Transit Priority Toolkit: Key Messages and Evaluation Methods

American Cities Climate Challenge – Transit Priority Working Group

May 2021

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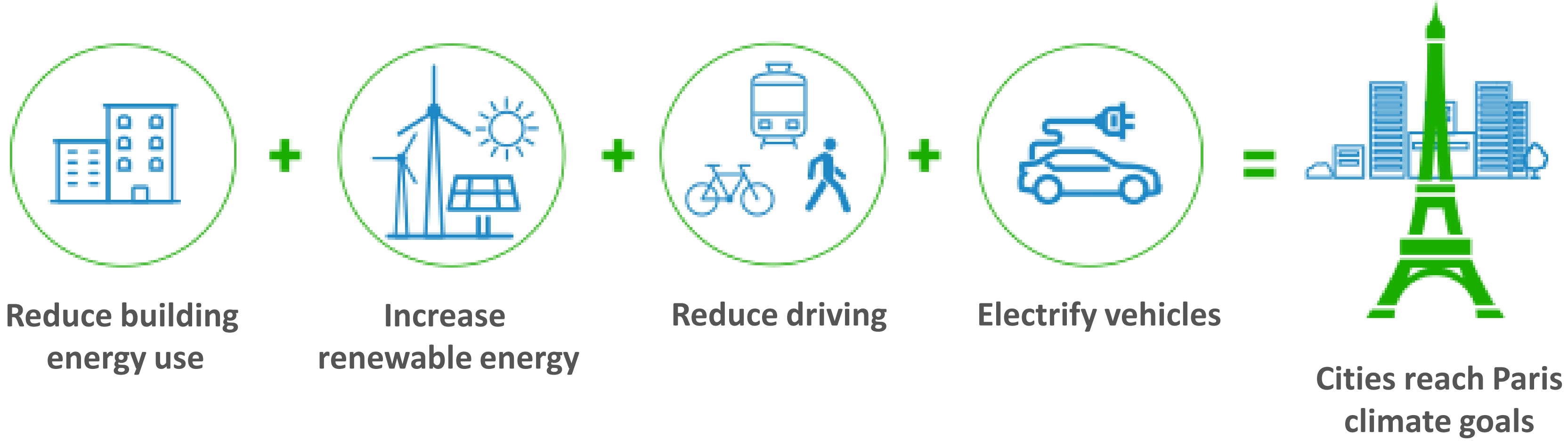
Created with support from:

American Cities Climate Challenge

TOOLKIT INTRODUCTION: WHAT IS THIS DOCUMENT AND HOW TO USE IT

AMERICAN CITIES CLIMATE CHALLENGE

The Bloomberg Philanthropies American Cities Climate Challenge aims to **accelerate and deepen** U.S. cities' efforts to create the **greatest climate impact,** as well as **showcase the benefits climate action brings for cities.**



CLIMATE CHALLENGE CITIES WANTED TO ACCELERATE TRANSIT PRIORITY PROJECT IMPLEMENTATION

- The Portland Bureau of Transportation–along with their partners at TriMet–initiated this project.
- PBOT and TriMet staff worked with Climate Challenge partners Nelson\Nygaard, NRDC, and NACTO to recruit representatives from four other city/transit agency pairs to scope and oversee the development of this toolkit.
- In 2019 and 2020 alone, the 25 Climate Challenge cities implemented more than 20 miles of bus-only lanes.

PURPOSE OF THE TRANSIT PRIORITY TOOLKIT

- Identify **methodologies** and **tools** to evaluate the benefits of transit priority projects
- Identify an approach **to tell the story about the benefits** of transit priority projects
- Give cities an easy-to-use resource **to engage with internal staff, stakeholders, decision makers, and the public**

PROJECT ELEMENTS

Project Element	Description	Outcomes	Timeline
Working Group Meetings	Engaged transit priority staff at cities and transit agencies from Atlanta, Honolulu, Los Angeles, Portland, and Washington, D.C.	- Gathered input on project needs - Determined Transit Priority Toolkit focus areas	September 2020 through February 2021 (4 meetings)
Peer Review	Conducted interviews with city and transit agency staff from Seattle, San Francisco, Minneapolis, and Boston	- Gained insights into transit priority programs, evaluation methods, messaging, COVID response, etc.	October 2020
Transit Priority Toolkit	Developed a Power Point presentation with links to native files and spreadsheets	- Provided methods, messages, and case studies for each transit priority metric for use by cities and agencies locally	May 2021

THE NEED FOR THIS TOOLKIT

The Working Group identified the following challenges for this toolkit to help solve

- Communication and Storytelling
  - Contextualize small travel time savings for individual trips to reflect aggregate benefits
  - Show how downtown transit priority projects can lead to systemwide benefits
  - Explain reliability impacts in terms of benefits to individual riders
  - Provide data visualization and infographics that can help communicate transit priority benefits internally with staff and externally to the public and other key stakeholders
- COVID Response and Equity
  - Develop messaging to support transit priority treatments during a time of changed travel patterns
  - Document how to measure and communicate some of the ways in which transit priority investments can make transportation systems more equitable

WHEN TO APPLY THE TOOLKIT

This toolkit helps tell the story to build the case for transit priority projects and evaluate project benefits

Conduct Operational Analysis

- Analyze transit delay

Identify Solutions

- Identify transit priority projects
- Design project

Build the Case

- Develop methodology to communicate potential benefits
- Create graphics to illustrate the story

Implement Projects

- Finalize design
- Build out project

Evaluate the Benefits

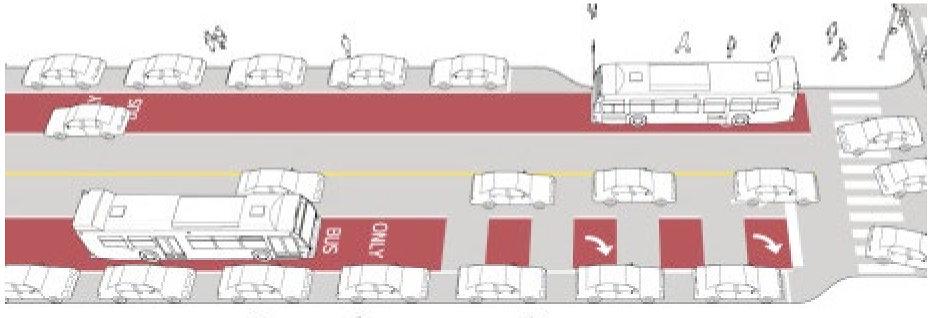
- Evaluate project benefits
- Create graphics to illustrate the story

Toolkit focus

This toolkit is **not** a:

- Design manual
- Project identification tool
- Public outreach guide

WHAT TYPES OF TRANSIT PRIORITY DOES TOOLKIT APPLY TO?



Source: NACTO

BAT Lane

HOW TO USE THIS TOOLKIT

- Toolkit format
  - The Working Group selected six topic areas for the project team to focus on
  - Each topic area is associated with one or two performance metrics
  - Each metric includes (where applicable):
    - A definition of the metric
    - Methods for analyzing data to calculate the metric
    - Visual storytelling strategies
    - Case studies from the peer review
- Toolkit organization
  - The toolkit is a menu of options for data analysis and communication
  - Agencies and cities can pick and choose graphics and methods as appropriate to their local and project context
  - Native files have been provided so that agencies can tailor graphics to their project context and audience
  - Text throughout the toolkit is editable so that messages can be modified and adapted as needed

HOW TO USE THIS TOOLKIT

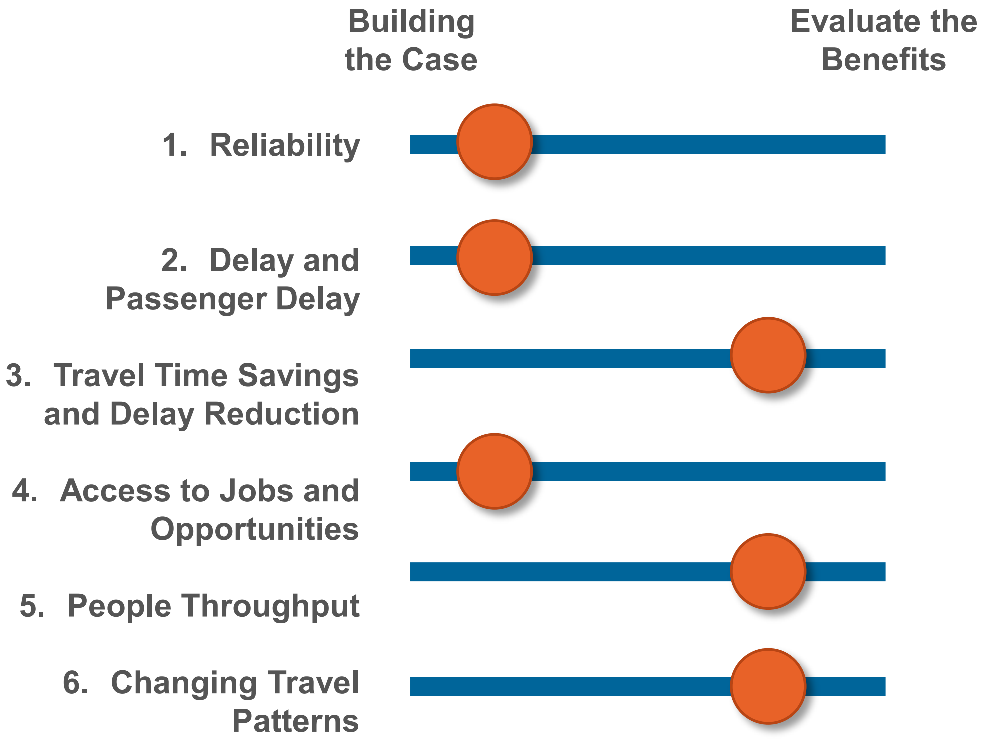
Understanding the level of detail provided

Working Group participants provided feedback on the type of information they thought would be most useful for each metric.

Therefore, for some metrics, the toolkit focuses on storytelling and **making the case**.

Other metrics were intended to have a focus on data and analysis approaches to **monitor and measure performance**.

The graphic on the right shows where each metric fits in on this spectrum between **building the case** and **monitoring and evaluate the benefits**.



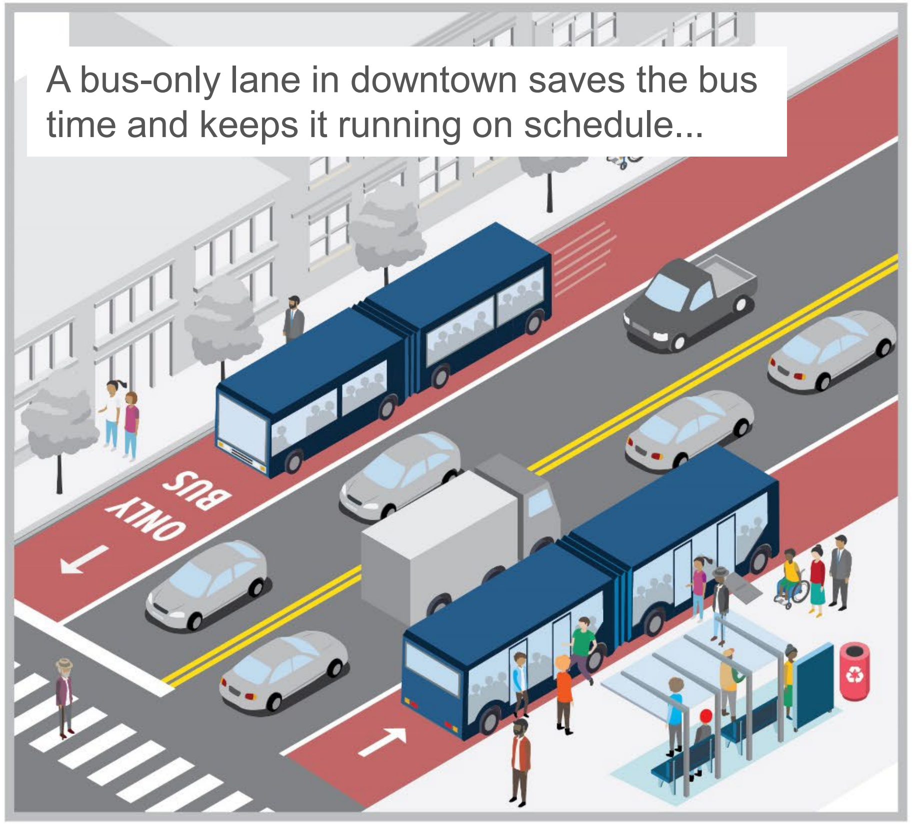
TRANSIT PRIORITY TOOLKIT: KEY MESSAGES AND EVALUATION METHODS

SYSTEMWIDE BENEFITS

- The Toolkit provides an overview of six key metrics to demonstrate the performance of transit priority projects and how to best tell the story.
- In discussions with the Working Group, it became apparent that there is a need to both justify a transit priority project's benefits at a specific location, as well as the cumulative benefits throughout the system.
- For example, small travel time savings in a downtown environment can help ensure the bus avoids delay downtown and arrives on time for passengers outside of downtown.
- The graphic on the following page is intended to illustrate the systemwide benefits of small localized projects.

