

**River Street  
Reconstruction**



# Working Group #5

Wednesday, July 17, 2019

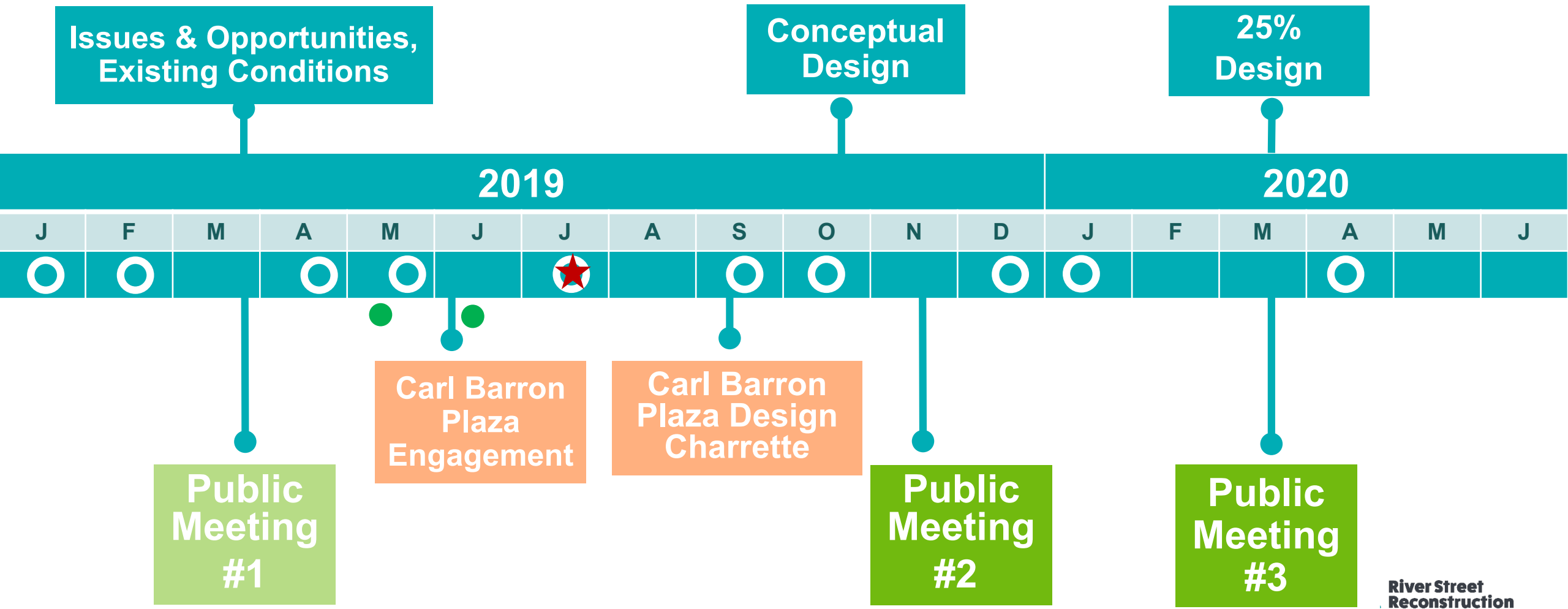
# Today's Agenda

- Welcome and logistics 10 minutes
- Transportation Considerations 25 minutes
- Intersection Considerations 20 minutes
- Street Design Basics: An Interactive Exercise 50 minutes
- Public Comments 10 minutes
- Next Steps 5 minutes

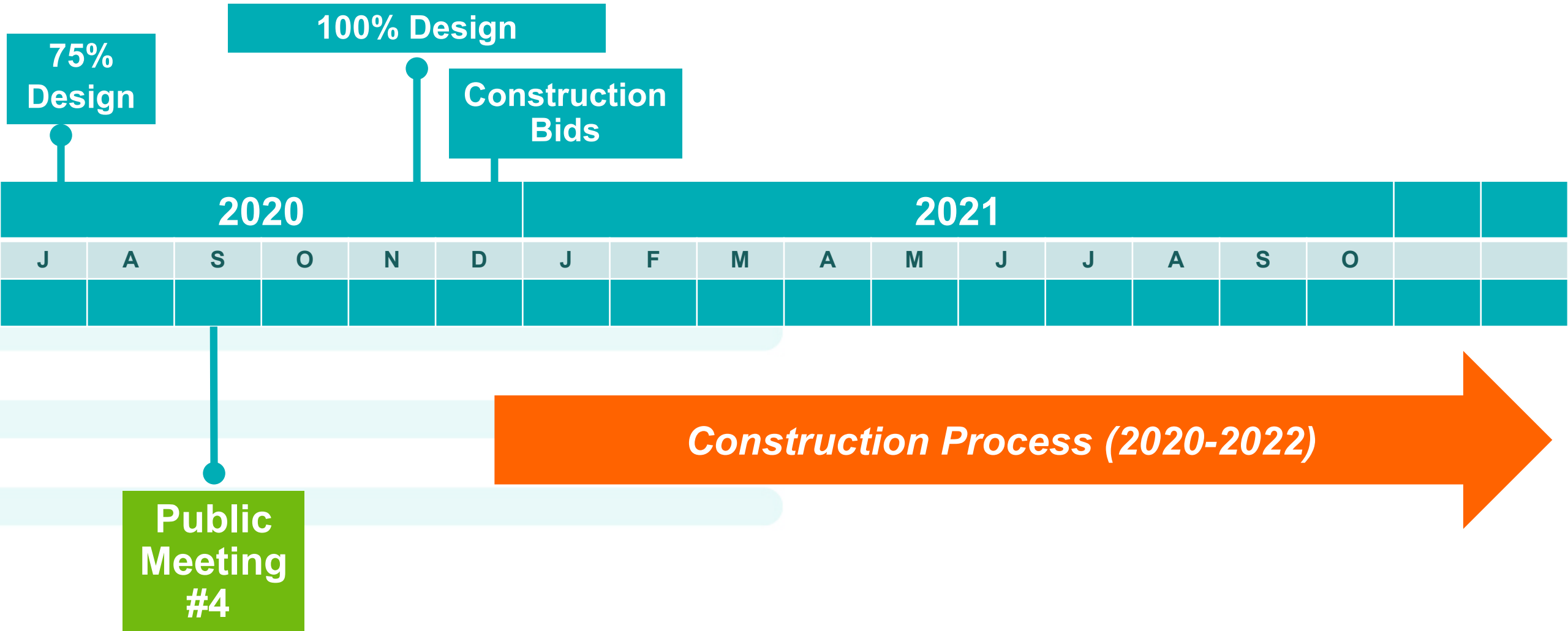
# **Welcome and Logistics**

# NEW Expected Timeline

○ Working Group Meetings  
● Public Walks  
★ Today



# Expected Timeline



# Summer & Early Fall Schedule

## New Working Group Schedule

- ✓ Working Group #4 Tues. 5/28
- ✓ Working Group #5 Wed. 7/17
- Working Group #6 Tues. 9/24

## Other Summer and Fall Activities

- ✓ Mobility/Safety Walk: Tues. 5/14
- ✓ Outreach at Riverfest: Sat. 6/1
- ✓ Carl Barron Existing Conditions: Open House on Wed. 6/5 and outdoors on Sat. 6/8
- ✓ Urban Design Public Walk: Tues. 6/11
- Carl Barron Design Charrettes: Sat. 9/14 (outdoors) and Tues. 9/17

# Working Group Meeting Agendas

- Working Group #5 Wed., 7/17
  - Mobility 101
  - Interactive Exercises for Street Design
- Working Group #6 Tues., 9/24
  - Draft Conceptual Design Alternative Progress



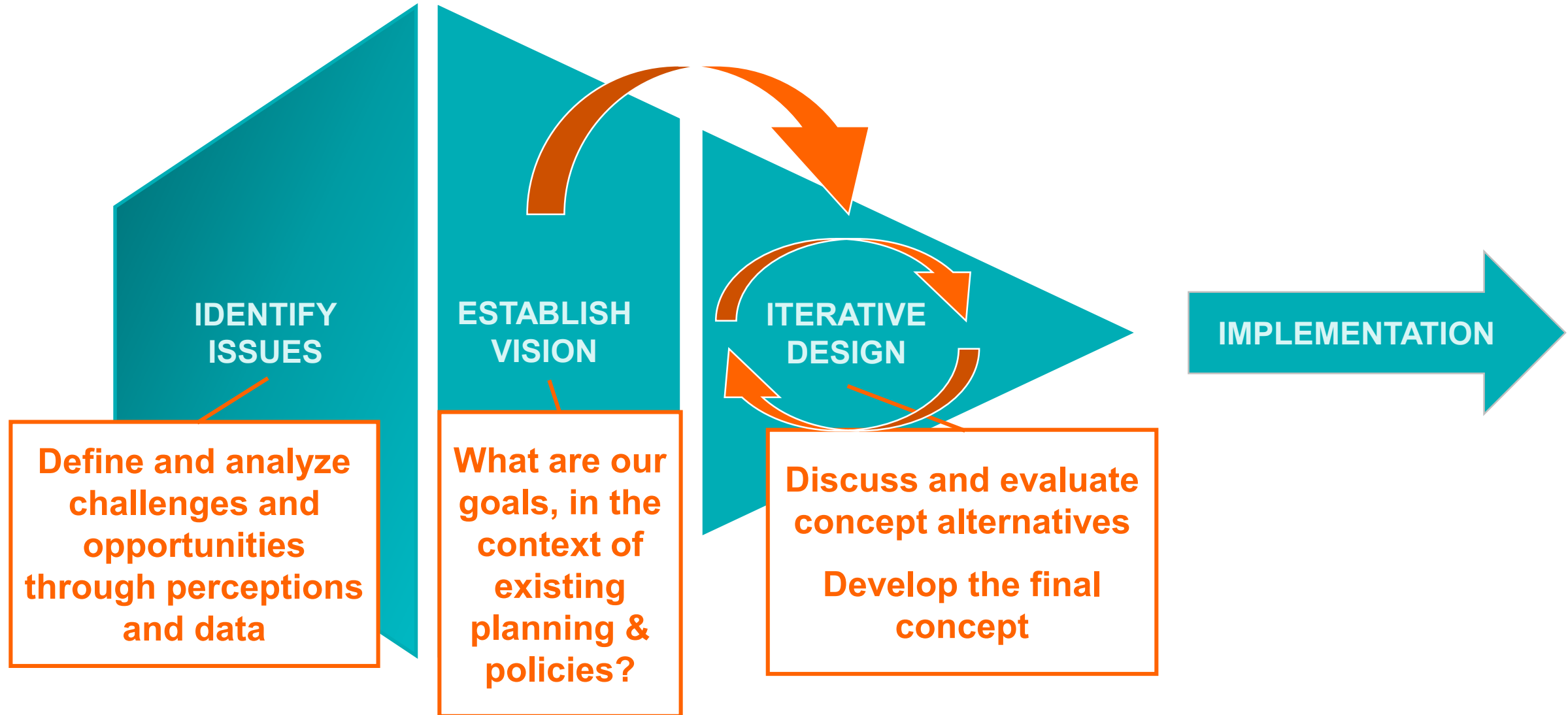


# Ground Rules

- Phones off
- Keep an open mind
- Respect other opinions
- Speak, and let others be heard
- Read agenda and materials before the meeting
- Request agenda changes prior to meeting
- Help us stay on schedule
- Public comments during public comment periods



# Building toward the design stage

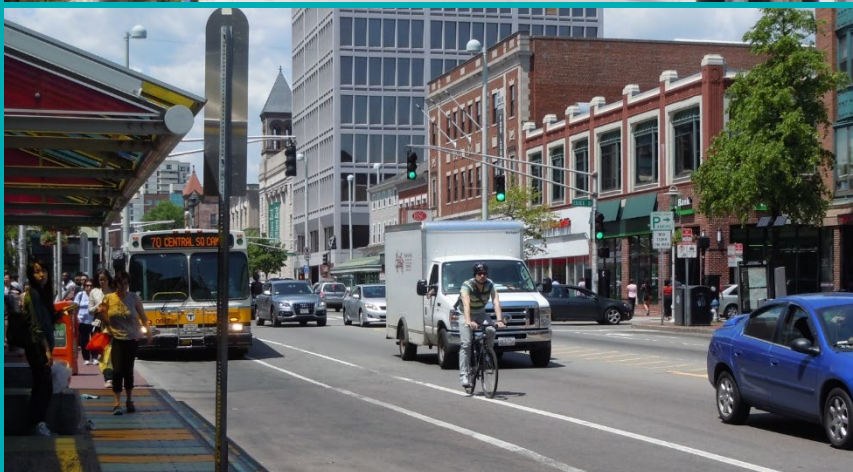


# **Transportation Considerations**

# Transportation is Multimodal



People may choose to walk, bike, take transit, or drive depending on different days and conditions. The City has policies in place to reduce drive alone trips in favor of sustainable, active modes. This means making walking, biking, and taking transit as comfortable and convenient as possible. Currently roughly 56-84%\* of trips made on River Street are by car.



