



NEW YORK CITY
Department of Transportation

POLLY TROTTENBERG, Commissioner

TRANSIT SIGNAL PRIORITY SYSTEM SELECT BUS SERVICE (SBS)

The New York Metropolitan
 Transportation Council (NYMTC)
 Metropolitan Mobility Network
 Tuesday, June 25th, 2019

Presented by:

Ernest Athanailos, P.E.
 Director of Signals and ITS Engineering
Emad Makarios P.E.
 Administrative Engineer

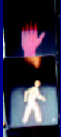
New York City Department of Transportation
 Division of Traffic Operations
 34-02 Queens Boulevard
 Long Island City, New York 11101



Agenda

- History of TSP Pilot Studies
- SBS Features.
- City-Wide Wireless Network (NYCWIn)
- TSP Treatments
- Implementation Activities
- Future TSP Corridors
- Maintenance of TSP Operations

Traffic Signals in New York City

- New York City has more than 45,000 Intersections
- 13,560 Signalized Intersections 
- 120,000 Pedestrian Signals 
- 100-120 new Traffic Signals installed every year based on Warrant Studies

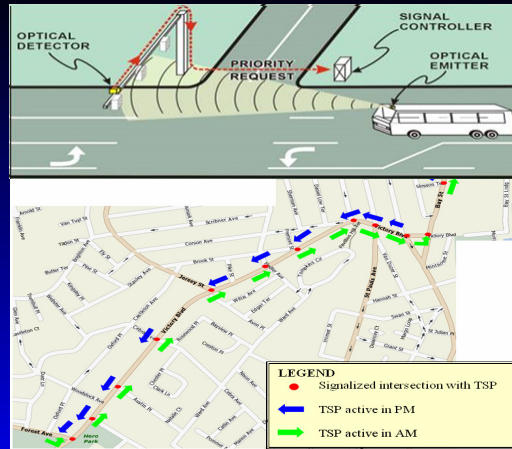
Public Transit in NYC

- 5,700 buses operating on 2,800 miles of routes
- 300+ Bus Routes
- Over 2 Million daily riders
- Public transit system operated by MTA NYC Transit
- Streets and traffic signals operated and maintained by NYCDOT

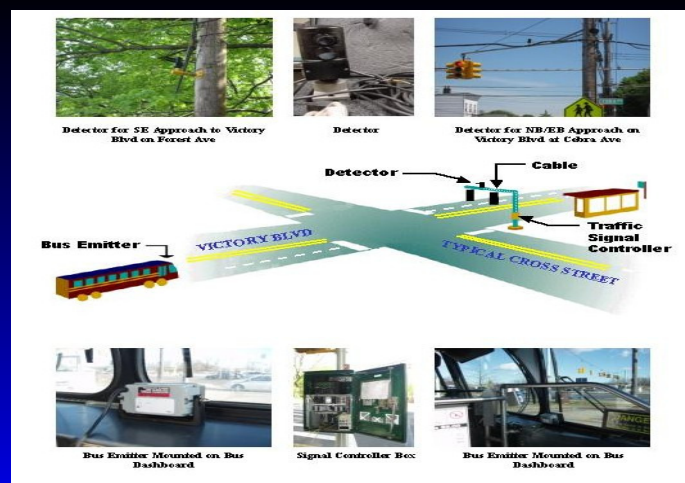


Victory Boulevard Study Area

- A 2.3 mile segment between Saint George ferry terminal and Forest Avenue / Victory Boulevard
- 14 Signalized Intersections
- Limited and Local bus routes
 - Individual routes:
33 in AM peak period
36 in PM peak period



Victory Boulevard



Victory Boulevard Bus Travel Times

Comparative bus travel times (minutes) derived from modeling

AM Peak Period	Existing	Optimization	% Improvement	TSP	% Improvement
TO FERRY	8:48	7:54	10.2%	7:18	7.6%

PM Peak Period	Existing	Optimization	% Improvement	TSP	% Improvement
FROM FERRY	8:12	8:12	0%	7:24	9.8%

Actual bus travel times (minutes) by NYCDOT

AM Peak Period	Existing	Optimization	% Improvement	TSP	% Improvement
TO FERRY	11:48	11:00	6.8%	9:54	10%

PM Peak Period	Existing	Optimization	% Improvement	TSP	% Improvement
FROM FERRY	12:00	11:38	3.3%	10:42	7.8%

Victory Boulevard TSP Demo



BRT IN NYC

Features



+Selectbusservice



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City-Wide Wireless Network (NYCWiN)

A new city-wide network (NYCWiN) has been installed by NYC's Department of Information Technology and Telecommunications (DOITT) which provides access for both stationary devices (traffic controllers, video cameras and emergency call boxes) and moving vehicles (emergency services – NYPD and NYFD) applications, including Transit Signal Priority (TSP).