WHO BENEFITS FROM TRANSIT PRIORITY IMPROVEMENTS?

Transit priority projects benefit the entire transportation system and everyone who travels through it.



A bus-only lane in downtown saves the bus time and keeps it running on schedule...

...which means the bus saves time along the entire route. People outside of downtown benefit from an on-time departure, too.

As transit travel times become more competitive with driving, more people take the bus, relieving traffic congestion all over the city.

TOOLKIT CONTENTS

Make transit a reliable choice

1. Reliability

Save time

2. Delay and Passenger Delay
3. Travel Time Savings and Delay Reduction

Serve people who need transit the most

4. Access to Jobs and Opportunities

Move more people

5. People Throughput
6. Changing Travel Patterns

INTEGRATING EQUITY AT EACH STEP

Identify high-need populations

- Use Census or other available data to identify locations with high-need populations according to local context, for example:
  - People of color
  - Lower-income people, or people in poverty
  - Households without access to a vehicle
- Overlay these areas with the high delay corridors or the proposed reliability improvement projects to assess needs and impacts for high-need populations.
- Assess the metrics in Sections 1 through 4 with a focus on the high-need areas.
- Consider other context-relevant data or demographics in the analysis.

Portland

The City of Portland Bureau of Transportation (PBOT) has an Equity Matrix that guides investment and is used to rank projects, programs and procedures.

It uses three demographic variables: race, income and limited English Proficiency.

Atlanta

The Atlanta Regional Commission (ARC) developed the Equitable Target Area (ETA) Index to identify environment justice populations and to make informed decisions and investments.

The ETA Index is calculated using five variables: age, education, housing cost, poverty rates and race.

1. RELIABILITY

Defining the Metric

Reliability refers to the concept of consistency - the bus arrives at the same time or at predictable intervals, day after day. Reliable service helps to meet passenger needs and expectations so riders can plan for when the bus will pick them up and know how long the journey will take. Reliability builds confidence in the bus; riders know they can get where they're going on time.

How do you measure it?

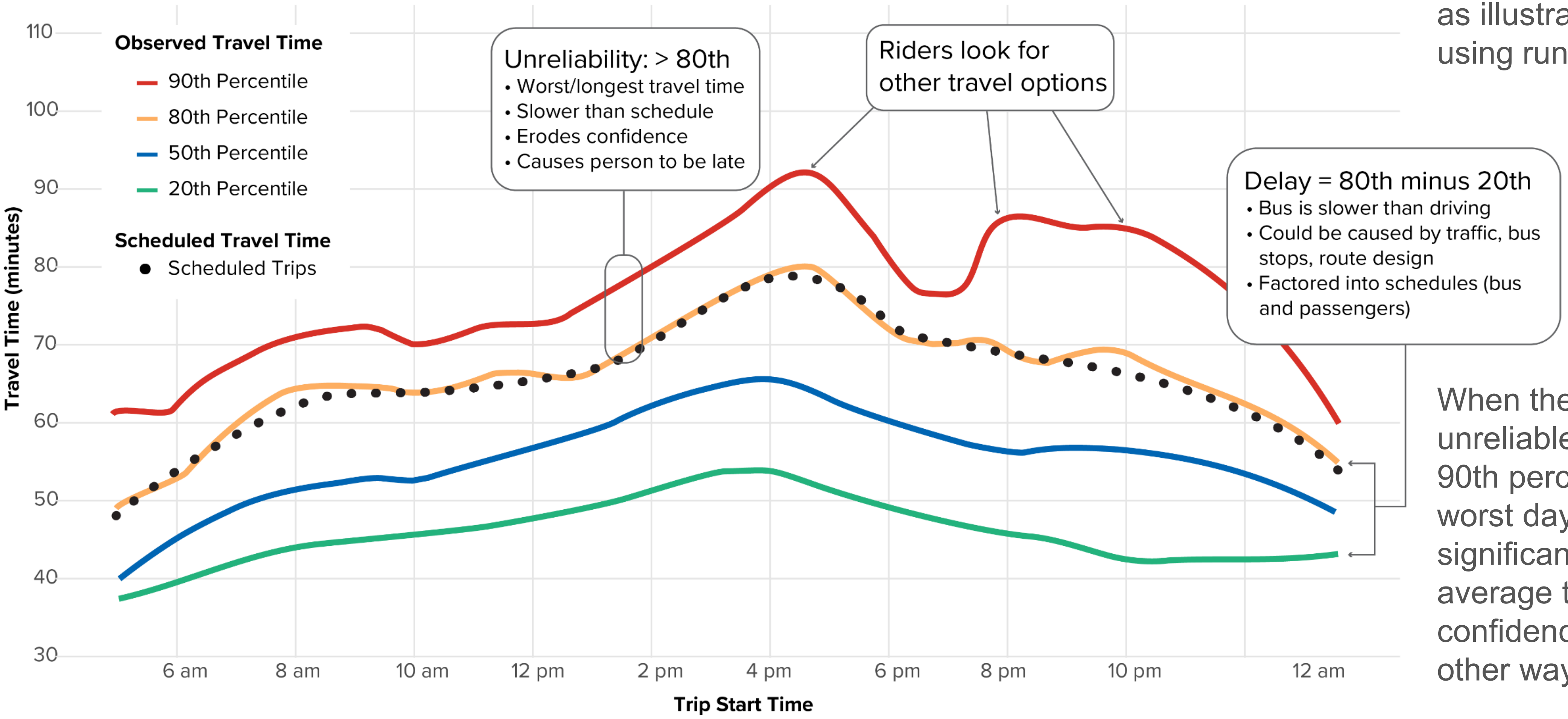
- Reliability is measured as the variability of travel time based on automatic vehicle location (AVL) data.
- Agencies often communicate travel time data using actual run times and arraying the times in percentiles, e.g. the 80th percentile value means 80% of trips are equal to or faster than that value. Schedules are often based on the 80th or 90th percentile to be conservative so passengers aren't late.
- There is a fine distinction between measuring reliability and measuring delay. Delay is often accounted for in schedules and is caused by traffic. But reliability refers to the amount of variability in travel times, day after day, that can cause people to lose confidence in the bus.

1. RELIABILITY

Make transit a reliable choice

Analyzing the data: diagnosing delay and unreliability

Travel Time by Time of Day



Each line represents the total one-way travel time throughout the day, by percentile, including average dwell times, based on the trip start time at the beginning of the route. The black dotted line represents the scheduled trip travel times (inclusive of dwell time at stops).

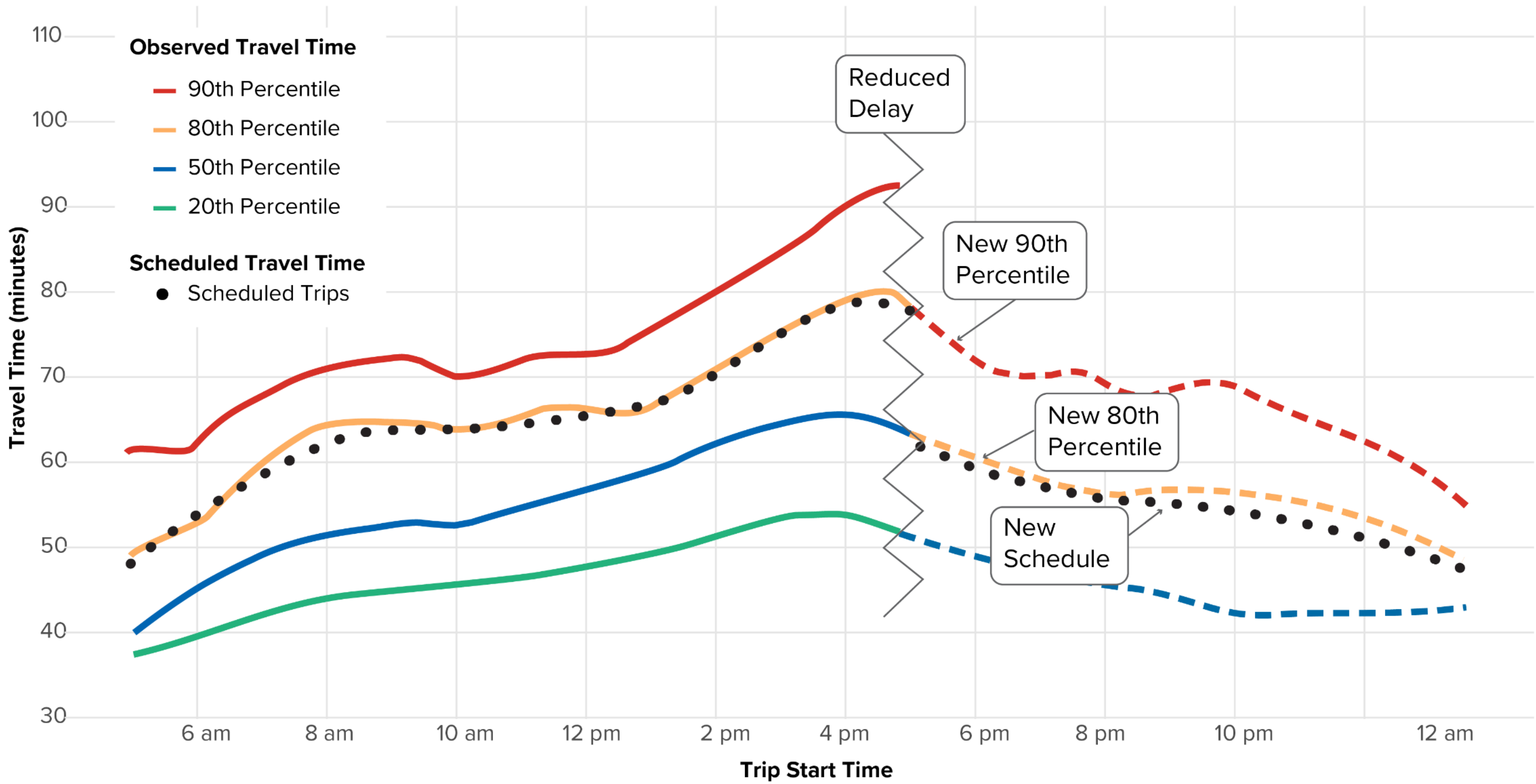
There is a distinction between delay and reliability, as illustrated in this graphic using run time percentiles.

When the bus is the most unreliable – i.e. when the 90th percentile trip (or the worst day out of ten) is significantly slower than the average trip – riders lose confidence and search for other ways to travel.

1. RELIABILITY

Make transit a reliable choice

Analyzing the data: reduced delay can lead to changing the schedules



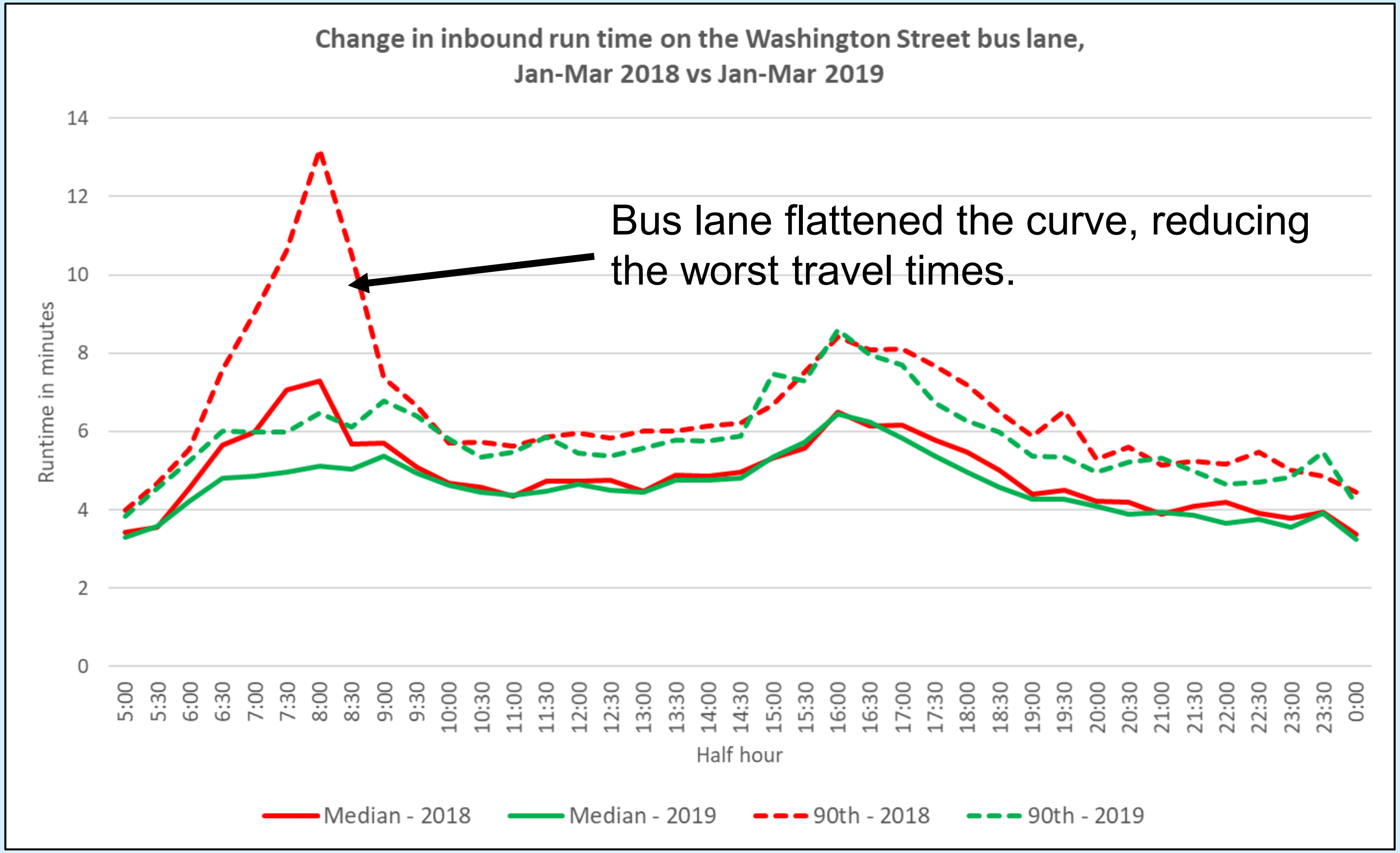
Transit priority provides consistent travel times.

