



Massachusetts Bay Transportation Authority

On Time Performance & Better Bus Project Update

Fiscal and Management Control Board

December 9, 2019

Kat Benesh

Better Bus Project.

Agenda

- Review **overall status** of the Better Bus Project (BBP)
- Review preliminary impact of Fall BBP **Near-Term** changes and planned Winter changes
- Discuss **Bus On Time Performance** and efforts to increase reliability, including **\$50M challenge fund** for municipalities to build bus lanes
- Discuss Network Redesign **Demonstration Projects**
- Request Notice of Award to **expand MBTA Bus Fleet by 5%** for peak service



What we've done in the past six months

INVESTMENT	FY20 efforts to date
Bus Lanes	2.6 miles built in FY20 to date
Other Bus Priority infrastructure	
Bus Stop Infrastructure	
Bus Stop Infrastructure	Draft RFR for bus shelters released; 63* PATI stops reconstructed
Peoplepower	Hired & scheduled 45 operators off-peak to improve reliability for trip start for top 40 bus routes
Buses	Proposal to increase bus fleet size by 5% to increase peak service
Facilities	Conceptual design and environmental assessments underway for Southampton & Quincy garages
Scheduling & Dispatching Tools	SKATE pilot (modern dispatching application) launched; Workforce Modernization Program – first pilot for electronic picking complete
Pilots & Route Changes	BBP Near-Term changes implementation; Bus-on-shoulder operational test, Silver Line Ramp operational test
Network Redesign	Developing metrics for Network Redesign, proposal of Demonstration Projects
Customer Information	Kick-off for solar-powered e-ink technology pilot for real-time information; Kick-off for "Ghost Bus Busting" for riders to know when adjusting service

First major service change in ~10 years

First major expansion of bus fleet in ~15 years

Building bus lanes 2x fast as last fiscal year

Reliability up by 1-2% year over year

Cross-functional efforts with Transit Priority, Capital Delivery, Service Planning & Scheduling, Network Redesign Team, Bus Facility Modernization Team, Customer Technology, OPMI, Customer Experience, Revenue, SWA, Vehicle Engineering, WMP team and others

Note: PATI stops reconstructed since April 2019, these are out of the 130 critical bus stops identified for reconstruction

Reminder: Evaluation Criteria for BBP Near-Term changes

Key Performance Metrics

- Track implementation status of 36 proposals and 45 new bus operators (as well as impact of any priority infrastructure)
- Use data to measure system-level performance and individual route proposal performance:
 - SDP Measures
 - Other supporting metrics (e.g. run-time deficits, ridership)

Evaluation Questions

- Understand if we accomplished our goal in implementing the proposal
- Assess impacts and if additional changes are warranted

Planned Report outs to the FMCB

- Implementation: September 2019 & December 2019
- Performance: May 2020 & January 2021



Fall Better Bus Project Initial Outcomes

Reminder of what went into effect on September 1st:

29 cost neutral route changes implemented and 27 additional operators added to top 40 routes

Key Bus Route target

Non- Key Bus Route target

- **>55% of Fall BBP routes saw OTP improvement, 40% of routes saw <2% improvement or maintained OTP**
- **Least reliable routes saw the greatest gains (15-20%+ improvement)**
- **Ridership** appears to be up on average across BBP routes
- Preliminary analysis of **customer complaints** shows small uptick, concentrated on few routes



Early progress, but with variation across routes due to multiple factors (e.g. predicted vs. actual run-times), reviewing for adjustments in Spring

Plan for Winter BBP changes

- **December 22** roll-out of next round of BBP changes
- **18 route changes planned**, with 4 remaining BBP changes contingent on municipal/private party support
- **18 of 45 new bus operators** added to 21 routes (and “cover list”) for **off-peak improvements**
- Will present **full evaluation of route changes** in September 2020 (with preliminary review starting in late 2019/early 2020)
- **Communications strategy and outreach** already started

Cost Neutral Route Changes

PLANNED DECEMBER 22 CHANGES

34	34E	36	37	52
64	70	61/70A	72	74
75	201	202	220	222
225	226	350		

RESOLVING CONTINGENCY

SL2	9	34	60
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Bus Reliability has improved system-wide 1-2% year over year



