidewalks / Buffers
  - Signalized Intersections
  - Mid-block Crossings
  - Bridges
  - Independent Paths

But Context Changes Over Time and Some Projects Have Extended Periods of Service

Near-term
- For Resurfacing, Restoration & Rehabilitation (3R) and Preventative Maintenance (PM) Projects
- Shows Likely Near-term Growth Areas
  - Currently Developing Areas
  - Schools
  - Suburban Interchange Area

Long-term
- For New and Reconstruction Projects
- Reflects County Vision and Zoning
- Reflects 2030 Long Range Transportation Plan

Eight Landscapes

The Suburban “Perfect Storm”

Suburban Landscape Table Example

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Suburban Landscape Table Example

Typical Road Conditions and Recommended Nonmotorized Facilites

<table>
<thead>
<tr>
<th>Roadway Class</th>
<th>Lanes</th>
<th>Total Lanes</th>
<th>Control Equipment</th>
<th>Bike Lane Width</th>
<th>Cycle Tracks</th>
<th>Barrier</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector</td>
<td>2</td>
<td>4</td>
<td>C (R/L)</td>
<td>5' AASHTO Min.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector</td>
<td>2</td>
<td>4</td>
<td>C (R/L)</td>
<td>5' AASHTO Min.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector</td>
<td>1</td>
<td>3</td>
<td>C (R/L)</td>
<td>5' AASHTO Min.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Suburban Landscape Table Example

Typical Nonmotorized Facilities at Signalized Intersections

<table>
<thead>
<tr>
<th>Pedestrian Signals</th>
<th>Bicycle Signals</th>
<th>100% Grade Separation</th>
<th>Bicycle Lanes</th>
<th>2-Way Bicycle Lanes</th>
<th>Sharrow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Suburban Landscape Table Example

Typical Nonmotorized Mid-block Cross Corridor Accommodations

<table>
<thead>
<tr>
<th>Accommodation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sidewalk</td>
<td>A continuous pedestrian walkway along the roadway, with a separation from motor vehicle traffic.</td>
</tr>
<tr>
<td>Bike Path</td>
<td>A continuously connected bicycle path, often integrated into the sidewalk or on the roadway.</td>
</tr>
</tbody>
</table>

Suburban Landscape Table Example

Typical Nonmotorized Facilities on Bridges

<table>
<thead>
<tr>
<th>Bridge Type</th>
<th>5' Minimum Width</th>
<th>Bicycle Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collector</td>
<td>5' Minimum</td>
<td>2-Way</td>
</tr>
<tr>
<td>Collector</td>
<td>5' Minimum</td>
<td>2-Way</td>
</tr>
<tr>
<td>Collector</td>
<td>5' Minimum</td>
<td>2-Way</td>
</tr>
</tbody>
</table>

Suburban Landscape Table Example

Typical Independent ROW Shared-use Pathway

<table>
<thead>
<tr>
<th>Pathway</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Footpath</td>
<td>A narrow walking path, typically less than 5 feet wide.</td>
</tr>
<tr>
<td>Bike Path</td>
<td>A continuous bicycle path, often integrated into the sidewalk or on the roadway.</td>
</tr>
</tbody>
</table>

Suburban Landscape Table Example

Other Nonmotorized Facilities

Some roads may be marked as bicycle routes if they connect key destinations or are part of a nationally recognized bicycle route.

Micro-Context Adjustments

- School Zones
- High Priority Nonmotorized Corridors

School Zones

- If a School Zones are in a Rural, Agricultural, Rural Residential, Suburban Fringe/ Transitional - Build to Suburban Guidelines
- High Priority Projects
- Pedestrian Focus with-in 1 Mile, Bicycle with-in 2 Miles
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High Priority Corridors
- Already Part of a Plan
- Improve Sooner Rather than Later
  - Pave Shoulders As Part of 3-R Projects
  - Anticipate Future Trail Crossings

Supplemental Tools
- LOS Based Paved Shoulder and Bike Lane Width Sizing
  - Based on Motor Vehicle Speeds, Volumes and % Heavy Vehicles
- Unsignalized Marked Crosswalk
  - Elaboration on AASHTO’s Most Effective Attributes
- Equestrian Issues

Urban Bicycle Lane Sizing

<table>
<thead>
<tr>
<th>ADT</th>
<th>Cycle Lane Widths</th>
<th>LOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40</td>
<td>1.5</td>
<td>C</td>
</tr>
<tr>
<td>40-70</td>
<td>1.7</td>
<td>C</td>
</tr>
<tr>
<td>71-100</td>
<td>1.9</td>
<td>C</td>
</tr>
<tr>
<td>101-150</td>
<td>2.1</td>
<td>C</td>
</tr>
<tr>
<td>151-200</td>
<td>2.4</td>
<td>C</td>
</tr>
<tr>
<td>&gt;200</td>
<td>2.6</td>
<td>C</td>
</tr>
</tbody>
</table>

Inputs: 3% Truck Traffic

Urban Bicycle Lane Sizing
- Inputs: 3% Truck Traffic

Training and Resources
- TSC Non-motorized Coordinator Training
  - Passed Effective Cycling Course
  - FHWA On-line Course
  - Quarterly Meetings
- All TSC Staff Training
  - Introduction to Nonmotorized Design Course
  - Introduction to Landscape Zone Based Guidelines Course
- Reference Library

Implementation and Funding
- Specific Guidelines for New/Reconstruction, 3-R, PM and Stand Alone Projects
- Cost of In-Road Facilities Part of Project Budget
- May Include Sidewalks, Grade ROW for Future If Not Included
- Seek Local or TEA Funds for “Extras”
- Prioritize Stand Alone Projects and Utilize Nonmotorized Set-Aside Funds

Cost of In-Road Facilities Part of Project Budget

Supplemental Design Guidelines
- Pedestrian and Bike Background Info
- Along Road Travel
- Across Road Travel
- Independent Pathways
- Pedestrian Travel Downtown

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Supplemental Design Guidelines

Typical Roadway Width Range:

- Urban Three-lane Multi-modal Roadway Design Guidelines
  - Typical Roadway Width Ranges:
    - 47' - Minimum
    - 57' - Minimum
    - 67' - Upper Range
  - Buffer Width Ranges:
    - 5' - Minimum
    - 8' - Preferred
  - Bike Lane Width Ranges:
    - 3' - Minimum
    - 5' - Preferred
Supplemental Design Guidelines

Typical Roadway Cross-Section Guidelines:

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bike Lane</td>
<td>5.5'</td>
<td>5.5'</td>
<td>5.5'</td>
<td>5.5'</td>
<td>5.5'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel Lane</td>
<td>12'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Center Left Turn Lane</td>
<td>12'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel Lane</td>
<td>12'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Road Width</td>
<td>47'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Highlighted cross sections should only be used in specific locations that meet certain conditions for which sub-11' travel lanes are appropriate.

For retrofitting existing streets as well as new street construction or street reconstruction projects.

The distance is from edge-of-metal to edge-of-metal and assumes a standard 18" gutter.

Pulling It All Together

- Determine the Landscape Zone via the Maps
- Consult the Appropriate Table to Determine Scope
- Create Design with Decision Support Tools, Reference Library and Design Guidelines
- Set up Budgets and Local Agency Agreements Based on the Implementation and Funding Guidelines

Further Information

Presentation and Report may be downloaded from: www.greenwaycollab.com

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