Consistently lower travel times reduce all the run time percentiles and give agency schedulers the ability to adjust transit schedules (such as increasing frequency).

Make transit a reliable choice

Washington Street, Boston

- The MBTA piloted a bus-only lane from Roslindale Village to Forest Hills (1 mile) from 5-9 am in May 2018. The project was made permanent in June 2018.
- Automatic vehicle location (AVL) data was used to track changes in run time:
  - Run times during the average condition (50th percentile or median) decreased by 2 minutes
  - Run times during the worst times of the morning peak (the 90th percentile) decreased by 5-7 minutes



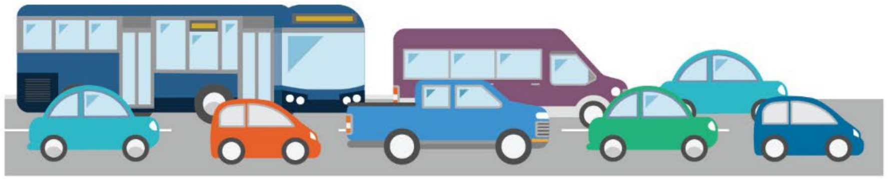
Source: MBTA (https://www.mbtabackontrack.com/blog/103)

1. RELIABILITY

Make transit a reliable choice

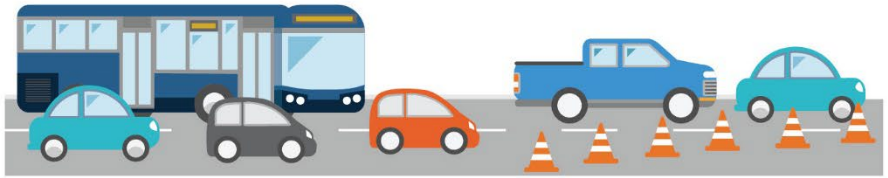
Telling the story: root causes of bus delay and unreliability

1. Rush hour delays everyone on the road. It's built into bus schedules.

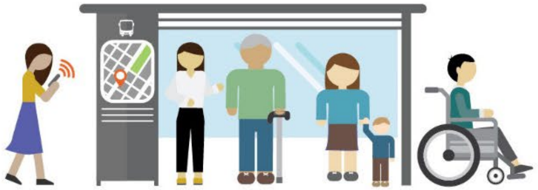


2. Unexpected incidents and heavier than normal traffic are hard to plan for and can cause the bus to be late.

3. Streets have limited capacity and aren't designed to accommodate the unexpected.



4. When traffic is unpredictable, the bus is late and passengers are either on transit for longer than planned or stuck waiting.

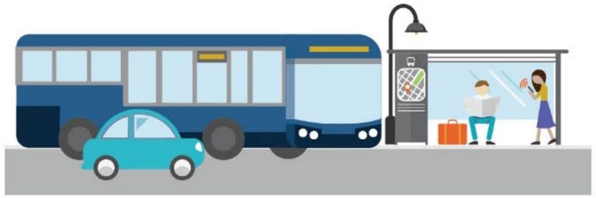


1. RELIABILITY

Make transit a reliable choice

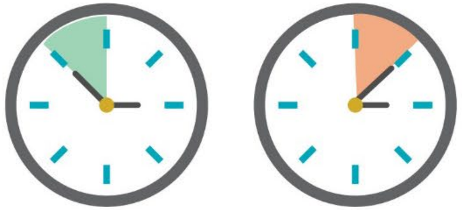
Telling the story: the issue with unreliability

A bus trip can take different amounts of time from day to day.

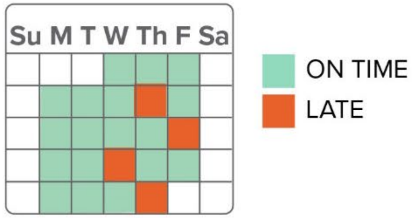


Schedules are conservative on purpose.

People would rather arrive early at their destination than late.



Buses are usually on time . . .



. . . but people don't want to be late even some of the time.

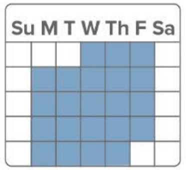
1. RELIABILITY

Make transit a reliable choice

Telling the story: how unreliability affects passengers

1. I plan for extra time traveling.

I take an earlier bus to make sure I arrive on time



15 minutes of extra travel time
x 5 days a week
= 75 minutes of extra time a week

Time that could be better spent on something else

2. It can cost me money.

I'm late for work and could lose my job

I get a late pickup fee at childcare

I'm charged a no-show fee at the doctor

3. It adds stress to my day.

The bus arrives so crowded that I have to wait for the next one

I miss my transfer

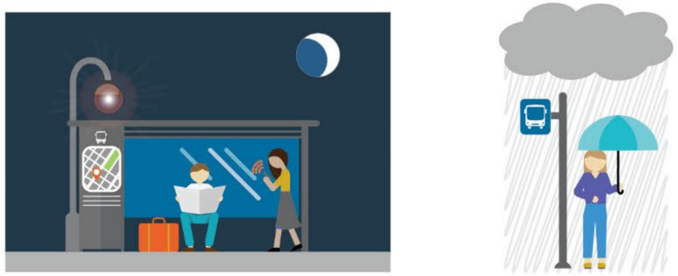
1. RELIABILITY

Make transit a reliable choice

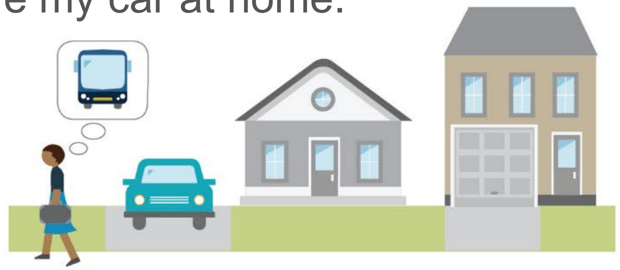
Telling the story: the benefits of reliability

1. I spend more time at home with loved ones.

2. I spend less time waiting for the bus.



3. When the bus is reliable, I'm more likely to leave my car at home.



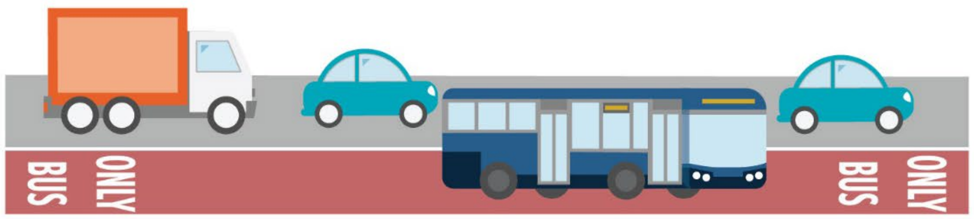
4. Emergency vehicles are able to respond to emergencies without delay.

1. RELIABILITY

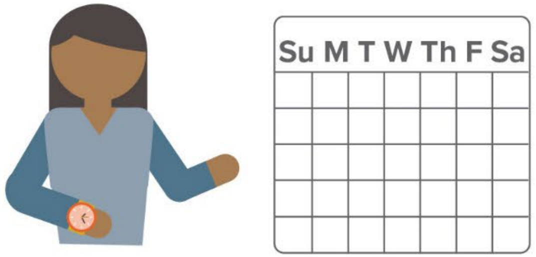
Make transit a reliable choice

Telling the story: reliability improvements affect bus schedules

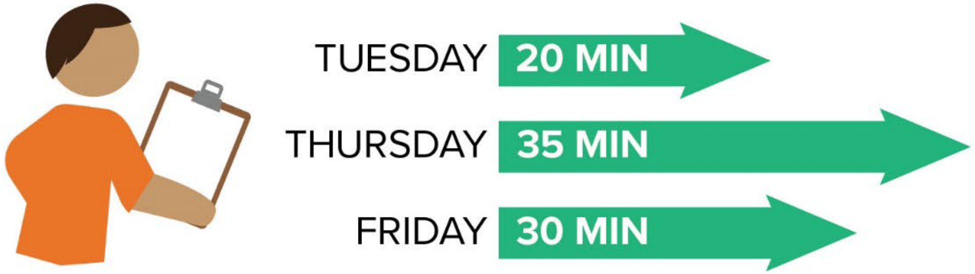
1. Adding transit priority means a faster trip and less crowding on buses.



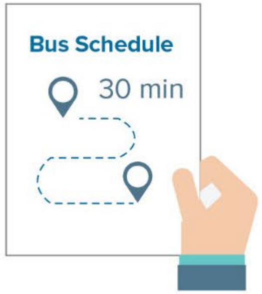
2. People need realistic information so they can plan ahead and not be late.



3. Agencies monitor the bus at several different times to set the schedule.



4. Once travel times are consistently faster, the schedule can be changed.



2. DELAY & PASSENGER DELAY

Save time

Defining the metric

Delay is the additional travel time passengers experience during slower/congested conditions relative to faster/free-flow conditions. This measure is calculated based on many trips over multiple days and weeks. It is not something that can be observed from one trip.

“Passenger delay” is a separate metric that weights the delay by the passenger load or ridership of a route. It is the cumulative delay experienced by all passengers.

How do you measure it?

- There are multiple methods to measure delay. Each method is based on differences between percentile travel times (e.g. 80th percentile, 50th percentile, 20th percentile).
- Use AVL data of observed run times between any two locations (stop pairs, timepoints, or route endpoints) to calculate the percentile travel times.
- Passenger delay is calculated by multiplying the delay value by the on-board load between those two locations. At the route-level, passenger delay can be calculated using total route ridership.
- Delay can be categorized as running delay (time stuck in traffic) and signal delay (additional travel time caused by signal), and merge delay (time spent merging back into traffic from a bus stop). Running delay can be mitigated with bus lanes and queue jumps. Signal delay can be mitigated with transit signal priority. Merge delay can be mitigated with in-lane stops and bus lanes.

2. DELAY & PASSENGER DELAY

Save time

Analyzing the data

The following is a list of different ways to measure delay. These are examples used by members of the Working Group and is not an exhaustive list.

Delay methods	Description	Benefits	Challenges
80-20 (by hour or trip) 90-10 (by hour or trip) 90-50 (by hour or trip)	Compares the range of travel times for individual trips or by hour.	Ability to identify which times of day have more variability, regardless of what occurs at other times of day.	Fails to easily identify where transit faces speed and reliability challenges all day (i.e. no increase in delay during peak hours could be masking all-day delay)
80-20 (all day) 90-10 (all day) 80 (peak) – 20 (off-peak) 90 (peak) – 10 (off-peak)	Compares slower trips (80/90) to the fastest trips (20/10) during the day.	Identifies the locations that experience more severe congestion; useful for identifying where bus lanes or BAT lanes are most likely to be beneficial.	Does not identify reliability challenges that individual trips experience day-to-day.
50 (peak) – 50 (off-peak)	Compares typical conditions at peak to typical conditions off-peak.		