Benefits of NYCWiN for TSP

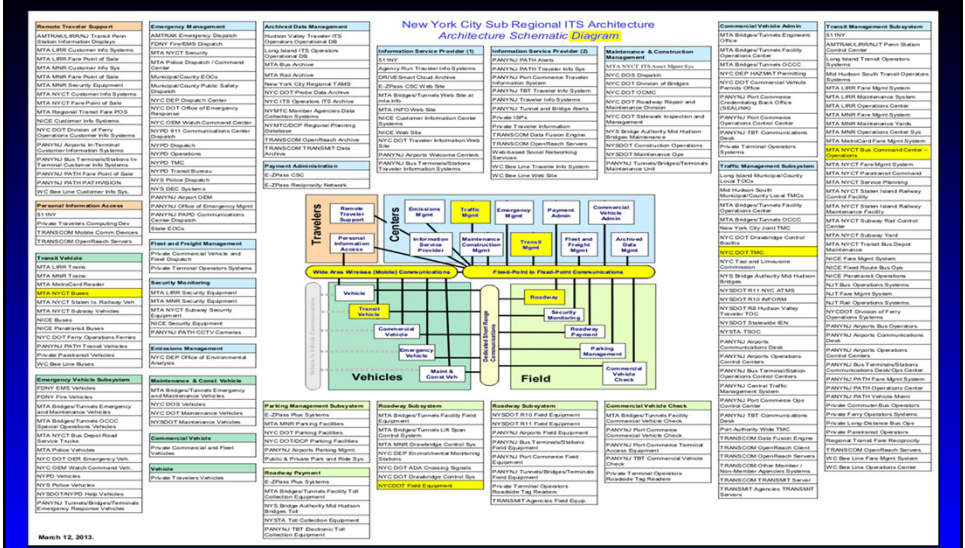
- Eliminates need for infrastructure changes to traffic controllers
- Requires only in-vehicle systems – GPS modem and computer to locate vehicle's position
- *Cost effective for city-wide use of TSP!*



