Traffic Engineering for Optimal BRT and TSP Success

District 10 / FSITE Annual Meeting 2018

PLANGINEERING
Integrating Planning with Engineering for a Better Community

October 31, 2018
Agenda

• Introduction
• Challenges
• Solution Process
• Traffic Engineering Decisions
• Case Study
• Results
About Presenter

Mark Yedlin

• PI of 1981 FHWA research on TSP
• 21 TSP projects since 1997
• Traffic engineering consultant for NYCDOT city-wide TSP since 2011

GPI:
• Full service Engineering Firm
• Staff of 1500 in over 40 US offices
• 8 offices in Florida
BRT Features

- **Exclusive ROW**
- **Pre-Payment**
- **Bus Signal Priority**
- **Passenger Info**
- **Stations**
- **Branding**
What is TSP?

Real Time signal adjustments to expedite buses:

- Extend Green
- Early Green
- Advance Green (Queue jump)
Why TSP?

- Reduce Travel Time
  - Reduce Variability
  - Maintain Schedule
  - Increase Ridership

- Reduce Operating Costs
Why BRT and TSP?

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  - Maintain Schedule
  - Increase Ridership
  - Reduce Congestion
- Reduce Operating Costs
- Improve Mobility

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Why BRT and TSP?
The devil is in the details

- Can you see it?
- Now?
We work in the realm of the devil

• Lots of details!!

• Many pitfalls
  − Political
  − Institutional
  − Technical
  − Many voices and choices

• Decisions influence success
Keys to Success

• Start small think big!
• Find a champion!
• Bring agencies together
• Communicate x 3
• Know what’s needed
• Understand constraints
• Address bottlenecks
• Good traffic engineering!!
Start Small – Think BIG

- Pick pilot to succeed
  - Opportunities for improvement
  - Reasonable cross street volumes

- Keep eye on the future
  - Anticipate full roll-out
  - Plan system wide policies, hardware
Find a Champion!

- Lead process
- Take responsibility
- Shepherd agencies to consensus
- Keep pushing!!
Bring Agencies Together

• Department of Transportation
• Transit Agency
• Consultants
• Multiple staff in each

• Recognize different:
  − Priorities
  − Agendas
  − Responsibilities
  − Cost/Benefit realities
Communicate, Communicate, Communicate!

- Throughout process
  - Objectives
  - Policies
  - Design
  - Implementation
  - Acceptance testing
  - On-going operations

- Even within same agency!
What are the constraints?

• Cross street traffic
• Pedestrians, seniors
• Capacity
• Coordination
• Bus stops
• Other corridor traffic
How should it work?

- Primary objectives?
- Conditional, Unconditional TSP?
- Coordination?
- Transition?
- Competing calls?
- How soon to accept next call?
- Door switches?
What do we have to Decide?

- What timings/offsets?
- Which intersections?
- What phases?
- How much time?
- When to act?
- Which call?
- Queue jumps?
- What are effects?
- Is it worth it?

Simulation invaluable!
Why simulate?

- Answer implementation decisions
- Accurately represent all traffic
- Determine savings for buses
- Determine effects on others
- Examine tradeoffs
- Optimize system
- Public outreach
- Justify funding!!!
Case Study: TSP in NYC

- Wall Street Financial District
- 2nd highest passenger loads in city
- Intermodal route
- Lots of pedestrians, bicycles
- Unloading trucks
- Congested
- Coordination
- Canyon for GPS signal
- Success unlikely!
Comparing Bus Operations With and Without TSP

Without TSP

Active TSP

Intersections Crossed: 0
Next:
Time saved to last intersection: 30:25:67981110121314151617181941

Allen / Stanton
Allen / Rivington
Allen / Delancey
Allen / Broome
Allen / Grand
Allen / Hester
Allen / Canal
Allen / Division
Pike / E. Broadway
Pike / Henry
Pike / Morris
Pike / Park Row
Pike / Pearl
Pike / Pearl South
Pike / Pearl Street
Pike / Pearl Street South
Pike / Park Row
State / Peter Minuit
Water / 55 Water
Water / Coenties Slip
Water / Broad
Water / Whitehall
State / Peter Minuit
Water / Fletcher

Early return to green
Extended green
Early return to green
Extended green
Early return to green
Extended green
Early return to green
Extended green
Early return to green
Extended green
Early return to green
Extended green
Early return to green
Extended green
Early return to green
Extended green
Early return to green
Extended green
Early return to green
Extended green
Results: Win-Win!

- Lowered Bus Travel Time
  - Up to 18.4%

- Reduced Delay for Other Traffic
  - Side streets improved too!
  - Side street delay: 3.2 to 10.3%
  - Peak hour delay for corridor: 12.4 to 15.1%
  - Peak hour delay for all traffic: 8.3 to 11.9%

- Lowered Variability
  - Improved reliability
Traffic Engineering for Optimal BRT and TSP Success

840 intersections
92 miles

- Victory Boulevard: S61, S62, S66, S91 Limited, S92 Limited
  - 33 intersections
  - 5.7 miles

- Hylan Boulevard: S79 SBS
  - 69 intersections
  - 14 miles

- South Brooklyn Crosstown:
  - B82-LTD
  - 125 intersections
  - 10.2 miles

- South Bronx Crosstown:
  - Bx6
  - 49 intersections
  - 6.0 miles

- 125th Street & Astoria Boulevard:
  - M60 SBS
  - 63 intersections
  - 6.8 miles

- Lower Manhattan:
  - M15 SBS
  - 34 intersections
  - 2.2 miles

- Webster Avenue: Bx41 SBS
  - 67 intersections
  - 5.3 miles

- Main Street & Kissena/Parsons Boulevard:
  - Q44, Q25
  - 53 intersections
  - 5.0 miles

- Hillside Avenue:
  - Q43
  - 40 intersections
  - 3.3 miles

- Merrick Boulevard:
  - Q5
  - 26 intersections
  - 3.6 miles

- Utica Avenue:
  - B46 SBS
  - 65 intersections
  - 5.7 miles

- Nostrand Avenue:
  - B44 SBS
  - 33 intersections
  - 4.3 miles

- Woodhaven Boulevard:
  - Q52/Q53 SBS
  - 125 Intersections
  - 15.5 miles

TRANSIT SIGNAL PRIORITY PROJECTS IN NEW YORK CITY
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Keys to Success

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• Bring agencies together
• Communicate!!!
• Know what’s needed
• Understand constraints
• Address bottlenecks
• **Simulation and good traffic engineering!!**
Questions?

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Thank you!