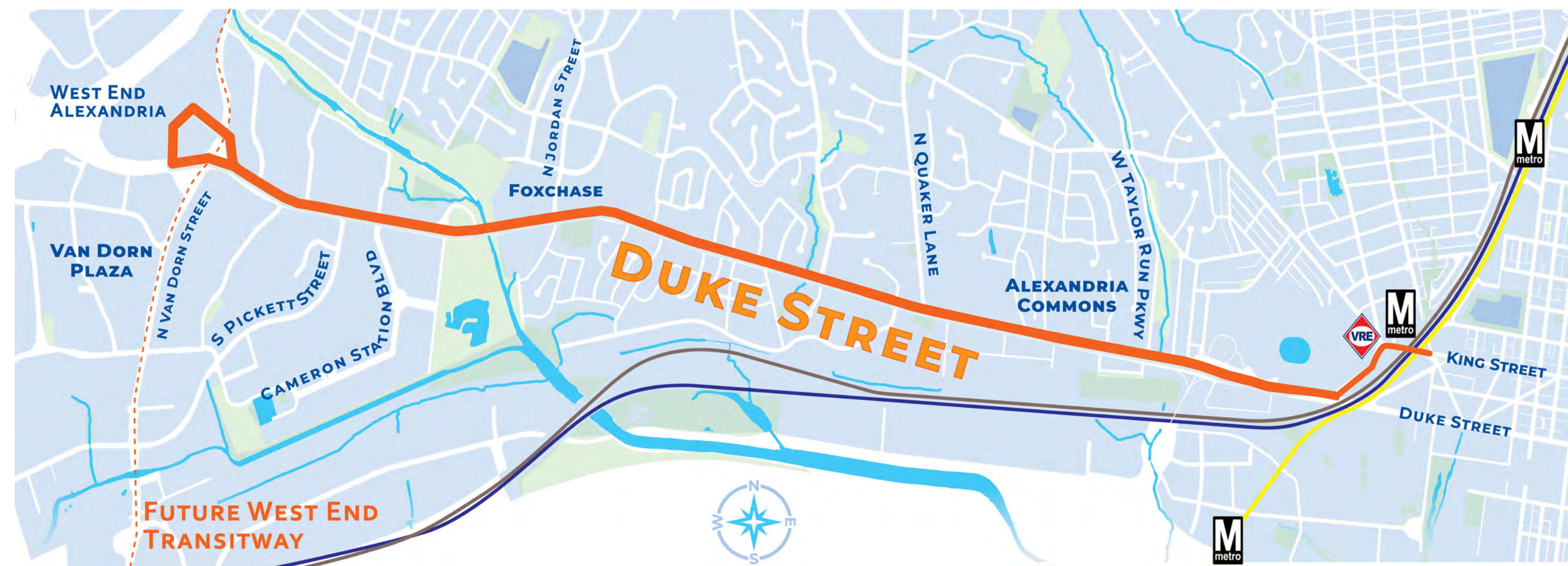
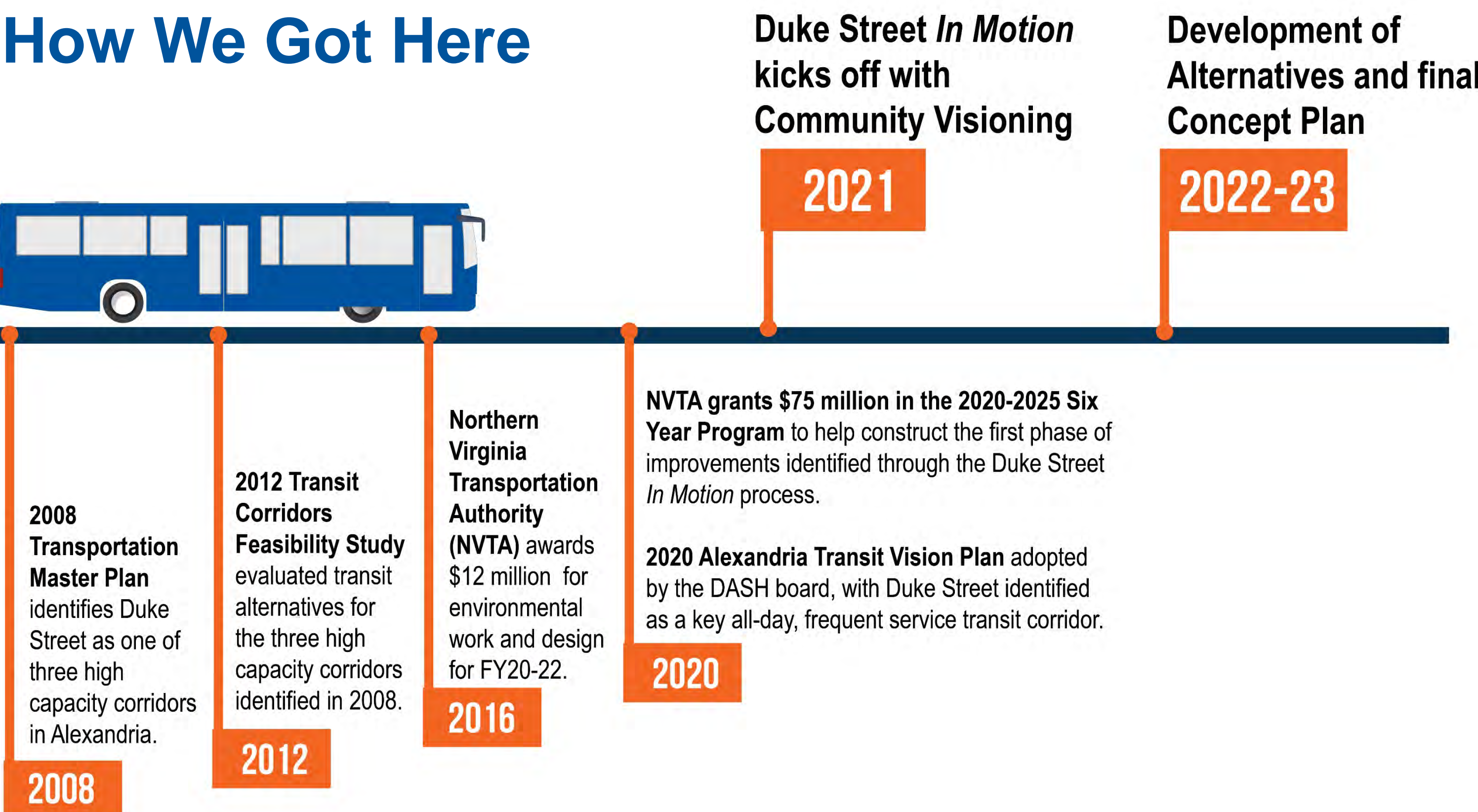


PROJECT OVERVIEW

Duke Street *IN MOTION* is a project focused on ensuring that transit improvements in the Duke Street corridor, from Landmark Mall to the King Street Metro Station, provide efficient transportation options that align with all users' needs, wants, and expectations.



How We Got Here



ROLE OF THE ADVISORY GROUP

The **Advisory Group (AG)** includes representatives of various City Commissions, the Federation of Civic Associations, small business, and development communities, in addition to at-large community representatives. As representatives of the community, the AG is asked to:

- Relay Information**
 - » Provide information to groups and neighborhoods
 - » Build awareness and solicit feedback
- Provide Feedback**
 - » Bring forward opinions and experiences of the groups they represent

PROCESS TO DEVELOP PREFERRED DESIGN



- November: **we will present public input to the Advisory Group**
- The Advisory Group will help decide which concepts to advance for more analysis and refinement.
- The Advisory Group will ultimately be **making a recommendation on a preferred alternative to Council**, after this round of community input.

Phase 1: Summer 2021

Public engagement resulted in the Vision & Guiding Principles

VISION

- This project will provide an **efficient and desirable bus rapid transit (BRT) option** along Duke Street **by improving the transit experience** for current and potential riders.
- With **multimodal enhancements** to the corridor, Duke Street will become a **safe, efficient, and desirable community connector** for people riding the bus, walking, biking, and driving.

GUIDING PRINCIPLES



Convenient: Make bus travel more predictable, frequent, and comfortable



Efficient: Improve mobility for all Duke Street travelers



Equitable: Use enhanced bus transit to support equitable access for a diversity of people and places



Safe: Ensure safety and accessibility for those connecting to and riding the bus, as well as other travelers



Vibrant: Create and enhance thriving and future corridor destinations that improve resident quality of life and boost the local economy



Sustainable: Contribute positively to the environment, now and in the future

Phase 2: Fall 2022

In fall 2022, we heard community feedback that contributed to our analysis of several draft concepts for each corridor segment.

Recorded Webinar



15-minute recorded presentation	450+ views
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Feedback Form



Series of questions, available on website and at events	1228 unique responses
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Focus Groups



Feedback from bus riders, business owners, and teenagers	4 meetings, ~28 participants
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Pop-up Events



Shared multilingual information throughout the corridor	9 events, >800 people reached
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Public Meetings



Four formal meetings for the public to engage	4 meetings, 195 signed in
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Examples of What We Heard

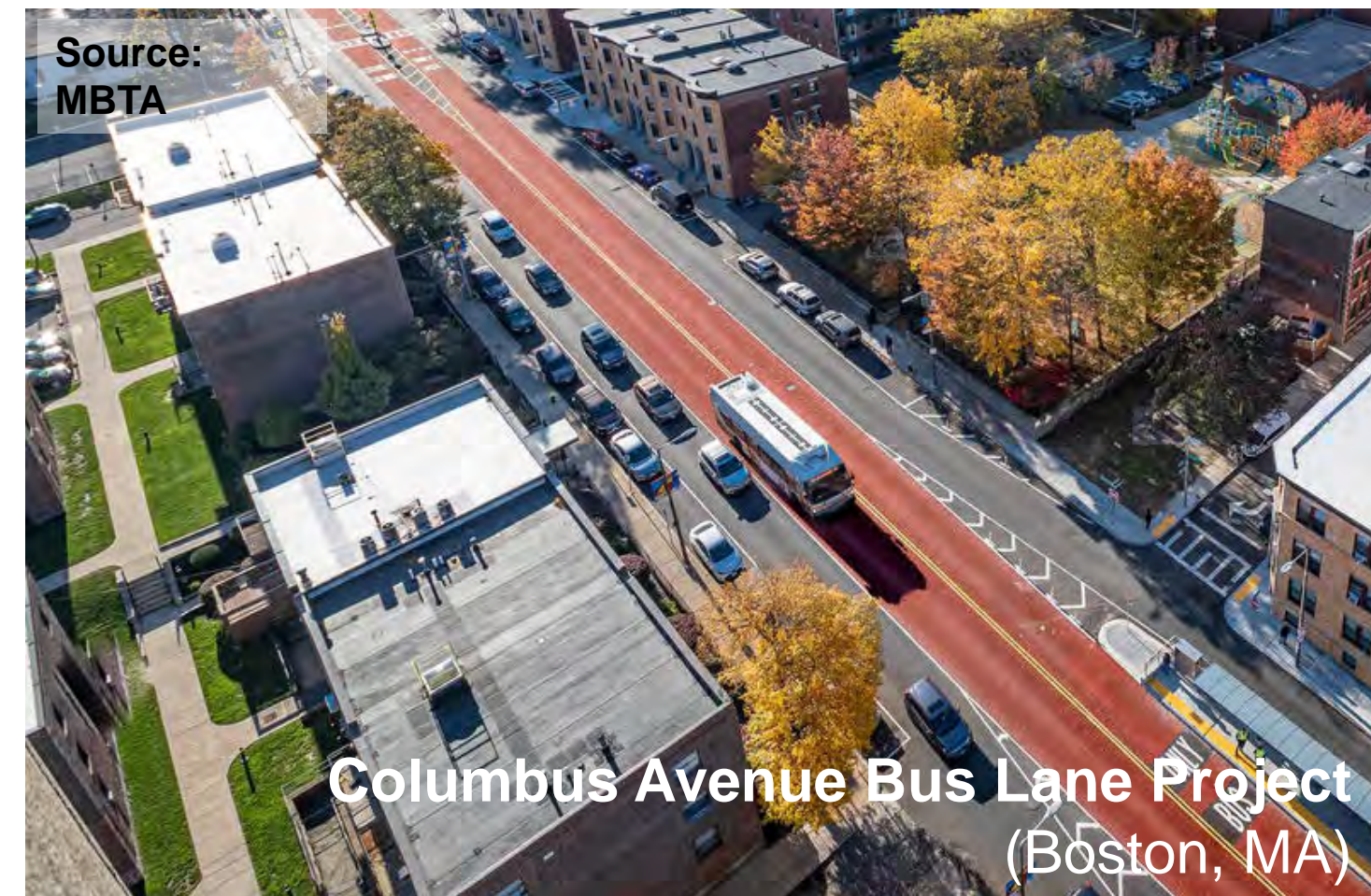
A slight majority of feedback form responses (53%) **did not think improved bus service warranted a few extra minutes of travel time**, but 69% of pop-up poll respondents **said it's important to improve bus service** even if that means it takes slightly longer by car.

