

# One Method to Assess Transportation Management Center Benefits: The Houston TranStar Annual Report

## Houston TranStar 2010 Annual Report



**METRO**



The Houston TranStar Consortium is a Partnership of Four  
Government Agencies Responsible for Providing Transportation  
Management and Emergency Management Services  
To the Greater Houston Region

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# *What We'll Cover*

- **Issues in assessing TMC/ITS benefits**
- **Methodology used for Houston TranStar annual benefits report**
- **Areas where we can improve**



# *Why Evaluate ITS & TMCs?*

- **Understand impacts**
- **Quantify benefits**
- **Support (or defend) investment**
- **Optimize operations or future system design**



# *Assessing TMC Benefits*

## *Why don't we do it more?*

- **Priorities**
- **Cost of evaluation**
- **Complexity & lack of standard methodology**
- **Confounding factors that change over time!**
  - ✓ **Economy & employment**
  - ✓ **Incidents, construction, and special events**
  - ✓ **Value of road user & fuel costs**
  - ✓ **Extent of regional ITS deployment**

# *Houston TranStar Annual Report: How Are Benefits Calculated*

- 14 years of annual reports
- Estimate impact of the center on:
  - ✓ **Mobility**
  - ✓ **Travel speed/time & delay**
  - ✓ **Customer satisfaction**
  - ✓ **Productivity**
  - ✓ **Energy and environmental benefits**
- Uses both quantitative and qualitative Measures

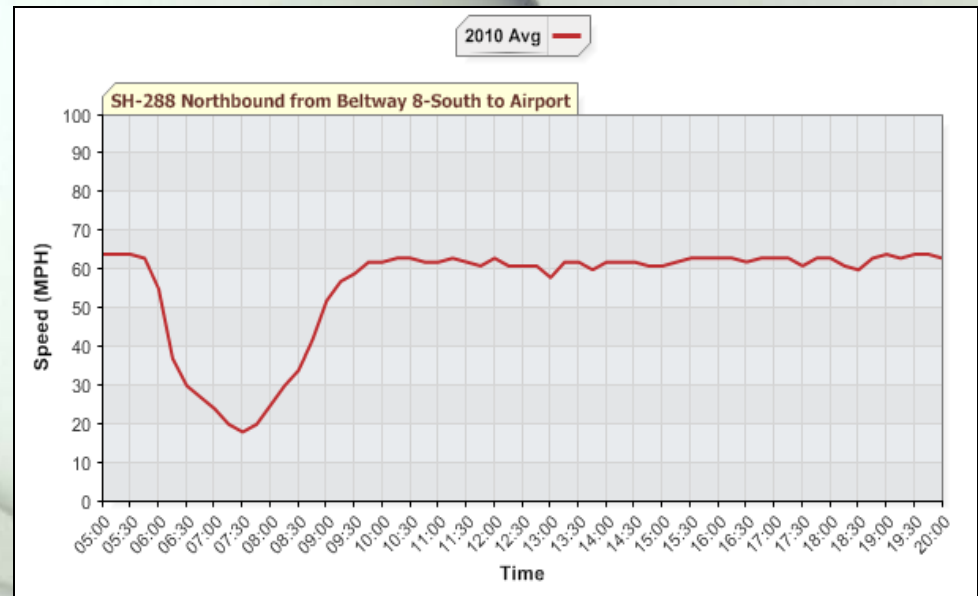
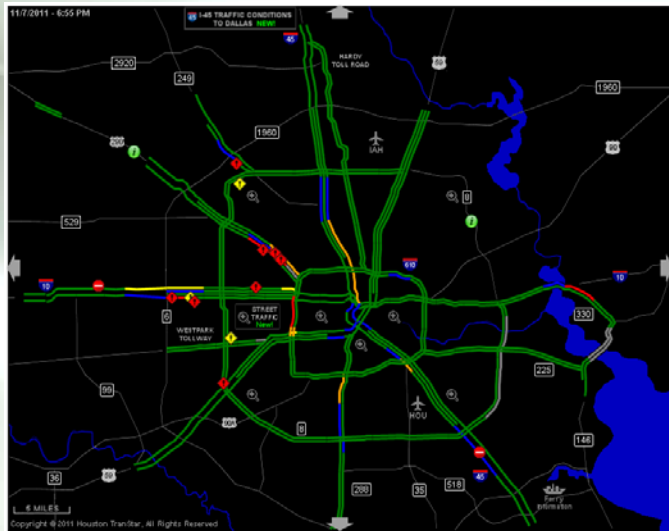


# *Upon What are Benefits Calculations Based?*

- **Benefits Estimated Primarily on Freeway & Tollway Operations**
- **We document, but do not currently seek to directly quantify benefits of:**
  - ✓ **Arterial signal control/operations**
  - ✓ **City of Houston Mobility Response Team**
  - ✓ **METRO Bus/Rail Dispatch**
  - ✓ **Emergency Operations (OHSEM)**
  - ✓ **MAP & SAFEClear**
  - ✓ **Multi-Agency Coordination, Cooperation, Collaboration**
- **Inherently conservative**

