Defining and Measuring the Sustainable Transportation Network

Andrew Gast-Bray
Norm Marshall
Kevin Tilbury
Scott McCarey
Fred Dock
Norman Garrick
Ellen Greenberg
What is a Network?

A structure that serves and connects multiple nodes, people, flows and/or functions to achieve a goal.
<table>
<thead>
<tr>
<th>Sustainable Transportation Network</th>
<th>Conventional Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>About places and getting to them</td>
<td>About moving cars at speed</td>
</tr>
<tr>
<td>Connected</td>
<td>Not</td>
</tr>
<tr>
<td>Multimodal</td>
<td>Auto-dependent</td>
</tr>
<tr>
<td>Accessible destination</td>
<td>Indirect routes</td>
</tr>
<tr>
<td>More public streets</td>
<td>Fewer public streets</td>
</tr>
<tr>
<td>Detailed streetscape</td>
<td>Few streetscape elements</td>
</tr>
<tr>
<td>Welcoming for pedestrians</td>
<td>Dangerous and unpleasant for pedestrians</td>
</tr>
<tr>
<td>More route choices / redundant</td>
<td>Fewer route choices / prone to breakdown</td>
</tr>
<tr>
<td>Smaller (narrower ?) streets</td>
<td>Wider streets</td>
</tr>
<tr>
<td>Finer grained</td>
<td>Coarser grained</td>
</tr>
<tr>
<td>Lower speeds but faster trips</td>
<td>Higher speeds but slower trips</td>
</tr>
<tr>
<td>Focus on quality of place</td>
<td>Focus on speed of vehicles</td>
</tr>
<tr>
<td>Less delay at intersections</td>
<td>More delay at intersections</td>
</tr>
<tr>
<td>Simpler turns</td>
<td>More complicated turns</td>
</tr>
<tr>
<td>Supports activity on sidewalks / adj to streets</td>
<td>More arterials that are not comfortable to be next to</td>
</tr>
</tbody>
</table>
People understand connecting places, even if transportation engineers and planners do not. Different modes must connect places regionally.

- **Indianapolis Case Study** - Places for Indianapolis regional transportation to serve – determined by a public process.
People understand connecting places, even if transportation engineers and planners do not. Different modes must connect places regionally.

• Indianapolis Case Study - Places for Indianapolis regional transportation to serve – determined by a public process.
Each multimodal district must be connected. If a district is too big to be walkable, it must be subdivided into walkable neighborhoods.
Each multimodal district must be connected. If a district is too big to be walkable, it must be subdivided into walkable neighborhoods.
Using a place-based functional classification reorganizes street layout within a walkable district or neighborhood.
Districts are multimodal places with “nodes” (N) at their center

- “Node” or center which is the heart of the district
- Cluster many destinations, goods and services
- Hubs – walkable, bikeable, transit, “park once”
- Unique places based on heritage and culture
Multi-Modal Corridors link Multi-Modal Districts

- MM Placemaking Corridors at district nodes
- MM Thru Corridors between or along edges
- MM Connector Corridors connect nodes and edges
Multi-Modal Corridors

Link Multi-Modal Districts
Multi-Modal Corridors Link Districts
Multi-Modal Corridors Link Districts
Intensity

Corridors

Link

Districts

- Node

Central Business Pedestrian District

1/2 mile radius

Village Mixed Use Pedestrian District

1/4 mile radius

District Edge to Core by Connector Corridor

District Edge defined by Connector Corridor

District Edge to Edge by Thru Corridor

District Core defined by Placemaking Corridor

1/4 mile radius
Intensity

Central Business District

Village Mixed-Use District

Village Residential District

District Concepts

CNU Transportation Summit | Charlotte, NC | November 6-8, 2008
Intensity

Corridors
Link
Districts

Central Business Pedestrian District

1/2 mile radius

Village Mixed Use Pedestrian District

1/4 mile radius

District Edge to Core by Connector Corridor

District Edge defined by Connector Corridor

District Core defined by Placemaking Corridor

District Edge to Edge by Thru Corridor

N - Node

CNU Transportation Summit  Charlotte, NC  November 6-8, 2008
More Performance out of Place-Based Networks:

Place-based networks are better for so much more – For a given district, there are natural overlays

Vertical Structure Level - Built Space, architectural guidelines, function of success of place - the more desirable for gsp to be there, more space for activities crams into the area driving prices/buildings up - houses wireless/cell/radio stations, windpower/solar - this level allows the district to evolve over time.

Economic/Land-Use Structure Level - economic infrastructure, freight, service-provision organization, information structure level, education infrastructure, CHP/district power must be accessible to all for least cost - this level allows all in the district to access the modes and functions, but does not provide them directly to all.

Road Structure Level - co-location of principal utilities with roads, transportation mode network, emergency response network - must serve all residences, this level providing modes and functions to all extents of the district

Green Infrastructure Level - Natural resources, water, air, topography - some imposed variation with landscaping and planning - this is the base level upon which all else is built, ignoring this increases cost of service dramatically.
Sustainable transportation networks’ (STN) new functional classification
### STN’s new functional classification characteristics

<table>
<thead>
<tr>
<th>STN Functional Class</th>
<th>Street Types</th>
<th>Speed Regime</th>
<th>Landuse Intensity &amp; Cross-Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thru</td>
<td>Highway, Parkway</td>
<td>35-65 mph</td>
<td>Low &amp; low</td>
</tr>
<tr>
<td>Connector</td>
<td>Commuter, Boulevards</td>
<td>25-35 mph</td>
<td>Med &amp; high</td>
</tr>
<tr>
<td>Placemaking</td>
<td>Avenues, Mainstreets</td>
<td>15-25 mph</td>
<td>High &amp; high</td>
</tr>
<tr>
<td>Local</td>
<td>Local, Links, Quiet</td>
<td>Bike, ped, transit determine speed, not autos</td>
<td>High &amp; low-med</td>
</tr>
</tbody>
</table>
Placemaking Class

• Multi-Modal Urban Pedestrian Corridor Concept
  – Other typology examples:
    MM Boulevard, MM Social Street
Thru Class

- Multi-Modal Parkway Concept
Connector Corridor Class

- Multi-Modal Urban Commuter Concept
  
  Other typology examples:
  
  MM Urban Connector, MM Suburban Commuter and Connector
Local Class

Multi-Modal
Quiet Street Corridor Concept

Other typology examples:
MM Urban, Suburban and Rural Links, MM Off Street and Off Street with Transit
<table>
<thead>
<tr>
<th>Network and Place</th>
<th>Walk</th>
<th>Bike</th>
<th>Transit</th>
<th>Auto</th>
<th>Freight</th>
<th>Emergency</th>
<th>Green</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Region: Metropolis, city, and town</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The neighborhood, the district, and the corridor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The block, the street, and the building (Takeover Point w/Bluebook)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Defining, and Measuring
Measuring a Network?

- **Optimizing**
  - Time to Destination, Directness and Circulation Patterns
  - Connectivity and Spacing
  - Continuity and Convergence
  - Street Hierarchy and Types
  - Street Intensity and Mode Accessibility
  - Cost and Efficiency

- **Assessing**
  - Network Grain
  - Pedestrian Route Directness
  - Pedestrian Environmental Quality
  - Width of Thoroughfares
  - Accessibility
  - Modal LOS

- **Verifying and Sustaining**
  - Triple Bottom Line
  - Generative Capacity