What is Smart Transportation?
Smart Transportation is partnering to build great communities for future generations of Pennsylvanians by linking transportation investments and land use planning and decision making.
Smart Transportation Means Listening
Smart Transportation Means Choice
Smart Transportation Means Safety
Smart Transportation Means Flexibility

A Guide for Achieving Flexibility in Highway Design
May 2004

SMART TRANSPORTATION GUIDEBOOK
Planning and Designing Highways and Streets that Support Sustainable and Livable Communities

New Jersey Department of Transportation
Pennsylvania Department of Transportation
MARCH 2008
Fundamentally, smart transportation is about linking land use & transportation decisions and investments.
2

How will PennDOT do this?
SMART TRANSPORTATION GUIDEBOOK

Planning and Designing Highways and Streets that Support Sustainable and Livable Communities

New Jersey Department of Transportation

Pennsylvania Department of Transportation

MARCH 2008
Integrating Smart Transportation

Understand the Context

**Must** be determined in Planning – Pre TIP

Context **MUST** consider:

- Land Use
- Community
- Environment
- Transportation
- Financial
COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

DATE: September 18, 2008

SUBJECT: Smart Transportation Interim Policy

TO: District Executives

FROM: Brian G. Thompson, P.E. /s/ David J. Azzato, P.E.
      Director
      Bureau of Design

The recent release of PennDOT’s Smart Transportation Guidebook is intended to guide the design of roadways and bridges that fit within the existing and planned contexts of the communities through which they pass, and to develop the best and most affordable transportation solutions.

The purpose of this Strike-Off Letter is to implement policy for the design of roadways that better reflect their context within the larger transportation network. These changes immediately implement the recommended design values from the Smart Transportation Guidebook into our design policy, and provide more flexibility for our designs. This time-sensitive Strike-Off Letter can be assigned to Chapter 1 and 2 of Design Manual Part 2 (PM-2)
Integrating Smart Transportation

Revisions to Design Manuals

- Interim Design Policy – Issued September 18, 2008
  - Roadway/Context Typologies
  - Expanded Bridge Width Criteria
  - Design Speed
  - Highway Occupancy Permit Policy

- Design Manuals Under Revisions
  - Design Manual Part 1
  - Design Manual Part 2
The Smart Transportation Guidebook is fully compatible and consistent with AASHTO.
## Defining the Contexts

<table>
<thead>
<tr>
<th>RURAL</th>
<th>SUBURBAN</th>
<th>URBAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>Suburban Neighborhood</td>
<td>Rural</td>
</tr>
<tr>
<td>Rural</td>
<td>Suburban Corridor</td>
<td>Suburban Center</td>
</tr>
<tr>
<td>Rural</td>
<td>Suburban Center</td>
<td>Town/Village Neighborhood</td>
</tr>
<tr>
<td>Rural</td>
<td>Town Center</td>
<td>Urban Core</td>
</tr>
</tbody>
</table>

### Density
- **Units**: 1 DU/ac - 8DU/ac
- **1 DU/ac – 8DU/ac**: 2 – 30 DU/ac
- **2 – 30 DU/ac**: 3 – 20 DU/ac
- **3 – 20 DU/ac**: 4 – 30 DU/ac
- **4 – 30 DU/ac**: 8 – 50 DU/ac
- **8 – 50 DU/ac**: 16 – 75 DU/ac

### Building Coverage
- **NA**
- **<20%**
- **20% - 35%**
- **35% - 45%**
- **35% - 50%**
- **50% - 70%**
- **70% - 100%**

### Lot Size/Area
- **20 acres**
- **5,000 – 80,000 sf**
- **20,000 – 200,000 sf**
- **25,000 – 100,000 sf**
- **2,000 – 12,000 sf**
- **2,000 – 20,000 sf**
- **25,000 – 100,000 sf**

### Lot Frontage
- **NA**
- **50 to 200 feet**
- **100 to 500 feet**
- **100 to 300 feet**
- **18 to 50 feet**
- **25 to 200 feet**
- **100 to 300 feet**

### Block Dimensions
- **NA**
- **400 wide x varies**
- **200 wide x varies**
- **300 wide x varies**
- **200 by 400 feet**
- **200 by 400 feet**
- **200 by 400 feet**