The city's goal is to reduce drive alone trips by 2020 to:

- 29% for residents
- 38% for workers

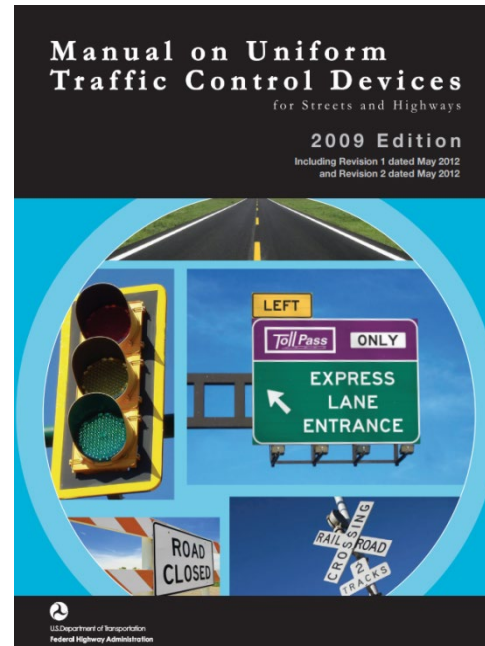
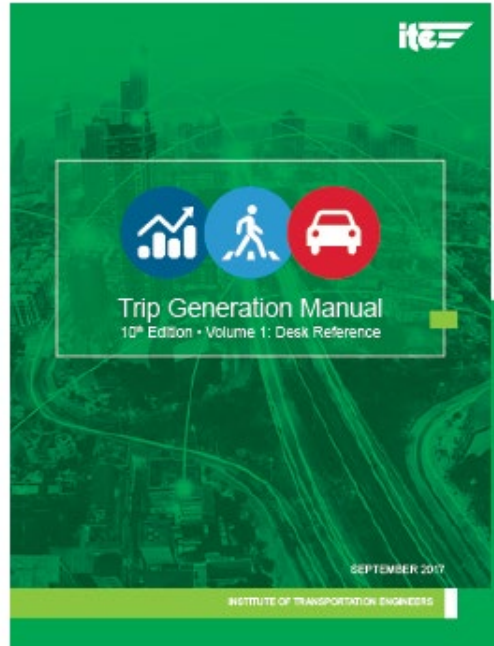


\*Vehicular mode share ranges from 56-76% in the AM peak hour and 60-84% in the PM peak hour when comparing River Street at Green Street to River Street at Memorial Drive.

# Who We Are Designing For



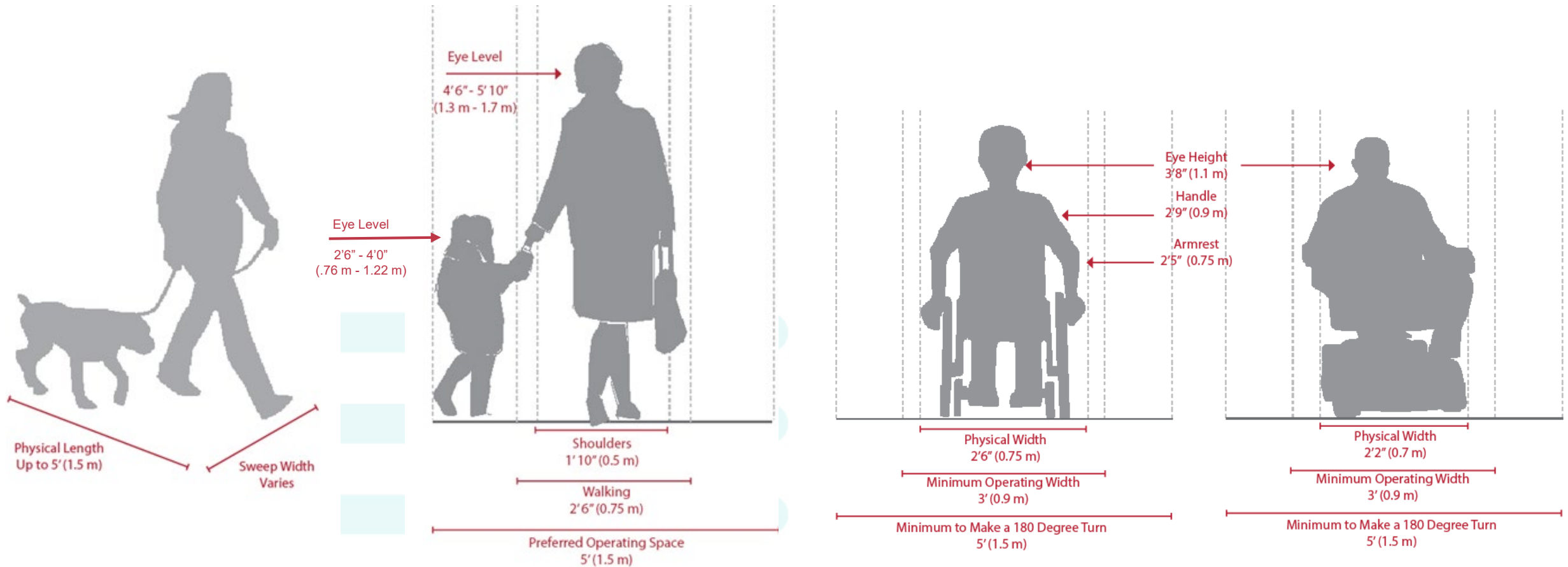
# Resources and Standards



AMERICAN ASSOCIATION OF  
STATE HIGHWAY AND  
TRANSPORTATION OFFICIALS



# Pedestrian Dimensions



Source: Guide for the Planning, Design, and Operation of Pedestrian Facilities (AASHTO 2004)

