STREET DESIGN

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Outline of Talk

- Background on Conventional Street Planning
- => Problems!
- Alternative Strategies:
  - Traffic Calming
  - Context Sensitive Design
  - Road Diets/Skinny Streets
  - Complete Streets
  - Green Streets
  - Activate the Street!
Background on Conventional Street Planning
## Road Design in the U.S.

<table>
<thead>
<tr>
<th>Level</th>
<th>Agencies</th>
<th>Primary concern</th>
<th>Primary role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal</td>
<td>FHWA, FTA</td>
<td>National Highway System</td>
<td>Funding Policy</td>
</tr>
<tr>
<td>State</td>
<td>DOT</td>
<td>Highways outside metro areas</td>
<td>Planning</td>
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<td>Building Operating</td>
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<tr>
<td>Regional</td>
<td>MPO, Transit</td>
<td>Highways, transit within metro areas</td>
<td>Planning</td>
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<td>Local</td>
<td>Planning Public Works</td>
<td>Local streets</td>
<td>Planning</td>
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<td></td>
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<td>Building Operating</td>
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</tbody>
</table>

**Manuals and Guidelines from FHWA and state DOTs, also from...**

- **AASHTO** – American Association of State Highway and Transportation Officials
- **ITE** – Institute of Transportation Engineers
- **NACTO** – National Association of City Transportation Officials
STREET RIGHT-OF-WAY (ROW)
<table>
<thead>
<tr>
<th>Street Patterns</th>
<th>Gridiron (c. 1900)</th>
<th>Fragmented Parallel (c. 1950)</th>
<th>Warped Parallel (c. 1960)</th>
<th>Loops and Lollipops (c. 1970)</th>
<th>Lollipops on a Stick (c. 1980)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intersections</strong></td>
<td>![Image]</td>
<td>![Image]</td>
<td>![Image]</td>
<td>![Image]</td>
<td>![Image]</td>
</tr>
<tr>
<td>Lineal Feet of Streets</td>
<td>20,800</td>
<td>19,000</td>
<td>16,500</td>
<td>15,300</td>
<td>15,600</td>
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<tr>
<td># of Blocks</td>
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<td>19</td>
<td>14</td>
<td>12</td>
<td>8</td>
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<tr>
<td># of Intersections</td>
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<td>22</td>
<td>14</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td># of Access Points</td>
<td>19</td>
<td>10</td>
<td>7</td>
<td>6</td>
<td>4</td>
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<tr>
<td># of Loops &amp; Cul-de-Sacs</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>8</td>
<td>24</td>
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</tbody>
</table>

Southworth and Owens (1993)
1880 street network

1990 street network
The Green Book

a policy on
Geometric Design of Highways and Streets
2004

American Association of State Highway and Transportation Officials

MUTCD
Guidelines for Residential Subdivision Street Design

Institute of Transportation Engineers
**Specified Dimensions for ROW**

<table>
<thead>
<tr>
<th>Reference Number</th>
<th>Collector Street Design Guidelines</th>
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<tbody>
<tr>
<td>2.04.01</td>
<td>Terrain Classification</td>
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<td>2.04.02.</td>
<td>Development Density</td>
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<td>2.04.03.</td>
<td>Right-of-Way Width (feet)</td>
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<td>2.04.04.</td>
<td>Pavement Width (feet)</td>
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<td>2.04.05.</td>
<td>Type of Curb</td>
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<td>2.04.06.</td>
<td>Sidewalk Width (feet)</td>
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<td>2.04.07.</td>
<td>Sidewalk Distance from Curb Face (feet)</td>
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<td>2.04.08.</td>
<td>Minimum Sight Distance (feet)</td>
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<td>2.04.09.</td>
<td>Maximum Grade</td>
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<td>2.04.10.</td>
<td>Minimum Spacing Along Major Traffic Route (feet)</td>
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<td>2.04.11.</td>
<td>Design Speed (mph)</td>
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<td>2.04.12.</td>
<td>Minimum Centerline Radius (feet)³</td>
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<tr>
<td>2.04.13.</td>
<td>Minimum Tangent Between Reverse Curves (feet)</td>
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<tr>
<td>2.04.14.</td>
<td>Street Lighting</td>
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<table>
<thead>
<tr>
<th>Level</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
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**Notes:**
- Assumes no superelevation - see discussion.

Speed Limits

- MUTCD section 2B-10 (update: 2B-13) requires that the numeric value be determined on basis of an engineering study. The following factors should be considered:

1. Road surface characteristics, shoulder condition, grade, alignment and sight distance.
2. The 85-percentile speed and pace speed.
3. Roadside development and culture, and roadside friction.
4. Safe speed for curves or hazardous locations within the zone.
5. Parking practices and pedestrian activity.
6. Reported accident experience for a recent 12-month period.