### Max. Height
- **1 to 3 stories**
- **1.5 to 3 stories**
- **Retail-1 story; office 3-5 stories**
- **2 to 5 stories**
- **2 to 5 stories**
- **1 to 3 stories**
- **3 to 60 stories**

### Min./Max. Setback
- **Varies**
- **20 to 80 feet**
- **20 to 80 feet**
- **20 to 80 feet**
- **10 to 20 feet**
- **0 to 20 feet**
- **0 to 20 feet**
### Roadways in Context

<table>
<thead>
<tr>
<th>RURAL</th>
<th>URBAN</th>
<th>REGIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Places</td>
<td></td>
<td>Regional Arterial</td>
</tr>
<tr>
<td>Suburban Neighborhood</td>
<td>Suburban Corridor</td>
<td>Community Arterial</td>
</tr>
<tr>
<td>Suburban Center</td>
<td>Town/Village Neighborhood</td>
<td>Community Collector</td>
</tr>
<tr>
<td>Town Center</td>
<td>Core City</td>
<td>Neighborhood Collector</td>
</tr>
<tr>
<td>Local Road/Street</td>
<td></td>
<td>Local Collector</td>
</tr>
</tbody>
</table>

*Figure 3.1 Roads in Context:

- The photos enclosed in a yellow box indicate the Town Center and Core City streets that also operate as a local or regional Main Street.
Conventional Functional Classification

Arterial

Collector

Local
Why rethink functional classification?

Just a few reasons...

- Some arterials carry predominantly local traffic and have many access points.

- The design speed for the arterial class can be too high for an arterial serving as the “Main Street” of a community.

- As land uses change, so should roadway design.

Both of these roadways are principal arterials.
### Solution: New Roadway Type “Overlay”

<table>
<thead>
<tr>
<th>Roadway Class</th>
<th>Roadway Type</th>
<th>Desired Operating Speed (mph)</th>
<th>Average Trip Length (mi)</th>
<th>Volume</th>
<th>Intersection Spacing (ft)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial</td>
<td>Regional</td>
<td>30-55</td>
<td>15-35</td>
<td>10,000-40,000</td>
<td>660-1,320</td>
<td>Roadways in this category would be considered “Principal Arterial” in traditional functional classification.</td>
</tr>
<tr>
<td>Arterial</td>
<td>Community</td>
<td>25-55</td>
<td>7-25</td>
<td>5,000-25,000</td>
<td>300-1,320</td>
<td>Often classified as “Minor Arterial” in traditional classification but may include road segments classified as “Principal Arterial.”</td>
</tr>
<tr>
<td>Collector</td>
<td>Community</td>
<td>25-55</td>
<td>5-10</td>
<td>5,000-15,000</td>
<td>300-660</td>
<td>Often similar in appearance to a community arterial. Typically classified as “Major Collector.”</td>
</tr>
<tr>
<td>Collector</td>
<td>Neighborhood</td>
<td>25-35</td>
<td>&lt;7</td>
<td>&lt;6,000</td>
<td>300-660</td>
<td>Similar in appearance to local roadways. Typically classified as “Minor Collector.”</td>
</tr>
<tr>
<td>Local</td>
<td>Local</td>
<td>20-30</td>
<td>&lt;5</td>
<td>&lt;3,000</td>
<td>200-660</td>
<td></td>
</tr>
</tbody>
</table>
# Regional Arterial