# Considerations for People who Walk



Accommodate Side by Side Walking



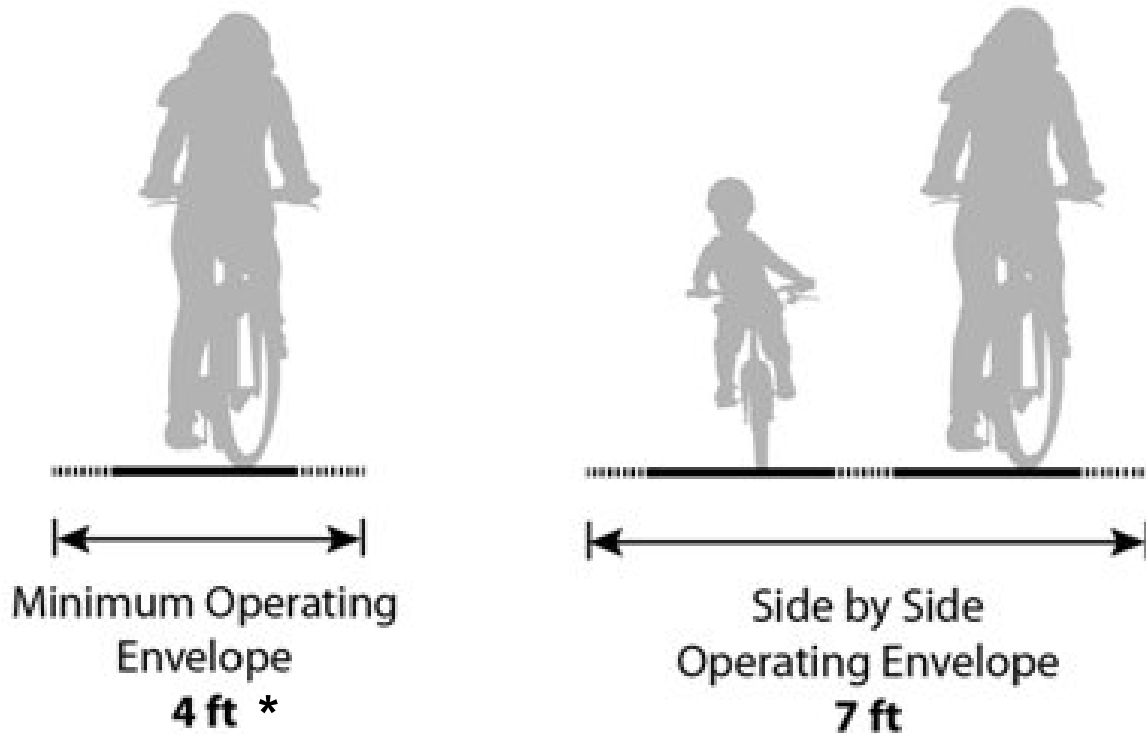
Design Should Match Desire Line



Design



# Dimensions and Considerations for People who Bike



\* 6 ft Operating Width is Preferred

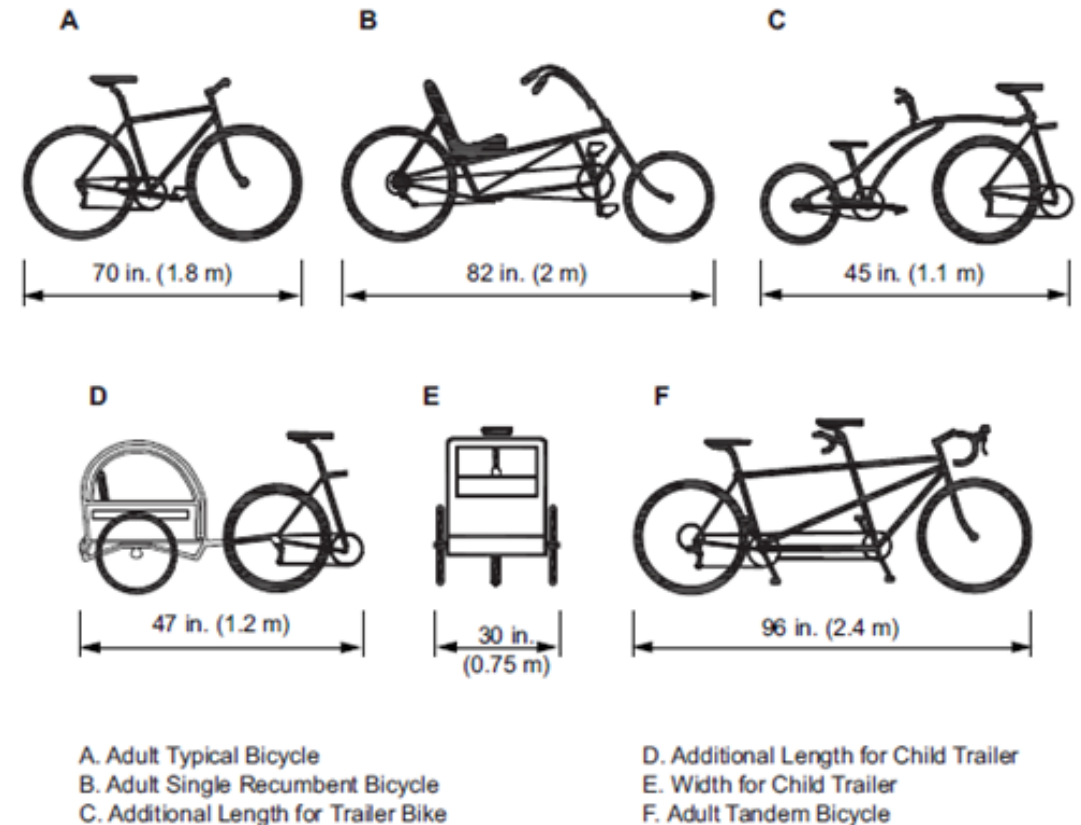
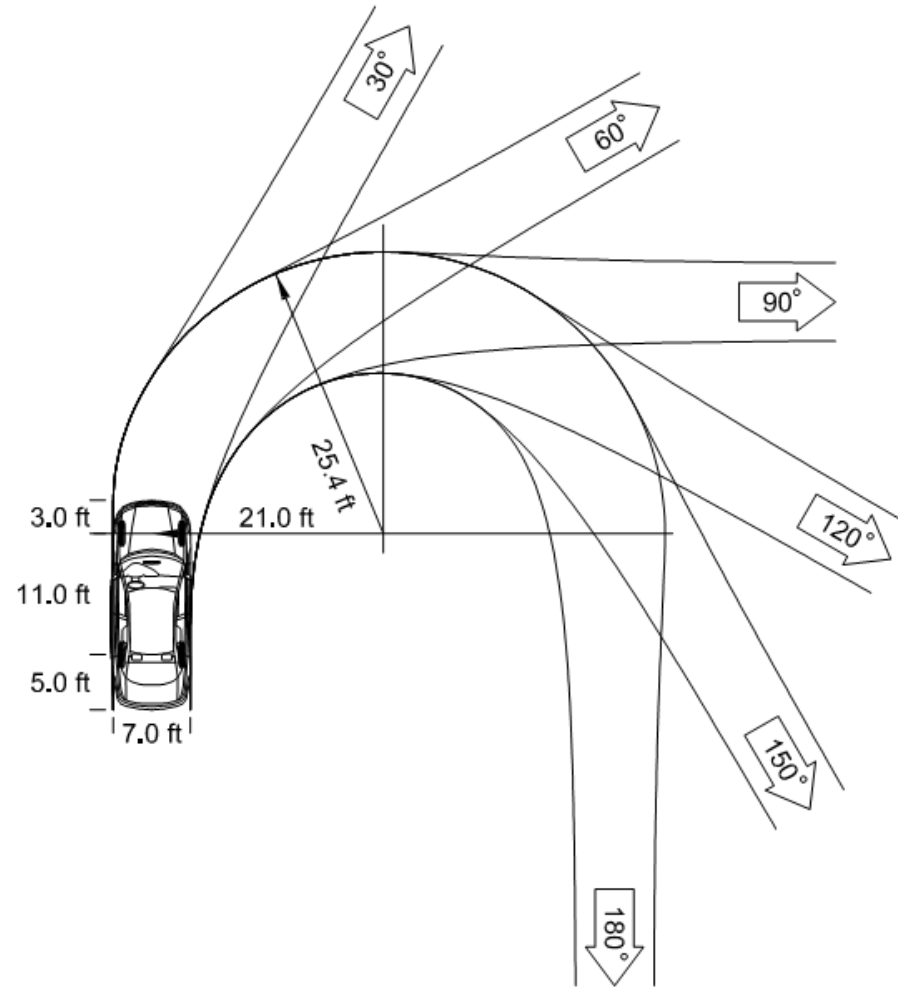
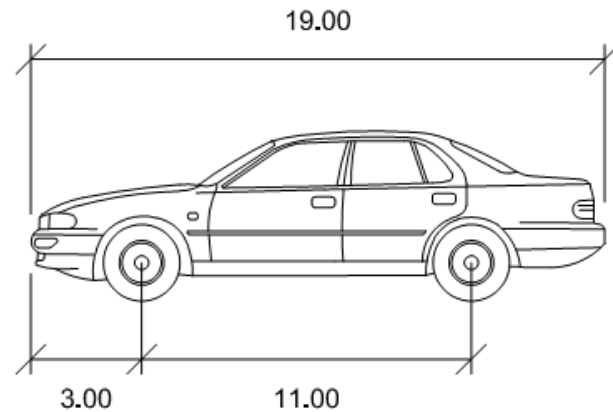


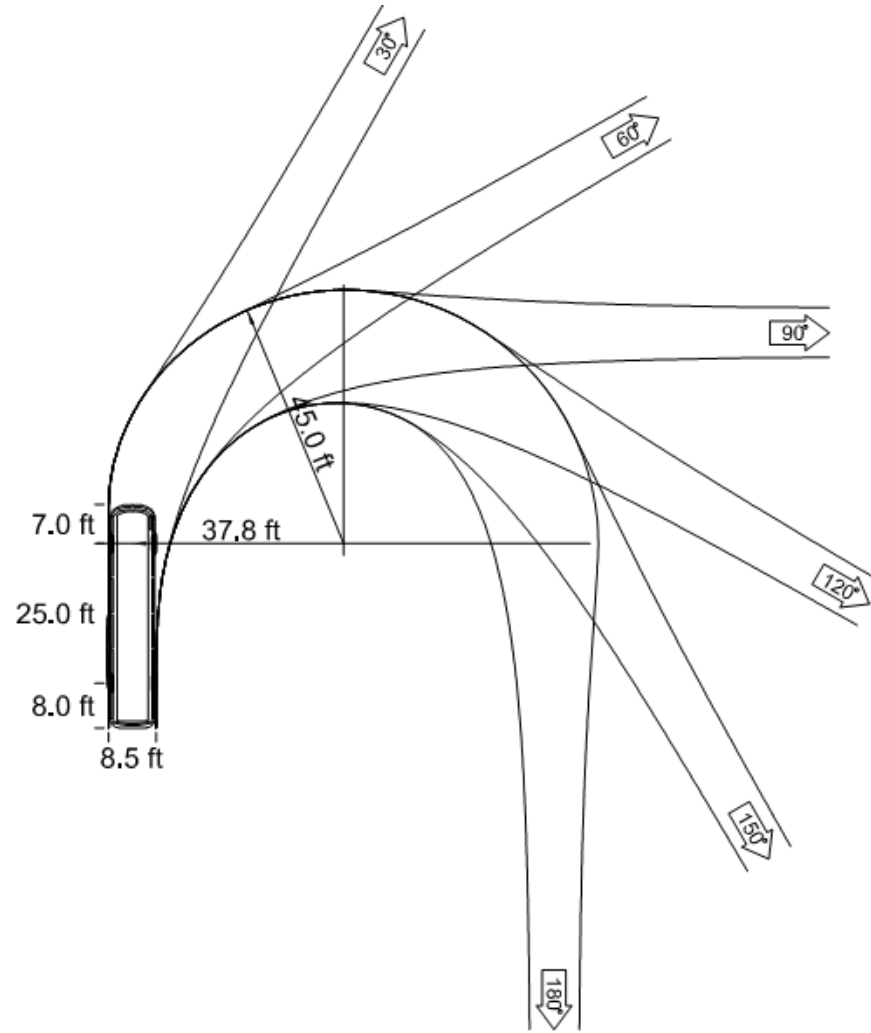
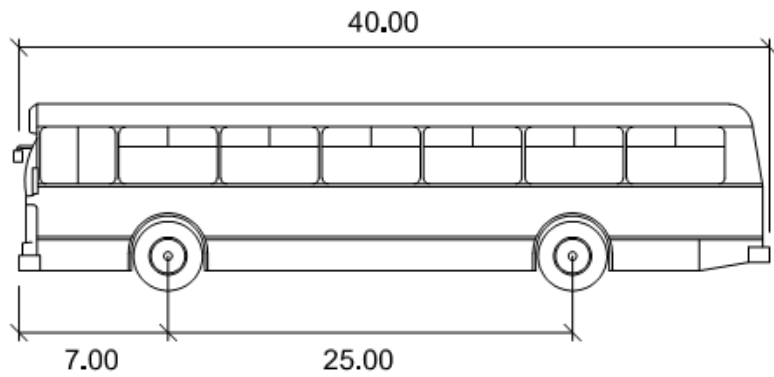
Figure 3-2. Typical Bicycle Dimensions

Source : Guide for the Development of Bicycle Facilities (2012)

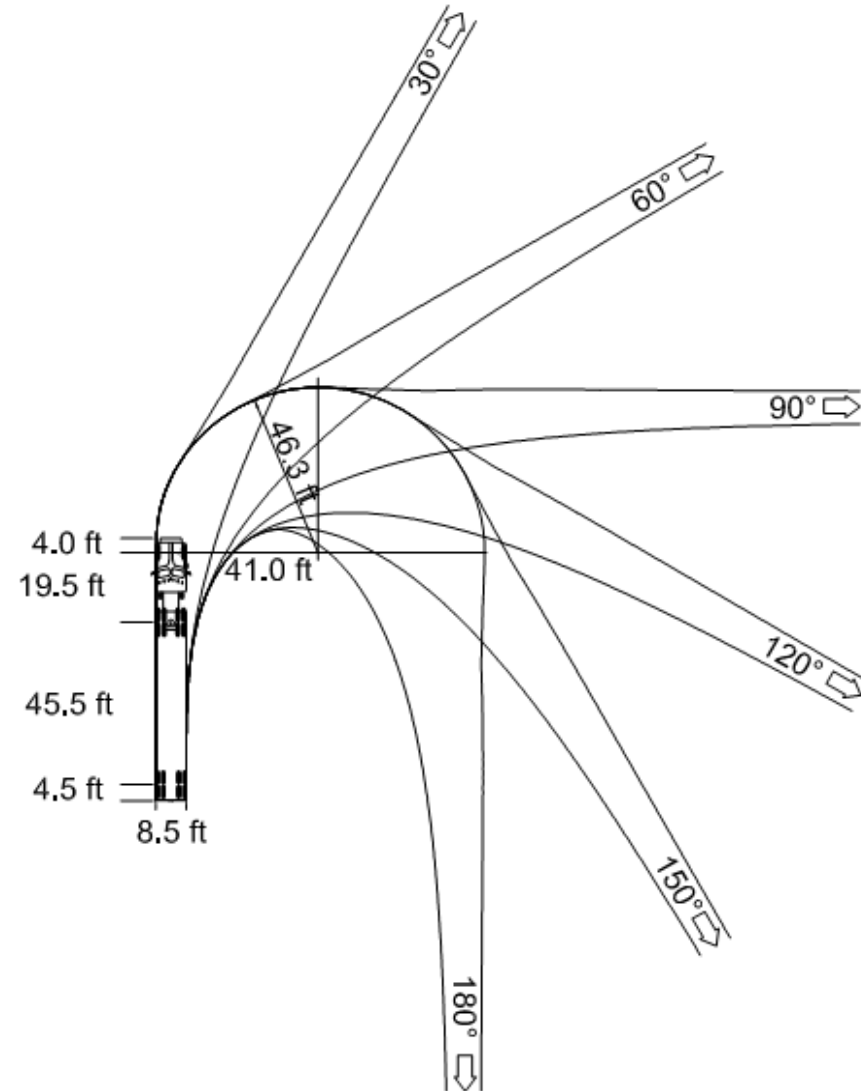
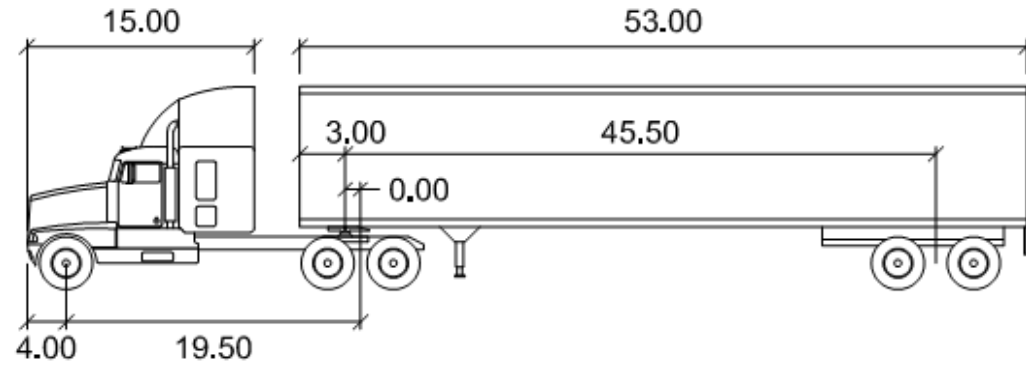
# Dimensions and Considerations for People who Drive