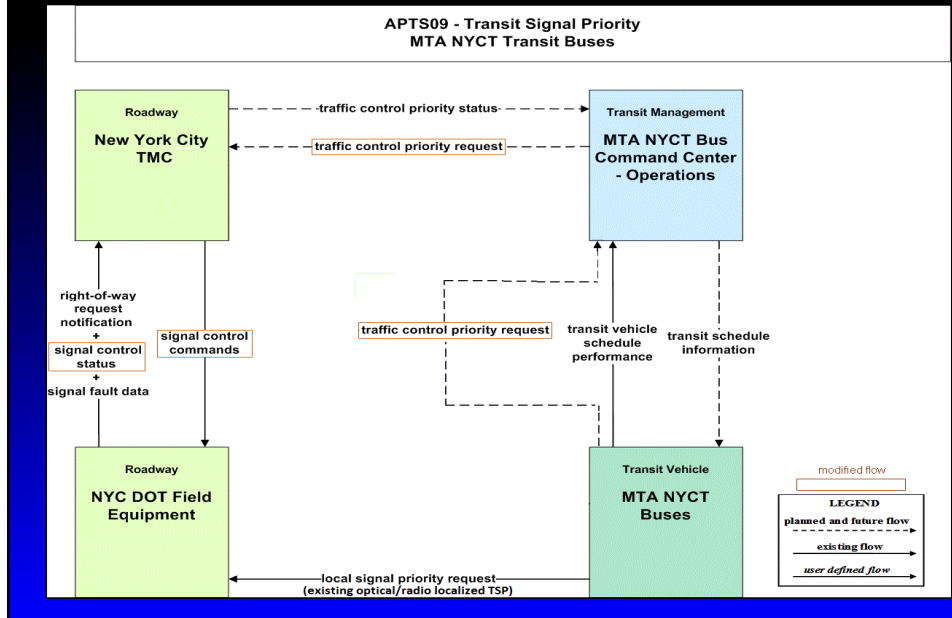
CENTRAL TSP DEPLOYMENT

The diagram illustrates the Central TSP Deployment architecture. At the top left is the **NYC DOT TMC TSP Server**, and at the top right are the **MTA Transit Center TSP Servers**. A green arrow labeled **TSP Clearance** points from the MTA servers to the NYC DOT server, and a green arrow labeled **Acknowledgement** points from the NYC DOT server to the MTA servers. Below the NYC DOT server is a radio tower labeled **NYCWIN Network**. A green line connects the NYCWIN Network to a **Bus** at a traffic intersection. Above the intersection are two boxes: **TSP Check out Detector** (with a red dashed arrow pointing to the bus) and **TSP Check in Detector** (with a green dashed arrow pointing to the bus). To the right of the bus is a **TSP Capable Bus** (a blue bus). A green arrow labeled **4G** points from the bus to the MTA Transit Center TSP Servers. A green arrow labeled **GPS** points from a satellite to the bus.

“Transit Signal Priority project - Subsystems are highlighted”



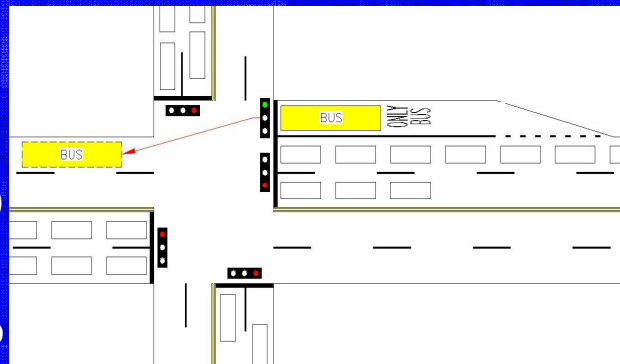
APTS09 - Transit Signal Priority



TSP Treatments

Automatic real time signal adjustments to expedite approaching buses:

- Extend **green**
- Early **green** (red truncation)
- Advance **green** for queue jump



Existing Conditions –Data Inputs

Network Data	Bus Data
Aerial photographs	Bus routes and schedules
Physical inventory	Passenger on and off counts
Signal phasing and timing	Bus stop placement
Turning movement counts and vehicle occupancy	Bus travel times
Pedestrian counts	Bus dwell times
Photo inventory	Traffic speed runs and side street queues

Software used to simulate and analyze plans for Transit Signal Priority (TSP) along the M15 SBS Route:

- Synchro© macroscopic model to identify/correct existing problems and optimize signals and coordination for TSP
- Custom Aimsun© microscopic traffic simulation model for NYCDOT to compare traffic operations for:
 - Existing conditions
 - Improvements + Optimal signal timings for *all* traffic (Passive TSP)
 - Improvements + Optimal timings + TSP (Active TSP)

Modeling performed for AM, Midday and PM peak periods

Constraints

- Pedestrians, seniors
- Coordination
- Capacity
- Cross-street traffic
- Bus stops
- Other corridor traffic



“Before” and “After” Conditions

“Before” Conditions:

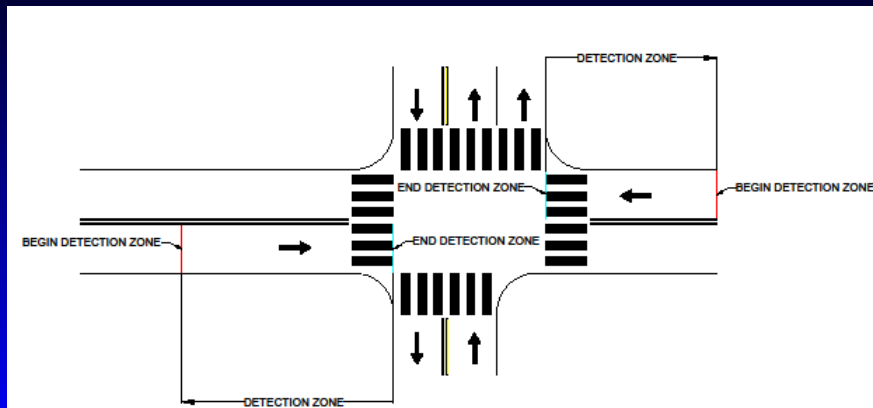
- Detail analysis associated with existing traffic operations, equipment research and recommendations including the “before” scenarios (simulation runs).