<table>
<thead>
<tr>
<th>Regional Arterial</th>
<th>Rural</th>
<th>Suburban Neighborhood</th>
<th>Suburban Corridor</th>
<th>Suburban Center</th>
<th>Town/Village Neighborhood</th>
<th>Town/Village Center</th>
<th>Urban Core</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Roadway</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lane Width¹</td>
<td>11' to 12'</td>
<td>11' to 12' (14' to 15' outside lane if no shoulder or bike lane)</td>
<td>11' to 12' (14' to 15' outside lane if no shoulder or bike lane)</td>
<td>11' to 12' (14' outside lane if no shoulder or bike lane)</td>
<td>10' to 12' (14' outside lane if no shoulder or bike lane)</td>
<td>10' to 12' (14' outside lane if no shoulder or bike lane)</td>
<td>10' to 12' (14' outside lane if no shoulder or bike lane)</td>
</tr>
<tr>
<td>Paved Shoulder Width²</td>
<td>8' to 10'</td>
<td>8' to 10'</td>
<td>8' to 12'</td>
<td>4' to 6' (if no parking or bike lane)</td>
<td>4' to 6' (if no parking or bike lane)</td>
<td>4' to 6' (if no parking or bike lane)</td>
<td>4' to 6' (if no parking or bike lane)</td>
</tr>
<tr>
<td>Parking Lane³</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>8' parallel</td>
<td>8' parallel; see 7.2 for angled</td>
<td>8' parallel; see 7.2 for angled</td>
<td>8' parallel</td>
</tr>
<tr>
<td>Bike Lane</td>
<td>NA</td>
<td>5' to 6' (if no shoulder)</td>
<td>6' (if no shoulder)</td>
<td>5' to 6'</td>
<td>5' to 6'</td>
<td>5' to 6'</td>
<td>5' to 6'</td>
</tr>
<tr>
<td>Median</td>
<td>4' to 6'</td>
<td>16' to 18' for LT; 6' to 8' for pedestrians only</td>
<td>16' to 18' for LT; 6' to 8' for pedestrians only</td>
<td>16' to 18' for LT; 6' to 8' for pedestrians only</td>
<td>16' to 18' for LT; 6' to 8' for pedestrians only</td>
<td>16' to 18' for LT; 6' to 8' for pedestrians only</td>
<td>16' to 18' for LT; 6' to 8' for pedestrians only</td>
</tr>
<tr>
<td>Curb Return</td>
<td>30' to 50'</td>
<td>25' to 35'</td>
<td>30' to 50'</td>
<td>25' to 50'</td>
<td>15' to 40'</td>
<td>15' to 40'</td>
<td>15' to 40'</td>
</tr>
<tr>
<td>Travel Lanes</td>
<td>2 to 6</td>
<td>2 to 6</td>
<td>4 to 6</td>
<td>4 to 6</td>
<td>2 to 4</td>
<td>2 to 4</td>
<td>2 to 4</td>
</tr>
<tr>
<td><strong>Roadside</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clear Sidewalk Width</td>
<td>NA</td>
<td>5'</td>
<td>5' to 6'</td>
<td>5' to 6'</td>
<td>6' to 8'</td>
<td>6' to 10'</td>
<td>6' to 12'</td>
</tr>
<tr>
<td>Buffer⁴</td>
<td>NA</td>
<td>6' +</td>
<td>6' to 10'</td>
<td>4' to 6'</td>
<td>4' to 6'</td>
<td>4' to 6'</td>
<td>4' to 6'</td>
</tr>
<tr>
<td>Shy Distance</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0' to 2'</td>
<td>0' to 2'</td>
<td>2'</td>
<td>2'</td>
</tr>
<tr>
<td>Total Sidewalk Width</td>
<td>NA</td>
<td>5'</td>
<td>5' to 6'</td>
<td>9' to 14'</td>
<td>10' to 16'</td>
<td>12' to 18'</td>
<td>12' to 20'</td>
</tr>
<tr>
<td>Speed</td>
<td>Desired Operating Speed</td>
<td>45-55</td>
<td>35-40</td>
<td>35-55</td>
<td>30-35</td>
<td>30-35</td>
<td>30-35</td>
</tr>
</tbody>
</table>

¹ 12' preferred for regular transit routes, and heavy truck volumes > 5%, particularly for speeds of 35 mph or greater.
² Shoulders should only be installed in urban contexts as a retrofit of wide travel lanes to accommodate bicyclists.
³ Buffer is assumed to be planted area (grass, shrubs and/or trees) for suburban neighborhood and corridor contexts; street furniture/car door zone for other land use contexts Min. of 6' for transit zones.
⁴ Curb return radius should be as small as possible. Number of lanes, on street parking, bike lanes, and shoulders should be utilized to determine effective radius.
## Community Arterial