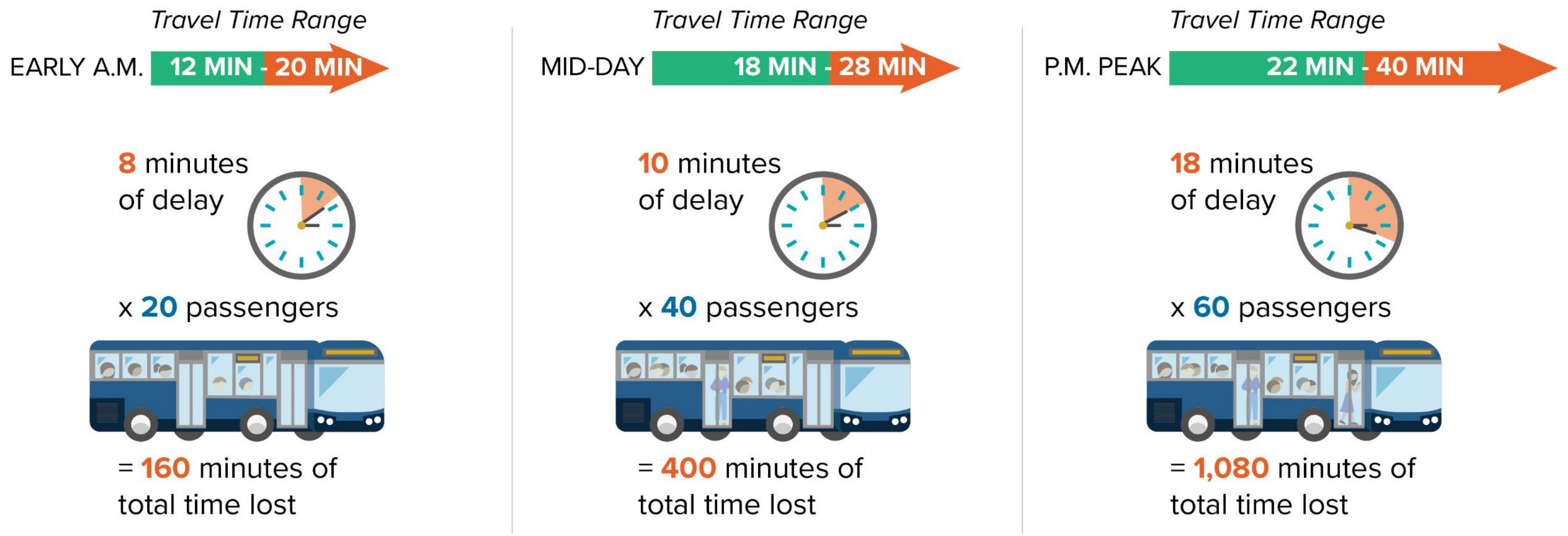
Equity: It's also helpful to analyze delay with the additional perspective of demographics and equity. For example, are there parts of the network with higher delay that are more likely to impact passengers who are from disadvantaged or low-income communities?

2. DELAY & PASSENGER DELAY

Save time

Telling the story

Passenger delay is people's time lost on transit. It shows the locations where the most people experience the most delay. Bus travel times vary throughout the day and week. People's time lost is calculated by multiplying the minutes of delay by the passengers onboard.



3. TRAVEL TIME SAVINGS & DELAY REDUCTION

Save time

Defining the metric

Travel time savings is the amount of time that can be saved (or reduced) with a transit priority project. Transit priority projects may either result in faster travel speeds and/or reduced variability in travel times.

How do you measure it?

- Each transit priority treatment varies in its effectiveness. But the travel time savings can be assumed to reduce the average travel times or speed up the slowest run times without impacting the average or fastest trips.
- The estimated savings are based on observed speeds and run times, as well as assumptions for savings for each project. The data can be from other projects already implemented, as well as data from other cities.

3. TRAVEL TIME SAVINGS & DELAY REDUCTION

Save time

Analyzing the data: Using planning-level travel time savings

The following page lists the potential savings for various transit priority interventions. These savings should be used as a preliminary estimate. Each location is unique, and savings can vary considerably based on traffic volumes, number of lanes, intersection spacing, signal cycle times, and additional local contexts. It is recommended agencies use data gathered from local precedents to inform travel time savings estimation.

3. TRAVEL TIME SAVINGS & DELAY REDUCTION

Save time

Analyzing the data: estimated travel time savings per treatment

Treatment	Savings	Example	Source
Transit signal priority (TSP); signal coordination	8-12% of travel time; 15-80% of signal delay	Adding TSP along a corridor that takes 60 minutes can reduce travel time to 54-56 minutes	TCRP 165 pg 6-44
	3 sec per TSP	Adding TSP to 33 intersections results in approximately 1 minute of savings	TCRP 118 pg S-9
In-lane stops (filling in bus pullouts)	7% increase in speed (for corridor-wide application)	Travel speeds at 20 mph can increase 1-2 mph with in-lane stops	TCRP 165 pg 6-51
Stop consolidation	Elimination of acceleration, deceleration and door close/open for each stop removed. ▪ Acceleration: 3.3 ft /sec/sec ▪ Deceleration: 4.0 ft/sec/sec ▪ Door open + close: 2-5 sec (avg 3.5 sec)	▪ At top speed of 15 mph, removing 3-4 stops results 1 minute of savings ▪ At top speed of 20 mph, removing 3 stops results in 1 minute of savings ▪ At top speed of 25 mph, removing 2-3 stops results in 1 minute of savings	TCRP 165 pg 6-4 & 6-6
Queue jump	5-15% of travel time through intersection	3-10 seconds of savings for each minute of travel time to get through an intersection	TCRP 165 pg 6-48
	6 sec per queue jump	Approximately 1 minute of savings with 10 queue jumps	TCRP 118 pg S-9
Bus lane	Travel time savings: ▪ 20-60 seconds per mile ▪ 35-45% of travel time Reduction in variation of travel: ▪ 12-30% change in the coefficient of variation (i.e. the standard deviation divided by the mean)	Approximately 1 minute of savings for every 1-3 miles of bus lane	TCRP 165 pg 6-39 & 6-40

3. TRAVEL TIME SAVINGS & DELAY REDUCTION

Save time

Analyzing the data: using existing travel time and delay to estimate delay and travel time reductions for bus lanes and BAT lanes

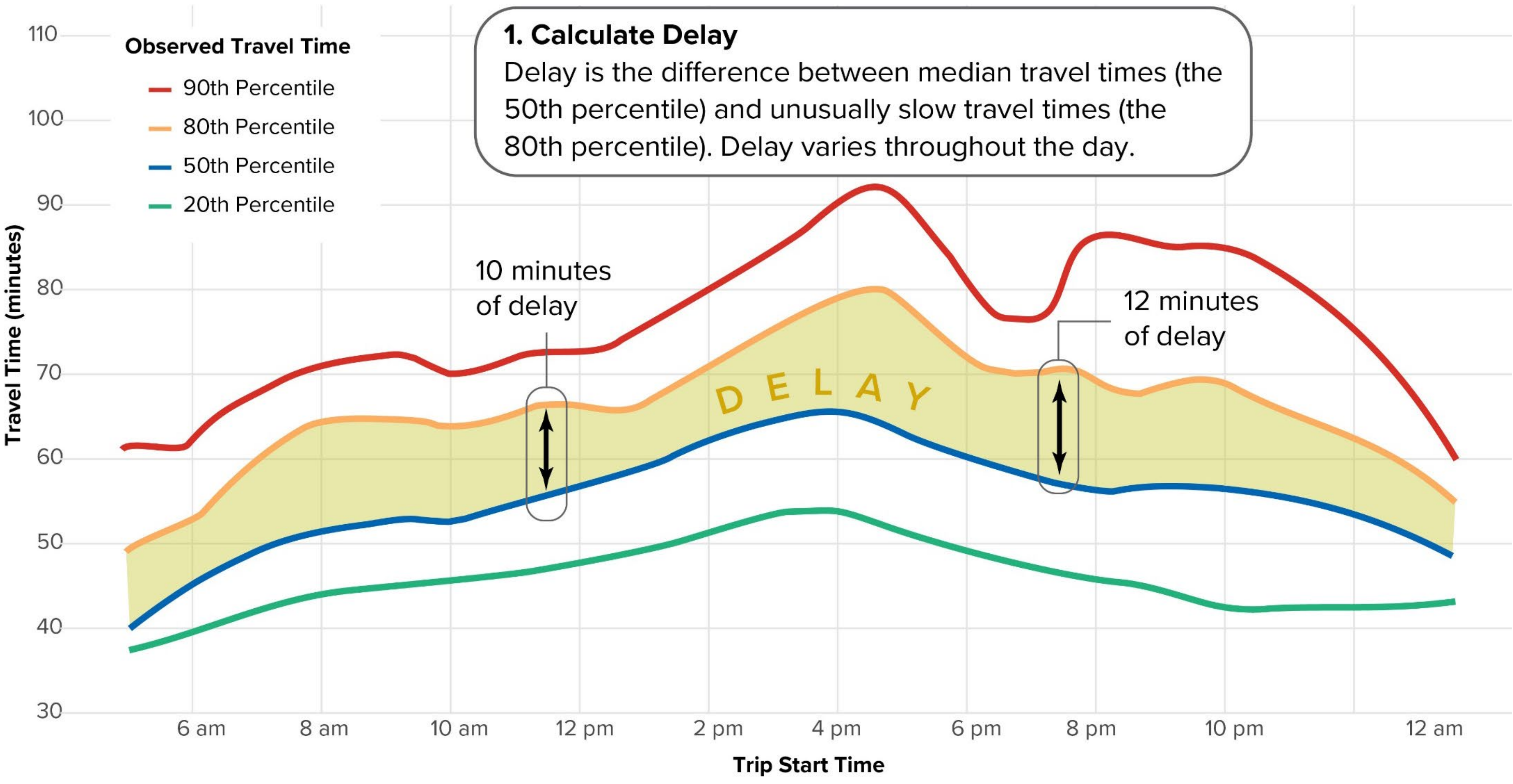
The following two pages provide additional methods for estimating travel time savings and delay reductions. Unlike the values from above, these methods use an agency's own travel time and delay values (from AVL) to provide an estimate along specific corridors or locations. These methods only apply to segments or corridors with planned bus or BAT lanes.

Equity: It's also helpful to compare existing and expected travel times from an equity and demographics standpoint. For example, are there parts of the network that serve more disadvantaged or low-income communities? What are the travel time savings for those passengers compared to the general population?

3. TRAVEL TIME SAVINGS & DELAY REDUCTION

Save time

Analyzing the data: potential delay reduction per treatment (bus/BAT lanes)



Use data for the segment or portion of the route where the transit priority treatment is located.

3. TRAVEL TIME SAVINGS & DELAY REDUCTION

Save time

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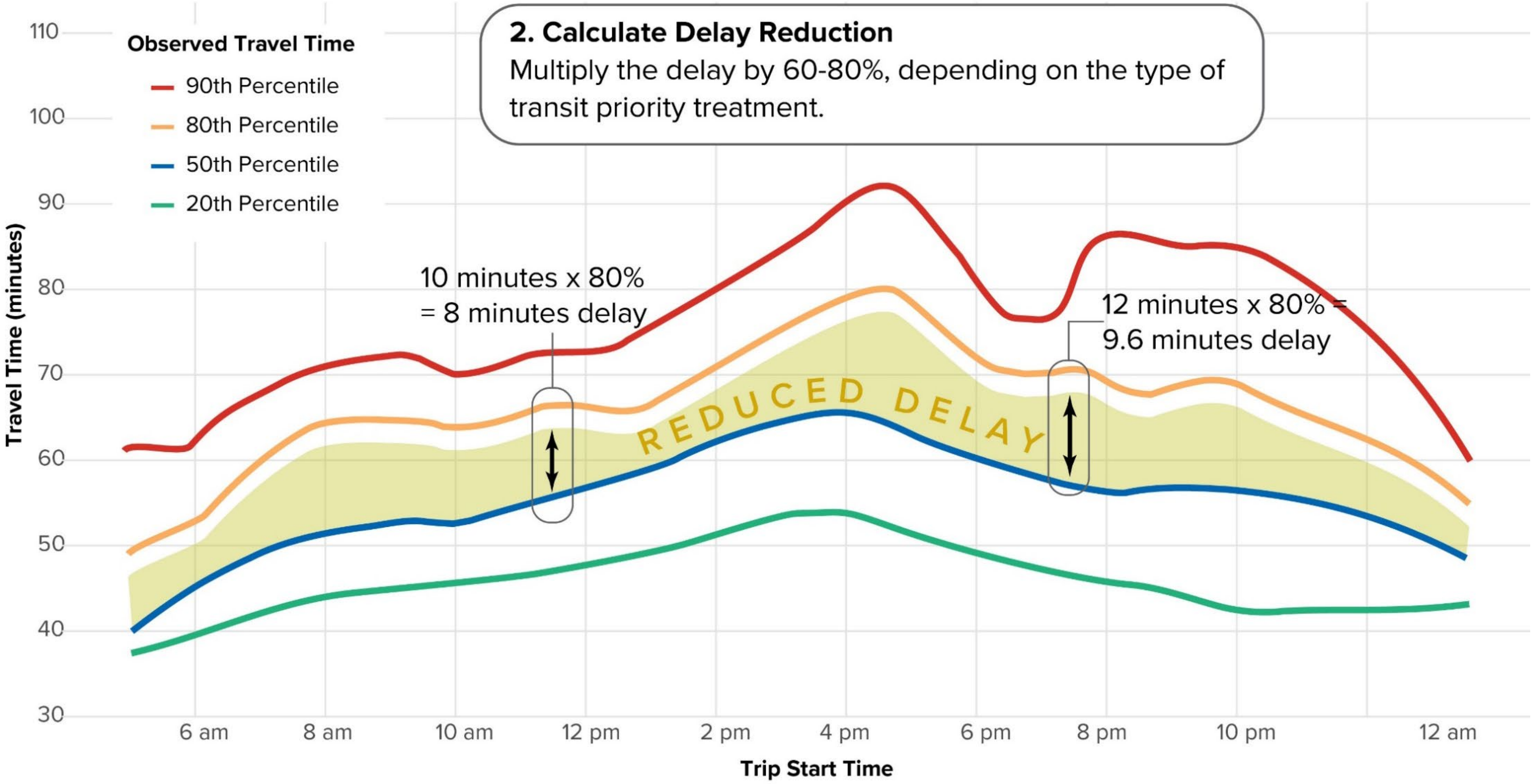

