Environment, Health and Transportation System Design

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Outline

• What is the transportation system?
  • Traffic Crashes
  • Air, Water and Noise Impacts
  • Travel Behavior

• Better Design: Context Sensitive Design, Sustainability, Livability
Transportation Research Board - TRB

“TRB is one of six major divisions of the National Research Council—a private, nonprofit institution that is the principal operating agency of the National Academies in providing services to the government, the public, and the scientific and engineering communities.”

- established in 1920
- Highway Research Board (HRB) in 1925
- During the 1960s became increasingly multimodal
- 1974 the Highway Research Board became the Transportation Research Board

Source: www.trb.org - go there for pubs and TRIS

Critical Issues – by TRB

- Congestion
- Energy, Environment and Climate Change
- Infrastructure
- Finance
- Equity
- Emergency Preparedness, Response and Mitigation
- Safety
- Institutions
- Human and intellectual capital
Transportation System

- Physical infrastructure
- Vehicles
- Travelers and goods
- Control systems and operations (level of service)
- Costs
- Environmental impacts

- We tend to design individual components not the entire system.
- Seven reasons why this system is a challenge we should all be more worried about!

The Importance of Traffic Safety

- 2006 42,642 people killed in US transportation - 1 per 12 minutes
- 96% motor vehicle crashes
- 2.6 million injured in motor vehicle crashes (most minor)
- 2000 motor vehicle crashes cost $231 billion (Evans 2004)
Transportation and air quality / emissions as a critical issue:

- Transportation and air quality / emissions as a critical issue:
  - Limited knowledge of problem
  - Hard to quantify
  - Hard to know impacts
  - Hard to solve
  - Legacy effects

Table 1. Vermont police-reported crashes 2003-2008

<table>
<thead>
<tr>
<th></th>
<th># crashes</th>
<th>%</th>
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<tbody>
<tr>
<td>Total Crashes</td>
<td>84,591</td>
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<tr>
<td>Total single-vehicle crashes</td>
<td>25,546</td>
<td>30.4</td>
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<tr>
<td>Total multi-vehicle crashes</td>
<td>58,168</td>
<td>69.5</td>
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<td>Total departure from lane crashes</td>
<td>28,676</td>
<td>34.1</td>
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<td>Total crashes involving large vehicles</td>
<td>5,220</td>
<td>6.2</td>
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<td>Total crashes involving bicycles and pedestrians</td>
<td>1,457</td>
<td>1.7</td>
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<td>Total crashes involving young drivers</td>
<td>20,186</td>
<td>23.9</td>
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<tr>
<td>Young drivers at fault</td>
<td>16,488</td>
<td>76.1</td>
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<td>Total fatal crashes</td>
<td>420</td>
<td>0.5</td>
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<tr>
<td>Total fatal crashes involving young drivers</td>
<td>95</td>
<td>0.1</td>
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</table>
What affects tailpipe emissions?

- Second by second operation
  - Road type
  - Driver
  - Vehicle
  - Traffic control
- Temperature and humidity
- Fuel

Travel Behavior

- Decisions / choice
  - Do I make a trip – activities / time use
  - Departure time
  - Destination
  - Mode
  - Trip tours and chaining
  - Route

- Hierarchy and decision processes poorly understood
Summary

We have traditionally been designing and operating for travel time (speed).

Environment and Health are not deeply rooted in transportation system policy or metrics.

Better Design such as “Context Sensitive Design”, “Sustainability”, and “Livability” struggle in such a large complex system.