

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**

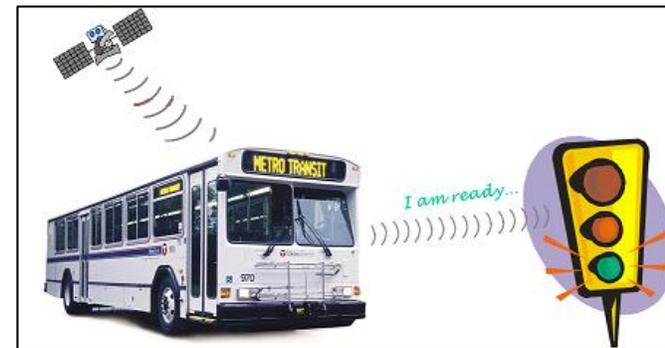
BRT Features



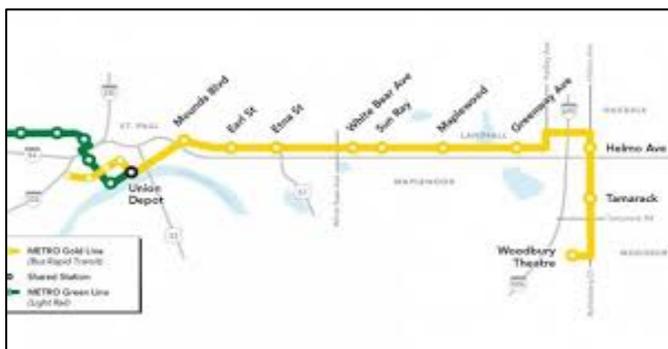
Exclusive ROW



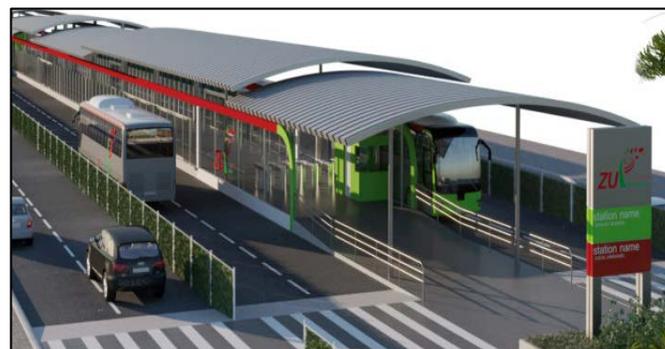
