Incorporating NHTS Data into the Urban Mobility Report

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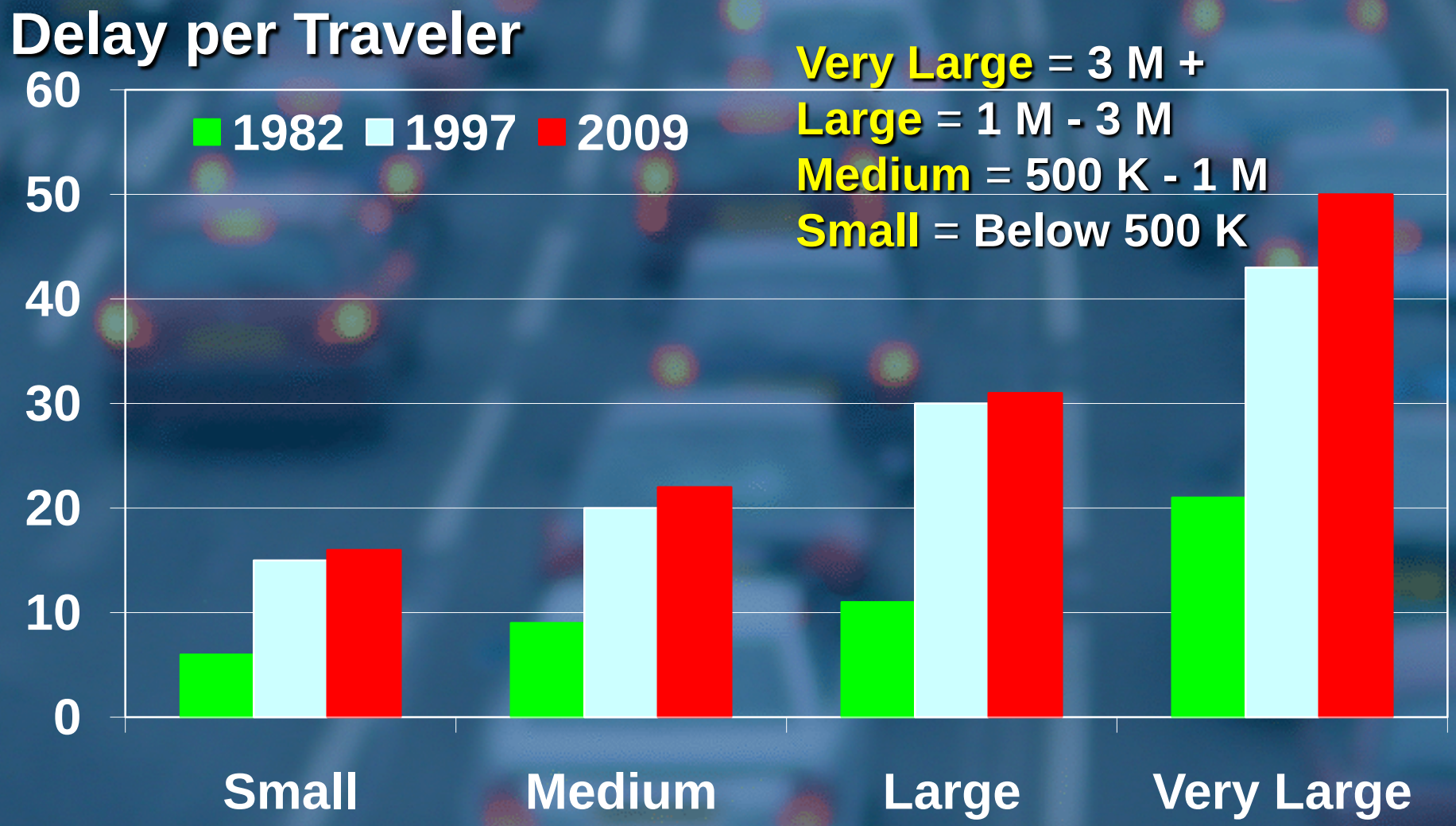
Overview

- History of the UMR
- Concepts and measures
- Elements and calculations
- Modal assumptions
- Results

Background

- History of the UMR
  - Over 20 years
- Primarily roadway delay
  - Passenger car and truck
- Public Transportation
  - Added several years ago

