Intelligent Transportation Systems (ITS)

CEE 320
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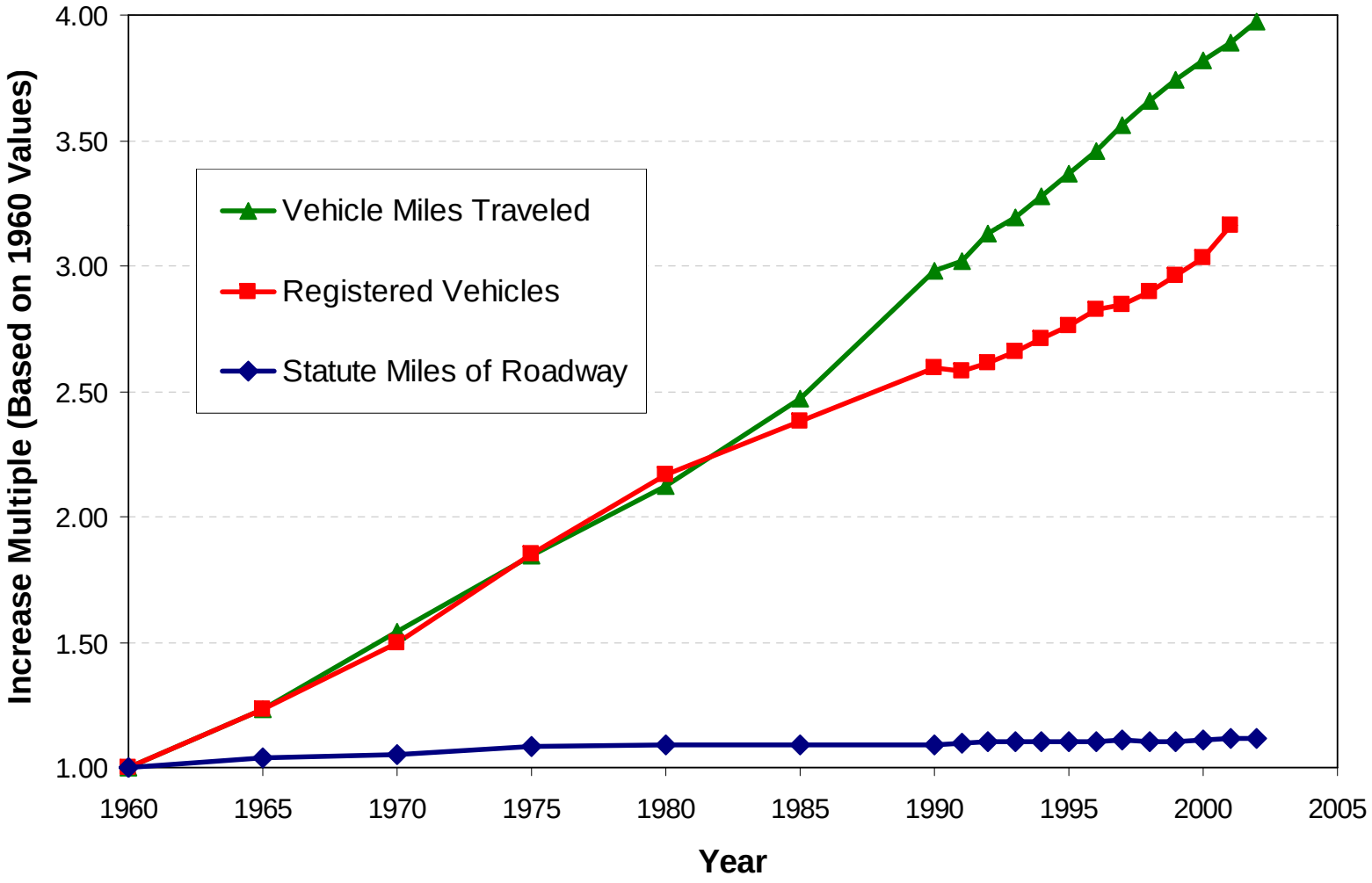
Outline