“After” Conditions:

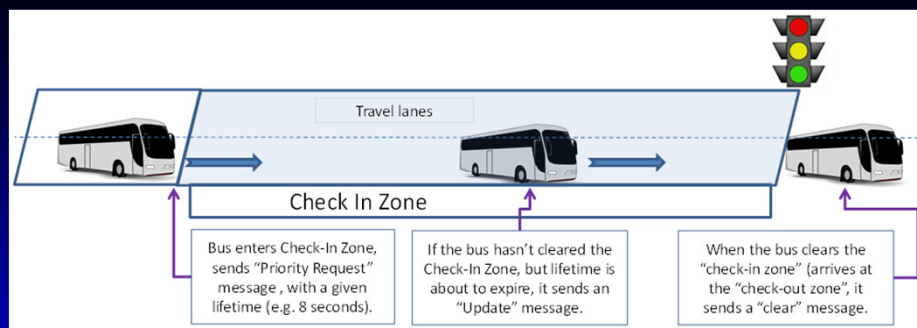
- Evaluation of the applied TSP scenarios for evaluating its effectiveness and potential for modification.

Detection Zones

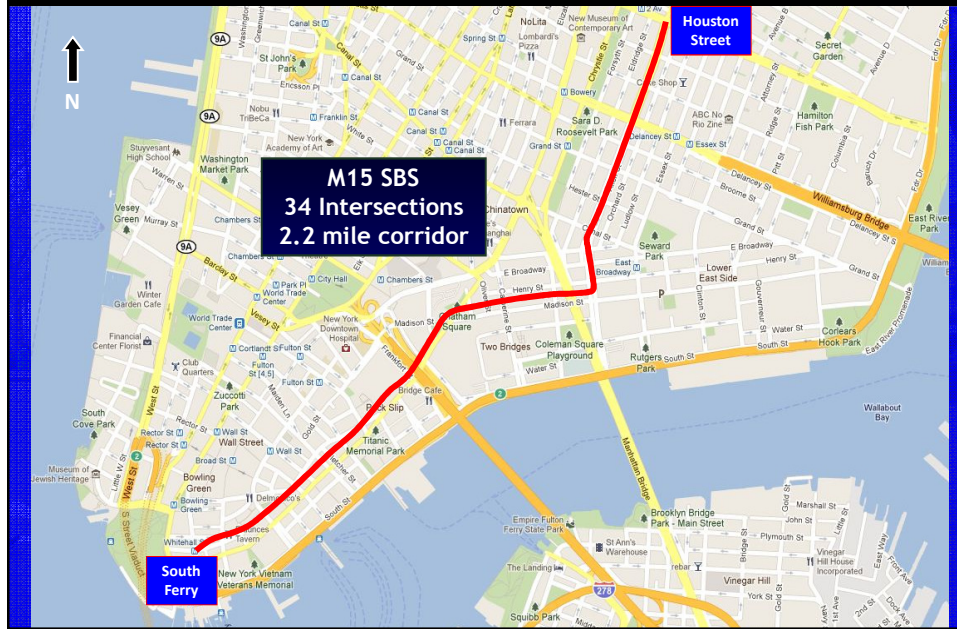
Region upstream of pedestrian crosswalk where TSP calls are recognized, measured in feet and based on estimated travel speed during each peak hour