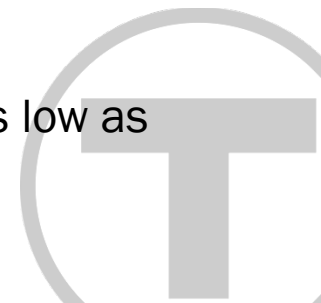
- On Time Performance is one of 5 key metrics in Service Delivery Policy
 - Reliability (OTP), Frequency, Span, Crowding, & Coverage
- Reliability is *sometimes* a trade-off versus frequency
- OTP is measured throughout a trip, and is based on either how closely a trip is meeting it's schedule or headway
- MBTA can directly control starting trips on time, but reliability on street depends on multiple factors

— 2019
- - - 2018

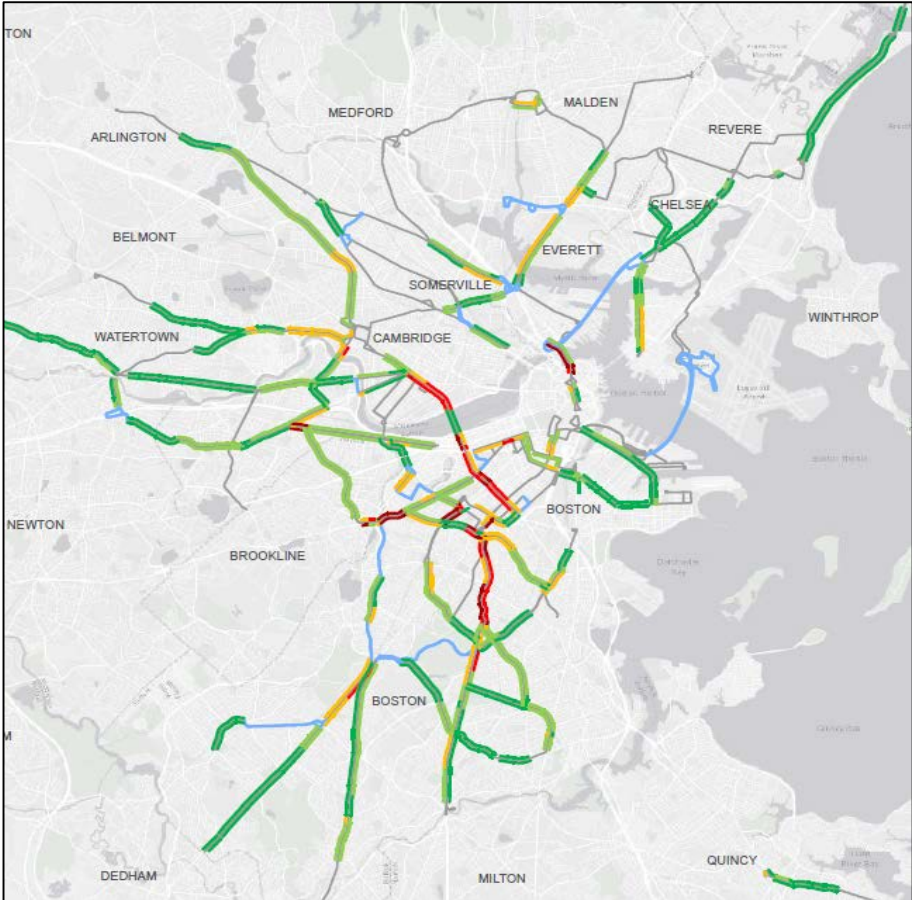


What drives bus reliability (OTP)?

- Reliability (On Time Performance) is evaluated on adherence to either schedules or headways
- **MBTA schedules with a goal of 90% of trips starting on time**; however, review of 500K weekday trip starts from this September & October 2019 showed **~71% of trips left on-time**
 - Opportunity for trip start OTP to be improved by up to 5-10% with improved dispatching & oversight, but to increase trip start OTP beyond ~80-85% requires transit priority or scheduling / asset trade-offs
- Even when the buses leave on time, performance frequently degrades throughout the trip, but **bus lanes can help significantly improve reliability**
 - For example, all routes that use the Everett Broadway bus lane are 10-30% more reliable when bus lane in effect (4-9 AM on weekdays)
 - Route 104 has ~75% OTP when the bus lane is in use, but only ~50% during all other hours, with as low as ~15% at 6 PM



How do the MBTA & municipalities build more bus lanes?