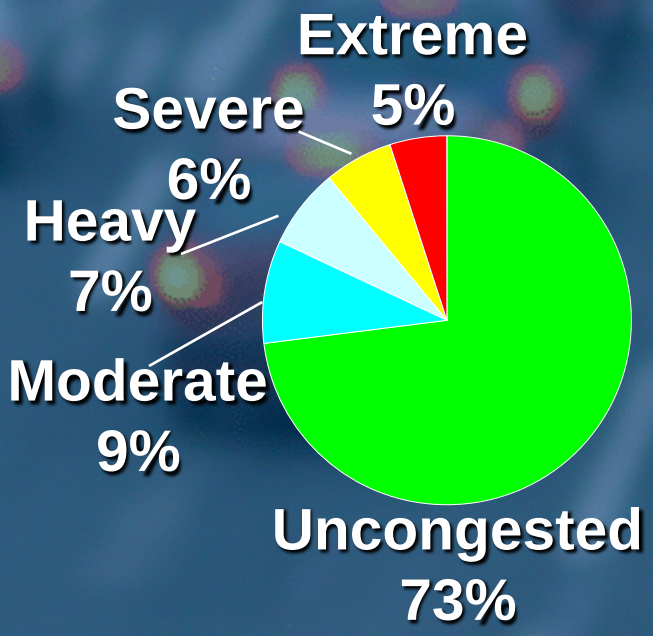
Congestion is Getting Worse in Cities of All Sizes –
But the Recession Has Caused a "Reset"