Of the 63% of survey respondents who said they use service roads to access their home, 44% were **willing or potentially willing to support changes to the service road to support a safer, greener, and more transit-friendly Duke Street**, as long as the redesign could provide access and parking.

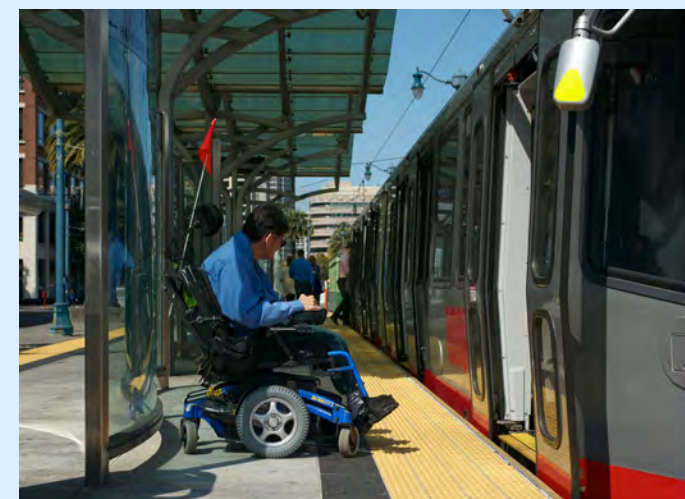
BRT OVERVIEW

BRT is a bus service that operates more like rail:

- » Faster, more reliable, and more comfortable



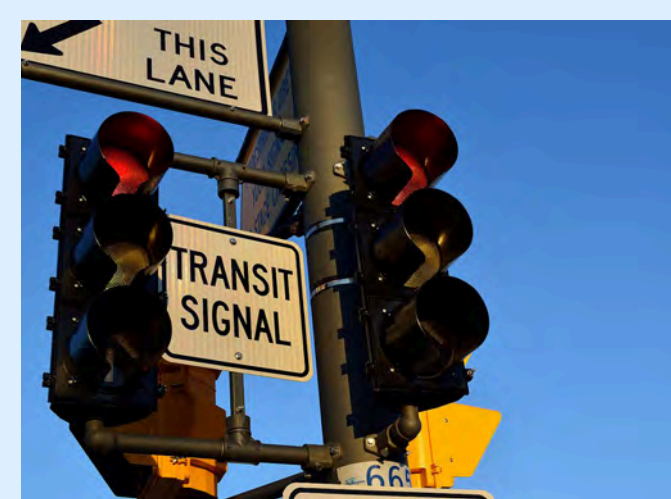
BRT MAY INCLUDE...



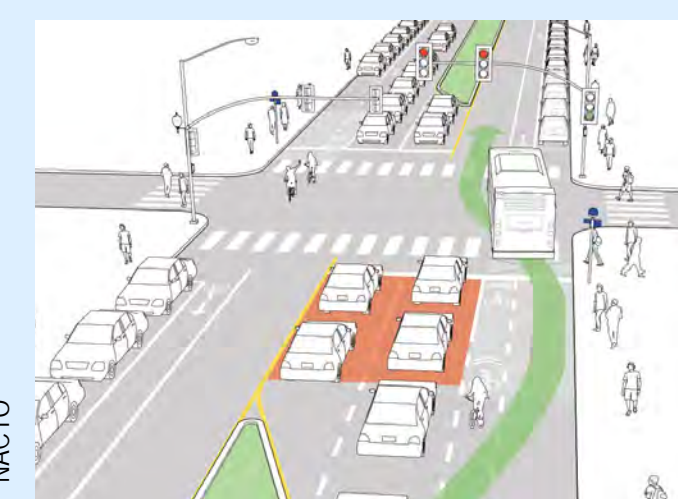
Less waiting at stops



Better bus stops and station amenities



More green lights



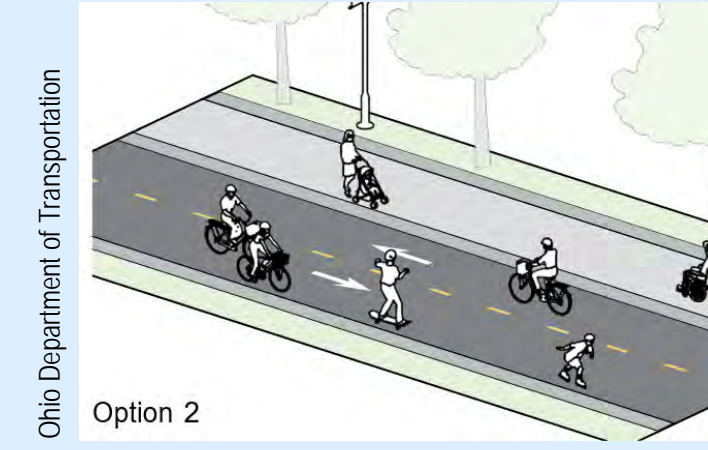
Queue jump lanes



Curb bus lanes

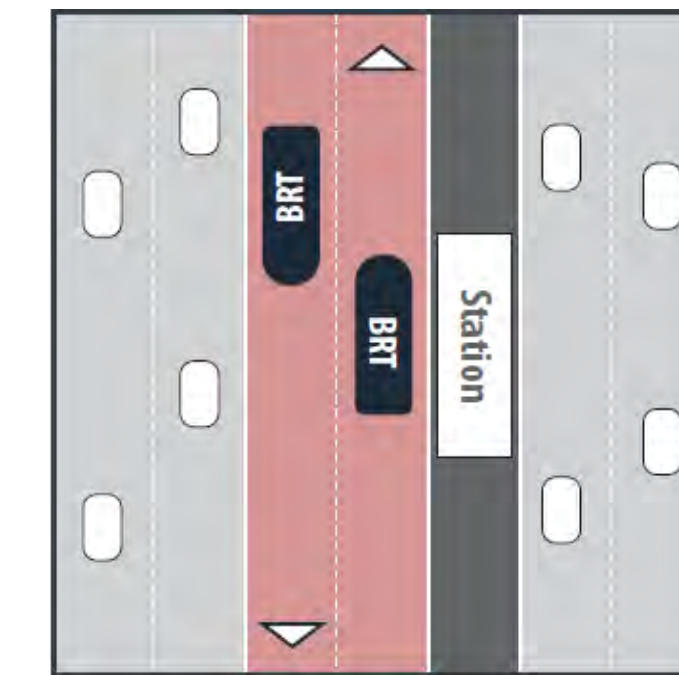


Center bus lanes



Safer ped/bike options

BRT BUSWAY OPTIONS

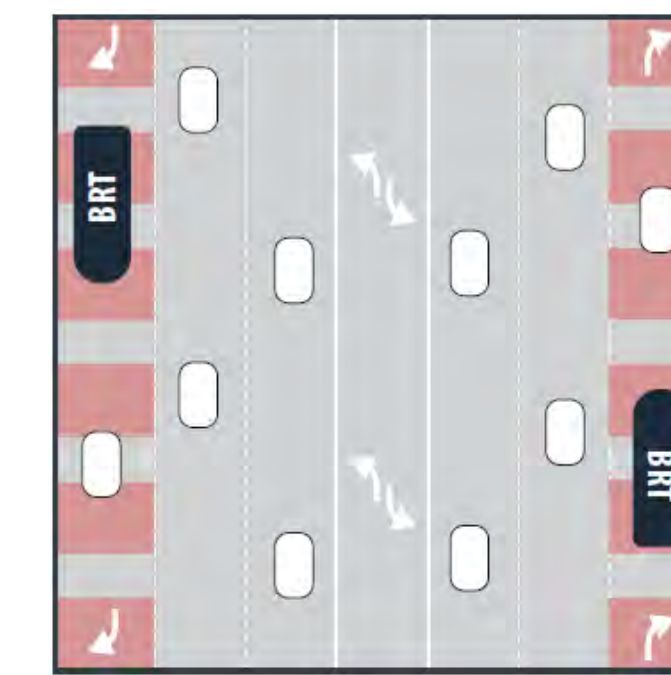


Center Running

- Bus lanes in the middle of the roadway

- Fastest
- Most reliable
- Greatly reduces bus/vehicle conflict

- Needs most space
- Left turn restrictions



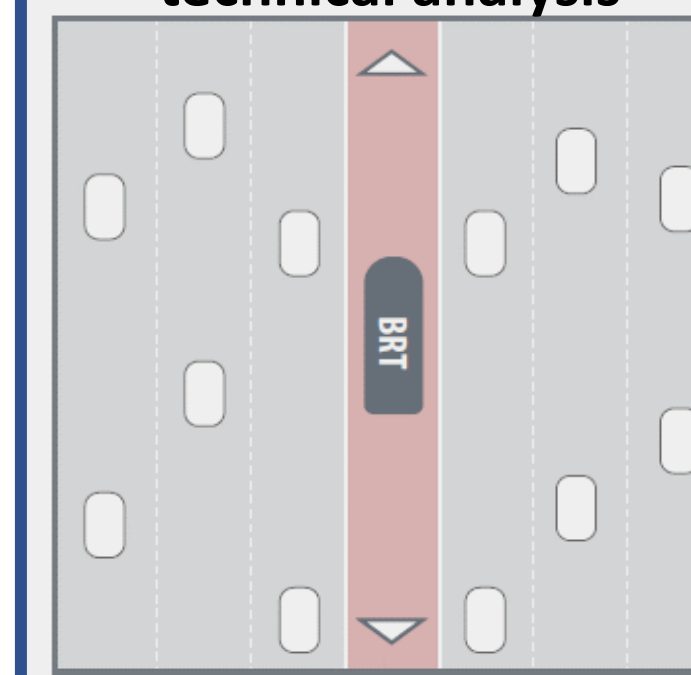
Curb Running Bus and Turn Lane

- Bus lanes along curb
- Conflicts with cars turning right

- Faster
- More reliable
- No new left turn restrictions

- Conflicts and delays from right-turning vehicles
- Needs some space

Removed from consideration based on technical analysis

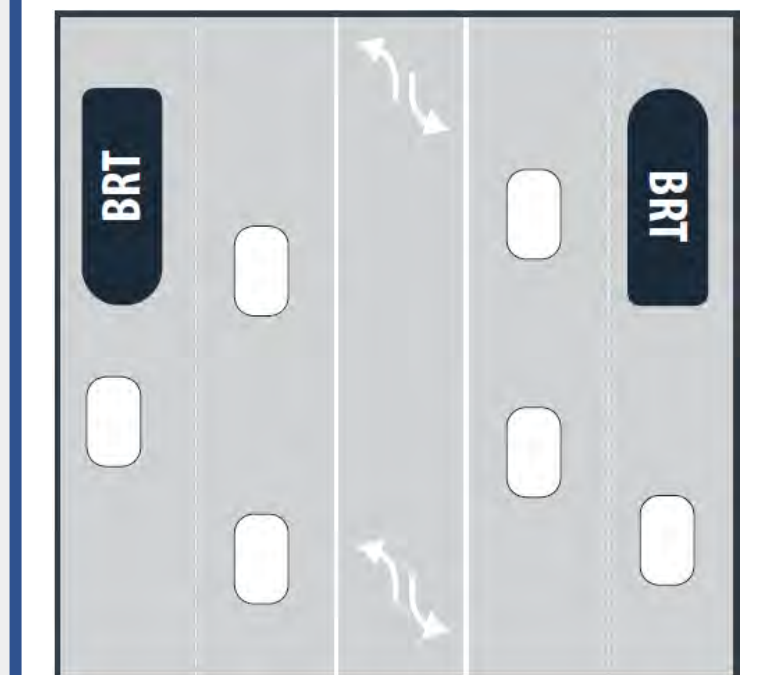


Bidirectional Bus-only Lane

- 1 bus lane in middle for both directions
- "Hold points" to allow for buses to pass each other