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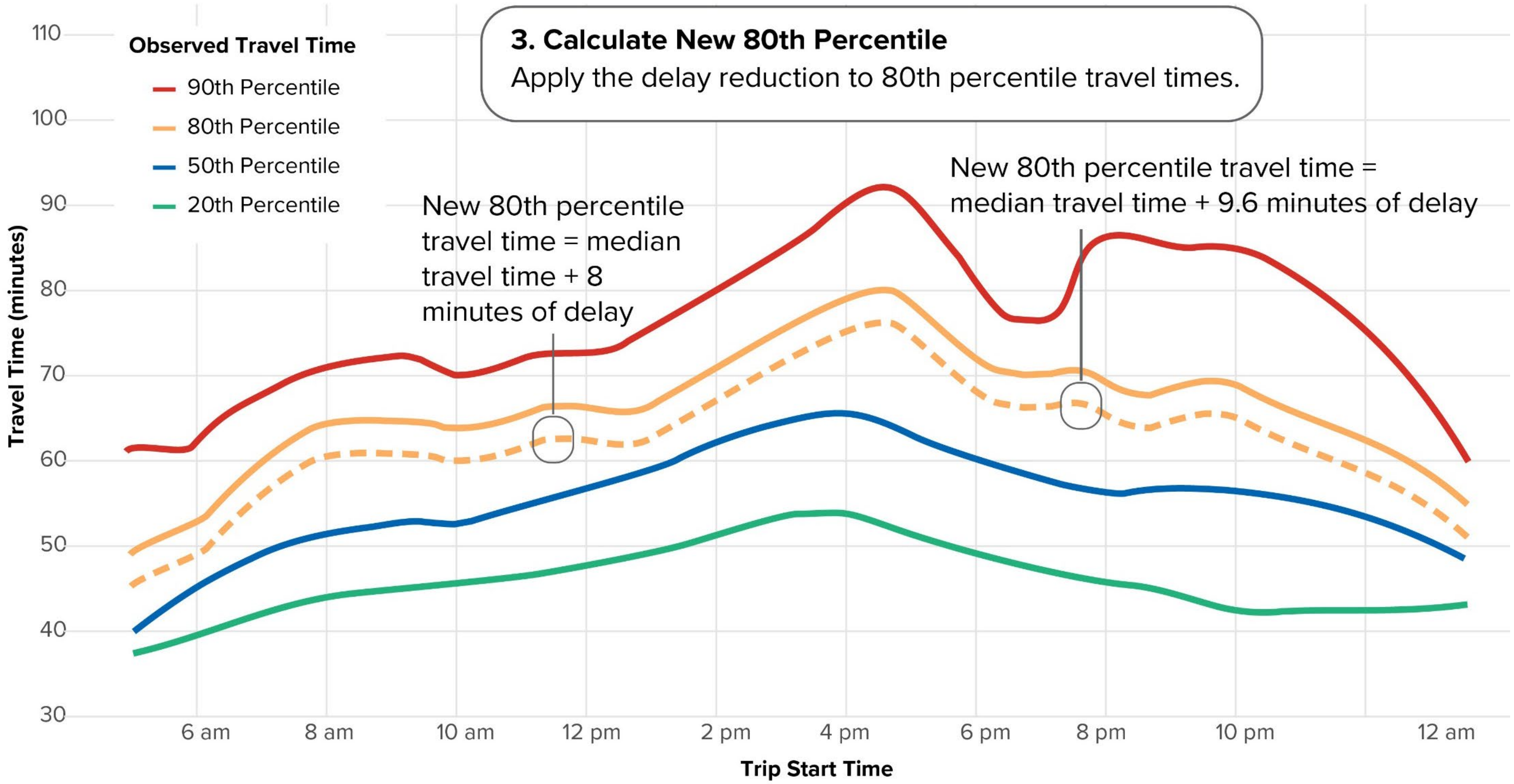

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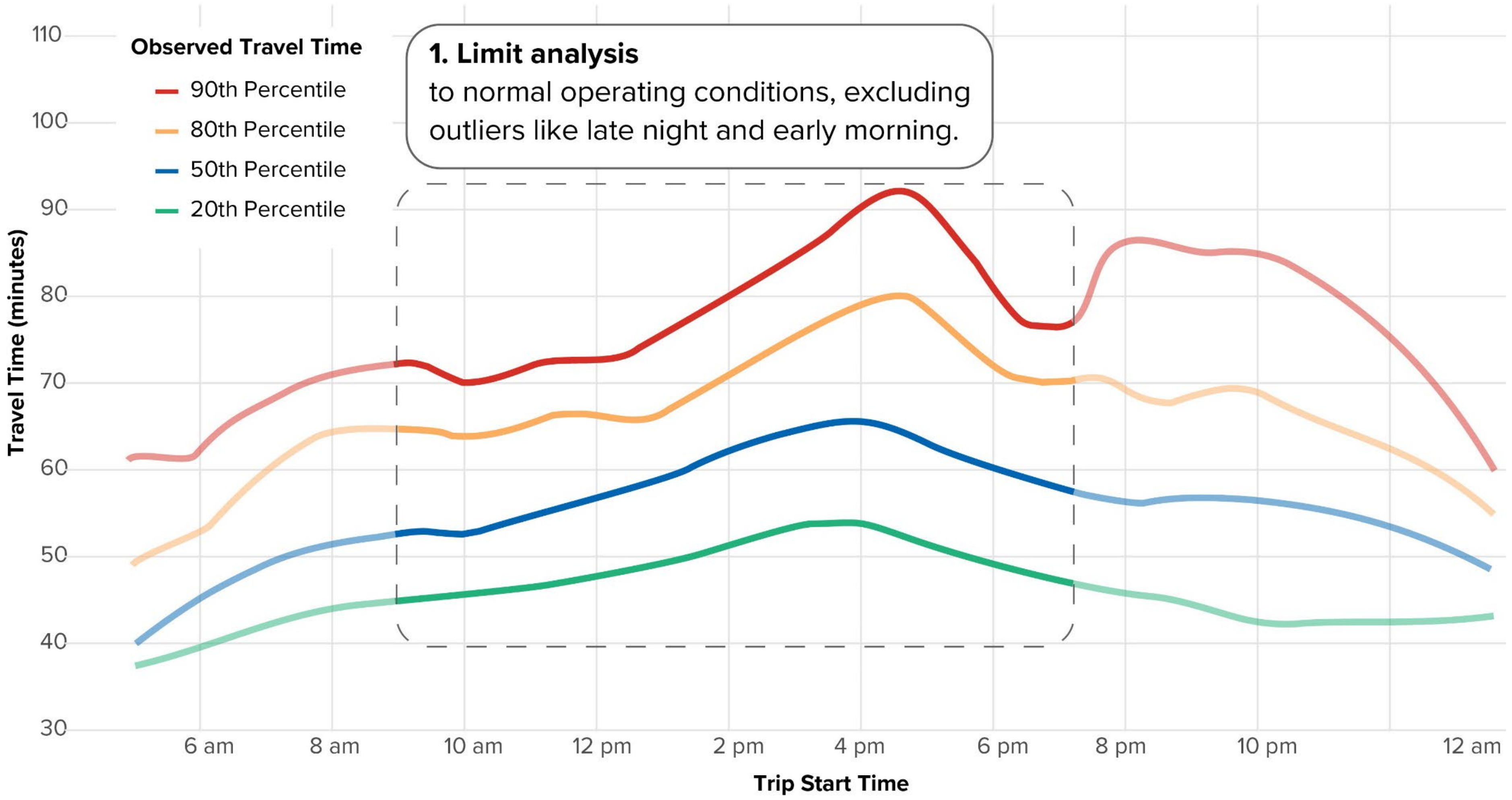
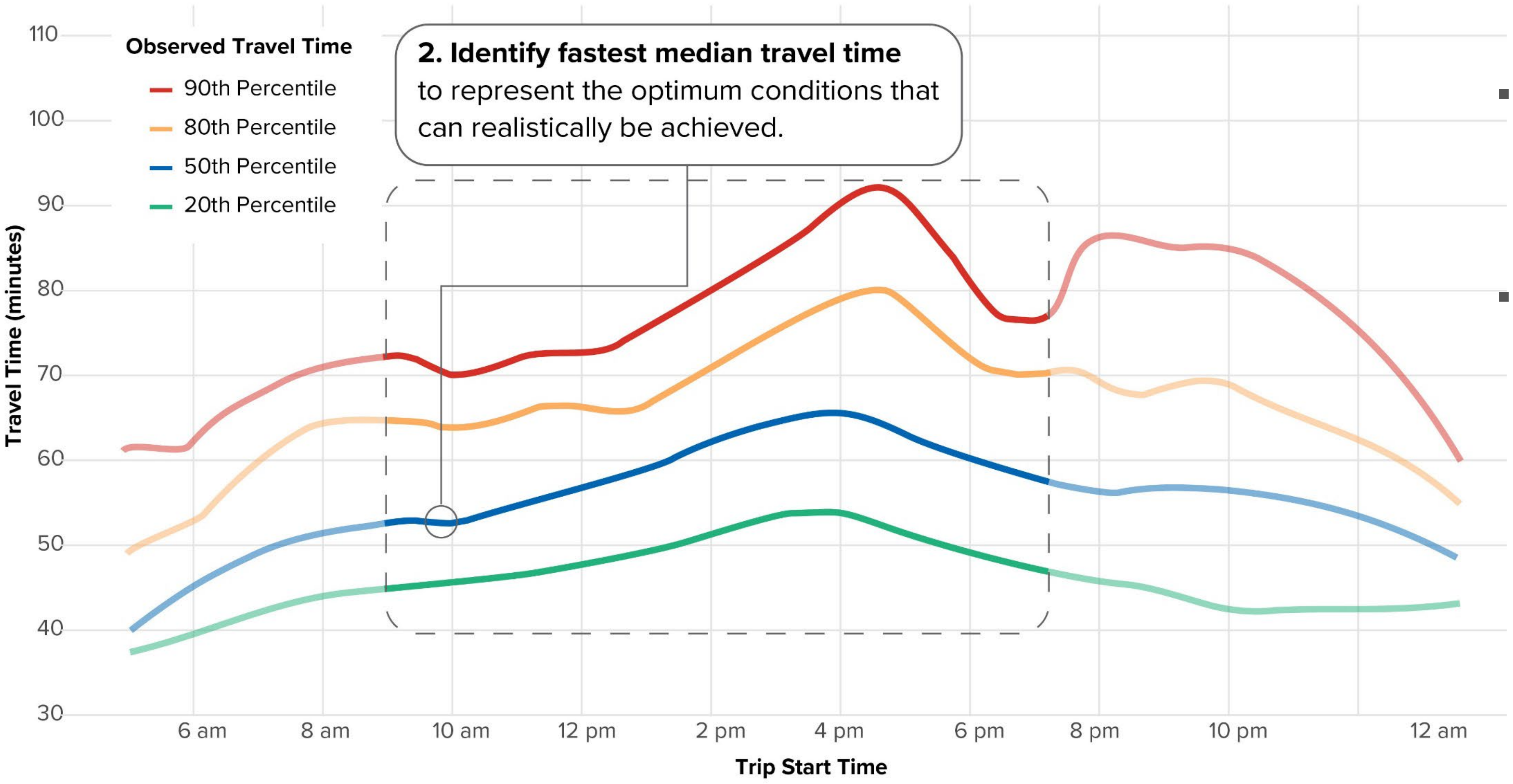


- Use data for the segment or portion of the route where the transit priority treatment is located.
- This calculation is only applicable for corridors that have time during the day when traffic is light, and conditions are generally free-flowing. This method cannot be used for corridors with chronic congestion and slow speeds.