# Larger Vehicle Dimensions



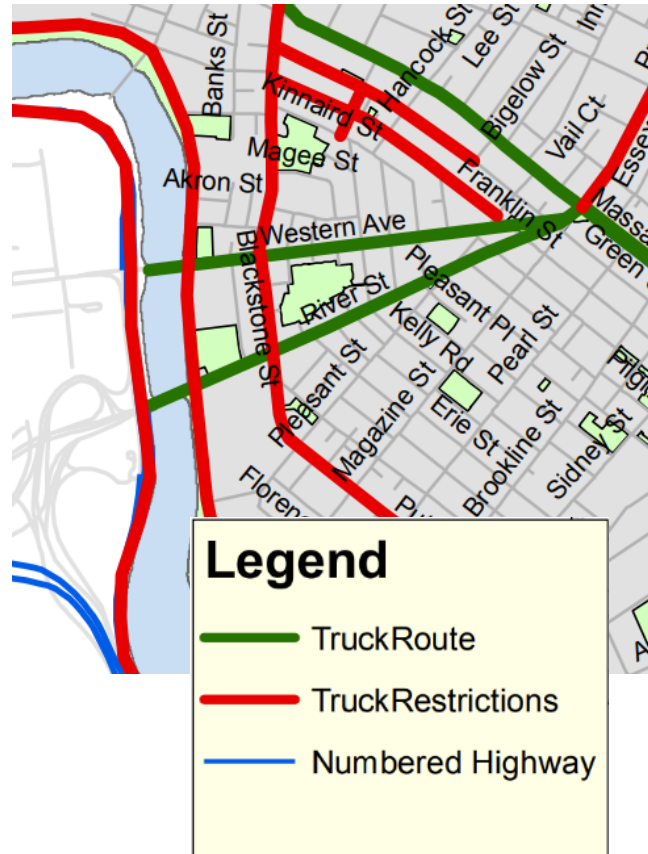
# Larger Vehicle Dimensions



# Considerations for Freight/Goods



Delivery Needs



Truck Routes



Parking/Loading

# Transportation Analysis Tools

## Delay for People Who Walk

LOS	Average Ped. Delay	Likelihood of Ped. Noncompliance
<b>A</b>	<10 Seconds	Low
<b>B</b>	10-19 Seconds	
<b>C</b>	20-29 Seconds	Moderate
<b>D</b>	30-39 Seconds	
<b>E</b>	40-59 Seconds	High
<b>F</b>	>60 Seconds	Very High

Source: Adapted from Urban Street Design Guide, NACTO

## Bicycle Level of Comfort



Source: City of Cambridge, MA

# Transportation Analysis Tools

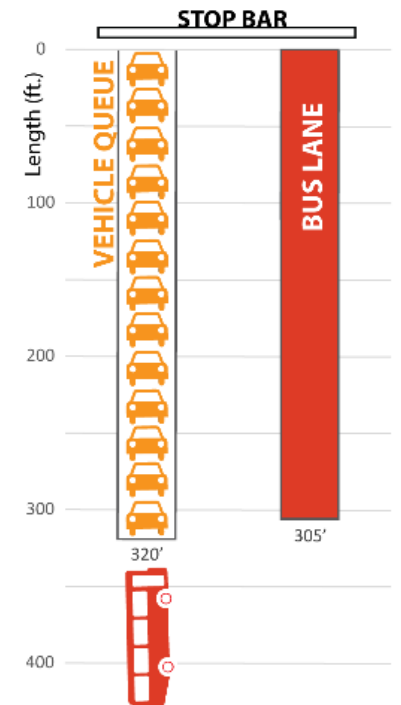
## Vehicle Capacity Analysis

- Consider volume compared to capacity (V/C ratio)
- Measure queuing in peak times (50th and 95th percentiles)
- Level of Service – LOS - D and E is acceptable in an urban area

- Level of Service (LOS)
  - A standard measurement, based on vehicle delay and speed, which reflects the relative ease of traffic flow on a scale of A to F
  - LOS "A": free-flow traffic
  - LOS "F": highly congested traffic conditions

## Transit Delay and Reliability

- Compare delay to minimum running time and minimize delay due to:
  - Congestion
  - Traffic Signal Delay
  - Dwell Time
- Total delay is the vehicle delay multiplied by the number of people on a bus
- Reliability is important to reduce bus bunching and provide predictable service
- MBTA plans its service based on 90th percentile travel times



# Design Goals

- Safe
- Inclusive
- Human Scale
- Ecological
- Multimodal
- Activated
- Resilient



**Western Avenue**



# Multimodal Safety

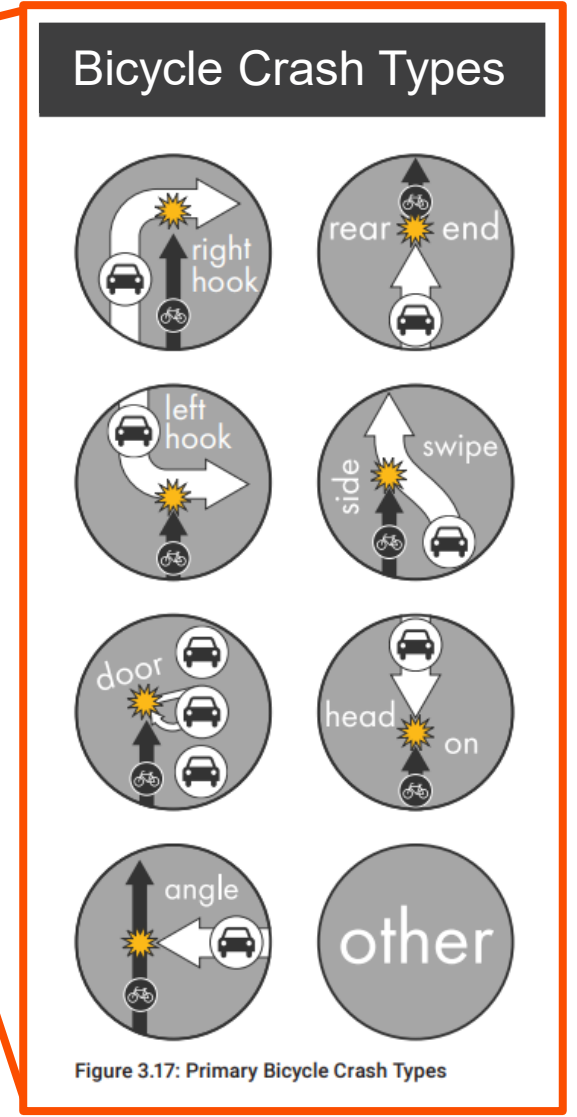
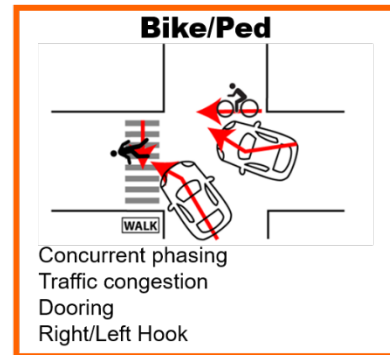
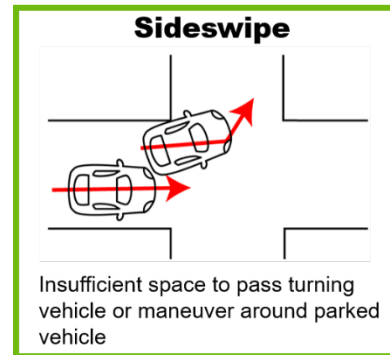
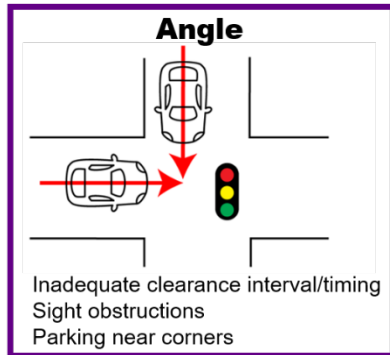
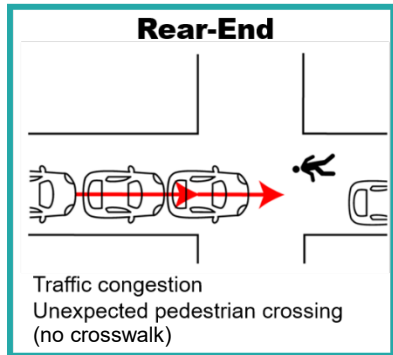


Figure 3.17: Primary Bicycle Crash Types

# Pedestrian Crossings



**Pedestrian Hybrid Beacon/HAWK**



**Signalized**

**Curb Ramps and Detectable Warning Strips**



**Uncontrolled**



**Rapid Flashing Beacon**

**Crosswalk Illumination**



# Separated Bike Lanes



Raised—No Parking



Raised—Buffered w/ Parking



Street Level – Buffered



Separated with Flexposts



Raised Mountable Curb



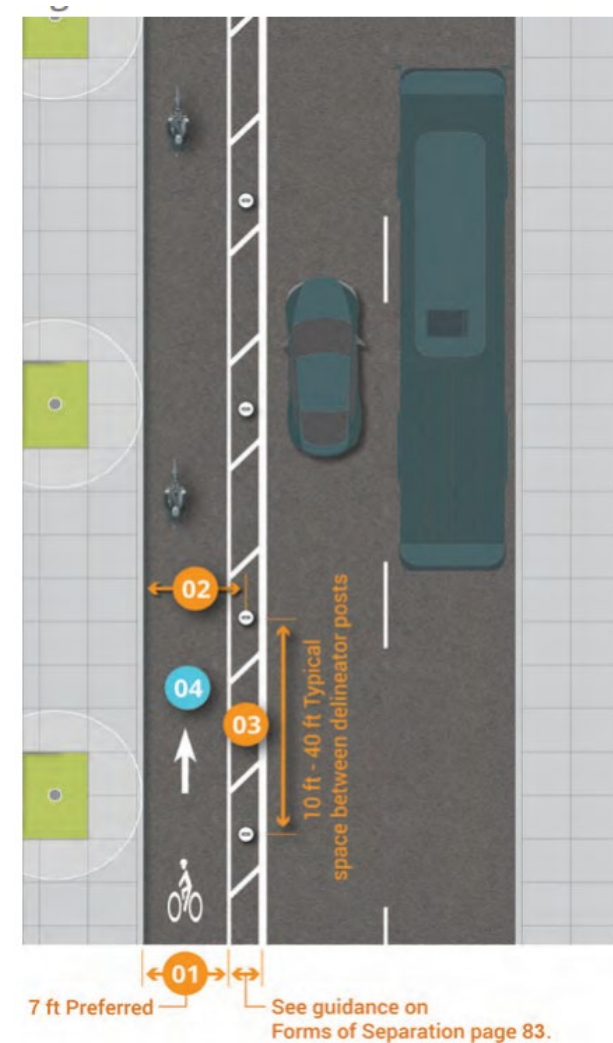
Protected Intersections



Signal Control

# Separated Bike Lanes

- Bike Lane Width
  - Typically 5-6 ft. wide\*
  - Greater than 7 feet allows for greater comfort, side by side riding, passing
  - *More width may be required for maintenance needs*
- Separation/buffer Width
  - 1 to 3 feet\* or grade-separated depending on type
- Things to Consider
  - Volume of Bicycles
  - Type of Separation
- Note that a "cycle track" in Cambridge is used to refer to a grade separated bicycle lane.