- Faster
- More reliable
- Greatly reduces bus/vehicle conflict
- Less space than center running

- Needs some space
- Not as fast as center running
- Operational challenges



Mixed Traffic

- Buses in mixed traffic (mostly like today)

- Can include spot improvements
- Minimal space required

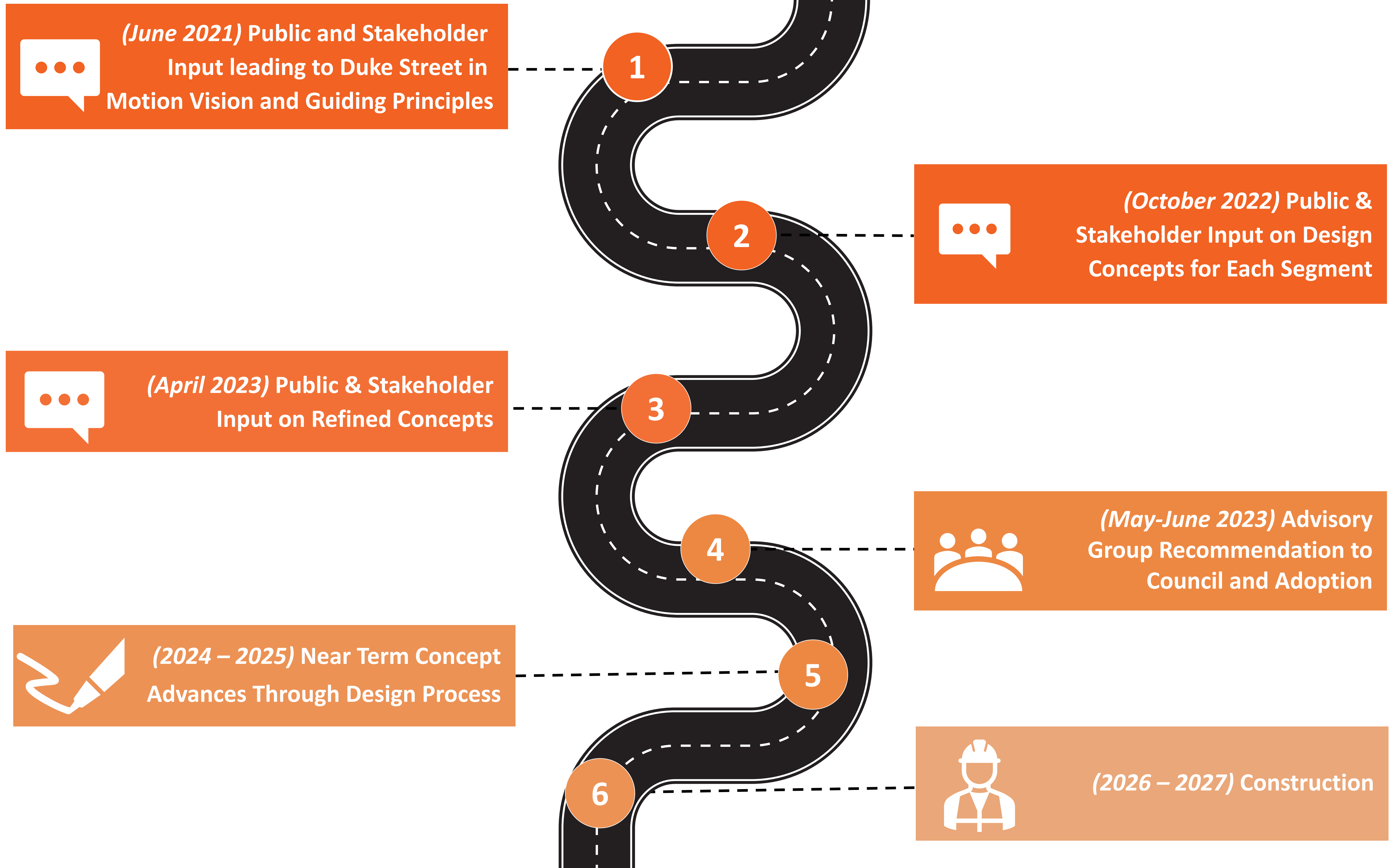
- Most of the same speed and reliability issues as today

Description

Benefits

Tradeoffs





CORRIDOR CONCEPT A

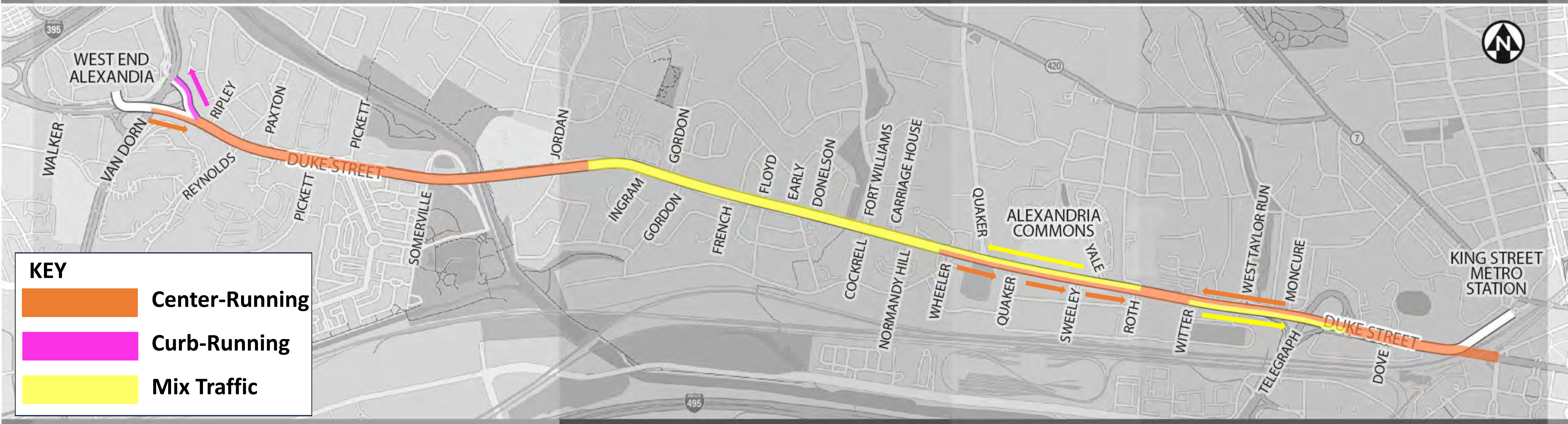
Mostly Center-Running & Mixed Traffic

SEGMENT 1 - West End Alexandria to Jordan

SEGMENT 2A – Jordan to Wheeler

SEGMENT 2B
Wheeler to Roth

SEGMENT 3 - Roth to King St Metro Station



Segment 1:

- Center bus lanes in both directions
- Utilize available roadway space for busway improvements

Segment 2A:

- Mixed traffic bus operations in both directions
- Avoid residential service roads with busway improvements

Segment 2B:

- Eastbound center bus lane, westbound mixed traffic
- Goal was to avoid Telegraph Road congestion

Segment 3:

- Eastbound mixed traffic through Telegraph Road to balance traffic and bus operations
- Westbound center bus lane

CORRIDOR CONCEPT B

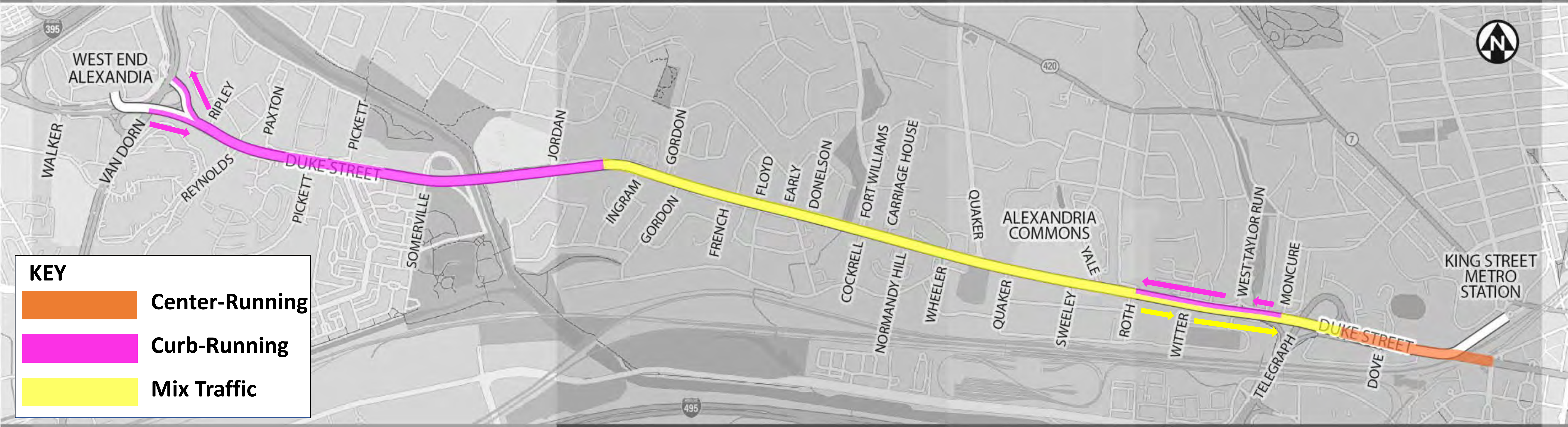
Mostly Curb-Running & Mixed Traffic

SEGMENT 1 - West End Alexandria to Jordan

SEGMENT 2A – Jordan to Wheeler

SEGMENT 2B
Wheeler to Roth

SEGMENT 3 - Roth to King St Metro Station



Segment 1:

- Curb bus lanes in both directions
- Utilize available roadway space for busway improvements

Segment 2A:

- Mixed traffic bus operations in both directions

Segment 2B:

- Mixed traffic bus operations in both directions
- Avoid significant impacts at Alexandria Commons

Segment 3:

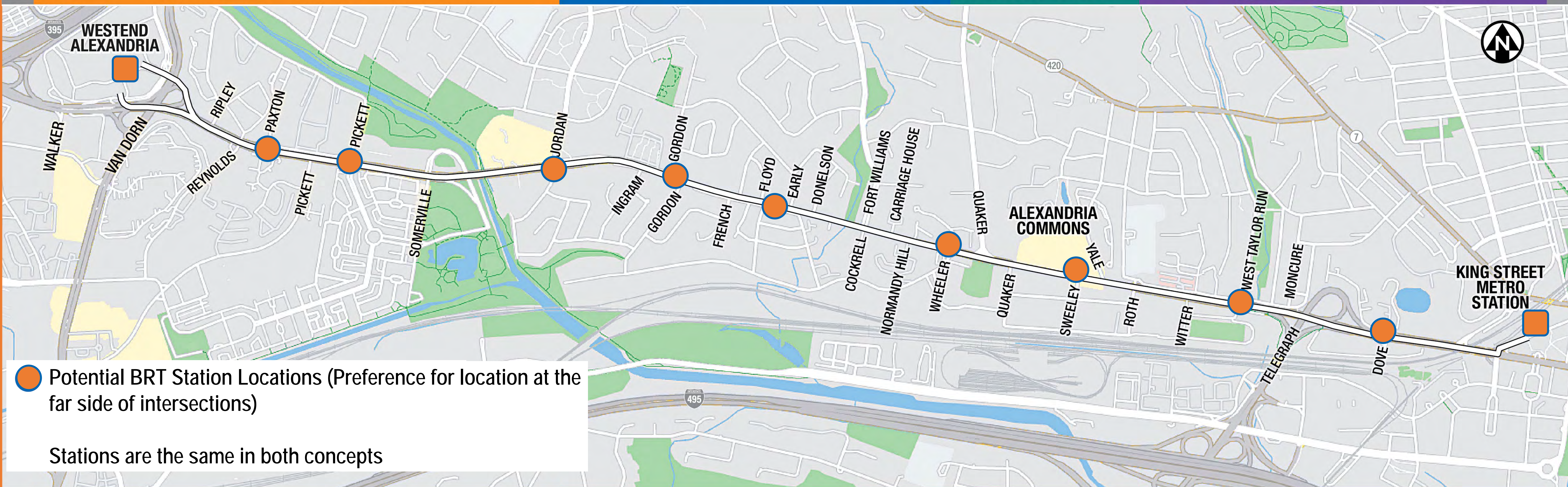
- Eastbound mixed traffic, westbound curb lane through Telegraph Road interchange
- Center bus lanes east of Telegraph to King Street