Expanding Travel Delay & Shrinking Free-Flow Hours

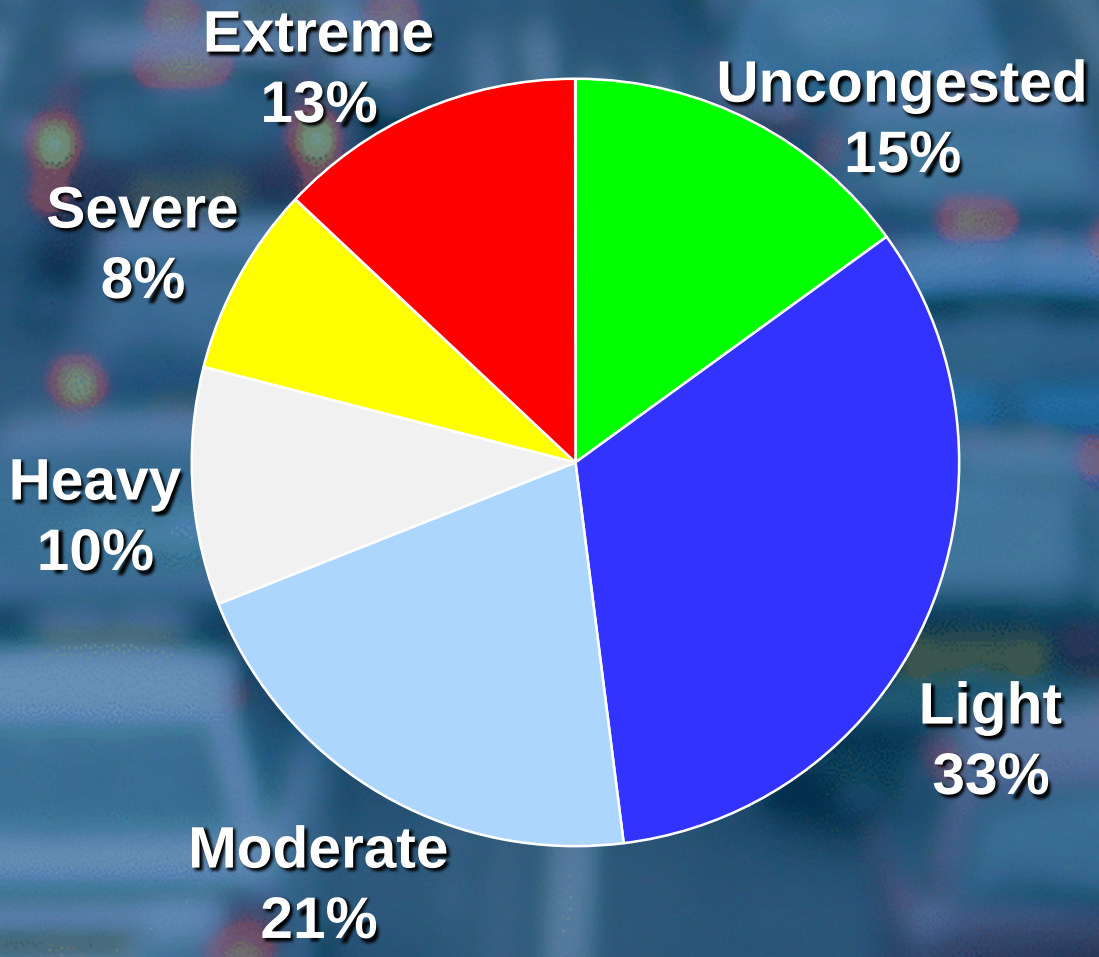
1982

Total Delay = 1.0 Billion Hours



2009

Total Delay = 4.8 Billion Hours



Wasted Fuel (Same Trend) 3.9 B Gallons in 2009

Most Congested Areas with Greatest "Tax"

Average peak period commuter

• Chicago	70 hours	$1,738
• Washington DC	70 hours	$1,555
• Los Angeles	63 hours	$1,464
• Houston	58 hours	$1,322
• Baltimore	50 hours	$1,218

- **The nation:**
  - 4.8 billion hours
  - 3.9 billion gallons
  - $115 billion cost

Concept

- Travel Time Index
  - Have shown benefits from transit
- Delay per Peak Period Traveler
  - Has included everyone moving in peak period
- Extend these measures focusing on sustainability
  - Add more modes

Key Elements

- "Uncongested condition"
  - Speeds below those in low volume conditions
- Delay can occur with all modes
  - Difference between uncongested and actual
- Includes auto, transit, walk, bike, work at home
  - person-miles, person-hours, avg occupancy
- Could include carpooling and flextime
- Continue to use performance measures based on time

Key Calculation Elements

- Freeflow travel speed
  - Overnight speed on roadways
  - Scheduled speed on transit
- Weight by person-miles of travel
- Travel time related measures
  - All users place a value on travel time
  - Can weight by volume to get summations
- Average and Reliability Measures
  - Annual average congestion measures
  - Reliability takes more detailed data to show day-to-day variations in travel time

Travel Mode Data

- NHTS has percentage of trips by mode
  - Basis for bike and walk percentages
  - Unfortunately not conducted in every region so used to get population size averages
- NTD provides public transportation data
  - Each mode has different alternative trip assumptions (e.g., commuter rail assumed to come from freeways due to longer trips)
- Journey to Work Census data provides info on work-at-home

Incorporating Other Modes

- Use same basic methods that have been used to include public transportation
  - Walk – 1 mile trip
  - Bike – 5 mile trip
  - Work at home – 9 mile trip
  - All of these trips are “congestion free” trips until better monitoring allows for direct measurement

Speeds Used for Travel Modes

Mode	Freeflow Speed	Congested Speed
Truck/Car	overnight	peak period
Transit		assume 95% of travel is uncong. 5% of travel is mod. cong. = about 10% time penalty
Bus	arterial	
Urban Rail	arterial	
Comm. Rail	freeway	
Bike	15 mph	15 mph
Walk	4 mph	4 mph
Work at home	average of freeway and arterials	

Travel Time Index

$$\text{Travel Time Index} = \frac{\text{Delay Time} + \text{Free-flow Travel Time}}{\text{Free-flow Travel Time}}$$

Weight the modes together by person-miles of travel

Results

Popn Group	UMR TTI	Sustainable TTI	Transit	Walk	Bike	Work @ Home
Very Large	1.371	1.321	1.338	1.369	1.369	1.352
Large	1.233	1.217	1.229	1.232	1.233	1.222
Medium	1.140	1.131	1.138	1.139	1.140	1.133
Small	1.099	1.093	1.098	1.099	1.099	1.094

- Transit travel has big effects in Very Large cities
- Work at home is largest contributor in other three population groups
- Most of the TTI value changes in Small/Medium areas will be in range of 1 or 2 point values

Conclusions

- Relatively simple procedure for incorporating travel by modes not typically in the UMR
- Uses NHTS to identify percentage of peak trips made by modes other than car and truck
- These changes allow the UMR to begin discussions about congestion effects of non-motorized travel, transit, and working from home

For More Information

- Please visit http://mobility.tamu.edu