Source: FHWA – Separated Bike Lane Planning and Design Guide

Facility Dimensions	One-Way Cycle Track		Two-Way Cycle Track	
	Minimum <sup>1</sup>	Preferred <sup>2</sup>	Minimum <sup>1</sup>	Preferred <sup>2</sup>
Cycle Track Width	5'	7'	8'	12'
Separation <sup>3</sup>	1' to 3'	3'+	1' to 3'	3'+

\*Cambridge Bicycle Plan

Source: City of Cambridge Cycle Tracks White Paper

# Bus Priority



## Bus Lane



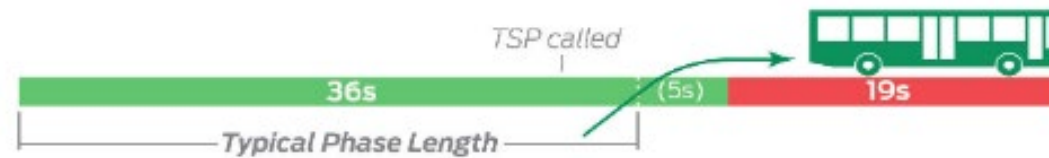
## Transit Signals/Bus Queue Jump



# Bus Priority to Address Delay and Reliability

## Transit Signal Priority

### Green Extension



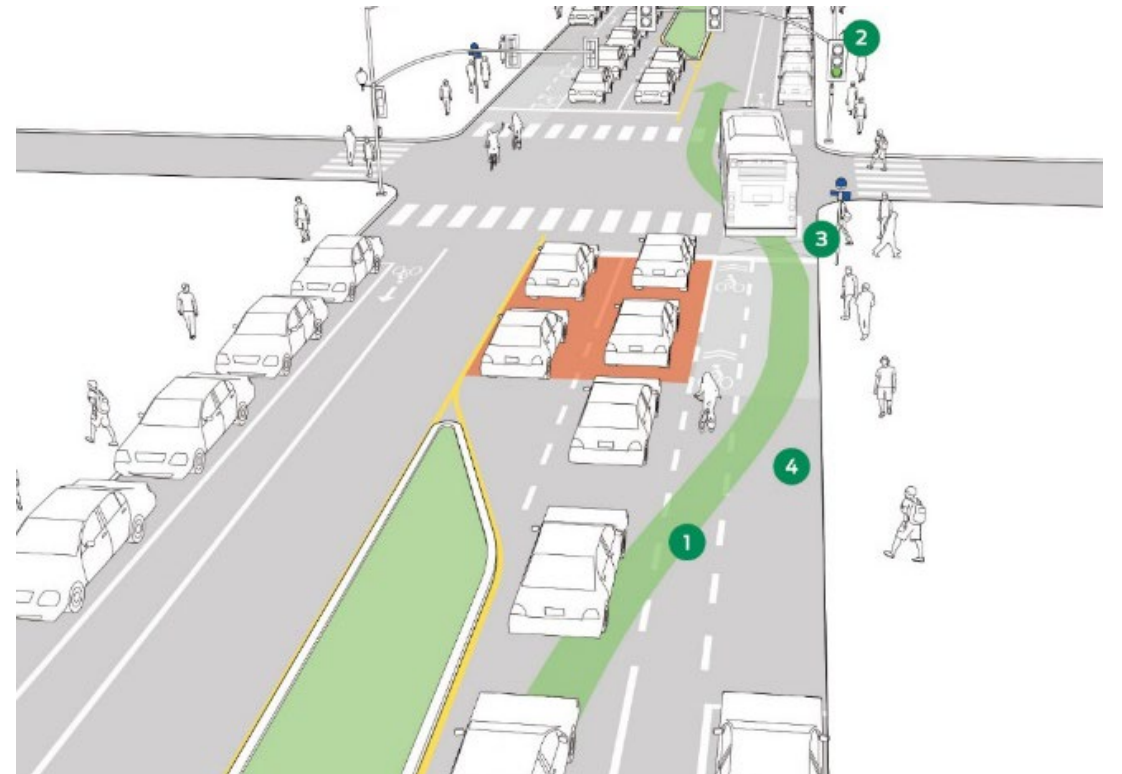
### Green Reallocation



### Red Truncation



## Queue Jump Lane (with TSP)



Source: NACTO Transit Street Design Guide

# Traffic Calming



Pinch Point



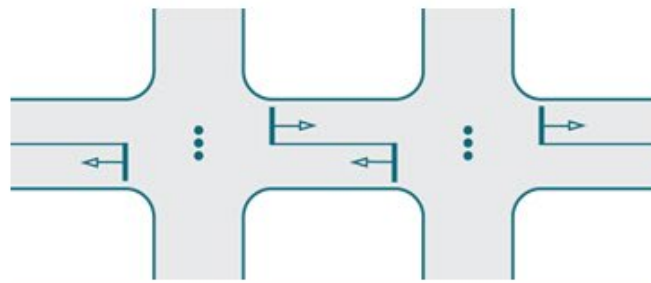
Chicane



Pedestrian Crossing Island



Raised Side-Street Crossing



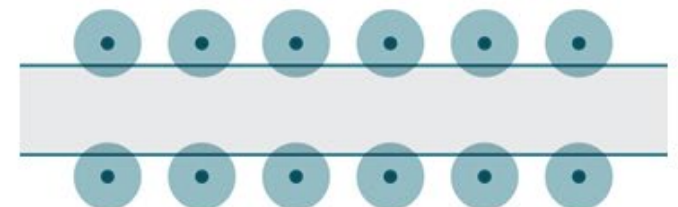
Signal Progression



Constrained Sight Lines



On-Street Parking



Street Trees

# Many Demands on Curbside Space



Greening and Green Infrastructure



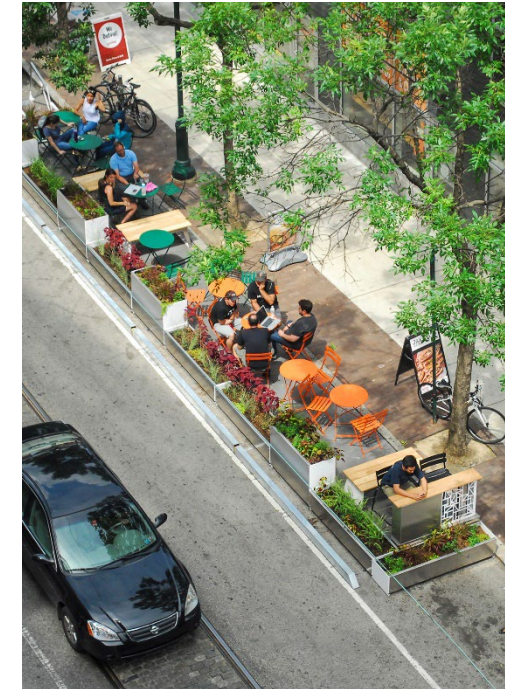
Pedestrian Safety



Food Trucks



TNC pick-up/drop-off



Activation

**New demands for curbside space are emerging**



# Factors Determining Curbside Uses

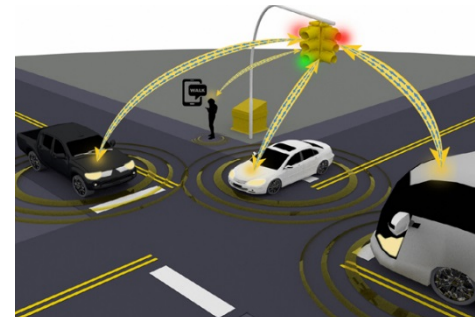
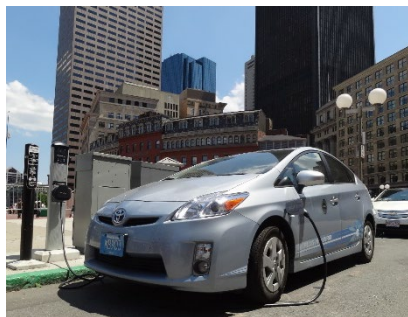
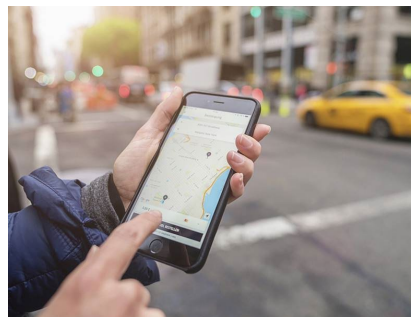
- Existing conditions
- Land use
- Neighborhood context
- Public input on neighborhood needs
- Observations
- Public feedback on design alternatives



# New Mobility Blueprint

## Re-think the use of right-of-way

- Modal boundaries blurring – less people use only one form of transportation.
- Adapt policy to accommodate new forms mobility in ways that meet City goals. For example:
  - Preserve affordability and equity of transportation
  - Reduce congestion and GHG emissions



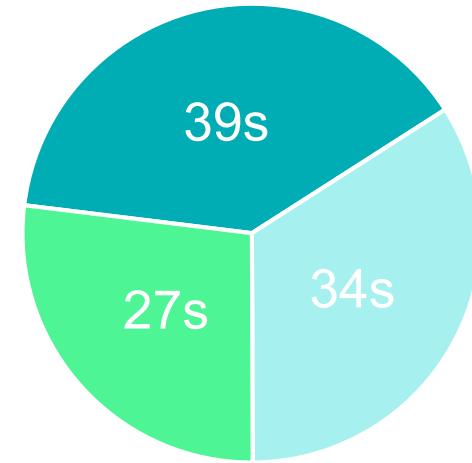
# **Intersection Considerations**

# River Street @ Putnam Example

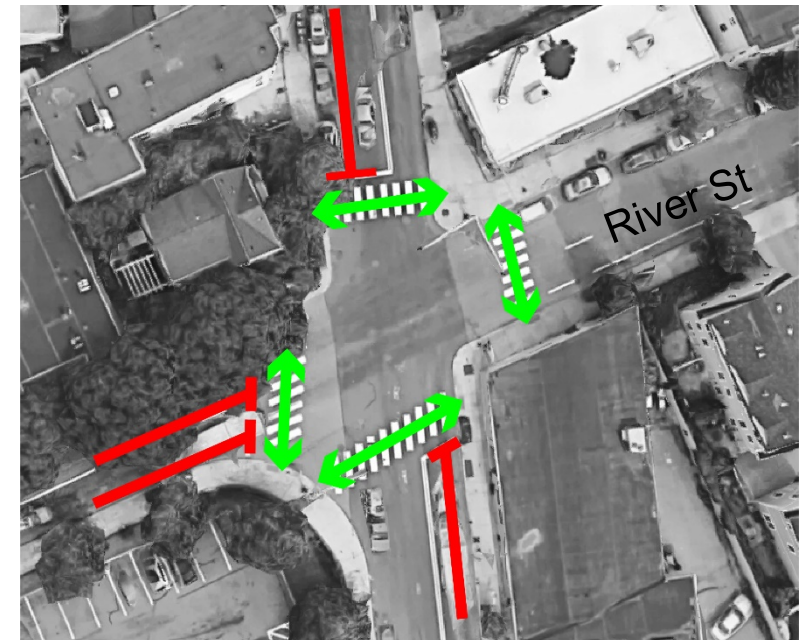


# Signal Phasing

- 3-phase signal
- Exclusive pedestrian phase
- Permissive Putnam Avenue left-turns