Bus Lane Prioritization Corridors – 2016 MassDOT/CTPS Study

Committed to investing \$50M marked for bus priority infrastructure in municipalities as a “challenge fund”

- Currently unprogrammed, but will be submitted as part of FY21-25 CIP process
- CIP proposal will include planning for program manager / administrator

Working on developing **two-part program** with consultants:

- **Prioritization of corridors** into tiers based on **customer need** (ridership + congestion) – *similar to how 14 miles high priority corridor selected*
- Development of MBTA/municipal partnership funding model, based on tiers, including:
 - **Technical assistance** for identification, review & design
 - Funding for **design and/or construction**
 - New approaches for initiating transit priority projects with MBTA, and for MBTA to engage in ongoing projects to leverage existing work

Partnership model development underway and expected to share with municipalities in **Spring 2020** in time to inform programming in next CIP

- Potential to start receiving proposals in **Summer / Fall 2020**



Next steps

- **Today:**
 - Introduce Network Demonstration Projects
 - Request vote for Notice of Award to add 60 buses to fleet for additional peak service
- **Spring 2020:**
 - Roll-out \$50M Municipal Challenge fund for Bus Priority Infrastructure along with CIP request
 - Revise Fall Better Bus Project routes as necessary
- **Summer 2020:**
 - Implement weekend service pilot (*pending Board vote*)
 - Revise Winter Better Bus Project routes as necessary
- **Fall/Winter 2020:**
 - Receive 60 additional buses for increased peak service (*pending Board vote*)
- **Timing varied:**
 - Implement Network Redesign Demonstration Projects (*pending Board vote*)



Appendix



Why Buses Matter

About the MBTA Bus Service Network

- More than a third of all MBTA trips are taken on buses.
- The MBTA's bus network consists of ~170 routes.
- Over 400,000 trips are taken on MBTA buses in a single weekday.
- 42% of Bus Riders are Low-Income, 45% are Minority.
- Serving 50 communities, the bus network provides critical connections where our rail system does not go.

About the Better Bus Project

POTENTIAL CHANGES

Service Changes

Route changes and frequency of service

Operational Changes

Dispatching buses and improved MBTA procedures

Capital Investments

Additional buses and supporting infrastructure

Partner with Cities/Towns

Implement street changes that improve service

**CAN
PROVIDE**

POTENTIAL BENEFITS

**Buses Will Show Up on
Schedule**

**People Get to Work
Faster**

Less Crowding on Buses

**Easy to Understand
Routes**

**Resources Are Spent
More Efficiently**

Better Bus Project Multi-Year Schedule


INVESTMENT	FY19	FY20	FY21	FY22+
Bus Lanes	2.3 miles built	Goal of 7 high-priority corridor miles	Goal of 7 high-priority corridor miles	Connect completed key corridors
Other Bus Priority Infrastructure	Concurrent with bus lane corridors			Concurrent & beyond bus lane corridors
Bus Stop Infrastructure	Plan. for shelter contract & PATI stop improvements	Procure new shelter contract & begin PATI construction	Continue construction of stop improvements & PATI stops	
Peoplepower	Invest in additional operators (~70)	Hire off-peak operators	Hire additional operators	Hire additional operators
Buses	-	Procure peak expansion contract; test BEBs	Support peak service	Delivery of new buses
Facilities	Initiate planning for Albany, Quincy & SH	Begin constr. for Albany, prelim design for Quincy & SH	Advertise Quincy & SH for construction	Begin construction at SH and Quincy
Scheduling & Dispatching Tools	Workforce Modernization Program, Bus Dispatching Pilot		Additional Optimization	
Pilots & Route Changes	47 Near-Term Proposals	Implement. of Near-Term Proposals	Service Pilots (e.g. Weekend Pilot), Quarterly Service Changes	
Network Redesign	Procure & Begin Design	Design	Demonstration Projects & Implementation (FY21 onwards)	
Customer Information	Improved bus tracking technology	"Ghost Bus" Busting, Bus Stop e-Link pilot	TBD	