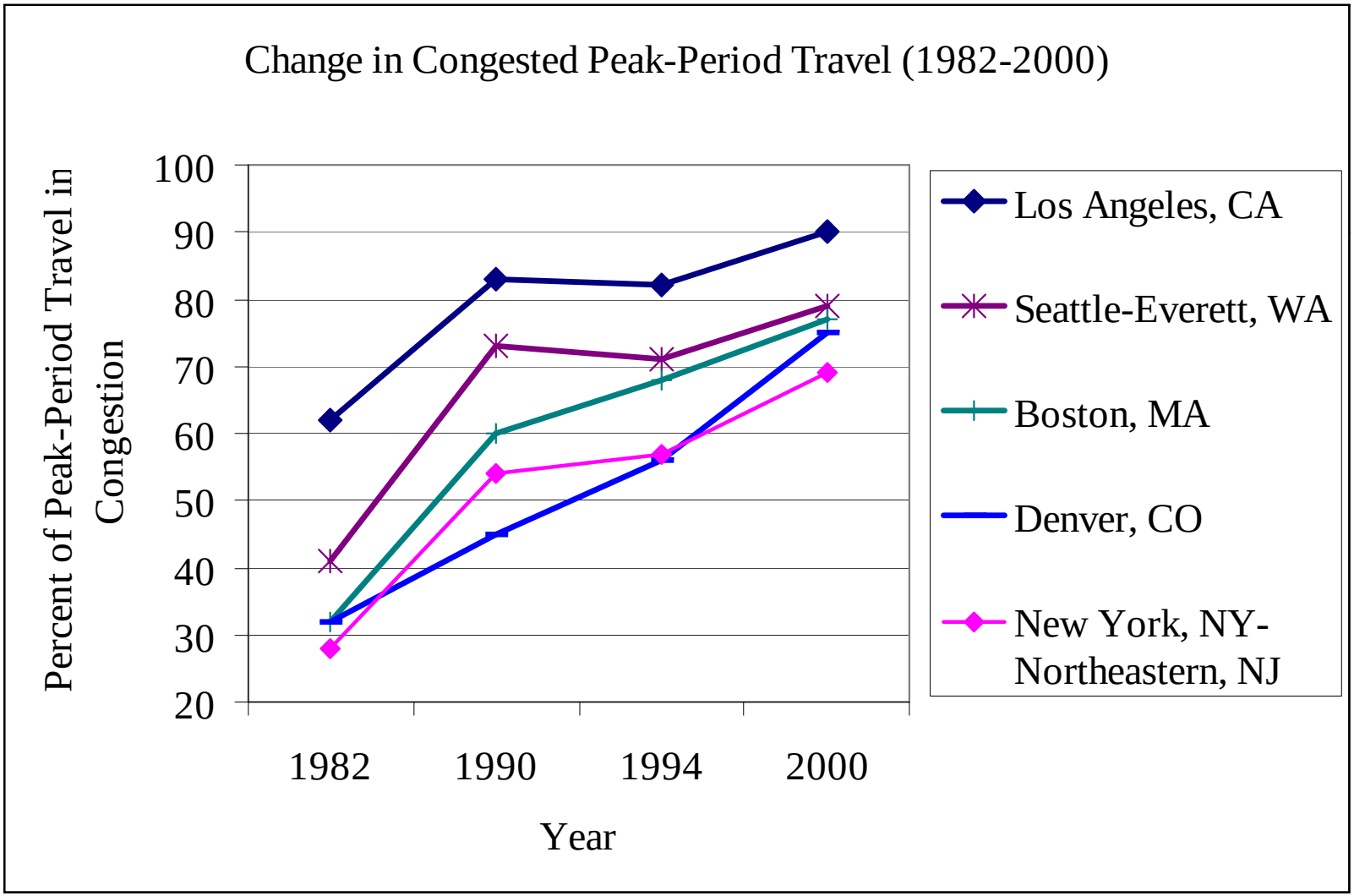
- **Need for traffic solutions**
- **Improving technology**
  - **Improved wireless networks**
  - **Low energy requirements**
  - **Improved management systems**
  - **Increased appetite for technology**

Road Use Growth



From the Bureau of Transportation Statistics, *National Transportation Statistics 2003*