SEGMENT 1 - Landmark Mall to Jordan

SEGMENT 2A – Jordan to Wheeler

**SEGMENT 2B
Wheeler to Roth**

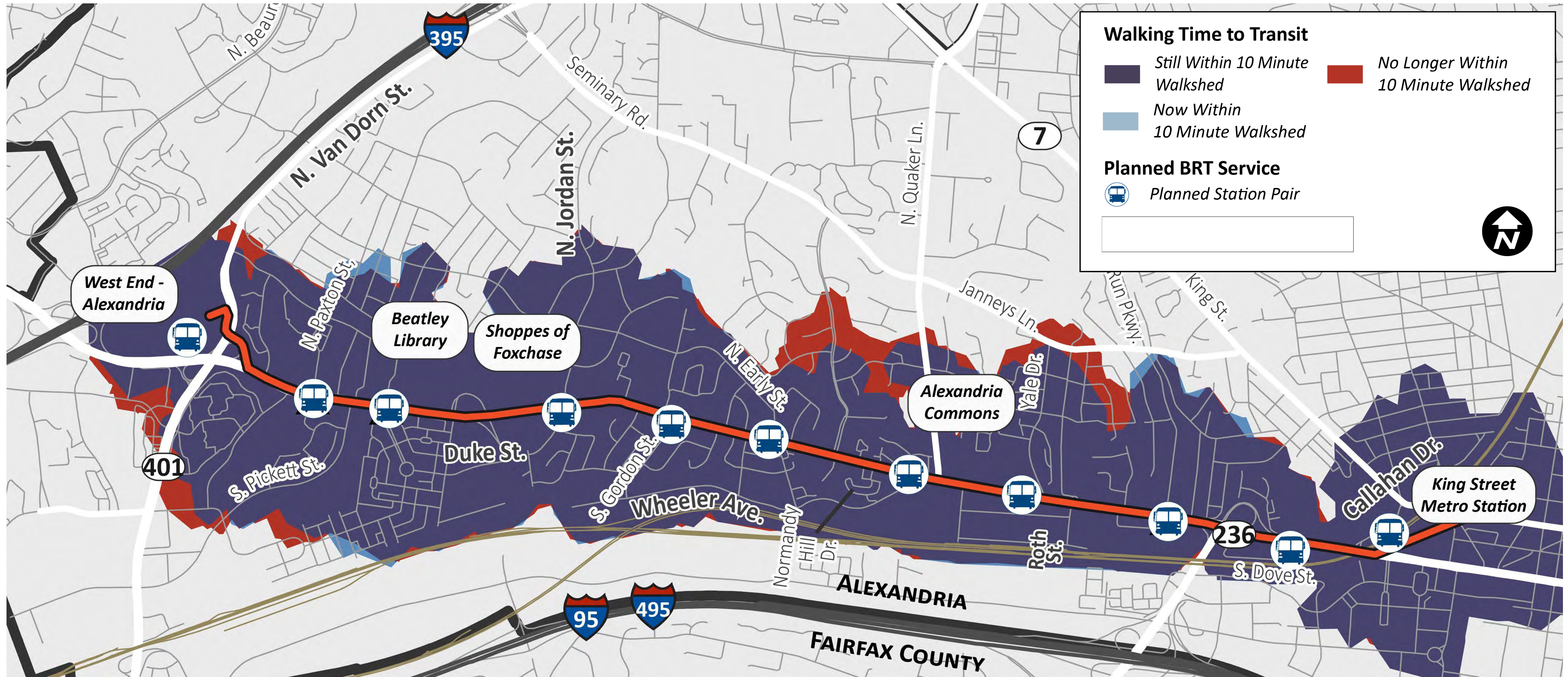
SEGMENT 3 - Roth to King St Metro Station



- **Proposed station locations balance:**
 - Space constraints
 - Proximity to activity centers
 - Convenient bus stop spacing

- **Station spacing distance:**
 - Maximum spacing 0.5 miles
 - Minimum spacing 0.25 miles
 - Average spacing 0.4 miles

- **0.4 mile average station spacing means a maximum 4 minute walk to a stop if you are already on Duke Street, walking at an average speed (~2.4 MPH)**



Maintaining Walkability to Stations

- The map shows the 10-minute walkshed for existing bus stops (dark purple and red) and for proposed BRT stations (dark purple and light blue).
- The proposed BRT stations maintain a similar coverage for walking access.

CURB CONCEPT Y

Proposed East – West Curb Features (North Side of Duke Street)

SEGMENT 1 - West End Alexandria to Jordan




SEGMENT 2A – Jordan to Wheeler

SEGMENT 2B
Wheeler to Roth

SEGMENT 3 - Roth to King St Metro Station



KEY

-  Shared Use Path
-  Cycle Track + Sidewalk
-  Potential Woonerf (shared street) Location on Service Road

Shared Use Path



Two-Way Cycle Track



Woonerf (Shared Street)



CURB CONCEPT Z

Proposed East – West Curb Features (North Side of Duke Street)

SEGMENT 1 - West End Alexandria to Jordan




SEGMENT 2A – Jordan to Wheeler

SEGMENT 2B
Wheeler to Roth

SEGMENT 3 - Roth to King St Metro Station



KEY

-  Shared Use Path
-  Cycle Track + Sidewalk
-  Potential Woonerf (shared street) Location on Service Road

Shared Use Path



Two-Way Cycle Track



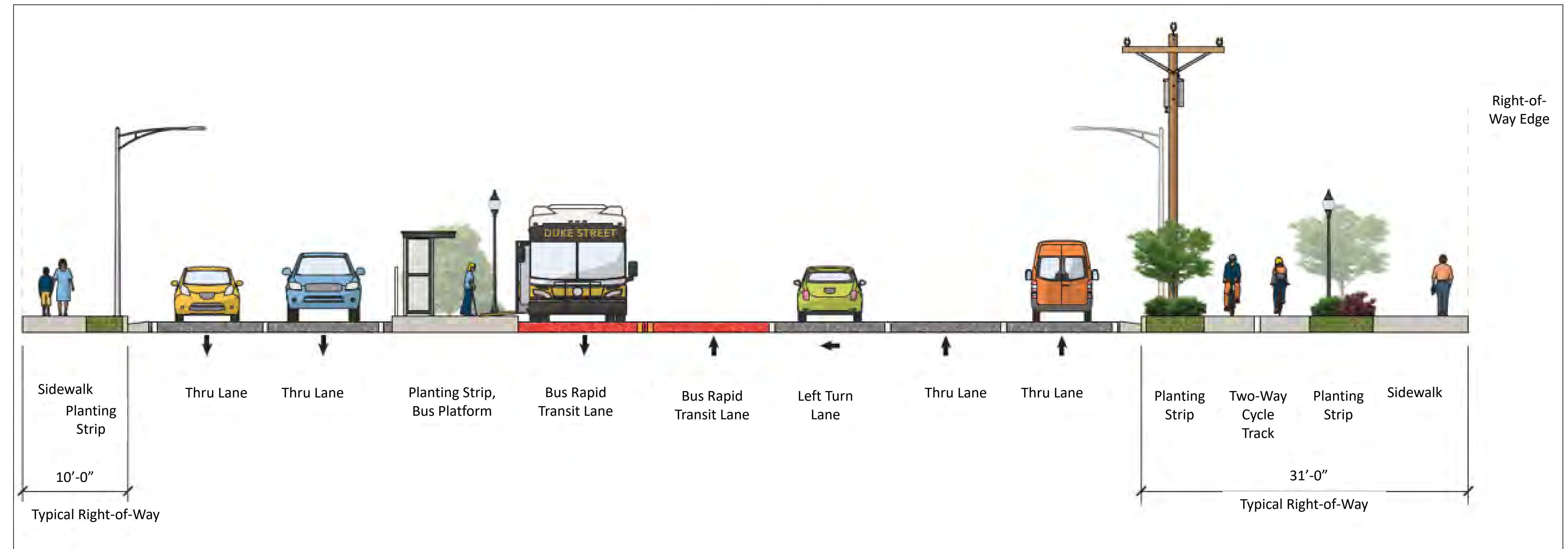
Woonerf (Shared Street)



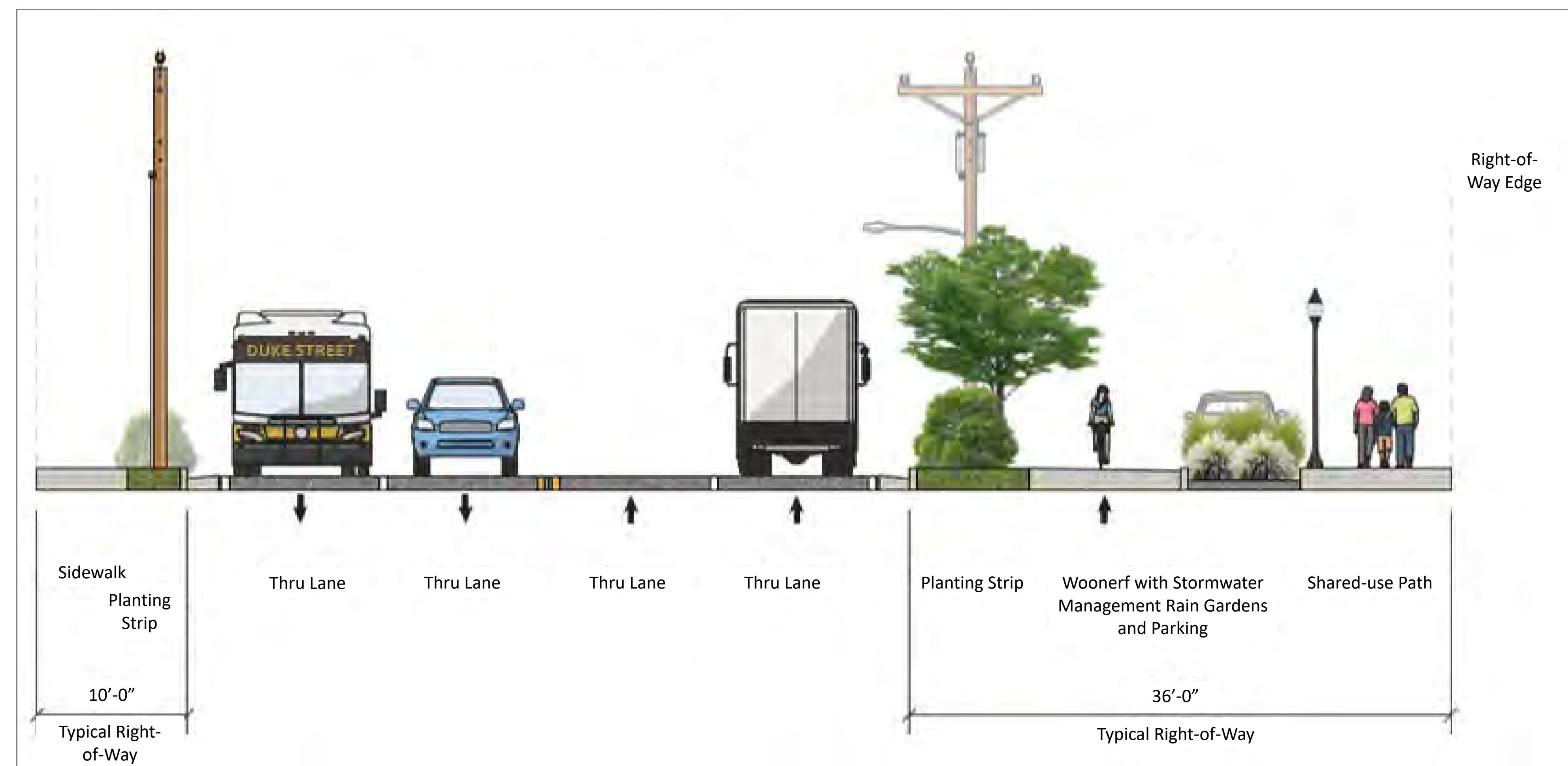
SAMPLE CROSS SECTIONS

These graphics do not represent all possible designs in all segments. They are simply meant to provide an overview of how the Corridor and Curb Concepts may be paired.