# The 8 Step Process...

- Step 1 – Determine Congestion
  - ✓ AVI/AWAM data + TxDOT Volume data = vehicle-hours of delay (below 60 mph), 880 directional miles of roadway



- Step 2 – Estimate Savings from Ramp Metering

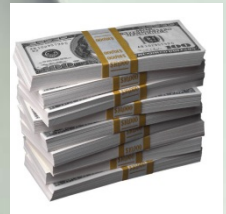
# *The 8 Step Process...*

- **Step 3 – TranStar Agency Manager Evaluation of Center Effectiveness**
  - ✓ **Qualitative assessment of 21 measures in five topical areas:**
    - » TMC operations
    - » traveler info pre-trip
    - » traveler info in-vehicle
    - » traveler info roadside
    - » incident management
  - ✓ **How well do we think we contributed to meeting the % reductions in delay due to national benchmarks for each of these measures? Scale of 1-100**



# The 8 Step Process...

- **Step 4 – Calculate benefit factors**
  - ✓ Measures of what percent of the national benchmark TranStar is estimated to have achieved this year
  - ✓ Typically this number is around 25-30%
- **Step 5 – Calculate benefits in vehicle-hours**
  - ✓ = Total vehicle-hours of congestion measures / (1-benefit factor)
  - ✓ **For 2010:**
    - » 28.6M vehicle-hours of congestion in the TranStar monitored area
    - » 40.3M veh-hrs estimated congestion the region would have endured if ITS wasn't deployed
  - ✓ **(Estimated w/o ITS) – (Measured w/ITS) = Vehicle-hours saved**
    - » 11.7M vehicle-hours saved
- **Step 6 – Monetize the benefits**
  - ✓ **Time:** 11.7M veh-hours X \$20.35/vehicle-hour = \$238.1M
  - ✓ **Fuel:** 11.7M veh-hours of delay = 21.9M gallons fuel, or \$57.7M



# The 8 Step Process

- Step 7 – Environmental benefits (savings in emissions)
  - ✓ NO<sub>x</sub>, CO, HC in tons based on fuel consumption savings
- Step 8 - Calculation of benefit to cost ratio (B/C)
  - ✓ Costs: Annualized capital expenditures
    - » Center capital cost (15 year life assumed)
    - » ITS infrastructure costs (10 year life assumed)
  - ✓ Costs: Annual operational cost
    - » TranStar annual budget
    - » ITS maintenance, TxDOT
    - » AVI maintenance, TxDOT
    - » MAP & SAFEClear
  - ✓ Benefits: Monetized delay & fuel savings
  - ✓ Most sensitive to: VMT, speed & fuel price
  - ✓ B/C ratio is typically between 10-13 since 2004



# *Estimated TranStar Benefits*

- Estimated costs of congestion: \$580M in 2010
- \$296 million in user cost & fuel savings
  - ✓ 11.7 million vehicle-hours of delay
  - ✓ 21.9 million gallons of fuel
- \$26 million annualized cost
- 2010 B/C ratio = 11.4
- Factors:
  - ✓ Fuel prices increased 18% (2009 to 2010)
  - ✓ Congestion increased 9% (2009 to 2010)
  - ✓ Agency managers rated effectiveness as somewhat less as in 2009 as they remain concerned about staff numbers and experience.



# *Other ITS Benefit Measures Included in the Evaluation*

- Significant meetings and press events
- Agency activity and accomplishments
- Tally of devices and activity
  - ✓ **CCTV, DMS, radar, AVI**
  - ✓ **DMS & HAR messages**
- Website Statistics
- Incident Management
  - ✓ **Number of incidents**
  - ✓ **MAP & SAFEClear statistics**



# Customer Satisfaction

- Website surveys every 2-4 years
- February 2011 Survey:
  - ✓ **Impact on travel decisions:**
    - » 25% change travel patterns daily
    - » 25% change 1-2 times per week
    - » 30%+ change during major events
  - ✓ **Impact on travel behavior:**
    - » 50%+ had left earlier
    - » 50%+ had left later
    - » 10% had cancelled trip
    - » 90% had taken an alternate route
    - » 5% had changed travel modes



# *Customer Satisfaction*

- **Time Savings:**

- ✓ **About 80% of website users say that the site helps them save time each week**

- » About 40% save up to 30 minutes
- » About 25% save 30-60 minutes
- » About 15% save 60+ minutes



- **Reliable, Accurate & Useful:**

- ✓ **Over 90% say the information is reliable and accurate**
- ✓ **Over 95% say the information is useful to them**

# *Lessons Learned/Needs*

- Most TMC ITS benefits are at best difficult to quantify – pick the ones that are most meaningful
- Not all TMC ITS benefits are quantifiable – they are intangible, but very real
- Calculate benefits that make logical sense and that are practical to generate
  - ✓ **Don't be overly complex**
  - ✓ **Do more evaluations of projects – better baseline data for various treatments**
  - ✓ **Try to isolate ITS treatments**
  - ✓ **Revisit benchmarks periodically to use the latest data for comparison**
- Be sure and ask your users what they think!