<table>
<thead>
<tr>
<th>Roadway</th>
<th>Community Arterial</th>
<th>Rural</th>
<th>Suburban Neighborhood</th>
<th>Suburban Corridor</th>
<th>Suburban Center</th>
<th>Town/Village Neighborhood</th>
<th>Town/Village Center</th>
<th>Urban Core</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lane Width&lt;sup&gt;1&lt;/sup&gt;</td>
<td>11’ to 12’</td>
<td>10’ to 12’ (14’ outside lane if no shoulder or bike lane)</td>
<td>11’ to 12’ (14’ outside lane if no shoulder or bike lane)</td>
<td>10’ to 12’ (14’ outside lane if no shoulder or bike lane)</td>
<td>10’ to 12’ (14’ outside lane if no shoulder or bike lane)</td>
<td>10’ to 12’ (14’ outside lane if no shoulder or bike lane)</td>
<td>10’ to 12’ (14’ outside lane if no shoulder or bike lane)</td>
<td></td>
</tr>
<tr>
<td>Paved Shoulder Width&lt;sup&gt;2&lt;/sup&gt;</td>
<td>8’ to 10’</td>
<td>4’ to 8’ if no parking</td>
<td>8’ to 10’</td>
<td>4’ to 6’ (if no parking or bike lane)</td>
<td>4’ to 6’ (if no parking or bike lane)</td>
<td>4’ to 6’ (if no parking or bike lane)</td>
<td>4’ to 6’ (if no parking or bike lane)</td>
<td></td>
</tr>
<tr>
<td>Parking Lane&lt;sup&gt;3&lt;/sup&gt;</td>
<td>NA</td>
<td>7’ to 8’ parallel</td>
<td>NA</td>
<td>8’ parallel; see 7.2 for angled</td>
<td>7’ to 8’ parallel; see 7.2 for angled</td>
<td>7’ to 8’ parallel; see 7.2 for angled</td>
<td>7’ to 8’ parallel; see 7.2 for angled</td>
<td></td>
</tr>
<tr>
<td>Bike Lane</td>
<td>NA</td>
<td>5’ to 6’ (if no shoulder)</td>
<td>5’ to 6’ (if no shoulder)</td>
<td>5’ to 6’</td>
<td>5’ to 6’</td>
<td>5’ to 6’</td>
<td>5’ to 6’</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>4’ to 6’</td>
<td>12 to 18; for LT; 6’ to 8’ for pedestrians</td>
<td>12 to 18 for LT; 6’ to 8’ for pedestrians</td>
<td>12 to 18 for LT; 6’ to 8’ for pedestrians</td>
<td>12 to 18 for LT; 6’ to 8’ for pedestrians</td>
<td>12 to 18 for LT; 6’ to 8’ for pedestrians</td>
<td>12 to 18 for LT; 6’ to 8’ for pedestrians</td>
<td></td>
</tr>
<tr>
<td>Curb Return</td>
<td>25’ to 50’</td>
<td>25’ to 35’</td>
<td>25’ to 50’</td>
<td>20’ to 40’</td>
<td>15’ to 30’</td>
<td>15’ to 35’</td>
<td>15’ to 40’</td>
<td></td>
</tr>
<tr>
<td>Travel Lanes</td>
<td>2 to 4</td>
<td>2 to 4</td>
<td>2 to 4</td>
<td>2 to 4</td>
<td>2 to 4</td>
<td>2 to 4</td>
<td>2 to 4</td>
<td></td>
</tr>
<tr>
<td>Clear Sidewalk Width</td>
<td>NA</td>
<td>5’</td>
<td>5’ to 6’</td>
<td>6’</td>
<td>6’ to 8’</td>
<td>6’ to 10’</td>
<td>8’ to 14’</td>
<td></td>
</tr>
<tr>
<td>Buffer&lt;sup&gt;4&lt;/sup&gt;</td>
<td>NA</td>
<td>6’+</td>
<td>5’ to 10’</td>
<td>4’ to 6’</td>
<td>4’ to 6’</td>
<td>4’ to 6’</td>
<td>4’ to 6’</td>
<td></td>
</tr>
<tr>
<td>Shy Distance</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>0’ to 2’</td>
<td>0’ to 2’</td>
<td>2’</td>
<td>2’</td>
<td></td>
</tr>
<tr>
<td>Total Sidewalk Width</td>
<td>NA</td>
<td>5’</td>
<td>5’ to 6’</td>
<td>10’ to 14’</td>
<td>10’ to 16’</td>
<td>12’ to 18’</td>
<td>14’ to 22’</td>
<td></td>
</tr>
</tbody>
</table>