Corridor Concept A, Curb Concept Y (Paxton to Pickett, looking West)

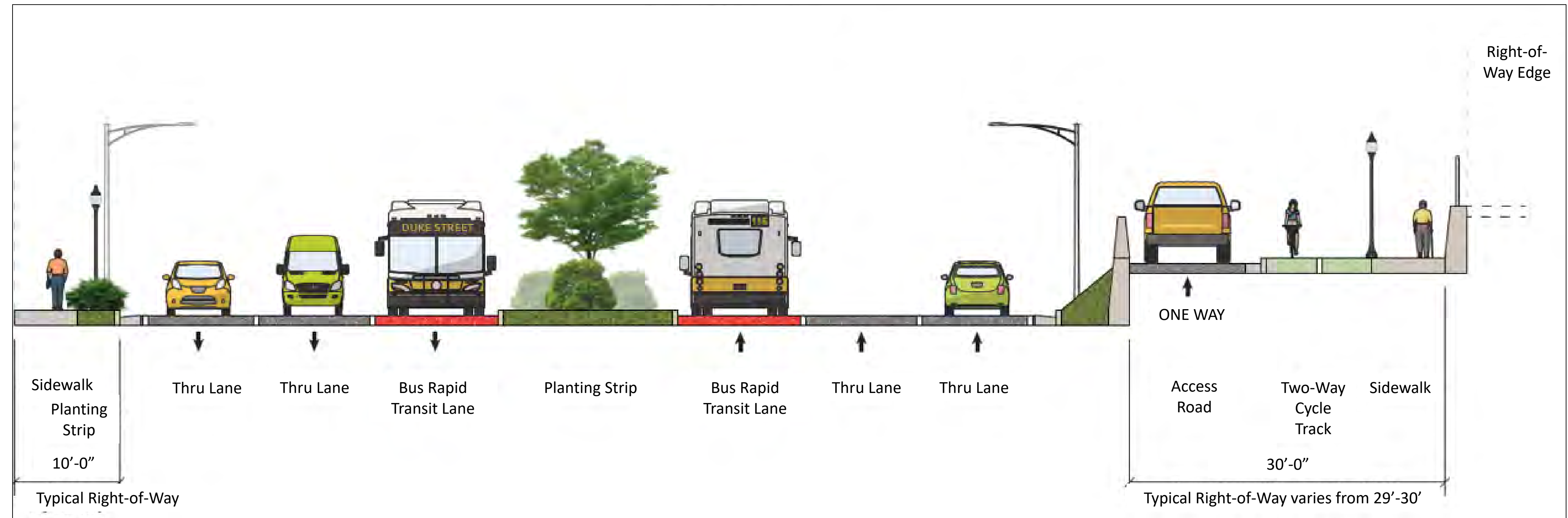


Corridor Concept A/B, Curb Concept Y/Z (Donelson to Fort Williams, looking West)

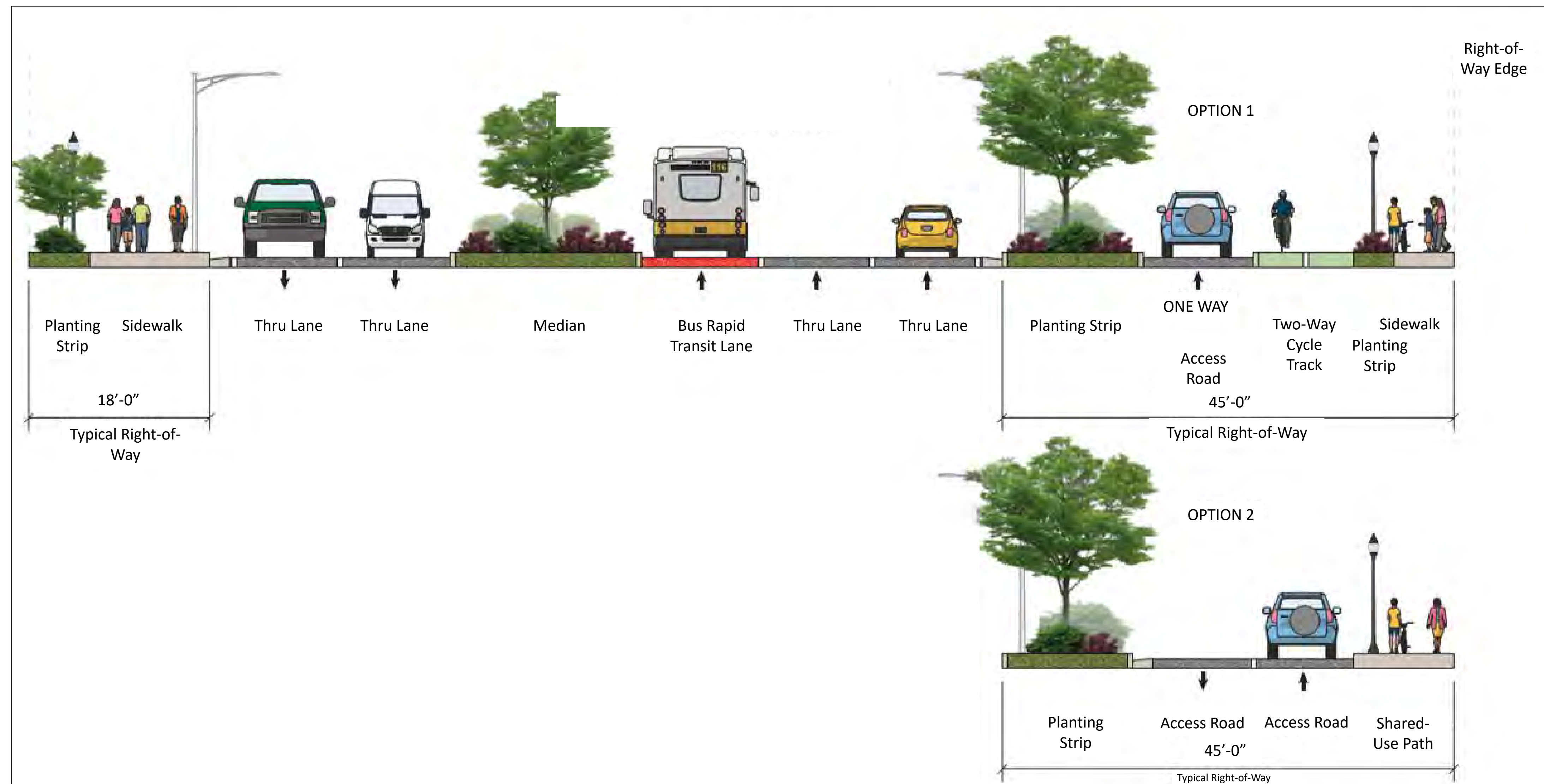


These graphics do not represent all possible designs in all segments. They are simply meant to provide an overview of how the Corridor and Curb Concepts may be paired.

**Corridor Concept A,
Curb Concept Y/Z**
(Roth to W. Taylor Run, looking West)



**Corridor Concept A,
Curb Concept Y (top)
Curb Concept Z (bottom)**
(W. Taylor Run to Telegraph, looking West)





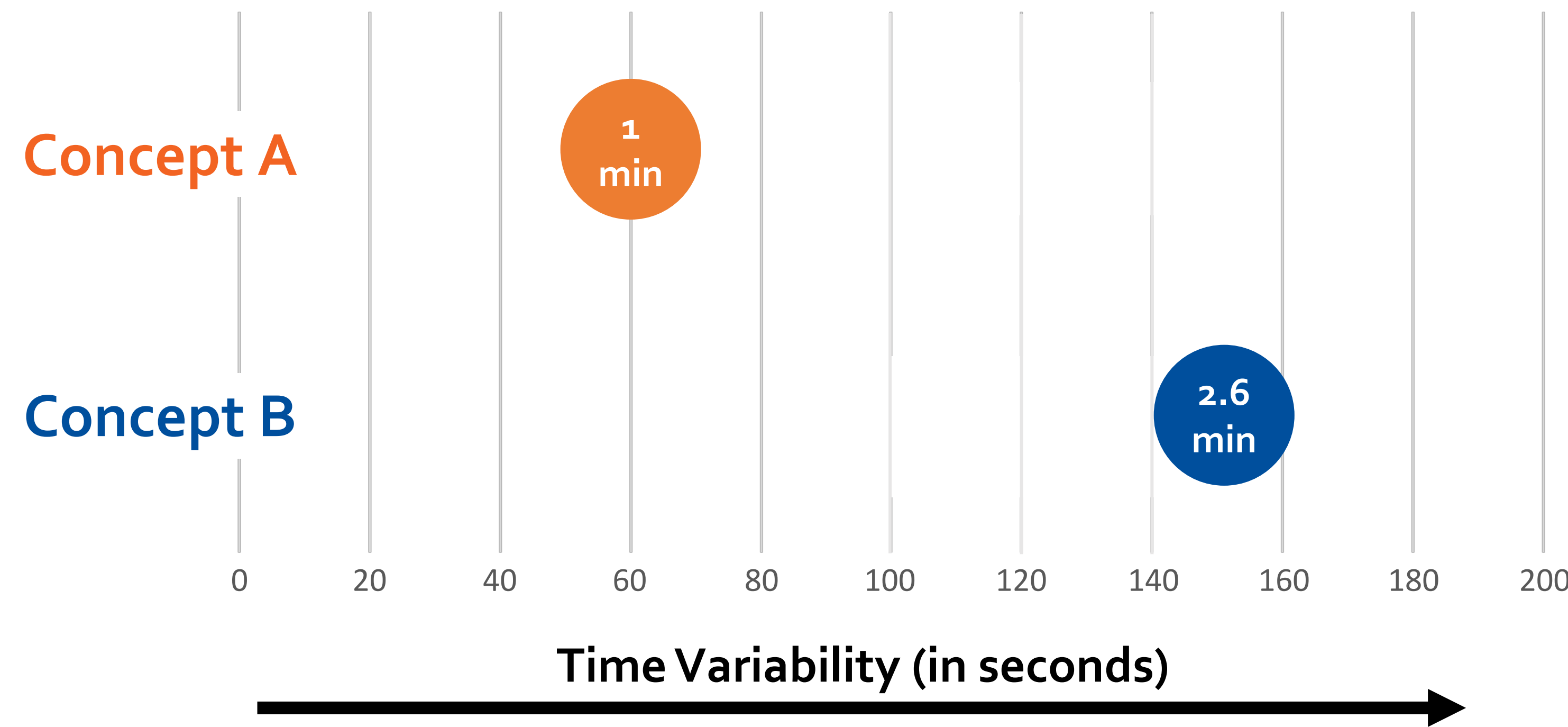
Convenient



Sustainable



PM Peak Bus Travel Time Reliability



Both concepts are highly reliable & provide improvement over “Business As Usual”

Concept A has less bus travel time variability – making it slightly more reliable (*locations with center bus lanes*)

Concept B is more variable (*locations with curb bus lanes/mixed*)



Alternative Modes / Travel Options (Ridership)