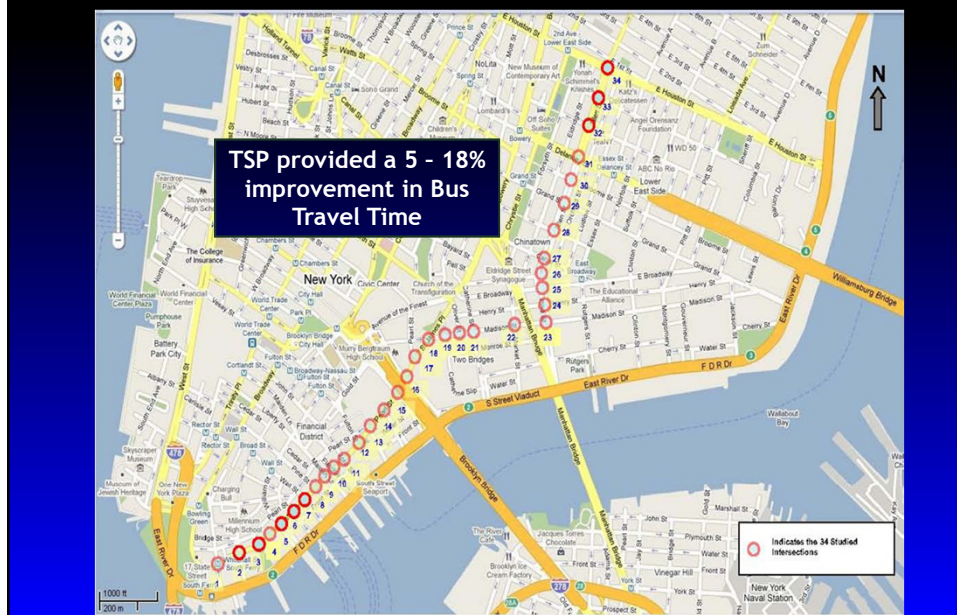
Bus Behavior at a TSP-Equipped Signal

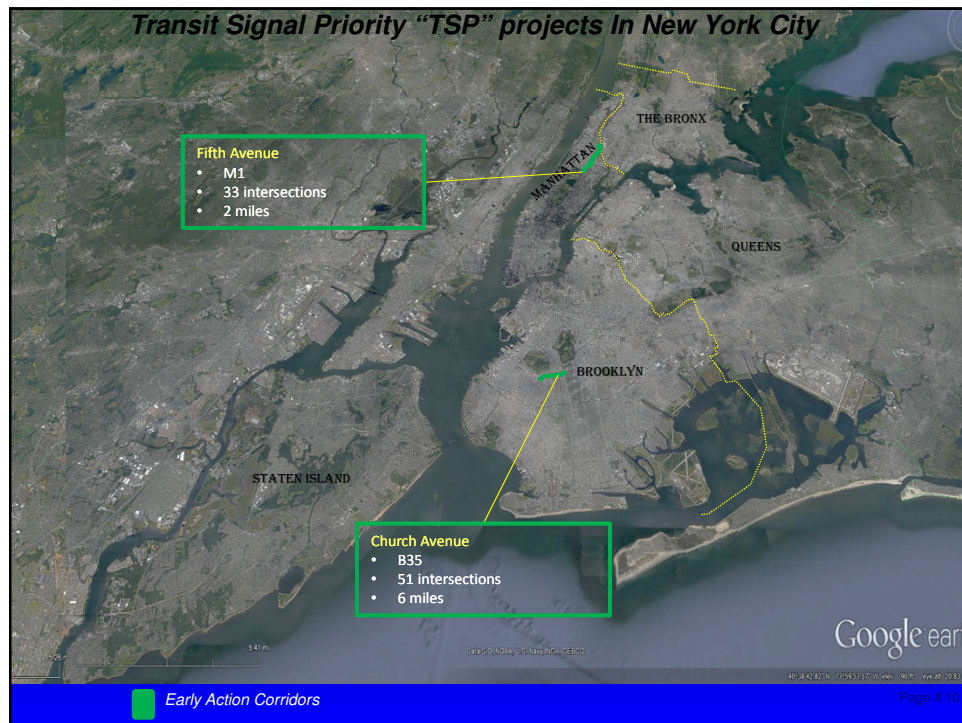
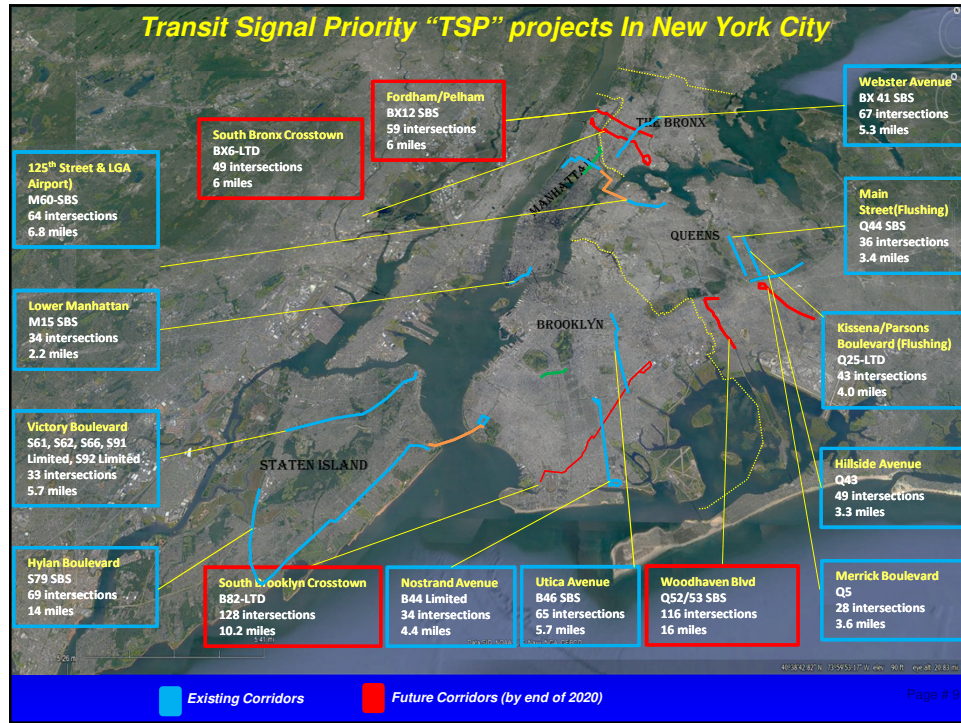