For a discussion, see: http://www.motorists.org/speed-limits/safety-setting-limits
Level of Service

TRB’s Highway Capacity Manual

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Control Delay per Vehicle (sec/veh)</th>
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<tbody>
<tr>
<td>A</td>
<td>≤ 10</td>
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<tr>
<td>B</td>
<td>&gt;10-20</td>
</tr>
<tr>
<td>C</td>
<td>&gt;20-35</td>
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<tr>
<td>D</td>
<td>&gt;35-55</td>
</tr>
<tr>
<td>E</td>
<td>&gt;55-80</td>
</tr>
<tr>
<td>F</td>
<td>&gt; 80</td>
</tr>
</tbody>
</table>


LOS = f (volume/capacity)  ➔  How to increase LOS?
Result: Massive Intersections
Wide Streets

All over Davis, and elsewhere
Parking!
Parking Problems

- Minimum parking requirements for residential and commercial development, in zoning codes
  - Excess parking and thus pavement and thus heat, run-off, etc.
- Free curbside parking in central business districts
  - Excess driving – “cruising” to find spaces – and thus emissions

See Don Shoup’s work!
Little thought given to the environment around the street (bus stop in New Mexico)
Traffic, traffic everywhere
A road-dominated environment just creates more driving
Alternative Strategies: Traffic Calming

- Movement began in Germany and the Netherlands in the 1960s
- Spread to the North Am. in 1970s and 80s
- Control speed, volume, or both?
- Design speed vs. posted speed
- Several types of strategies:
  - Pedestrian streets/districts
  - Diverters
  - Slow streets: humps, tables, circles, bulbouts, chicanes
  - Woofnerf: Dutch design for very slow single-grade street
  - Naked streets: no demarcations force drivers to slow?
Effects on neighboring, resident use of the street environment
Context-Sensitive Design
Key Principles of CSD

- Interdisciplinary Team
- Stakeholder Input
- Balance
- Flexibility
- Aesthetics
Complete Streets
WHAT IS A COMPLETE STREET?

ACTIVE SIDEWALKS
Sidewalks should be smooth, wide, feel safe, and have appropriate transitions to the street, making them easy to walk or use a wheelchair on.

DEDICATED BIKE LANES
Simple pavement markings creating a dedicated bike lane make both motorists and bicycle movement more predictable, and therefore safer for both. They may increase the likelihood of casual riders using bicycles for transportation.

ACTIVE ROADWAY
One lane of car traffic going in each direction with a two-way-left-turn-lane (TWLTL) in the center would reduce the amount of car crashes on Government Street by providing turning vehicles a refuge from through traffic, while keeping through traffic moving more efficiently.

SAFE CROSSWALKS
Clearly marked crosswalks allow pedestrians and wheelchair users to cross streets safely, while making sure cars know where to expect them.

PLANTING STRIP
Street trees and landscaping slow speeding traffic, improve the aesthetics of the roadway, provide shade, and create a buffer between cars and people, making a more inviting environment for pedestrians.

GREEN SPACES
Parks and public green spaces create a destination, encouraging community interaction and providing a rest from the surrounding urban environment.

City of Gardner, MA
Visualization of street design changes (courtesy of Steve Price/Urban Advantage)
Freeway Removal

Road Diets
Road Diet

Source: http://www.buryinc.com/blog/2012/08/10/the-road-diet/
Road Diet

Before

Sidewalk  Travel Lane  Travel Lane  Center Turn Lane  Travel Lane  Travel Lane  Sidewalk

6' (varies)  12'  12'  12'  12'  12'  6' (varies)

60'

After

Sidewalk  Furnishing Zone  Travel Lane  Center Turn Lane  Travel Lane  Furnishing Zone  Sidewalk

6' (varies)  6.5'  5'  11'  11'  11'  5'  6.5'  6' (varies)

Raised, Buffered Cycle Track

2'

Green Streets
Green Streets

Anatomy of a Green Street

- Pedestrian friendly
  - 1000 cf soil volume for street tree tree boxes
- Landscape areas
- Permeable sidewalks
- Transit oriented
  - Shielded, Energy efficient street fixtures
- Bike Lane
  - Permeable pavement in transitway
- Bioretention
  - Recycled materials used
  - Mature Street Trees
  - Compost amended soils
  - Permeable pavement in parking lane
  - Bike Rack
  - Interpretative signs

Marcy McInelly, SERA/Urbsworks
Activate the Street!
HOLY BODY

Late night fog
glows in the bay
like a holy body.
Morning slant
restores the trees
chalk white city
glass blue water.
By evening flushed
and spent
you grow dark again.
Mysterious and
constant lover.

—Susan Griffin
THE FUTURE OF STREET DESIGN

- More holistic/complete/contextual thinking about design
- More connected street patterns
- More bike- and ped-oriented
- Streets reclaimed as public space
- Slow and steady traffic
- Greener streets
- More balanced land use minimizes travel
- Emphasis on access rather than mobility
Thank you!

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