Concept A

5,940 riders per day
210% increase*

Concept B

5,770 riders per day
205% increase*

Both concepts increase ridership significantly
–Increase is primarily driven by faster, more reliable bus service

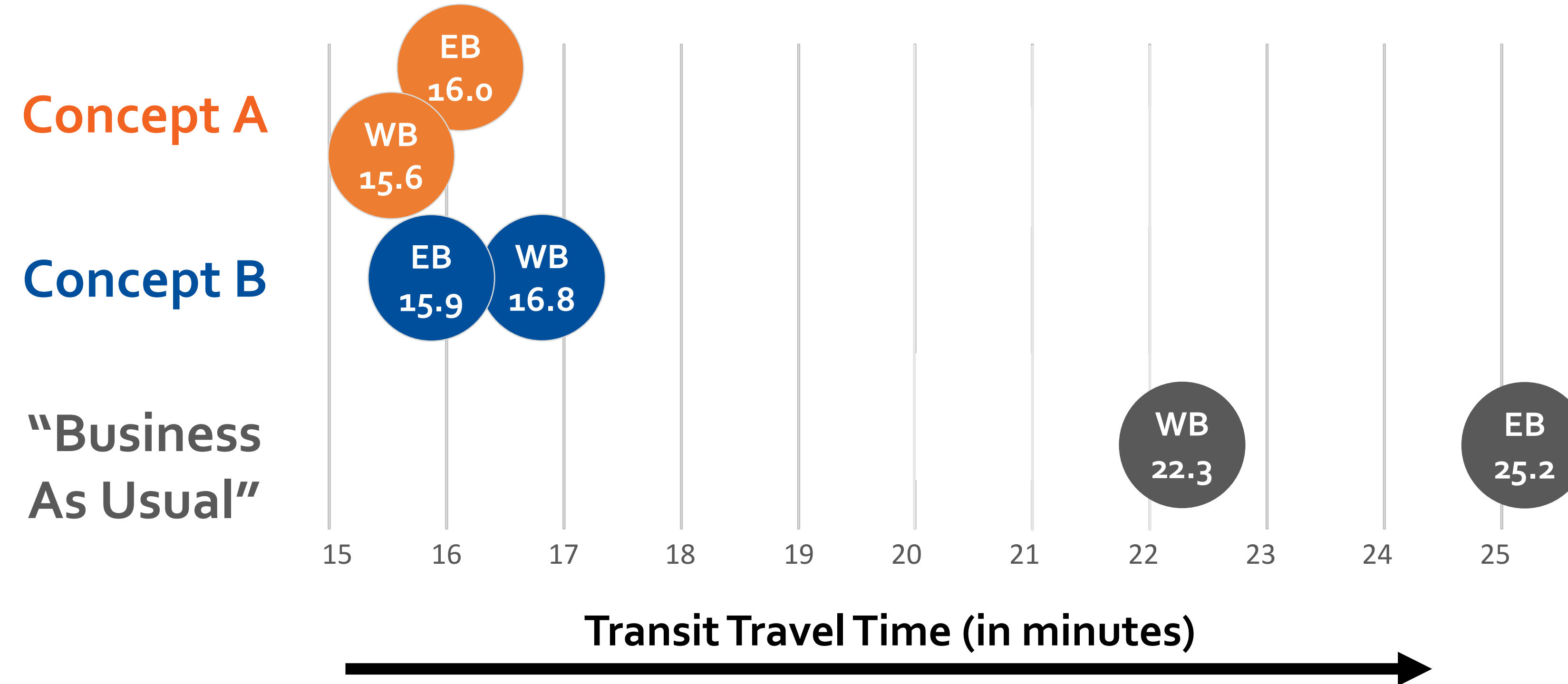
Zero-car household ridership more than doubles for both concepts

Trips for households with cars increase, suggesting that some trips by car could be eliminated from Duke Street in the future

* Increase is based on 2030 “Business as Usual” scenario



PM Peak Bus Travel Time

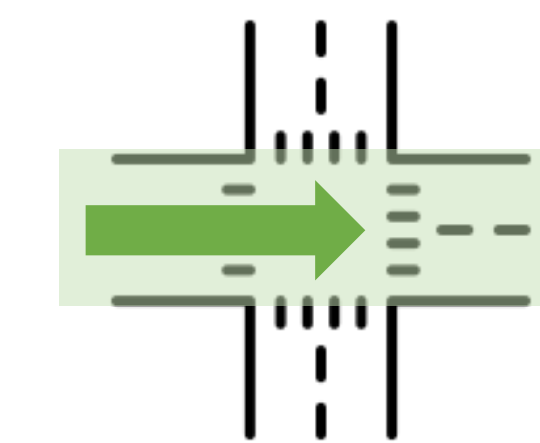
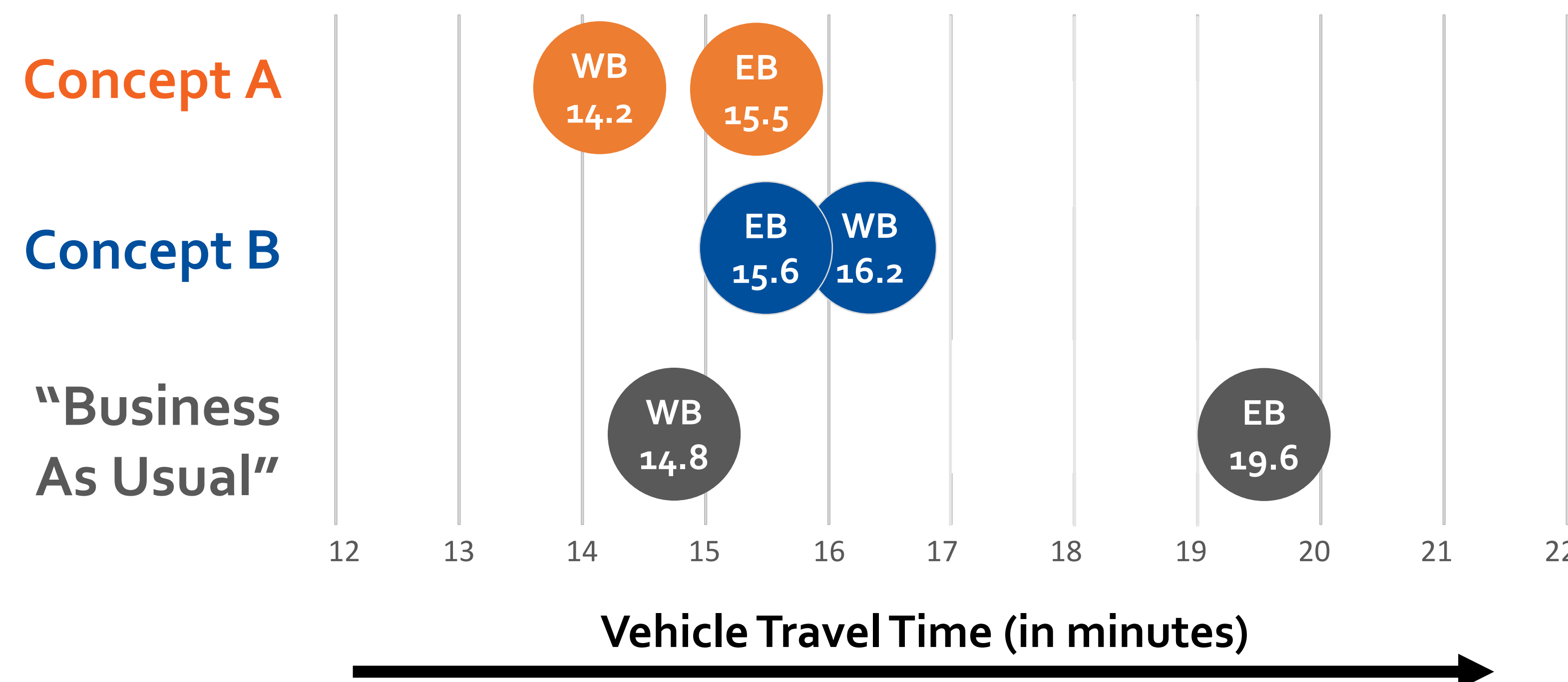


Both concepts **significantly improve bus travel times** in the afternoon/evening rush hour (the most challenging time of day)

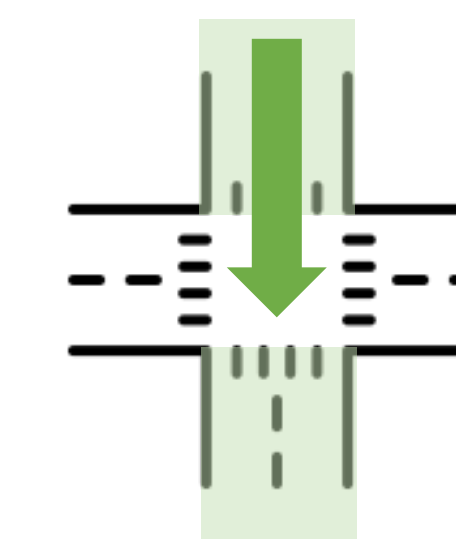
Concept A improves a little more than **Concept B**, on average

Efficient

PM Peak Vehicular Travel Time



Duke Street
Travel time improves, due to increased green-light time

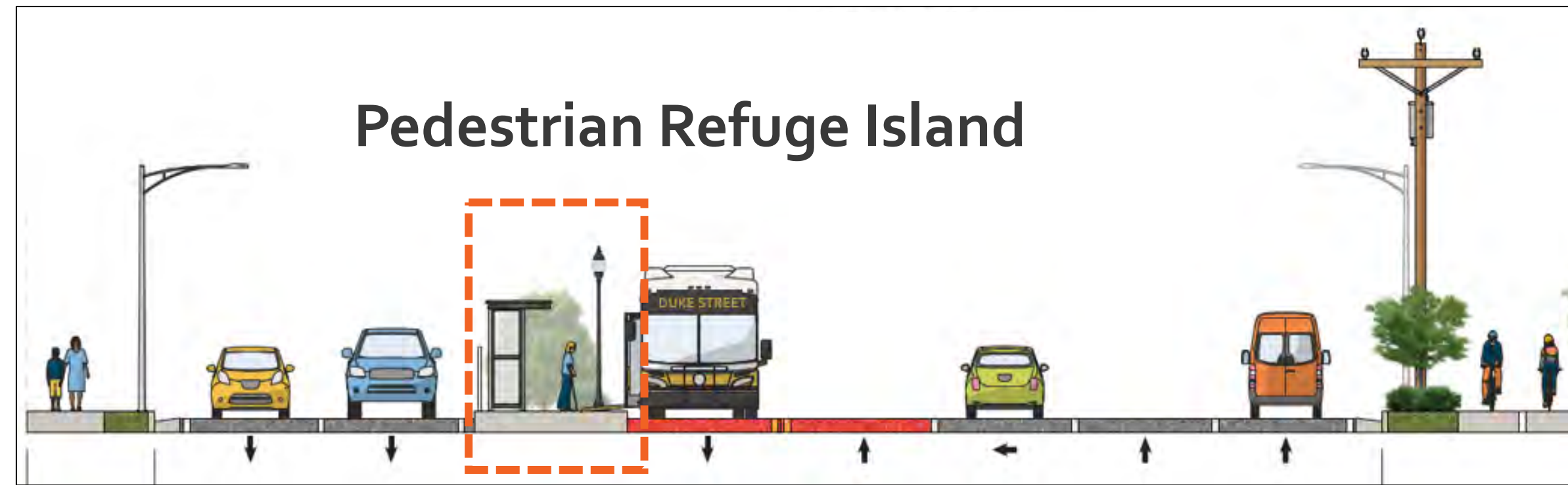


Side Streets
Travel time increases, due to bus and Duke Street priority signaling