3. TRAVEL TIME SAVINGS & DELAY REDUCTION

Save time

Analyzing the data: potential travel time savings per treatment (bus/BAT lane)



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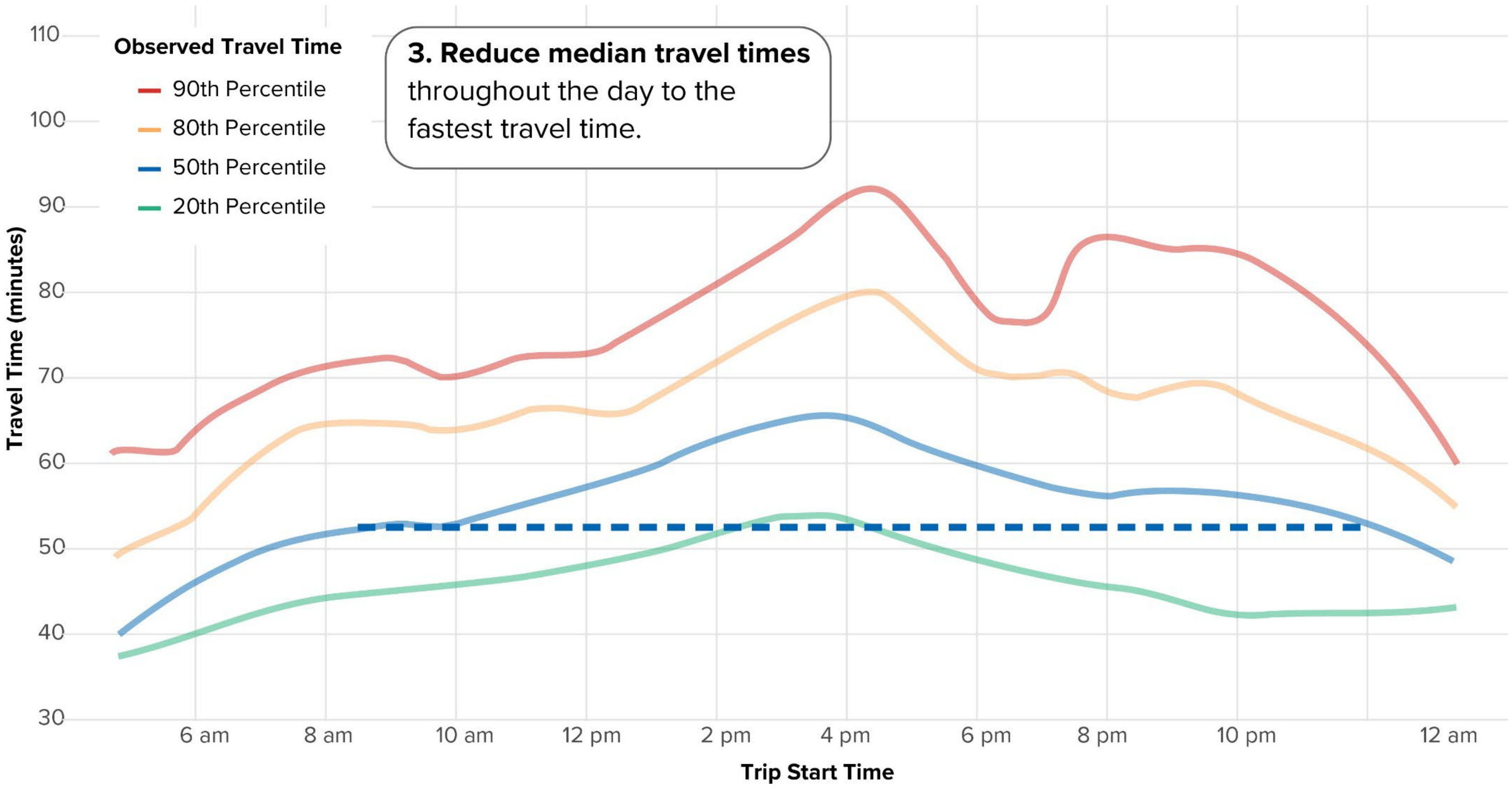

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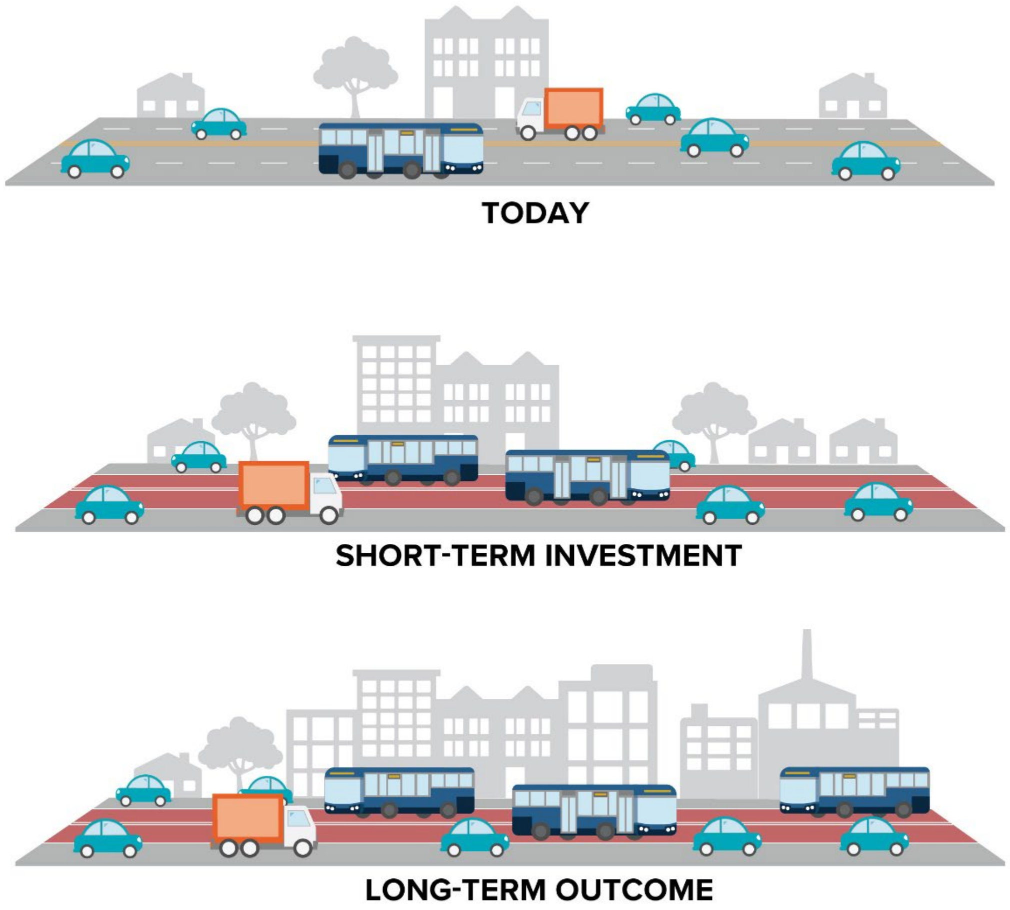
3. TRAVEL TIME SAVINGS & DELAY REDUCTION

Save time

Telling the story: small savings today can ensure larger savings long-term

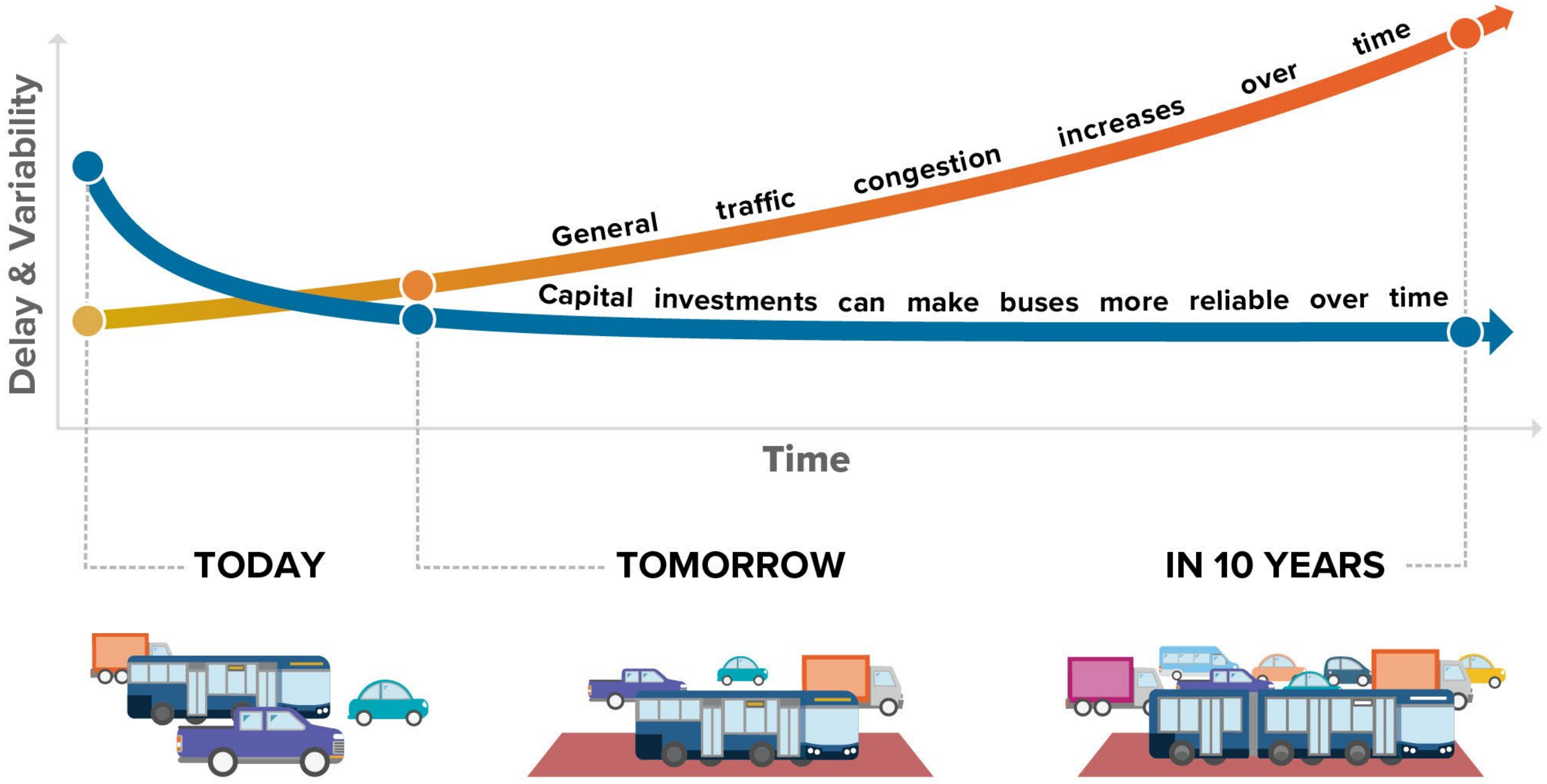
- Use priority treatments now to get ahead of future congestion and protect existing transit run times.
- Even small savings that don't have significant immediate impacts on frequency and operating cost can postpone when additional vehicles/operators may be needed to maintain current frequency.



3. TRAVEL TIME SAVINGS & DELAY REDUCTION

Save time

Telling the story: preserve roadway space to guard against future delay and make transit a more attractive travel option



Case Study

Save time

Travel Time Savings – Examples from various cities

- Flower Street, Los Angeles; Streetfilms & TransitCenter (YouTube)
- Flower Street, Los Angeles; LAMetro (Twitter)
- Howell Street, Seattle; King County Metro (YouTube)
- Forbes Creek Drive, Kirkland, WA; King County Metro (YouTube)
- SW Main St, Portland; PBOT (YouTube)
- Portland Rose Lanes; PBOT (YouTube)
- Downtown DC Bus Lanes; Streetfilms (YouTube)
- Select Bus Service, New York City; SBS Studies (NYCDOT)

4. ACCESS TO JOBS AND OPPORTUNITIES

Serve people who need transit the most

Defining the metric

People's access to jobs and opportunities is a key equity metric and one that can help guide the implementation of a transit priority project. For example, documentation of how many jobs are accessible within a 45-minute transit ride for people living along a specific corridor. By implementing the transit priority project, agencies can help demonstrate that small travel time savings can have a big impact on the increase in number of jobs and opportunities available to high need populations.

How do you measure it?

- Identify high-need populations (see page 16)
- Calculate the number of jobs (or other types of destinations) that are accessible within a specific travel time, for example 30- or 45-minutes.
- Estimate the travel time improvements for a transit priority project and demonstrate the change in number of jobs that are accessible within the specified travel time.