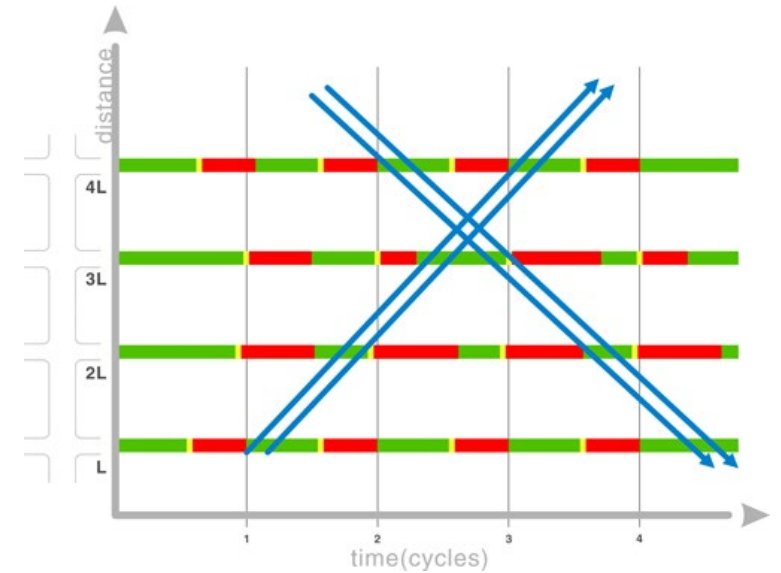
■ River Street    ■ Putnam Avenue    ■ Pedestrian



# Signal Technology

- Coordination
- Actuation
- Signal Equipment

Signal cycles operate in a progression along a corridor for efficiency of movement



Source: FHWA - Traffic Signal Timing Manual

Bike Signal



Pedestrian Signal



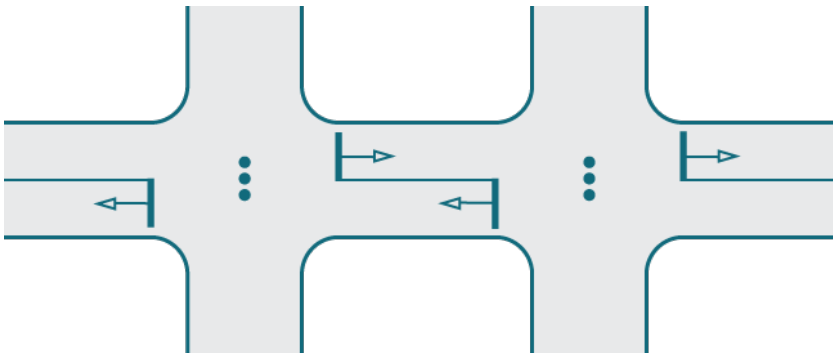
Accessible Pedestrian Signal



# Traffic Flow



## Optimized Signal Timings



## Lane Use Signage



# Operations/Capacity Analysis

- Vehicle Queues in Feet
- User Delay in Seconds
- Management of Vehicle Operations Important for Safety of all Users

## Average & Maximum Queues

AM (7:00-10:00 AM)



PM (4:30-7:30 PM)



Based on field measurements of vehicle queues





# Geometry

- Lane configurations
- Crosswalks
- Corners
  - Curb radii
  - Curb ramps



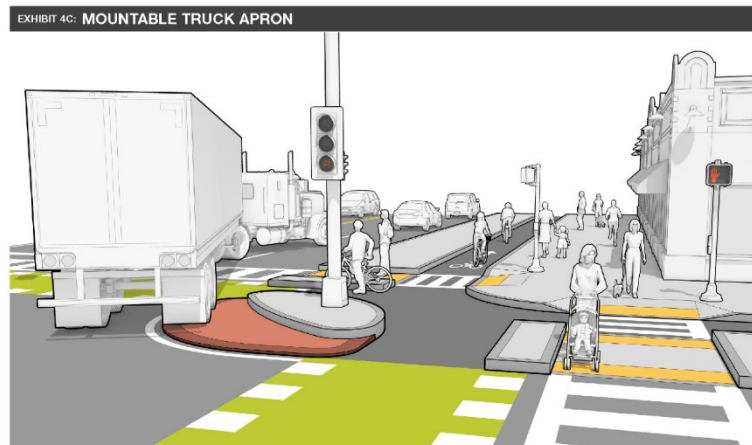
Geometric configuration informs signal timing

Lane Designations  
Capacity/Safety

Accommodate  
Turning Vehicles

Length of Crossing  
Visibility

Accommodate  
MBTA Route 64  
Routing/Turns



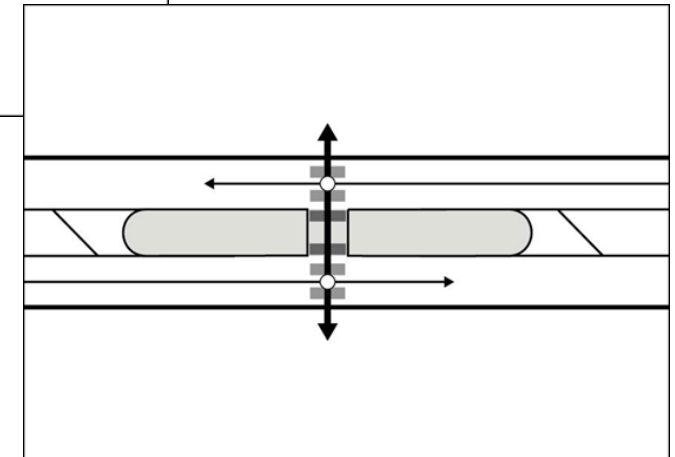
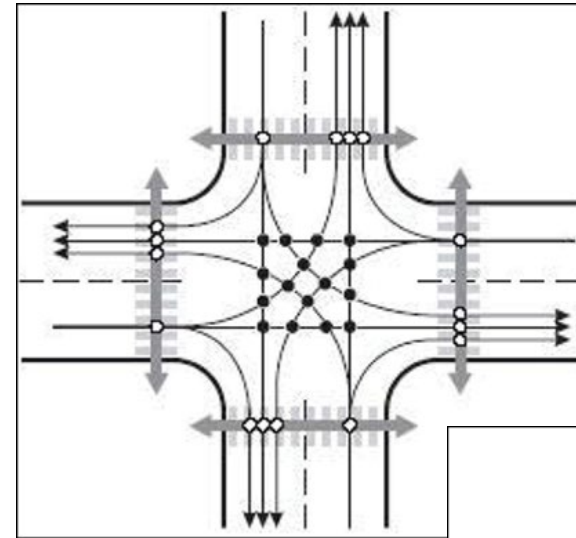
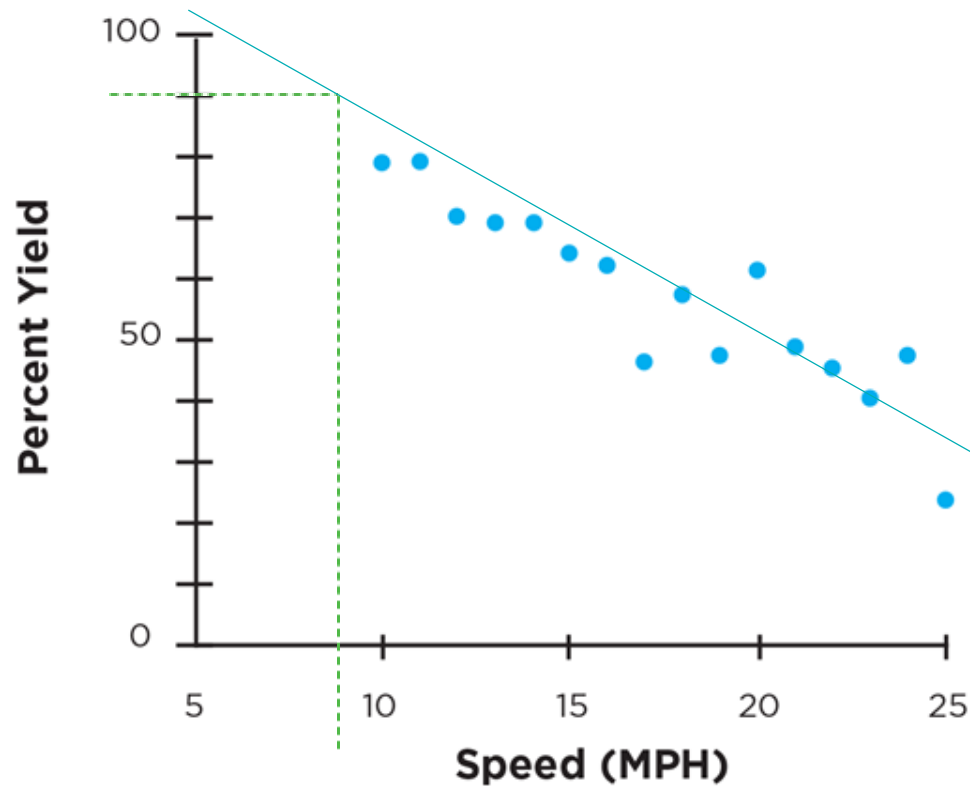
MassDOT Separated Bike Lane Planning & Design Guide



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# Intersection Safety Considerations

Driver Yielding Rates and Travel Speeds at Crossings



# Traffic Calming



Pinch Point



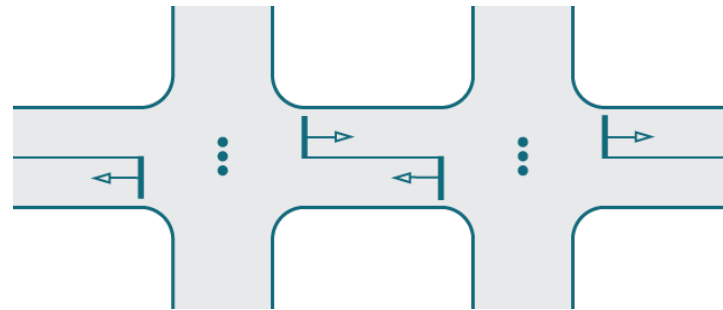
Chicane



Pedestrian Crossing  
Island



Raised Side-Street  
Crossing



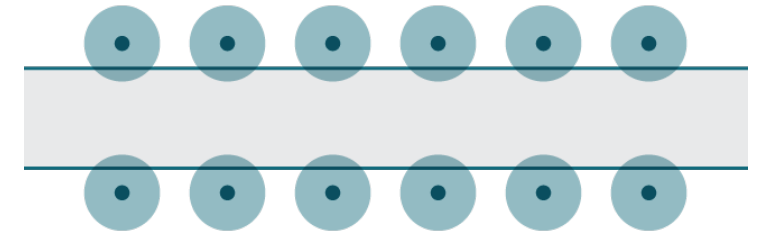
Signal Progression  
(Signals timed to match the  
target speed)