Safe

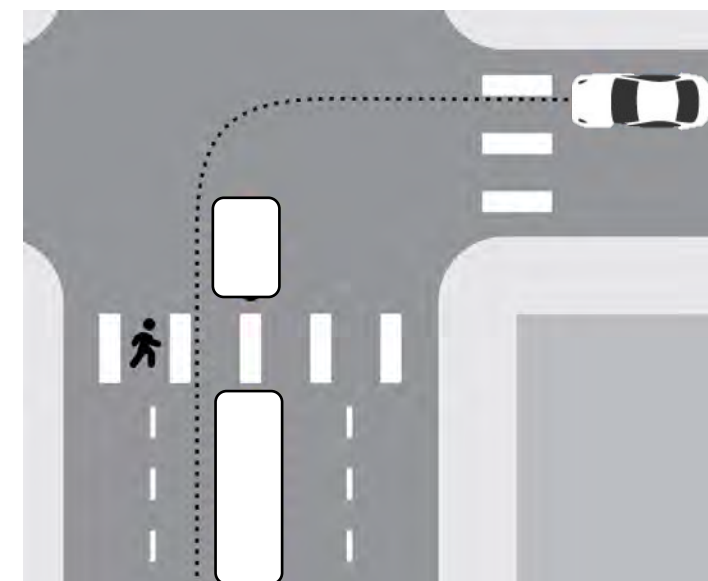
Pedestrian Safety



Pedestrian Refuges

A median with a refuge area helps protect pedestrians crossing a multi-lane road. Federal Highway Administration (FHWA) notes *pedestrian refuges contribute to a 46-56% reduction in pedestrian crashes.*

- A** 28 refuge islands
- B** 10 refuge islands



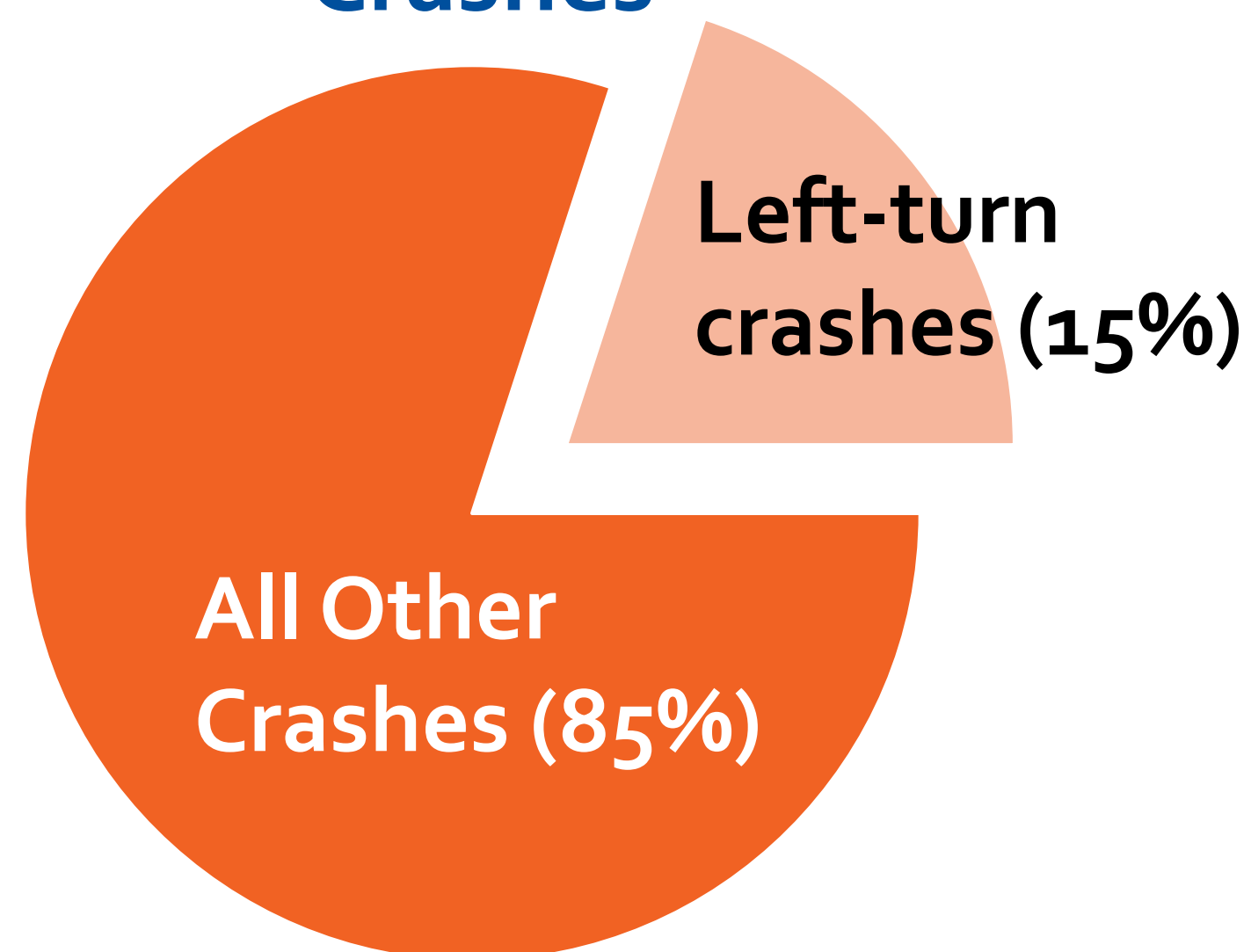
Protected Left Turns and Calming

Provides a green arrow for left turning vehicles while stopping both on-coming traffic and parallel pedestrian crossings. Virginia Department of Transportation (VDOT) notes *protected left contribute to up to a 18% reduction in pedestrian crashes.*

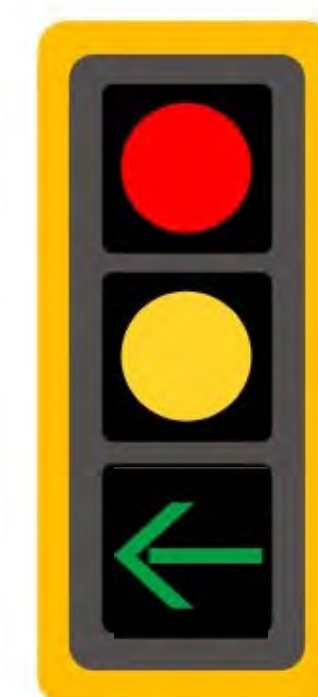
- A** 25 protected lefts
(Required protected lefts to remove conflict with center bus lanes)
- B** 4 protected lefts

Intersection Safety

Current Duke Street Crashes



Proposed Improvement



Protected left turns (which require a green arrow) reduce left-turn or angle crashes by 99%
NCHRP Report 617

Concept A
Reduces left-turn crashes 70%
Reduces overall crashes 15%

Concept B
Reduces left-turn crashes 10%
Reduces overall crashes 5%

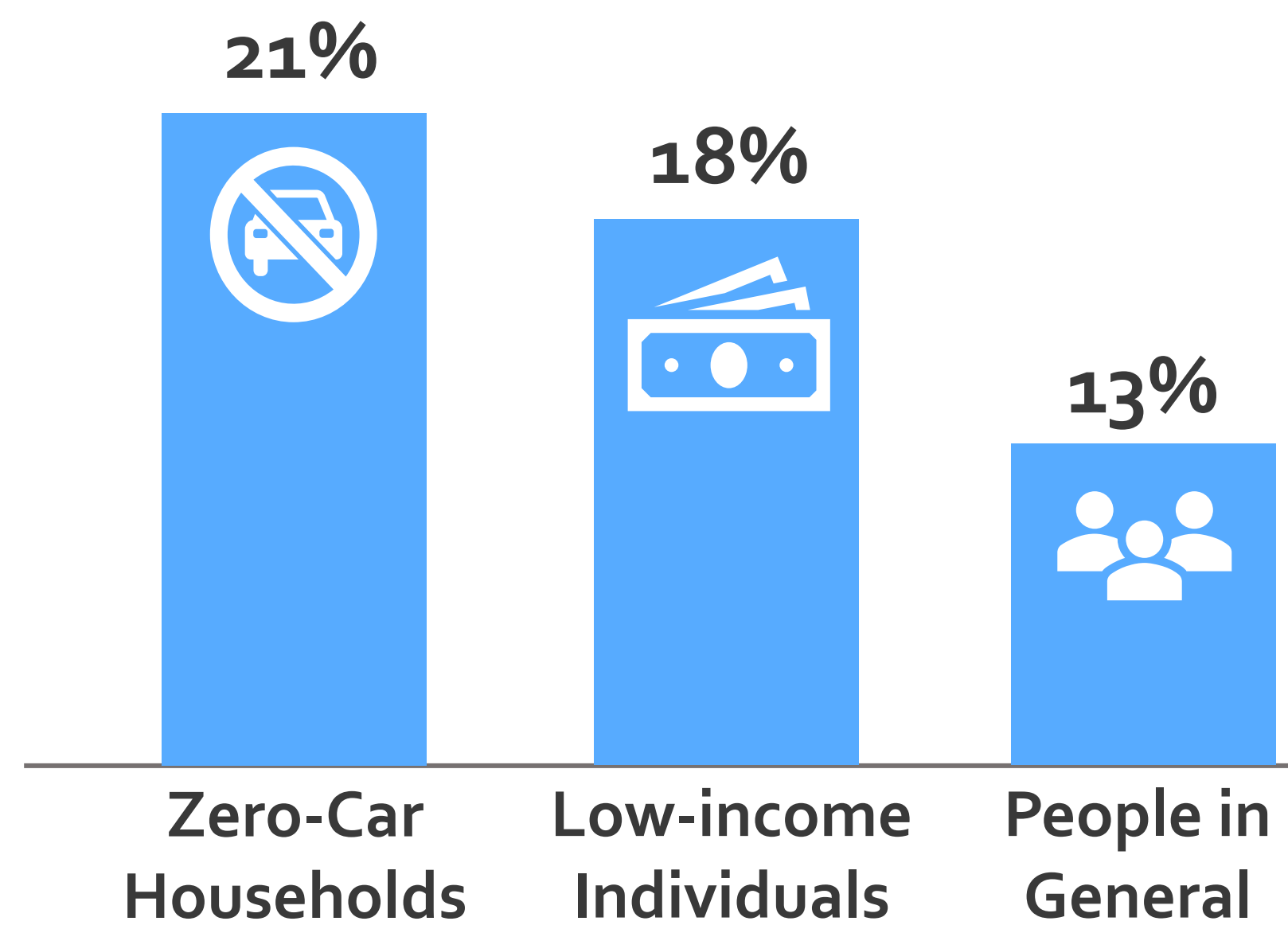


Equitable



Serving Low-Income and Zero-Car Households

Approximate increase in access to Alexandria Commons within 30 minutes by transit for both concepts