4. ACCESS TO JOBS AND OPPORTUNITIES

Serve people who need transit the most

Telling the story: reliability and reduced travel times brings more opportunity to those who need it

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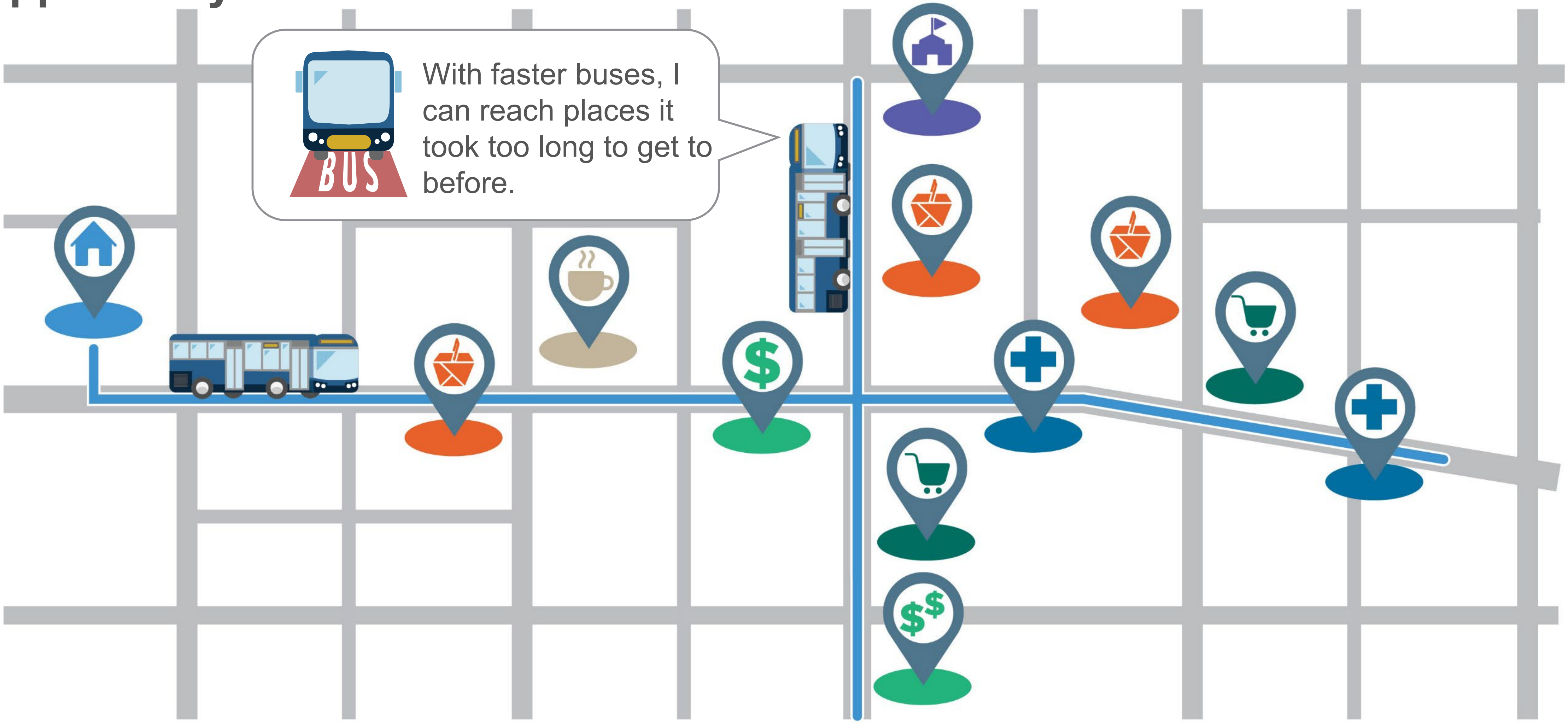
Serve people who need transit the most

Telling the story: reliability and reduced travel times brings more opportunity to those who need it

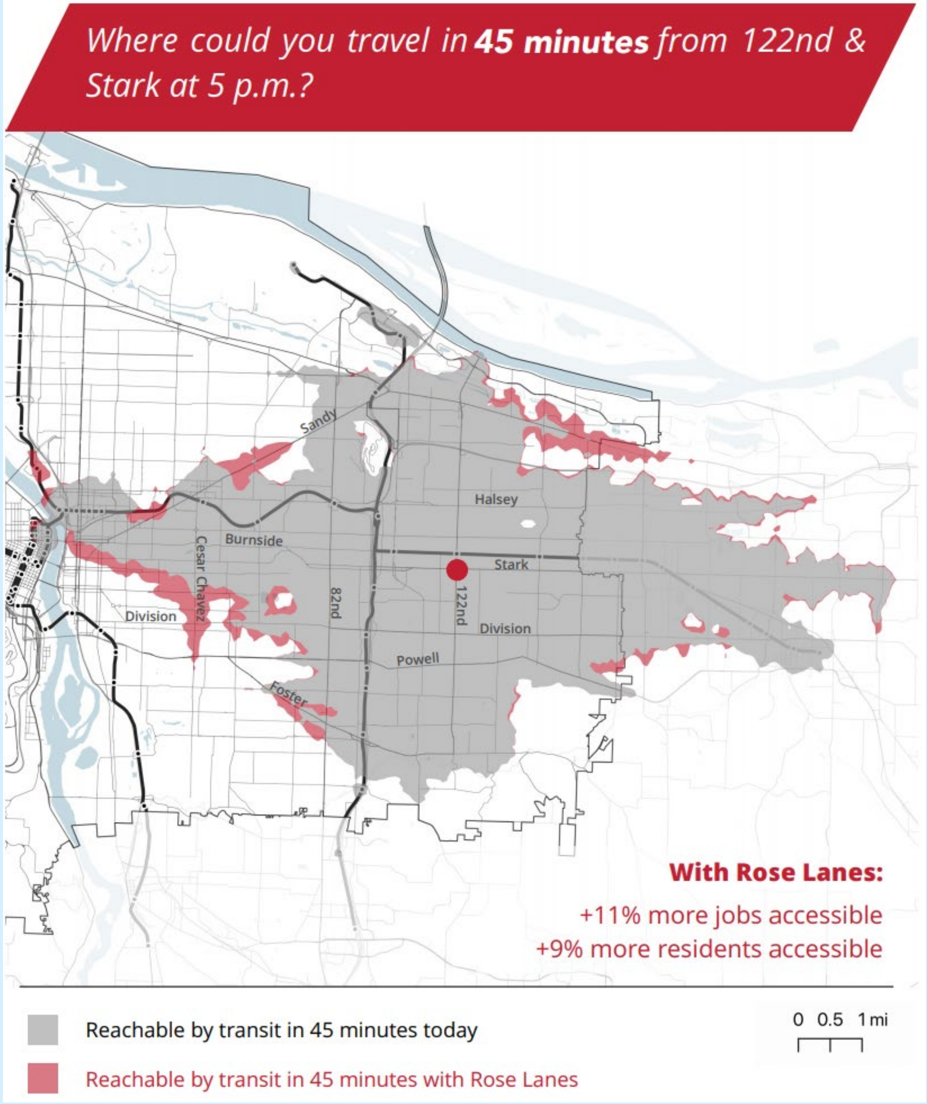


Case Study

Serve people who need transit the most

Communicating Equity Impacts – Portland, OR

- Transit priority projects were identified on delayed corridors throughout the city.
- Travel time savings associated with these treatments were estimated. Run times were adjusted accordingly into a city-wide GTFS model.
- Visualizations show how much farther (in red) a person can get by transit in 45 minutes with the transit priority projects from a location with high needs.
- Full report: https://www.portland.gov/sites/default/files/2020-06/rose-lane-plan-final-2.13.2020-low-res.pdf



Source: Portland - Rose Lane Project

5. PEOPLE THROUGHPUT

Move more people

Defining the metric

People throughput is the amount of people that can move through an intersection or along a corridor. It measures people rather than vehicles.

Because transit can carry more people per square foot than personal vehicles can, a greater volume of people can be accommodated in a transit lane than in a general-purpose lane.

How do you measure it?

- The amount of people that can be carried by transit is based on the on-board load and frequency.
- The transit throughput should be compared to the vehicle throughput to gauge percent of people that pass through the corridor on transit.

5. PEOPLE THROUGHPUT

Move more people

Analyzing the data: calculate passenger throughput

Calculating throughput is specific to each corridor, as the variables that determine throughput are location-dependent. The formulas below are the ways to calculate throughput for each lane.

Roadway throughput (people per hour)

Lane type	Formula
General purpose lane	Vehicles per hour × passengers per vehicle
General purpose lane with bus in mixed traffic	(Vehicles per hour × passengers per vehicle) + (Buses per hour × passengers per bus)
Bus lane	Buses per hour × passengers per bus

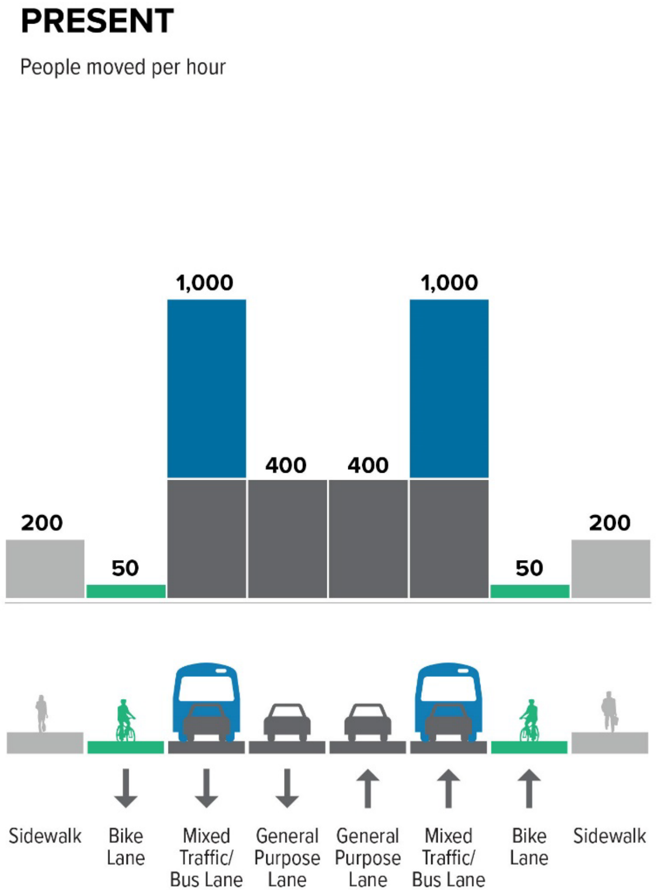
A sample spreadsheet to calculate people throughput is provided here: Passenger throughput.xlsx