---

1. 12’ preferred for regular transit routes, and heavy truck volumes > 5%, particularly for speeds of 35 mph or greater.
2. Shoulders should be installed in urban contexts only as part of a retrofit of wide travel lanes, to accommodate bicyclists.
3. 7’ parking lanes on this roadway type to be considered in appropriate conditions.
4. Buffer is assumed to be planted area (grass, shrubs and/or trees) for suburban neighborhood and corridor contexts; street furniture/car door zone for other land use contexts. Min. of 6’ for transit zones.

**Definition:** The speed of traffic that, in the expert judgments of the highway engineer and community planner, best reflects the function of the roadway and the surrounding land use context.

**Simple Definition:** The speed at which we would like vehicles to travel.
Which Type of Network is Best?

- **Hint:** One network offers more flexibility in designing individual roadways, and gives more choices to motorists, bicyclists and pedestrians alike.
Bicycle Facilities

What is the best means of accommodating bicyclists?

- Bike lane
- Wide curb lane
- Roadway with shoulders
Intersections

- In urban contexts, choose the smallest curb radius that can accommodate the design vehicle
  - Balance the need to accommodate truck turning movements with the benefit of smaller crossings for pedestrians
- Add width of parking and bike lanes when determining effective curb radius

Source: Main Street...When a Highway Runs Through It: A Handbook for Oregon Communities
Sidewalk network is the best gauge of community’s “walkability”

Provide sidewalks along both sides of all roadways in commercial areas, and along all arterials and collectors in residential areas

Strive for “clear sidewalk width” of 5 to 8 ft.

Provide more intensive crosswalk treatments for major roadways
Public Transit

• “Farside” bus stops are preferred to “nearside” bus stops
  – Pedestrian crashes at bus stops are more associated with nearside stops
  – Farside bus stops are shorter, giving more room for on-street parking

• Be prepared for greater interest in public transit!
Access Management

- Encourage municipalities to pass access management ordinances, focusing on arterials.
- Preserves the taxpayers investment in their transportation system.

Poor access management on suburban corridor
Design Using the Principles

- Understand the surrounding and future land uses
- Consider the role of the roadway within the network
- Know the roadway type and users
- Set the desired operating speed
- Refer to the Matrix for the starting design values

Requisite for process: understand the flexibility provided by the AASHTO Green Book
Pennsylvania Community Transportation Initiative

- Applications received: 403 requesting $600 million
- Applications selected: 50 granting $59.3 million

<table>
<thead>
<tr>
<th>Type of Project</th>
<th># of Selections</th>
<th>% of Total Selections</th>
<th>Total Funding for Selected Projects</th>
<th>% of Total Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle/Pedestrian</td>
<td>9</td>
<td>18%</td>
<td>$9,230,405</td>
<td>16%</td>
</tr>
<tr>
<td>Roads/Intersections/Local Network</td>
<td>6</td>
<td>12%</td>
<td>$9,937,000</td>
<td>17%</td>
</tr>
<tr>
<td>Intermodal/Transit-oriented Development</td>
<td>13</td>
<td>26%</td>
<td>$14,007,200</td>
<td>24%</td>
</tr>
<tr>
<td>Land Use &amp; Transportation Planning/Redevelopment</td>
<td>13</td>
<td>26%</td>
<td>$7,666,500</td>
<td>13%</td>
</tr>
<tr>
<td>Streetscape/Traffic Calming</td>
<td>8</td>
<td>16%</td>
<td>$18,158,887</td>
<td>31%</td>
</tr>
<tr>
<td>Regional Planning</td>
<td>1</td>
<td>2%</td>
<td>$285,000</td>
<td>0%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>50</strong></td>
<td><strong>100%</strong></td>
<td><strong>$59,284,992</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
PCTI Project Example

Bike Path - Altoona and Penn State Altoona Campus ($300,000)

• Good bike trail project
• Connections to town/campus
• Enhance local network
• Bike lanes added as part of a larger DOT project
TRANSPORTATION PROJECT DELIVERY PROCESS
revised draft 09.28.09
For more information, please visit:

www.smart-transportation.com