Increased ridership

More frequent, reliable, and faster bus service

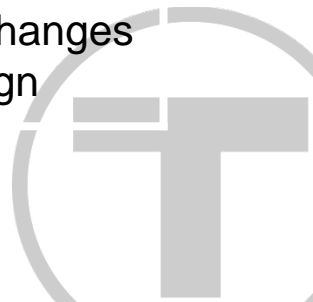
Better overall customer experience

More efficient use of resources



Investment Framework for Improved Bus Service

INVESTMENT CATEGORY	WHY THIS INVESTMENT MATTERS	EXAMPLE INVESTMENTS
<p>On Street Infrastructure</p>	<ul style="list-style-type: none"> Without on street infrastructure in congested areas, no amount of buses and operators can guarantee that buses will run on time (reliability), only that they will start trips on time 	<ul style="list-style-type: none"> Bus lanes TSP Queue Jumps Bus Bumps Bus Stop Infr.
<p>Resources</p>	<ul style="list-style-type: none"> Even with on street infrastructure, additional buses and operators are required to provide the level of service defined in the SDP Off-peak peoplepower can be utilized immediately, but additional peak peoplepower will require creative solutions in short term due to bus and facility limitations 	<ul style="list-style-type: none"> Peoplepower Buses
<p>Operational changes</p>	<ul style="list-style-type: none"> We need to continuously improve both operations and the underlying service network, and not rely only on major redesigns in order to respond to ever-shifting demand and environs 	<ul style="list-style-type: none"> Scheduling & dispatching tools Pilots & Route changes Network Redesign



Investments Critical to Improve Bus Service

INVESTMENT	KEY IMPACT	DEPENDENCIES
<p>Bus Lanes</p> <p>TSP + Queue Jumps + Bus Bumps</p> <p>Bus Stop Infrastructure</p>	<p>Run-time consistency (reliability) & speed</p> <p>Comfort & Improved Accessibility</p>	<p>Municipal participation</p>
<p>Peoplepower</p> <p>Buses</p>	<p>Frequency & run-time start (reliability)</p>	<p>Operating budget resources</p> <p>Maintenance garage(s) and/or contracted buses</p>
<p>Scheduling & Dispatching tools</p> <p>Pilots & Route Changes</p> <p>Network Redesign</p>	<p>Run-time cons. (reliability) & resource utilization</p> <p>Additional / Improved Service (All Aspects of SDP)</p> <p>New/Higher Ridership & Improved Accessibility</p>	<p>Software upgrades and/or hardware</p> <p>Municipal participation</p> <p>MBTA & Municipal Buy-In</p>
<p>On Street Infrastructure</p>	<p>Resources</p>	<p>Operational Changes</p>

Communication and roll-out plan (Winter 2020)

Due to level of change, significant coordination effort across multiple departments and stakeholders will be implemented this fall

	Typical service change	Better Bus Implementation
System-wide	<ul style="list-style-type: none"> Updated system-wide map (digital) 	<ul style="list-style-type: none"> Updated system-wide map (digital) Updated Better Bus Project website Digital screens ads and car cards Legislative and municipal outreach Newspaper ads Complementary foreign language communications Email to BBP email list
Route-specific	<ul style="list-style-type: none"> T-Alerts Bus Operator training Updated schedule cards 	<ul style="list-style-type: none"> Multiple T-Alerts Bus Operator training/engagement Updated schedule cards On-bus announcements
Stop-specific	<ul style="list-style-type: none"> Notifications at affected stops 2 weeks prior 	<ul style="list-style-type: none"> Notifications at stops approx. a month ahead of time ~10 new stops, ~70 removed stops ~400 stops w/ changed service