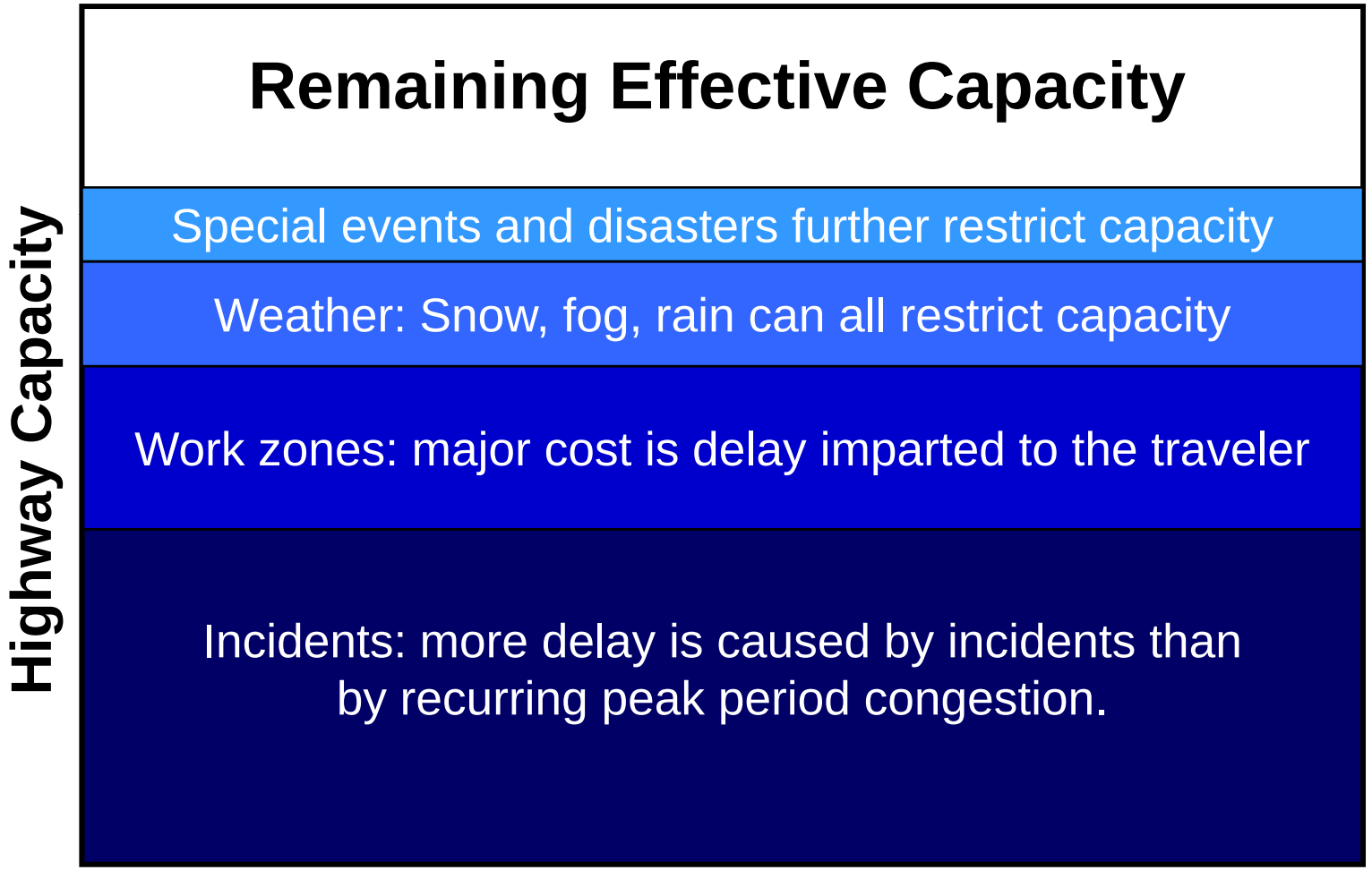
Changes in Congested Peak-Period Travel



Problems Caused by Congestion

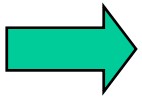
- **Increased…**
  - **Travel time**
  - **Travel cost**
  - **Air pollution**
  - **Accident risk**
  - **…..**

How Much Capacity Is There?