Constrained Sight Lines



On-Street Parking



Street Trees

# Curb Extensions



Western Avenue Before



Western Avenue After

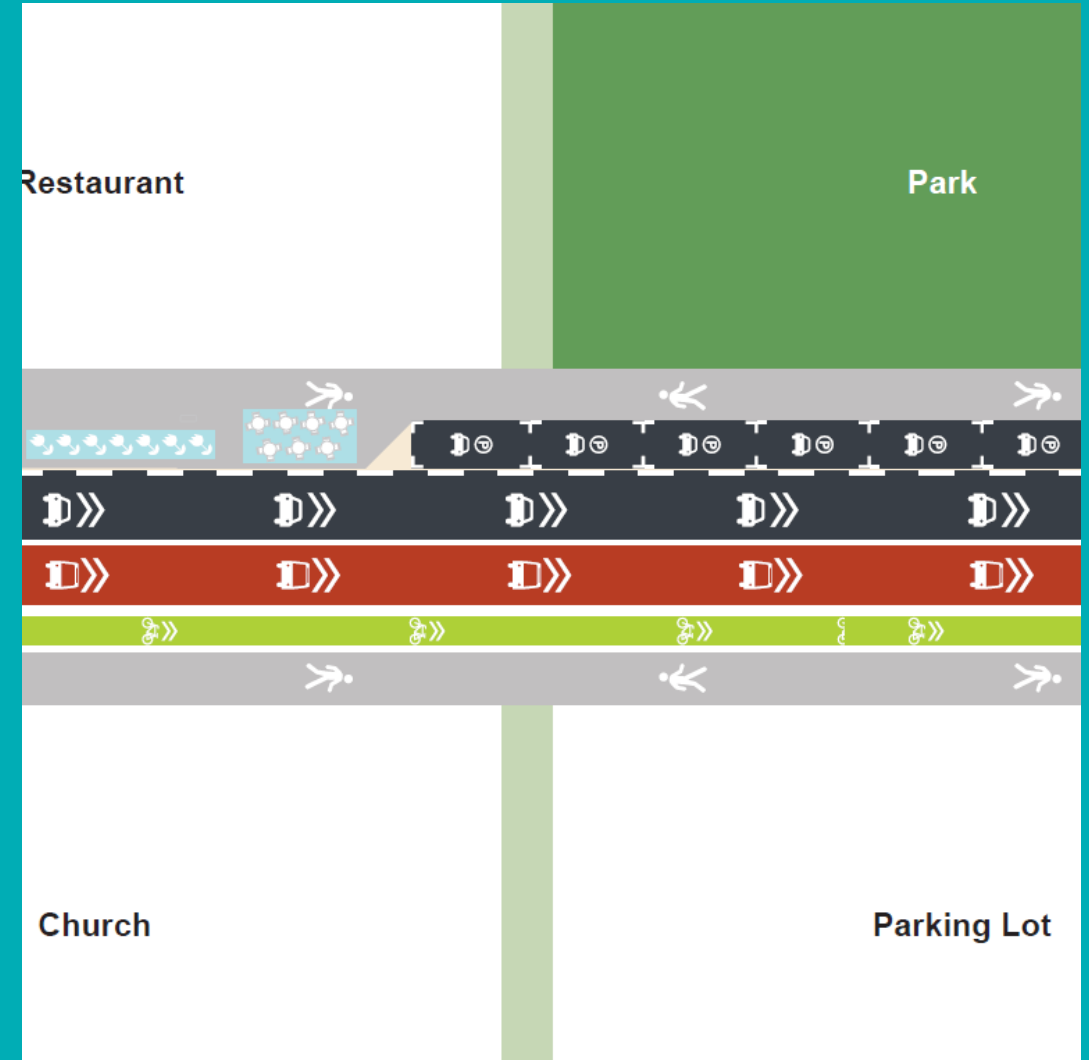




# **Street Design Basics: An Interactive Exercise**

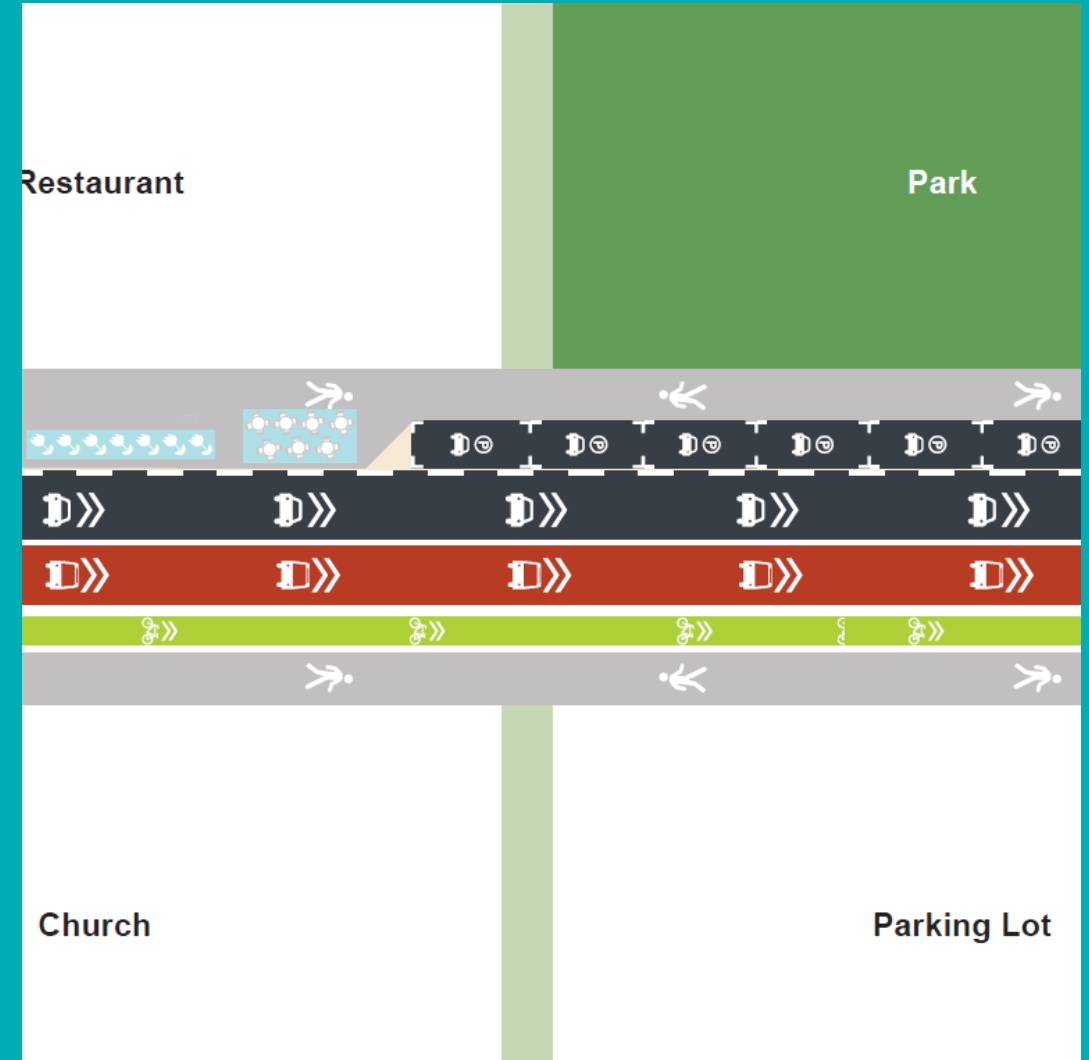
# Goals of the Exercise

- Build a common understanding of the opportunities, constraints, and challenges involved in street design.
- Examine and think about how the group decides between different elements that could be included in a constrained cross-section.



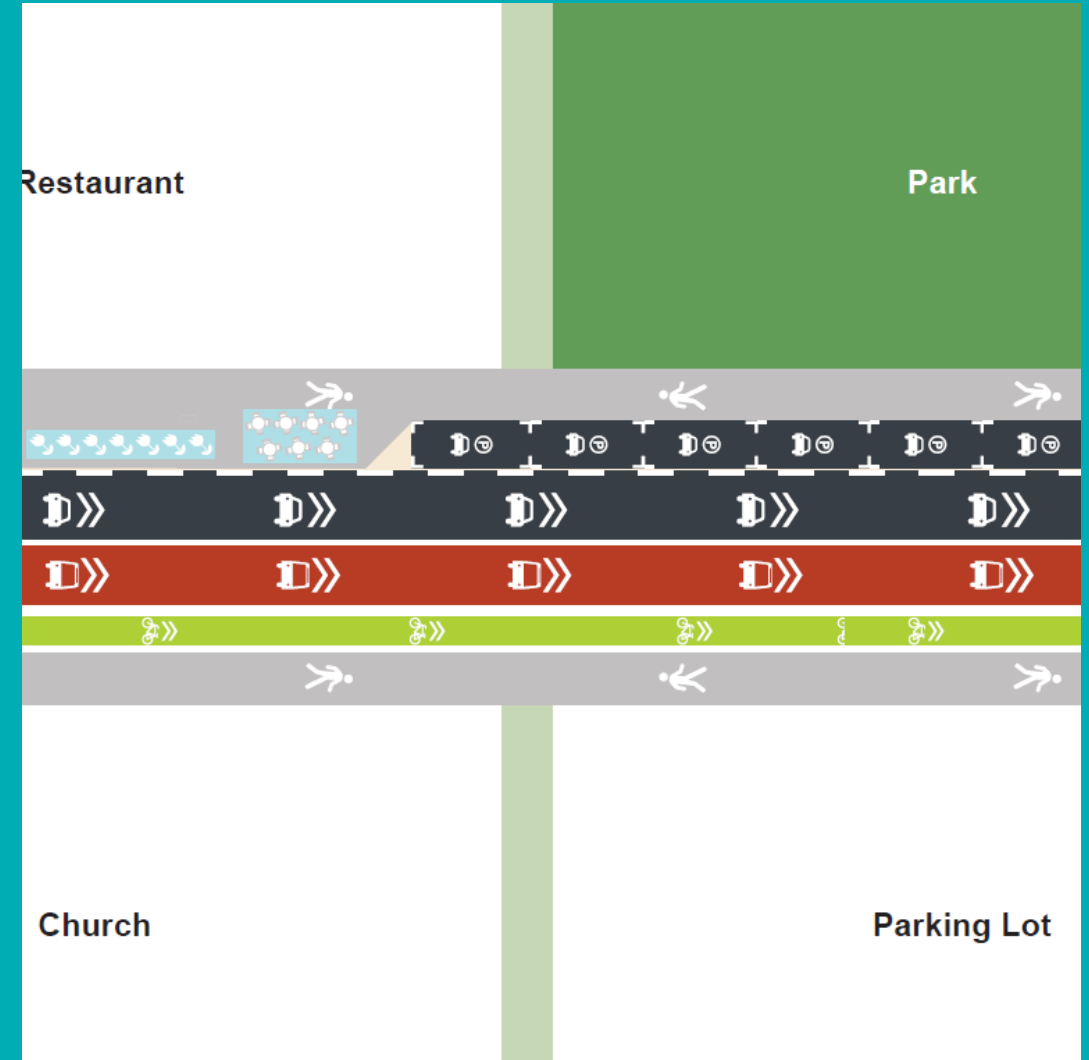
# Basic Directions

- Help us design **Main Street**, a fictional **one-way** street that is **50 feet wide**.
- Each group of 3 to 5 people must agree on one design.
- Pieces must fit inside the right-of-way on the map without overlapping with each other or adjacent buildings.
- Discuss options with your group.
- You have 25 minutes to complete.



