Trees Sidewalks Schools and Public Health

Jody Rosenblatt Naderi, Professor and Distinguished Chair
Department of Landscape Architecture, CAP, Ball State University
Acknowledgements:

Transportation Research Board, National Academies of Sciences
Landscape & Environmental Design Committee (AFB 40)

AASHTO Technical Committee on Environmental Design

Dr. Jun Hyun Kim, Assistant Professor, Cal Poly Pomona

Dr. Guillermo Vasquez de Velasco, Dean, College of Architecture and Planning, BSU
1. Introduction
2. Process
3. Discussion
4. Conclusion
The nature of a child’s behavior and walking habitat is more about being there than getting there.
AMENDING TYPICAL SIDEWALK DESIGN STANDARDS NEAR SCHOOLS:

MINIMUM
ACCEPTABLE
DESIREABLE
2. Process
2. Process

Defining the preferred standard for Child Priority Zone

Wide buffer with trees.
Sidewalk can be wider too but buffer is more important.

(Parents considered anything less than this unsafe for their child).
Existing Policy reflected in typical standards
## CSD Case Study for: Child Priority Zone Standards

<table>
<thead>
<tr>
<th></th>
<th>College Station</th>
<th>Cypress Grove CPZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>population</td>
<td>67,890</td>
<td>6,789</td>
</tr>
<tr>
<td>Total Area (acre)</td>
<td>29,434.08</td>
<td>1,107.25</td>
</tr>
<tr>
<td>Total street length (m)</td>
<td>573,873.05</td>
<td>60,372.39</td>
</tr>
<tr>
<td>Sidewalk length (m)</td>
<td>494,797.17</td>
<td>35,384.54</td>
</tr>
<tr>
<td>% of streets with sidewalk</td>
<td>86.22</td>
<td>58.61</td>
</tr>
<tr>
<td>Sidewalk density</td>
<td>16.81</td>
<td>31.96</td>
</tr>
<tr>
<td>Range of speed</td>
<td>15 to 70 mph</td>
<td>30 to 45 mph</td>
</tr>
</tbody>
</table>
Identifying scope of Child Priority Zone

Preferred Walking Route Patterns (N=56)
Enhanced Walking Standard - showing variations based on peak period of use in afternoon

Sep. 15th, 8:00 a.m.
Azimuth: 110.1
Altitude: 35.1
Shadow length: 57.4'
Shadow angle: 158°

Sep. 15th, 10:00 a.m.
Azimuth: 141.3
Altitude: 56.3
Shadow length: 28.7'
Shadow angle: 128°

Sep. 15th, 1:00 p.m.
Azimuth: -135.1
Altitude: 53.7
Shadow length: 28.1'
Shadow angle: 52°

Sep. 15th, 4:00 p.m.
Azimuth: -98.2
Altitude: 18.8
Shadow length: 91.3'
Shadow angle: 11°
Enhanced Walking Standard - showing variations based on peak period of use in afternoon.

- **Sep. 15th, 8:00 a.m.**
  - Azimuth: 110.1
  - Altitude: 35.1
  - Shadow length: 52'
  - Shadow angle: 157°

- **Sep. 15th, 10:00 a.m.**
  - Azimuth: 141.3
  - Altitude: 56.3
  - Shadow length: 30.4'
  - Shadow angle: 126°

- **Sep. 15th, 1:00 p.m.**
  - Azimuth: -135.1
  - Altitude: 53.7
  - Shadow length: 30.5'
  - Shadow angle: 51°

- **Sep. 15th, 4:00 p.m.**
  - Azimuth: -98.2
  - Altitude: 18.8
  - Shadow length: 99.4'
  - Shadow angle: 7°
Testing design layout applying Enhanced Standard (N. Graham RD. in College Station, TX)

3:30 p.m.
north–south alignment
## 2. Process

**Construction Cost: case study**

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Standard – reconstruct existing boulevard configuration with typical standard</td>
<td>$85,000</td>
</tr>
<tr>
<td>Enhanced Walking Standard – additional cost of enhanced walking environment standard over cost of replacing existing w/o buffer</td>
<td>$93,000</td>
</tr>
<tr>
<td>Total Estimated Cost of Roadway Reconstruction Budget</td>
<td>$6,000,000</td>
</tr>
<tr>
<td>Escrow set aside for maintenance and POE</td>
<td>.01</td>
</tr>
<tr>
<td>Cost of Upgrade</td>
<td>$8.00 per l.m.</td>
</tr>
<tr>
<td>Impact on capital reconstruction budget</td>
<td>+.0016</td>
</tr>
</tbody>
</table>
3. Discussion
New Policy: Enhanced Walking Standard for CPZ

- Move sidewalk away from curb by at least 2’
- Install green buffer between sidewalk and curb
- Plant trees at back of curb to slow down traffic speeds
- Plant at back of walk to attenuate microclimate on west side of north-south streets; plant at curb on east
- Plant in proximity of overhead wires
- Plant tree at back of curb on east side

Typical Boulevard Standards + Enhanced Walking Standard
Capital Program Policy

For every $1.00 of reconstruction spend $1.02 when the capital program improvements occur in CPZ.
Planning Policy

Identify the extent of the CPZ based on Walk-To-School. Adopt the CPZ and the microclimatic guidelines for the variations of the Enhanced Walking Environment Standard.
4. Conclusions
Use Evidence-based Design to Amend Standards in CPZ

- Provide Equitable Access
- Increase Walking Habit
- Improve Safety, Reduce Crashes
- Sequester Carbon, Save Energy
- Provide Contact with Nature
- Improve Community Welfare
- Be Cost-effective with public $
Thank you