Pre-Payment



Bus Signal Priority



Passenger Info

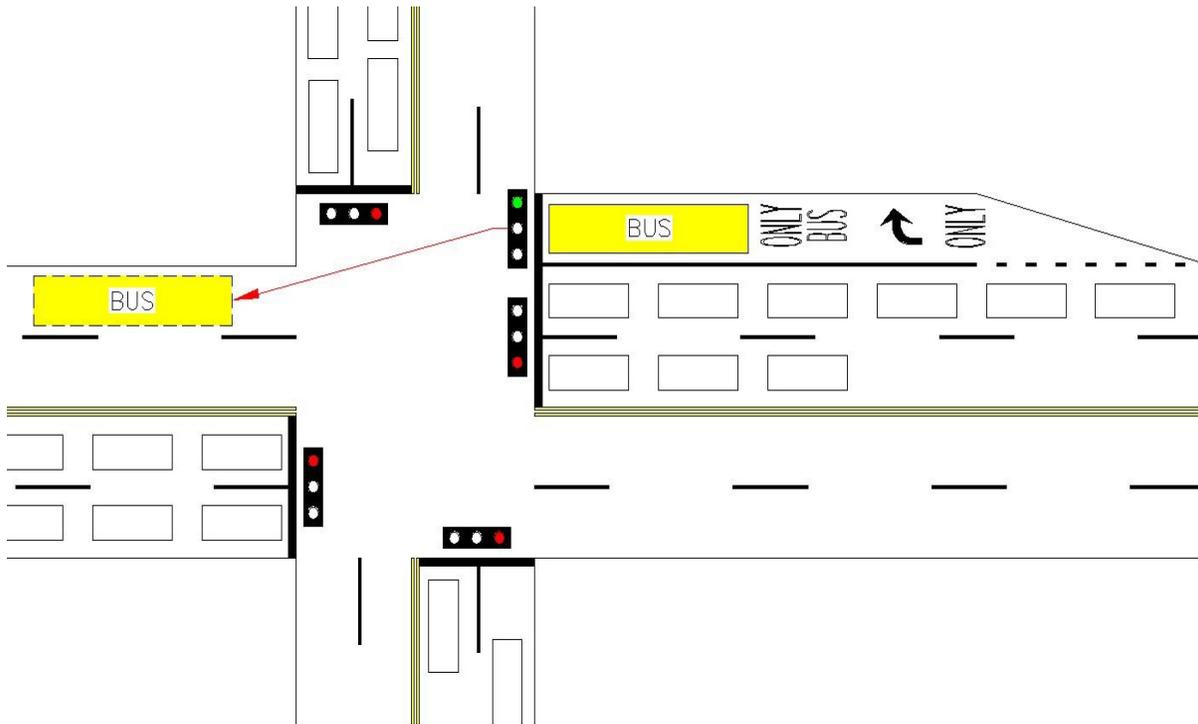


Stations



Branding

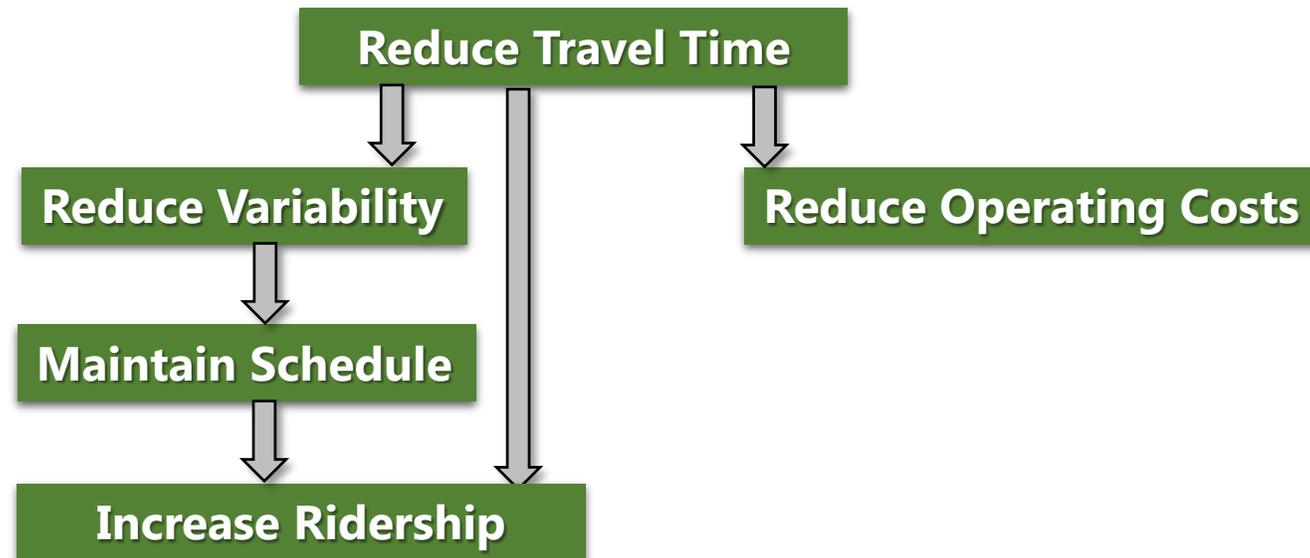
What is TSP?