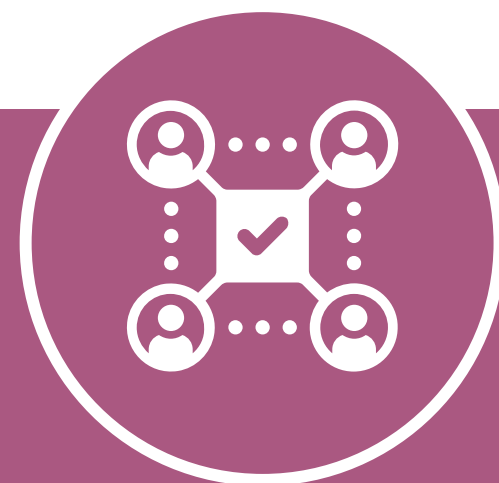
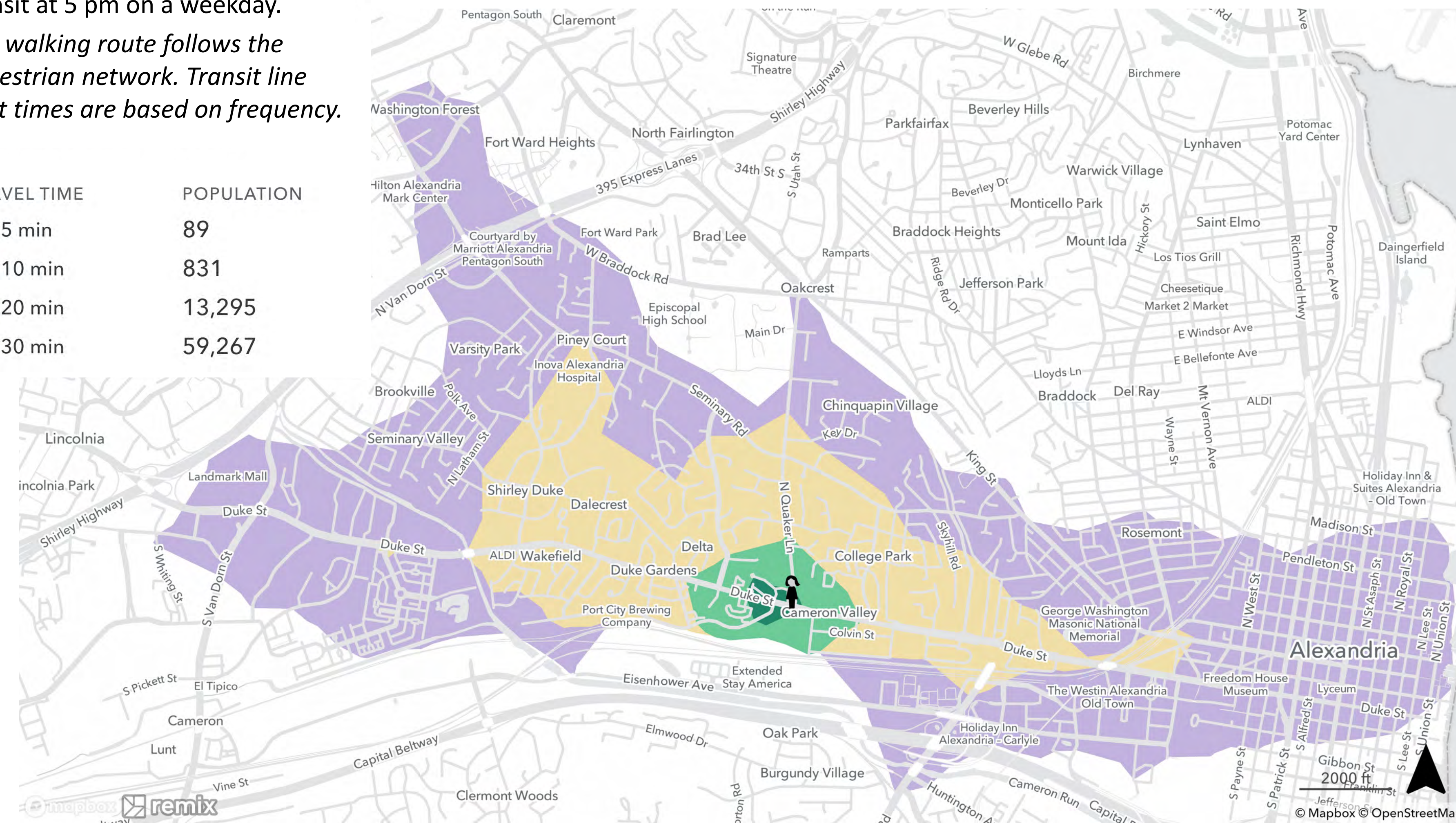


Travel Time

How long it takes to reach Jane via transit at 5 pm on a weekday.

The walking route follows the pedestrian network. Transit line wait times are based on frequency.

TRAVEL TIME	POPULATION
5 min	89
10 min	831
20 min	13,295
30 min	59,267



Vibrant



Improved Access to Activity Centers

Improved access to Alexandria Commons for the total population for both concepts

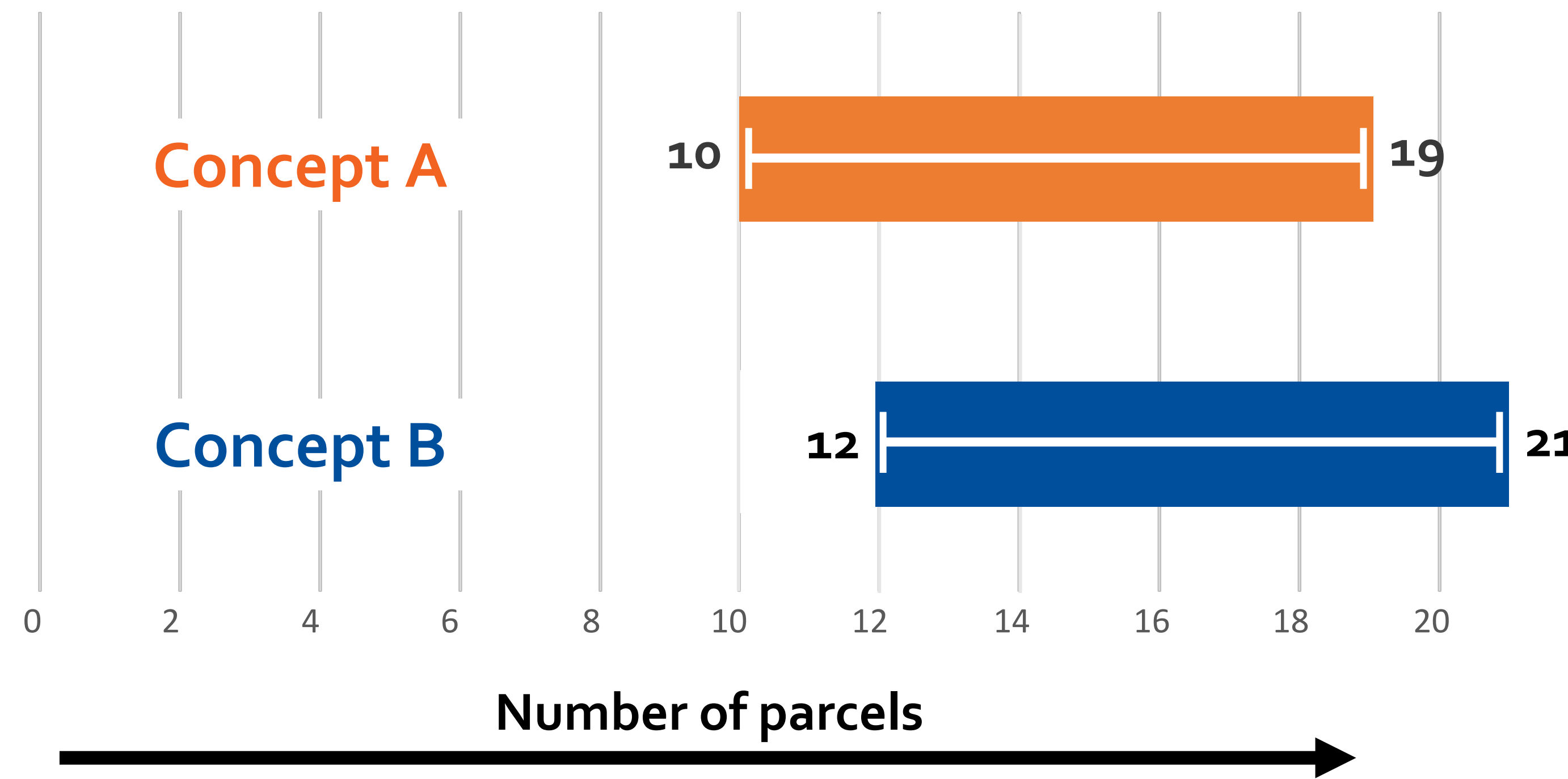
By improving the bus travel times, we expand the access to destinations along the corridor



13% (7,500) more residents within 30 mins of Alexandria Commons by transit



Right of Way – Number of parcels potentially touched



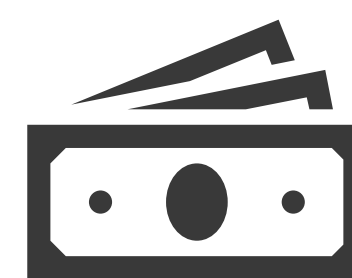
Between Quaker and Roth is the area of most significant right-of-way impact in **Concept A**.

Survey will be completed as design advances, so impacts will be refined.

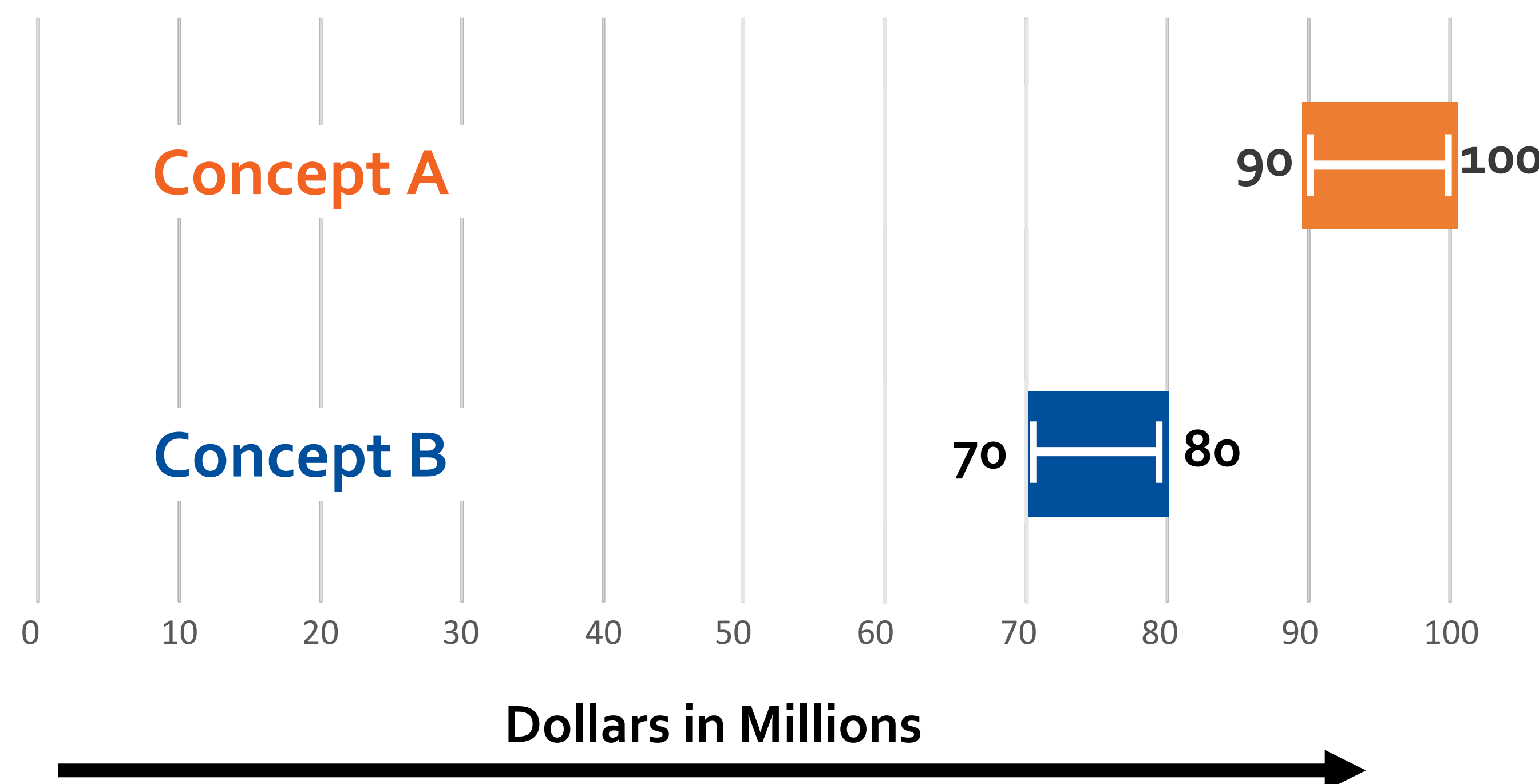
Curb feature impacts are being assessed and are similar for both concepts, outside of the Quaker to Roth area.

Continued planning and design will work to minimize needs.

Impacts



Cost – Based on initial conceptual estimates and contingencies



Initial cost estimate shows either concept is close to \$85M target budget. **Concept A** included more "nice to have" curb features.

Includes healthy contingency amounts. Opportunities to blend elements from either concept to hit target budget .

Costs will refine as more design information, utility information, and survey information becomes available.