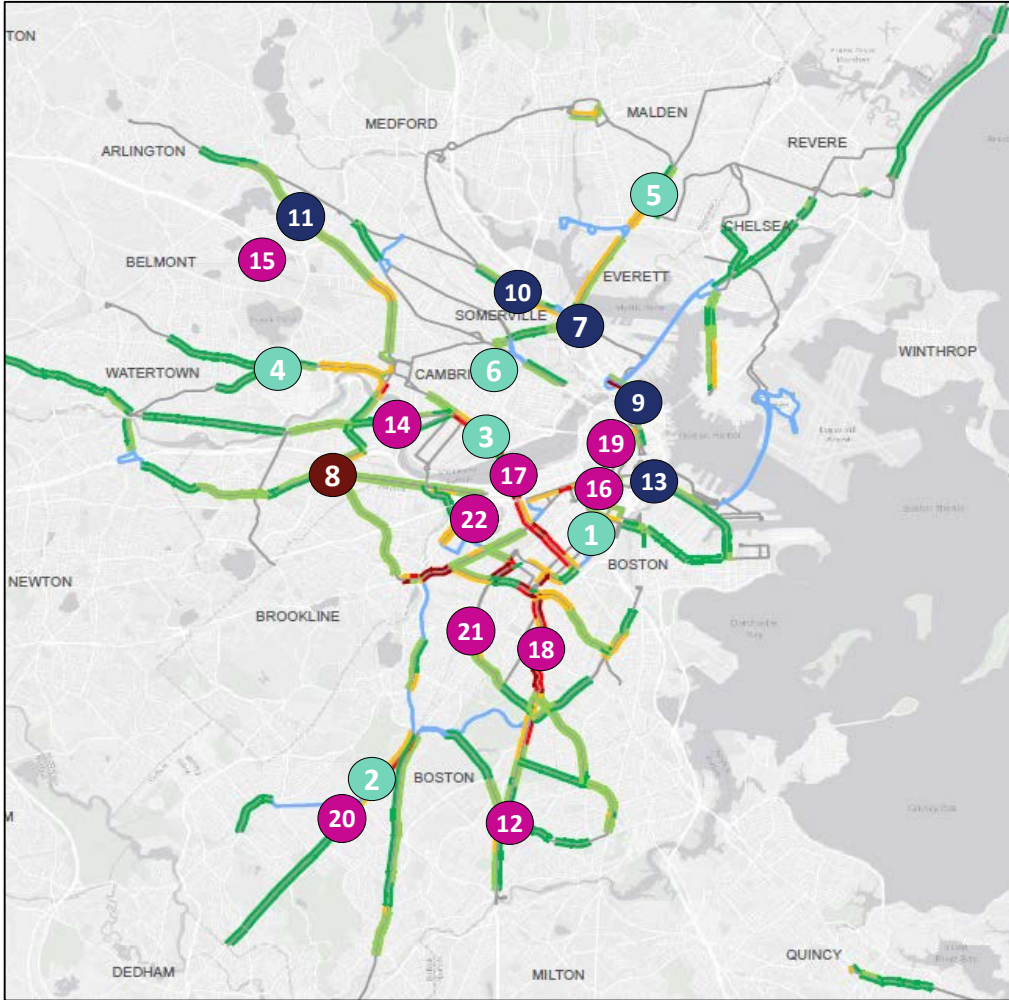
Top 40 Bus Routes

Highest Ridership Routes / Corridors Definition: >3,200 daily weekday riders

Key Bus Routes (14)	1	28	66	111		
	15	32	71	116/117*		
	22	39	73			
	23	57/57A*	77			
Silver Line (5)	SL1	SL3	SL5			
	SL2	SL4				
Local Routes w/ highest ridership (21)	7	31	47	88	104	441/442*
	9	34/34E*	70/70A*	89	109	
	16	35/36/37*	86	93	110	
	21	44	87	101	220/221/222*	