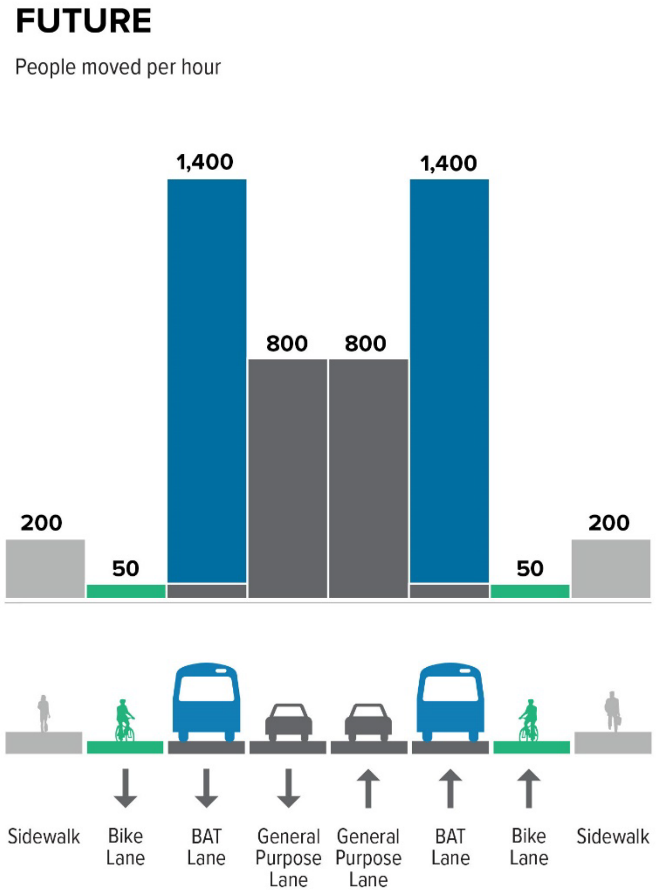
5. PEOPLE THROUGHPUT

Move more people

Telling the story: increase roadway capacity through mode shift

Example Throughput for BAT Lane





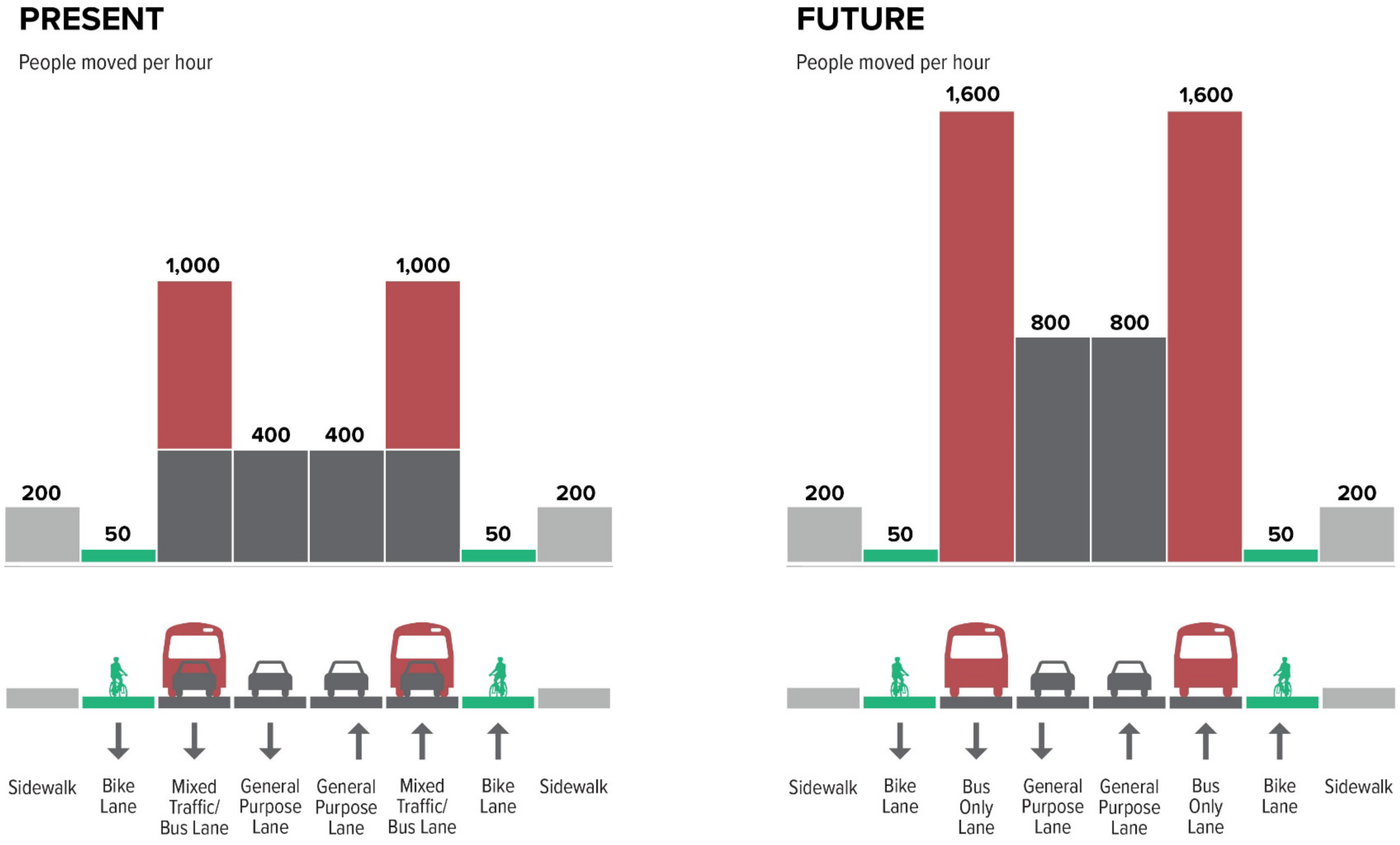
Note: Numbers shown are for illustrative purposes

5. PEOPLE THROUGHPUT

Move more people

Telling the story: increase roadway capacity through mode shift

Example Throughput for Bus Only Lane

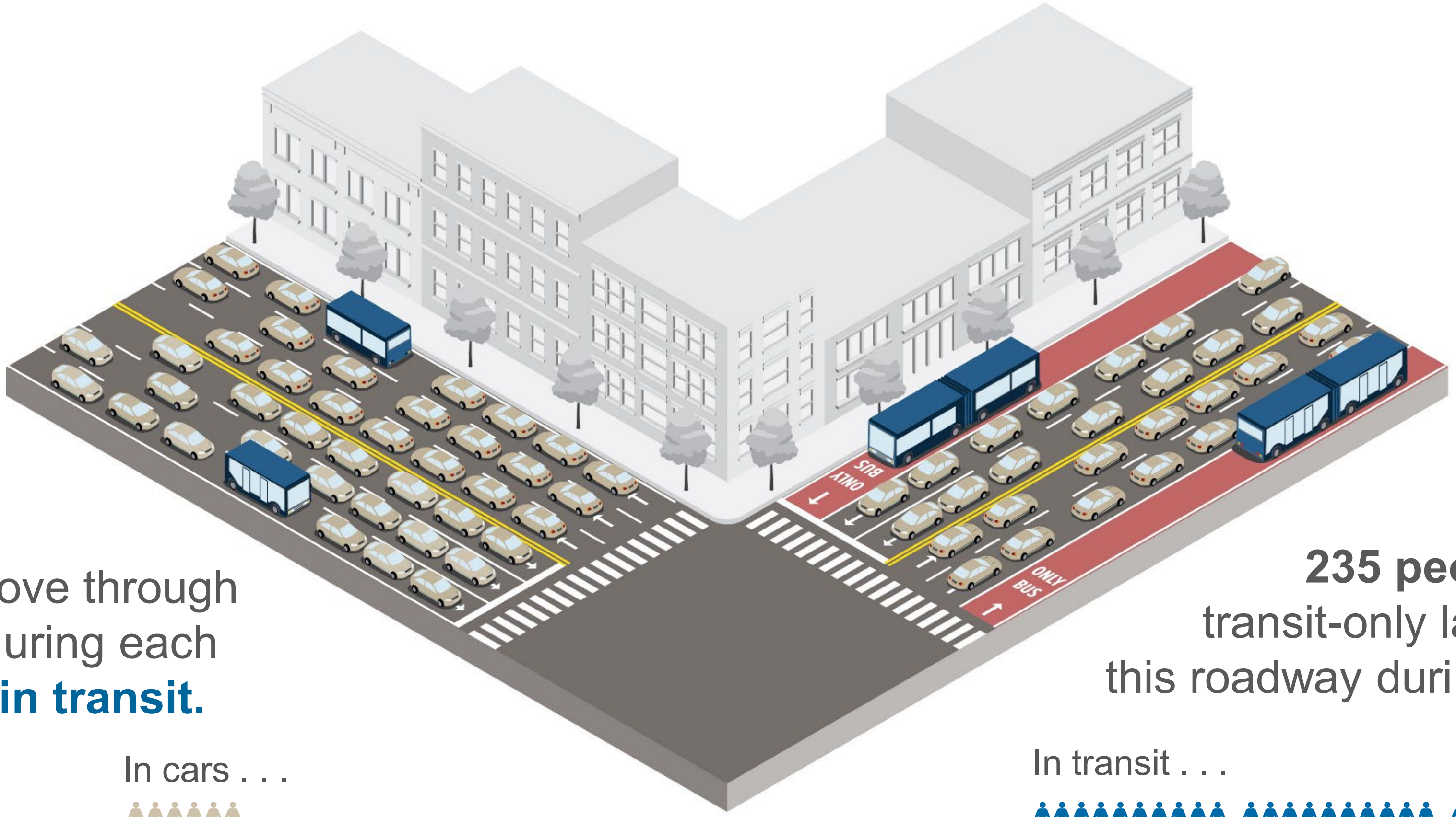


Note: Numbers shown are for illustrative purposes

5. PASSENGER THROUGHPUT

Move more people

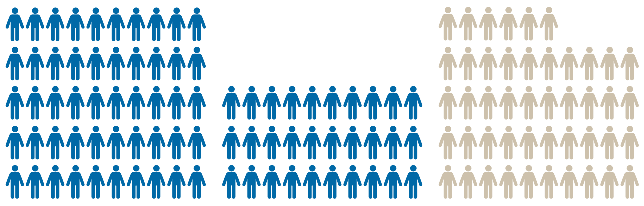
Telling the story: use limited space more efficiently



126 people move through this roadway during each light cycle. **80 in transit.**

In transit . . .

In cars . . .



235 people on a road with transit-only lanes move through this roadway during each light cycle. **204 in transit.**

In cars . . .

In transit . . .

6. CHANGING TRAVEL PATTERNS

Move more people

Defining the metric

When a traffic lane is changed to a different use like a bus lane, cities have found that a certain amount of traffic goes away. Drivers change their travel patterns – taking a different route, traveling at a different time of the day, or switching to the bus. Bus lane projects are evaluated based on traffic impacts. Integrating assumptions about changes to travel patterns into analysis adds a more realistic look at impacts.

Traffic volumes reduced greatly during COVID-19, but cities are finding that while peaks have flattened, there is more traffic during the "off-peak." Transit priority now gets more people on board. Bus lanes guard against future increases in congestion, and ensure trips taken during the traditional off-peak times are quick and efficient.

How do you measure it?

- Compare the traffic volumes before and after a project is implemented. If traffic volumes decreased after implementation, the volume reduction means peoples' travel patterns changed.
- Look at increases in midday or early afternoon traffic volumes to understand how delay to transit riders may have increased during COVID.

Case Study

Move more people

Traffic Reduction – Boston

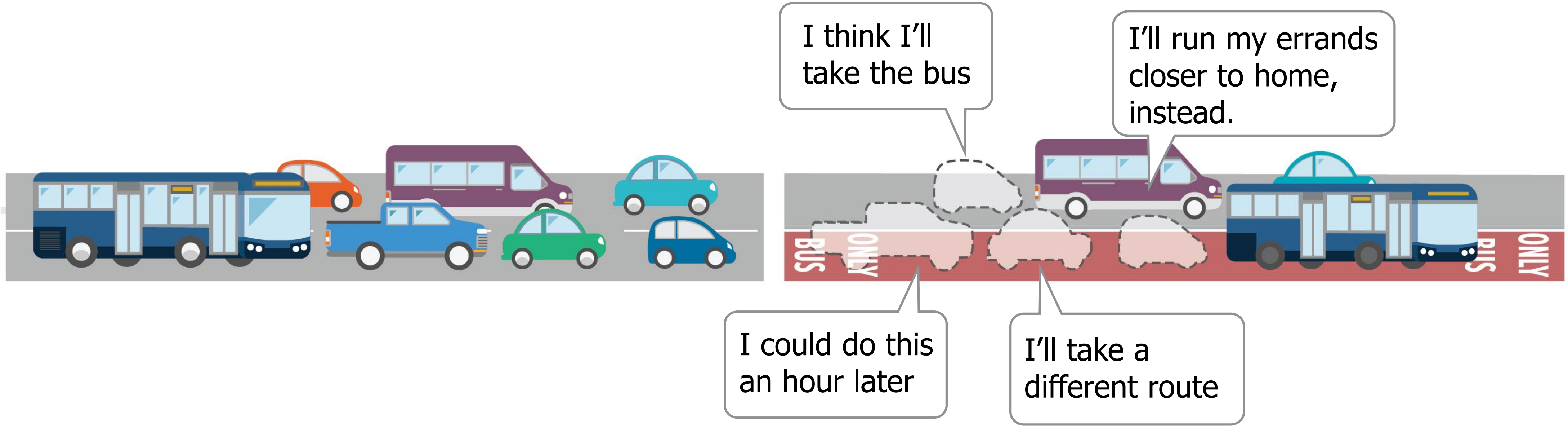
- Brighton Avenue in Allston, MA was a high-ridership corridor with 14,000 daily riders.
- This corridor was selected for transit priority given delay, ridership levels, and community support.
- The MBTA implemented bus-bike lanes in 2019; these can also be used by school buses.
- The agency found some of the traffic reduced after implementation. General traffic declined by 13% (note that side street impacts were not quantified). There was also an 8-9% increase in bus ridership.
- These outcomes helped the agency create new assumptions for traffic modeling on other corridors. Instead of assuming existing traffic levels remain the same post-project, the city and MBTA assumes some traffic may evaporate. Traffic volume assumptions of 80% / 90% / 100% are being used to create traffic scenarios to present to the public and leadership.

Source: Livable Streets

6. CHANGING TRAVEL PATTERNS

Move more people

Telling the story: when a traffic lane is converted to a new use, travel patterns change.



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- NACTO (National Association of City Transportation Officials)
- City of Portland Bureau of Transportation (PBOT)
- TriMet
- District Department of Transportation (DDOT)
- Washington Metropolitan Area Transportation Authority (WMATA)
- Metropolitan Atlanta Rapid Transit Authority (MARTA)
- City of Atlanta
- Los Angeles Department of Transportation (LADOT)
- Los Angeles County Metropolitan Transportation Authority (LA Metro)
- City and County of Honolulu

If you have questions about the content in this toolkit, please reach out to:

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ADDITIONAL READING

Practitioners Guide to Measuring Accessibility
State Smart Transportation Initiative (SSTI)
https://ssti.us/2021/01/27/ssti-releases-practitioner-guide-to-measuring-accessibility

Better Bus Studies
New York City DOT
https://www1.nyc.gov/html/brt/html/other/studies.shtml

Rose Lane Project: Implementing Transit Priority Projects in Portland
City of Portland Bureau of Transportation
https://www.portland.gov/sites/default/files/2020-06/rose-lane-plan-final-2.13.2020-low-res.pdf

Transit Street Design Guide
NACTO
https://nacto.org/publication/transit-street-design-guide/
https://nacto.org/tsdg/making-transit-count/

The Path to Partnership: How Cities and Transit Systems Can Stop Worrying and Join Forces
TransitCenter
https://transitcenter.org/wp-content/uploads/2018/05/Collaboration.pdf