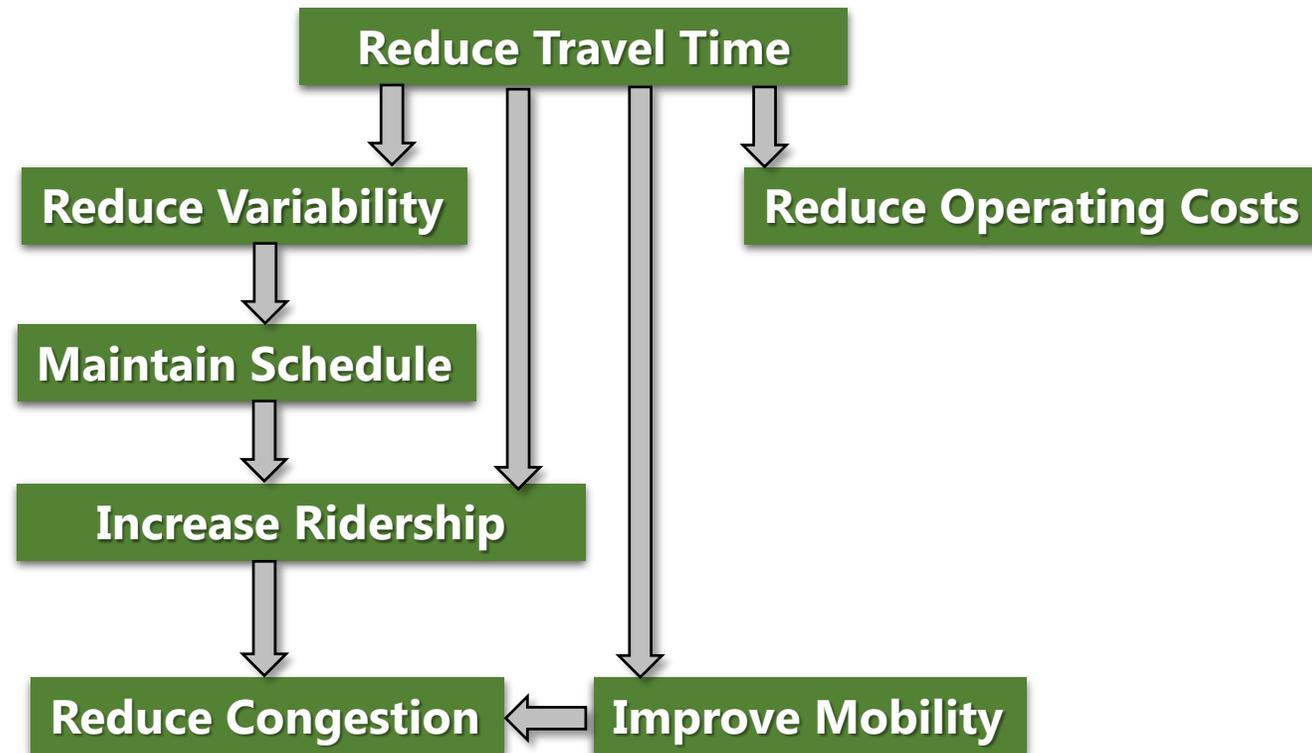
Real Time signal adjustments to expedite buses:

- Extend **Green**
- Early **Green**
- Advance **Green** (Queue jump)

Why TSP?



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
- Shephard 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?

All answers vary by time of day

Also varies by direction

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



Intersections

Crossed: ■■

Next:

~~XXXXXXXXXX~~ sp

Active TSP



Intersections

Crossed: ■■

Next:

~~XXXXXXXXXX~~ sp

Time saved to last intersection:

Time saved to last intersection:

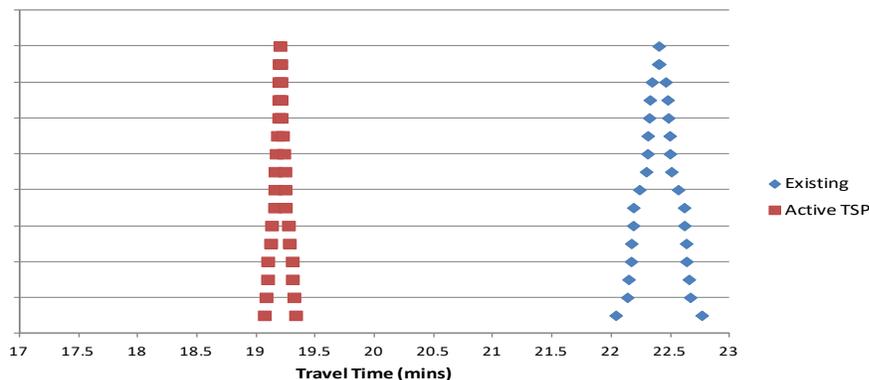
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Results: Win-Win!

Travel Time Savings

Period	Min/Bus trip		%	
	NB	SB	NB	SB
AM Peak	3.5	2.6	18.4	13.7
Mid-day	0.7	1.7	4.4	9.1
PM Peak	3.2	2.6	16.2	14.5

M15 SBS Bus Travel Time Deviations, SB/WB Direction, AM Period



- 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

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

Lower Manhattan:

- M15 SBS
- 34 intersections
- 2.2 miles

South Brooklyn Crosstown:

- B82-LTD
- 125 intersections
- 10.2 miles

125th Street & Astoria Boulevard:

- M60 SBS
- 63 intersections
- 6.8 miles

South Bronx Crosstown:

- Bx6
- 49 intersections
- 6.0 miles

Nostrand Avenue:

- B44 SBS
- 33 intersections
- 4.3 miles

Utica Avenue:

- B46 SBS
- 65 intersections
- 5.7 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

Woodhaven Boulevard:

- Q52/Q53 SBS
- 125 intersections
- 15.5 miles

TRANSIT SIGNAL PRIORITY PROJECTS IN NEW YORK CITY

Keys to Success



- Find a champion!
- Bring agencies together
- Communicate!!!
- Know what's needed
- Understand constraints
- Address bottlenecks
- **Simulation and good traffic engineering!!**

Questions?

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Thank you!