# Consider Different Perspectives/Needs

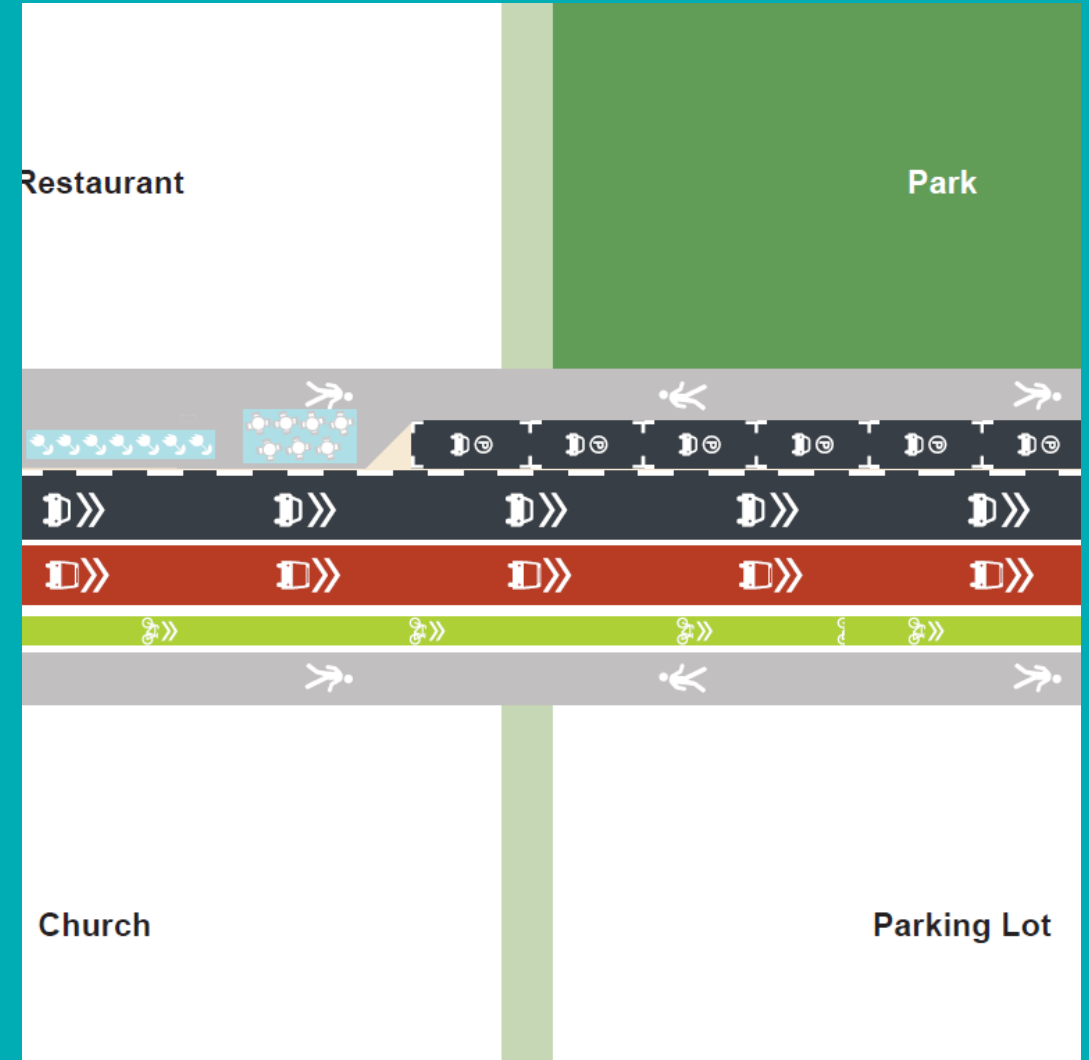
- Business owner
- School children
- Visitor/customer
- Resident
- People with mobility challenges
- Adjacent activities
  - Land use
  - Public transportation
  - Connections/desire lines





# Things you must include

- Sidewalk on both sides of the street
- A separated bicycle lane (at-grade with buffer or raised)
- Vehicle travel lane(s) for one-way travel
- Each group of 3 to 5 people must agree on one design



# Step One: Mobility

- Sidewalks (with street trees included)
  - 8' wide (current)
  - 10' wide (widened)
- Bus Lanes (11' wide)
- Bike Lanes
  - At-Grade w/Buffer (8' wide minimum)
  - Raised/Grade-separated (6' wide minimum)
- Vehicle lanes (10.5' wide)
- Crosswalk (10' wide)

# Step 2: Curbside

- Curb Extensions (7' wide)
    - Planted
    - Paved
  - Buffer (4' wide)
    - Planted
    - Painted
    - Paved
  - Loading/Parking/Storage (7' wide minimum)
    - Could be for commercial/loading, pick up/drop off, 15-minute, metered, residential or ?
- Note that curbside can also be used for:***
- Bicycle facilities
  - Additional sidewalk
  - Bus / travel lanes

# Step 3: Street Furniture (not to scale)

- Bench
- Bike racks
  - Single
  - Multiple
- Blue Bikes Docking Station
- Bus Shelter
- Café Seating
  - Narrow
  - Wide
- Planters
  - Narrow
  - Wide

# Design Goals

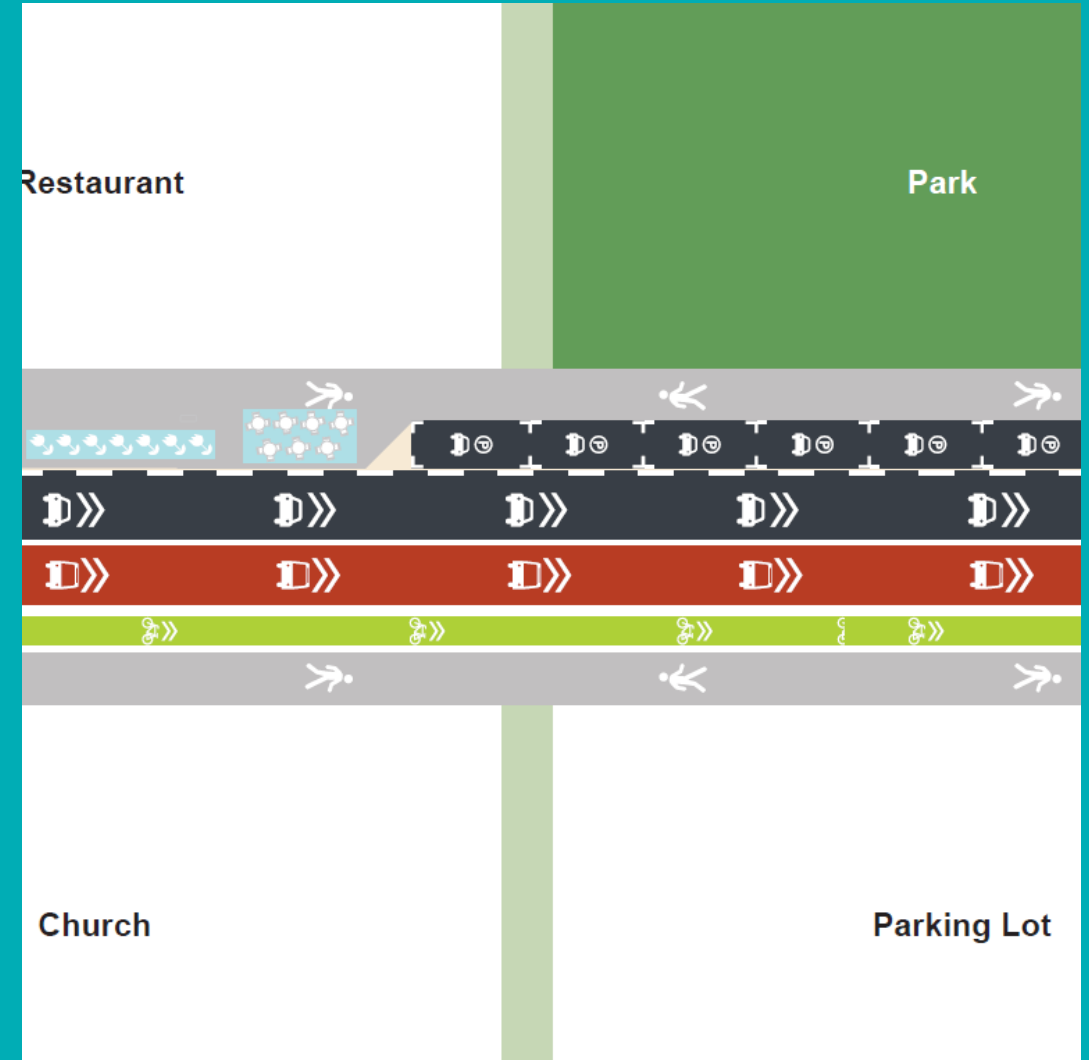
- Safe
- Inclusive
- Human Scale
- Ecological
- Multimodal
- Activated
- Resilient



**Western Avenue**

# Discussion

- What transportation modes did you include?
- What makes this street configuration ideal?
- What are this street configuration's pros and cons?



# Next Steps

# Pre-Construction Questionnaire

- To be published soon (watch your email)
- Will become the “Before” survey for the River Street Reconstruction
- When Post-Construction survey is complete, the two will help the City measure the project’s success
- **Please help us distribute to your neighbors!**



# Upcoming Meetings and Events

- **Carl Barron Plaza Design Charrette**
  - Design Charrette 1: Saturday, September 14, 11am-2pm
  - Outdoor Engagement: Saturday, September 14, 3-6pm (Carl Barron Plaza)
  - Design Charrette 2: Tuesday, September 17, 6pm-9pm
- **Working Group #6 Meeting:** Tuesday, September 24, 6-8pm at Manning Apartments
  - Concept plans - Memorial Drive to Franklin Street
  - Surface and subsurface project goals

# Cambridgema.gov/RiverStreet



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344 Broadway

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& ENERGY

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PLANNING &  
URBAN DESIGN

TRANSPORTATION

ZONING &  
DEVELOPMENT

CDD > Projects > River Street Reconstruction

## River Street Reconstruction

The River Street Reconstruction project will upgrade the sanitary sewer, stormwater and water subsurface infrastructure while developing a new surface design for River Street, the bus terminal area at River and Magazine Streets near Central Square, and Carl Barron Plaza. The project aims to create a streetscape design that meets the needs of all the various users and in a way that engages the local community, contributes to overall enhancement of the neighborhood, and meets the City's goals related to infrastructure, transportation, and urban design.

The concurrent design of Carl Barron Plaza, the significant open space at the heart of Central Square will include consideration of public art, fixed and/or unfixed furniture, access, plantings, and landscaping. The design must also consider the complexity of transportation needs related to the bus bays adjacent to the Plaza and people moving through the plaza.

The community outreach and design processes will occur throughout 2019 and into early 2020. Construction is anticipated to begin in Spring 2020.

[Click here to sign up for email updates on this project.](#)

[Click here to provide general comments and feedback.](#)

[Please use this Public Input Map to provide your input on issues and opportunities along River Street and in Carl Barron Plaza.](#)

The Latest

Schedule

Description

Community Process

Documents

Contact

March 2019

### Quick Links

I'd like to learn more about...

Select a Topic

Neighborhood or Square

Select One

Current Projects...

Select One



[Click the Map to Explore Cambridge](#)

**A 5-STAR Community  
and National Leader in  
Sustainability**

**THANK YOU!**

**[riverstreet@cambridgema.gov](mailto:riverstreet@cambridgema.gov)**