Bus Lane & Priority Treatment Investments



Note: Some transit corridors may only include TSP segments, not bus lane

Complete	<p>Pre-2019 Priority Investments:</p> <ul style="list-style-type: none"> 1 Boston: Essex/Washington St 2 Boston: Washington St. (Roslindale) 3 Cambridge: South Mass Ave 4 Cambridge: Mt. Auburn St. 5 Everett: Broadway 6 Somerville: Prospect St. 	<p>Completed in 2019:</p> <ul style="list-style-type: none"> 7 Boston/MBTA: Sullivan Sq 8 Boston: Brighton Ave 9 Boston: N. Washington St 10 Somerville: Broadway 11 Arlington: Mass Ave 13 Boston: Summer St
	<p>In Planning for 2020:</p> <ul style="list-style-type: none"> 12 Boston/MassDOT: Morton St 14 Boston/MassDOT/DCR: Soldiers Field Rd 15 Cambridge/MassDOT: Alewife access ramp 16 Boston: Washington St 	<ul style="list-style-type: none"> 17 Boston/Cambridge/MassDOT/DCR: Mass Ave Bridge 18 Boston: Warren St 19 Boston: Essex St 20 Boston: Roslindale 21 Boston: Columbus Ave 22 Boston: Comm Ave
Total	<p>Pre-2019: 6.7 miles</p> <p>2019: 3.4 miles</p> <p>Early 2020: ~4-8 miles (planned)</p>	



Bus Priority Investments – Completed Pre-2019

Project	Completion	Direction	Length (miles)	Time	Right-of-Way Source	Notes
Essex St / Washington St Boston – Chinatown	Fall 2009	Inbound Outbound	1.45 1.33	All Hours	Parking; General lane	Implemented with Silver Line
Washington St Boston – Roslindale	Summer 2018	Inbound	1.21	5 AM to 9 AM Weekdays	Parking; Shared (time of day)	Outbound direction in planning stages
South Massachusetts Ave Cambridge	Fall 2018	Inbound	0.55	All Hours	General lane	Reevaluating for improvement
Belmont St, Mt Auburn St Cambridge and Watertown	Fall 2018	Inbound	0.96	All Hours	General lane	Shared with bikes
Broadway Everett	Winter 2016	Inbound	1.14	4 AM to 9 AM Weekdays	Parking; Shared (time of day)	Shared with bikes
Prospect St Somerville	Fall 2017	Outbound	0.04	All Hours	Parking	Queue jump



Bus Priority Investments – Completed/Planned 2019

Project	Completion	Direction	Length (miles)	Time	Right-of-Way Source	Notes
Sullivan Square Station Boston – Charlestown	Spring 2019	Inbound	0.12 (comb.)	All Hours	Separated	Dedicated lanes into station busway
Brighton Ave Boston – Allston	Spring 2019 Fall 2019	Inbound Outbound	0.64 0.64	All Hours	General lane	
North Washington St Boston – Downtown	Fall 2019	Inbound	0.16	All Hours	General lane	Benefits Route 111 (and others)
Broadway Somerville	Fall 2019	Inbound Outbound	0.53 0.57	All Hours	General lane	Completed last week
Massachusetts Ave Arlington	Fall 2019	Inbound	0.57	6 AM to 9 AM Weekdays	Parking	Retained TSP from pilot project
Morton St Boston / MassDOT	Planned <i>Deferred to 2020</i>	Eastbound	0.04	All Hours	Parking; General lane	Queue jump
Summer St Boston – Downtown	Fall 2019	Inbound	0.15	All Hours	General lane	Traffic pattern changes
Soldiers Field Rd Boston / MassDOT / DCR	Planned <i>Deferred to 2020</i>	Inbound	0.05	All Hours	Adjusted lane widths	New pre-emption signal
Alewife Access Ramp Cambridge / MassDOT	Planned <i>Deferred to 2020</i>	Inbound	0.25	All Hours	Adjusted lane widths	Reviewing bridge structure
Washington St Boston – Chinatown	Planned <i>Deferred to 2020</i>	Inbound	0.81	All Hours	Parking; General lane	Creating continuous SL bus lane

