You’re Concerned about Congestion & Infrastructure; So Are We; Let’s Work Together

Business Advisory Committee
The Transportation Center

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This Morning

- Congestion
  - How Bad?
  - Impacts?
- Infrastructure
  - Condition
  - Are we investing enough?
- Possible Research
  - Congestion pricing
  - Network surety
  - Disruption management
  - Project “success”
Highway Congestion Is Getting Worse

Need to Be Careful about Definitions

Source: FHWA
Highway Congestion
- Measured by Travel Time Index

TTI = \frac{\text{Peak Period Travel Time}}{\text{Uncongested Travel Time}}

41% Increase in Congested Travel Time Premium

Average TTI for all US Urban Areas, 1995-2004

Source: FHWA
Congestion Not Just a Highway Problem

- Rail, water, pipeline, air all face capacity constraints
- Require substantial investments simply to hold current market share
- All depend on roads for “intermodalism”
Congestion Impacts

- Wasted
  - Travel time
  - Fuel
  - Emissions
  - Vehicle wear

- Decreased transport time reliability
  - Leads users to build in cushion
    - “Buffer”
    - Businesses & families
Travelers Build in “Buffer”
Representing Near-Worst Case

Source: FHWA
What do transport-dependent businesses do?
Causes of Highway Congestion

- Bottlenecks: 40%
- Traffic Incidents: 25%
- Bad Weather: 15%
- Work Zones: 10%
- Special Events: 5%
- Poor Signal Timing: 5%

Total delay = ~4 billion hours per year

Source: FHWA
We Think We Know What to Do (?)

- Incident Management
- Operations Improvements
- Construction Project Coordination & Management
- Transit
- Demand Management
  - Pricing
- Additional Capacity
- Land Use
Do We Know How Effective Tools Are?
Can We Target Congestion Causes?
2 Concerns about Infrastructure

- Capacity
  - Federal euphemism = “Bottlenecks”

- Condition
  - Defined 2 ways
    - Physical condition/utilization measures
    - Needed reinvestment
Highway Ride Quality

Vehicle-Miles Traveled on Roads with Acceptable/Good Ride Quality, 1995-2004

Source: FHWA
Highway Bridge Condition

Urban Bridge Deficiencies, 2004

Source: FHWA
Transit Capital Stock Condition

Condition of Urban Transit Capital Stock, 1-5 Scale, 2004

- Urban Buses: 3.08
- Rail Vehicles: 3.5
- Rail Stations: 3.37

Source: FTA
USDOT Analysis Indicates We Aren’t Spending Enough on Roads

Current Bridge/Highway Annual Capital Investment Vs. Cost to “Maintain” vs. Maximum Economic Investment

Source: USDOT
Or Transit

Current Transit Annual Capital Investment Vs. Cost to “Maintain” vs. Cost to “Improve”

“Maintain”
Current asset conditions
Vehicle occupancy levels

“Improve”
Average asset condition to “Good,”
Reduce vehicle occupancy,
Increase speed

Source: USDOT
Other Modes Have Similar Condition/Capacity Issues
Are There Areas of Research Interest Here for Northwestern?
Congestion

- Faculty group formed & meeting
- Focus on pricing?
- Looking to catch up with international leaders
- Interested in reliability impacts
Network Surety

- Faculty group formed & meeting
- Focus on network resiliency, disruption management?
- CTA interested
Disruption Management

**Alert:**
Detection, Diagnosis, Response Prescription, Communication

**Response:**
Life-Safety, Damage Control, Extinguishment, Functional Restoration

**Recovery:**
Post Mortem, Redesign, Reconstruction

Disruption
Project Success

- Informal effort since 2004
- Working with RISE, others
Conclusion

- Congestion worsening
  - Top national priority
- Infrastructure investment not keeping up
- Needs & opportunities for important research
  - Congestion
  - Network surety
  - Disruption management
  - Project success
- Let’s get to it!