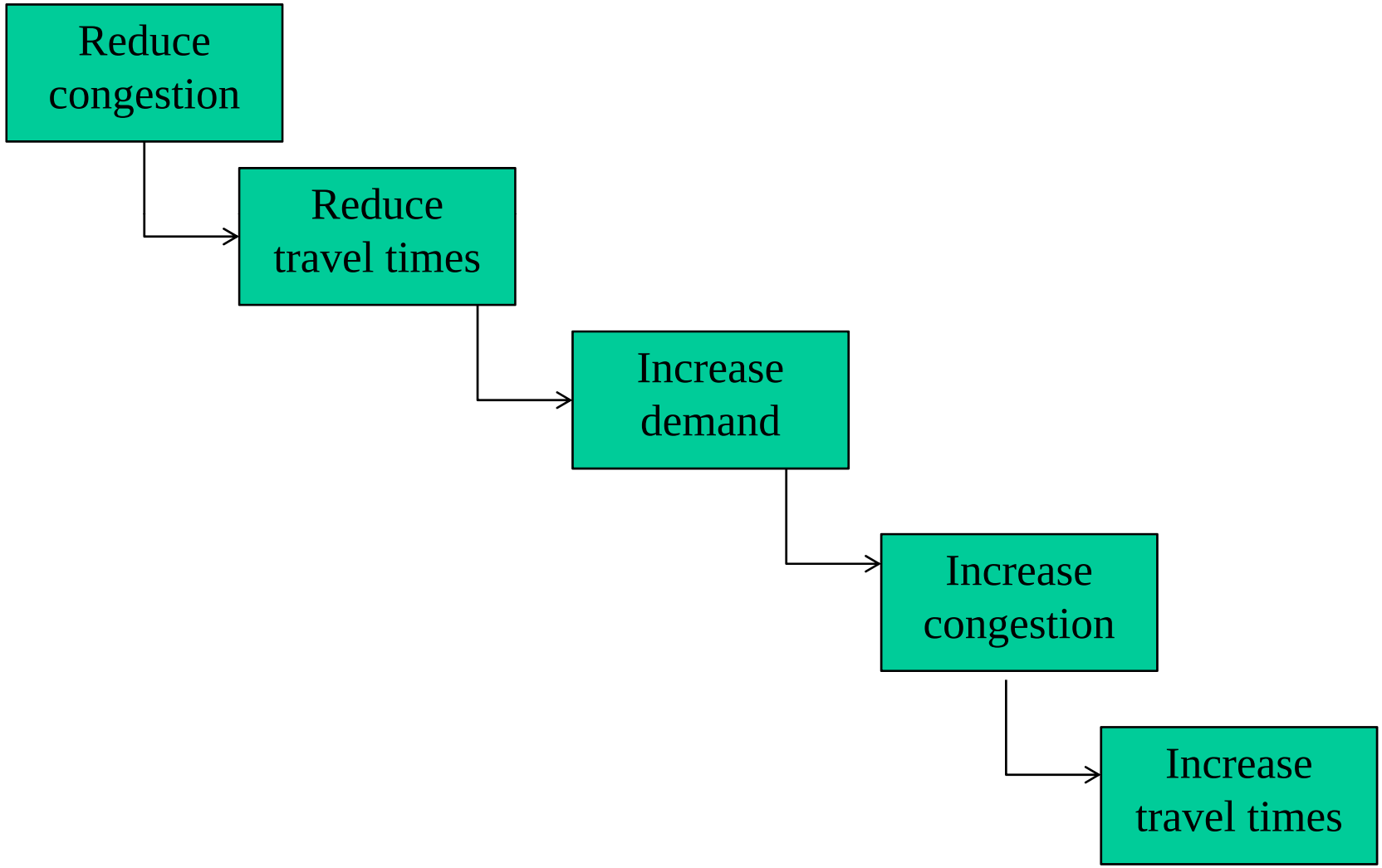
Options

- **Construct new roads**
  - **Covered in geometric design**
  - **Not likely to happen on a large scale**
- **Reduce Traffic**
  - **Travel demand management**
  - **Alternative transportation**
- **Increase existing infrastructure capacity**
  - **Often exploits the intelligent transportation systems (ITS)**



All of these are required, and there will (probably) still be congestion

Induced demand



Option 1: Construction

Highway Construction Cost Sampling

Project	Total Cost	Lane-Miles	Cost per Lane-Mile
Route 3, North Boston	**$395.0 million**	**42**	**$9.4 million**
I-4 Tampa to Orlando	**$403.0 million**	**73**	**$5.5 million**
I-5 Oregon	**$30.0 million**	**5.16**	**$5.8 million**
US 26 Sunset Hwy. Oregon	**$10.6 million**	**2.24**	**$4.8 million**
US 12 near Walla Walla River	**$36.4 million**	**25**	**$1.5 million**
US 101 on Olympic Peninsula	**$1.8 million**	**0.8**	**$2.2 million**

<u>General Conclusion</u>

Highways cost $1 to $10 million per lane-mile to build

Option 2: Reduce Traffic or Spread Demand

- **Make the trip using another mode**
  - **Extra capacity**
- **Don't make the trip**
  - **Pricing**
  - **Controls**
- **Make the trip at a different time**
  - **Pricing**
  - **Controls**

Option 3: Increase Existing Infrastructure Capacity

- **An alternative to expensive new highway construction is the implementation of strategies that promote more efficient utilization of transportation infrastructures.**
- **Simple:**
  - **More people per vehicle (carpool, bus)**
  - **Smaller vehicles (motorcycles)**
  - **Narrow lanes**

Option 3: Increase Existing Infrastructure Capacity

- **More complex:**
  - **Vehicle automation**
  - **Variable speed limits**
  - **Variable use facilities**
  - **Traffic monitoring**
  - **Ramp meters**
- **Many rely on Intelligent Transportation Systems (ITS), which aims to reduce travel time, ease delay and congestion, improve safety, and reduce pollutant emissions**