Bus Priority Investments – Planning for Early 2020

Project	Completion	Direction	Length (miles)	Time	Right-of-Way Source	Notes
Massachusetts Ave Bridge Boston / Cambridge / MassDOT / DCR	In Planning	Inbound	0.42	All Hours	General lane	Cross-agency coordination
Warren St Boston – Dorchester	In Planning	Outbound	0.79	All Hours	Parking; Median; General Lane	Includes multiple treatments
Essex St (Restoration) Boston – Chinatown	In Planning	Inbound	0.17	All Hours	Existing bus lane	Restoring existing bus lane
Washington St Boston – Roslindale	In Planning	Outbound	1.21	4 PM to 7 PM Weekdays (TBD)	Parking	Paired with existing inbound bus lane
Columbus Ave Boston – JP / Roxbury	In Planning	Inbound Outbound	0.80 0.80	All Hours	General Lane	Multiple design concepts
Commonwealth Ave Boston – Back Bay	In Planning	Inbound Outbound	1.46 1.46	All Hours	General Lane	Connects to existing Brighton Ave lane



Median bus run times 20-22% longer during Peak periods over past 13 years



Reliability (OTP) at Trip Start for all routes is ~70%

Reliability (On Time Performance) for a trip start is evaluated as “on time” if it departs within 3 minutes after expected departure (any early departure is not “on time”)

MBTA schedules with goal of 90% trip start OTP (9 out of 10 trips start on time)

OPMI & OpsTech reviewed 500K weekday trips from this September and October 2019, and observed that:

- **71% left on-time**, within 3 minutes after expected departure.
- **4% left early**, which could be improved by better dispatching & oversight
- **8-10% left late**, but the arriving trip was on-time or close to on-time
- **12-14% left late because the arriving trip was late**, either due to schedule deficiency and/or high variation due to traffic/congestion
- **3% left late** for unknown causes

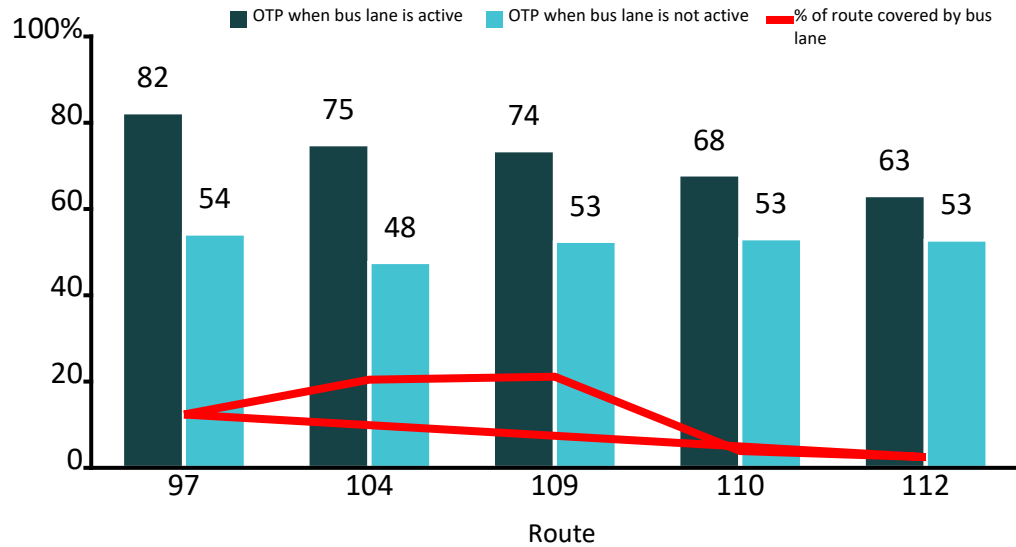


Trip Start OTP could be improved by up to 5-10% with improved dispatching & oversight; to increase Trip Start OTP beyond ~80% requires transit priority or scheduling / asset trade-offs

Bus lanes can significantly improve reliability

- Best lever to significantly improve bus reliability is the construction of transit priority, as well as improve run-times (median weekday bus trip is 20-22% longer during peak hours than it was 13 years ago)
- Bus lanes not only speed up bus trips, but decrease variation, which makes trips more reliable

OTP on Broadway Bus Lane



Note: Broadway Bus Lane active from 4-9 AM on weekday; other times shown are also weekday