Lower Manhattan Project Area



Lower Manhattan Project Area





Maintenance of TSP Operations

- Monitor TSP Corridors on a daily basis.
- Identify anomalies
- Determine causes (Bus, Intersection, TSP settings).
- Make necessary adjustments.
 - Identify Bus
 - Modify TSP Settings
 - Inspect Intersection / Controller
- Observe these adjustments the next day during our daily monitoring schedule.

TSP MONITORING

Operations Workstation

- System wide TSP Monitoring
- Reports (Ongoing)
 - Communications
 - Performance
- Live Video Feeds
- Weekly E-Mail Alerts



WEEKLY SUMMARY REPORT

Start Date: 5/9/2016 End Date: 5/13/2016 Corridor: M15 SBS

"M15 SBS" Summary Report 05/09/2016 - 05/13/2016

Date	05/09/2016	Monday		
Bus Route	M15 SBS			
Route Length	0			
Intersections on Corridor	33			
Equipped Buses	48			
		AM	MD	PM
TSP Active Hours	07:30 - 10:00	12:30 - 14:00	16:00 - 19:00	
TSP Capable Intersections	26	27	25	
Intersections Reporting Activations	26	27	25	
TSP Intersections Utilized (%)	100	100	100	
TSP Intersections - No Actions Reported	0	0	0	
Total Dispatched Buses	MTA to provide	MTA to provide	MTA to provide	
Buses Reporting TSP Action	22	18	30	
TSP Buses Utilized (%)	45	37	62	

Average for Dates from 05/09/2016 to 05/13/2016				
Bus Route	M15 SBS			
Route Length	0			
Intersections on Corridor	33			
Equipped Buses	48			
		AM	MD	PM
TSP Active Hours	07:30 - 10:00	12:30 - 14:00	16:00 - 19:00	
TSP Capable Intersections	26	27	25	
Intersections Reporting Activations	26	27	25	
TSP Intersections Utilized (%)	100	100	100	
TSP Intersections - No Actions Reported	0	0	0	
Total Dispatched Buses	MTA to provide	MTA to provide	MTA to provide	
Buses Reporting TSP Action	25	16	27	
TSP Buses Utilized (%)	51	33	56	

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American Council of Engineering Companies (ACEC)

Diamond Award
New York State
and
National Recognition Award



ITS Project of the Year ITS - NY





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