



Traffic Signal and Safety Improvements at Interchange 127 (Newton Corner)

Vissim Model Summary

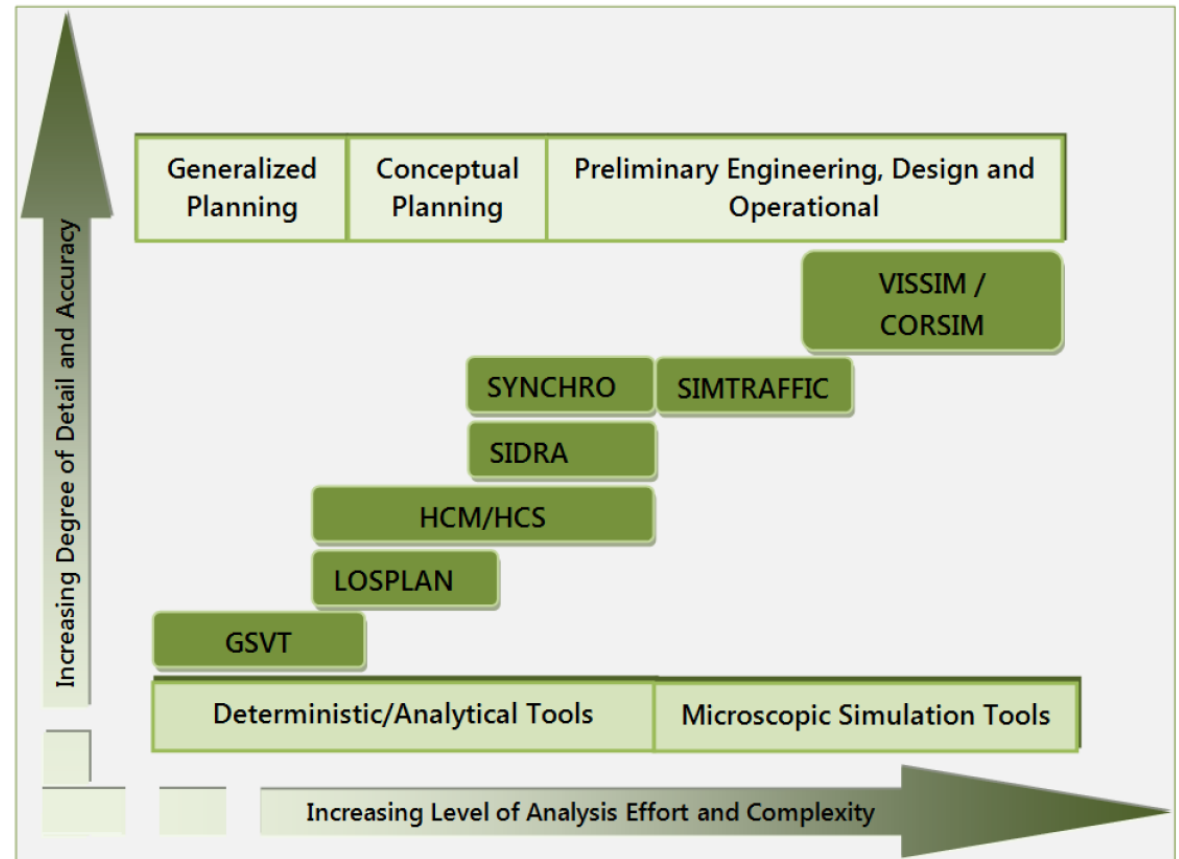
June 2024

Project File No. 609288

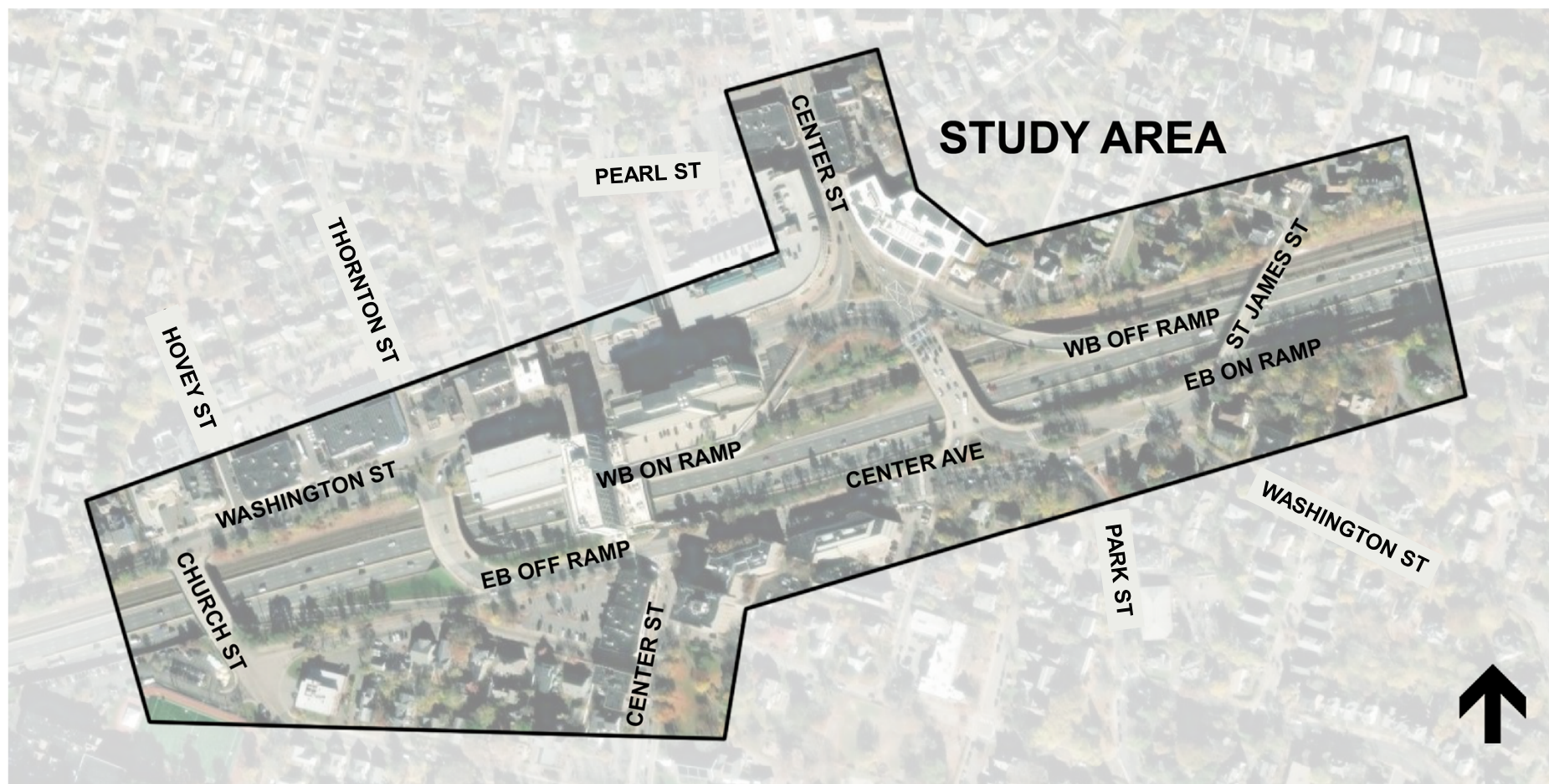


Vissim Software

- VISSIM is a microsimulation transportation planning and operations software package designed to provide a visual and technically based analytical representation of traffic operations for a full range of functionally classified roadways.
- Microscopic, time step, behavior-based multi-modal traffic simulation model



Vissim Model Study Area



Vissim Model Objectives

- Modeled preferred concepts in each quadrant to understand how they work together.
- Identify additional details to be revised during design process.
- Note: Traffic operations is just one component of the evaluation criteria. Other factors considered include:
 - Safety
 - Multimodal Infrastructure
 - Transit
 - Land Use / Placemaking
 - Property Access

Project Goals

Enhance Safety



Improve Traffic Operations
& Reduce Congestion



Expand Multimodal Infrastructure



Improve Transit



Land Use/Placemaking



Property Access & Parking



Existing Condition Model Methodology

- Modeled weekday morning and evening peak periods
- Existing Infrastructure and Volumes
 - 2022 existing traffic volumes at all intersections
 - Traffic volumes collected at all study area intersections in 2018 to 2019
 - Volumes collected at key locations in 2022 and used to adjust volumes at all other intersections to represent 2022 conditions
 - Existing geometry based on field inventories in 2022
 - Signal timings based on inventories in 2022
- Calibrated Model against:
 - 2022 Volumes
 - 2022 queue observations

Future Conditions Model Assumptions

Future No-Build Conditions

- 2032 future traffic volumes at all intersections
 - Based on existing traffic volumes with future volumes added to be generated by regional traffic growth and specific planned/proposed developments in Newton, Watertown, and Brighton
- Existing geometry
- Existing signal timings
- MBTA routes updated to reflect Better Bus Network Redesign as of 2023.

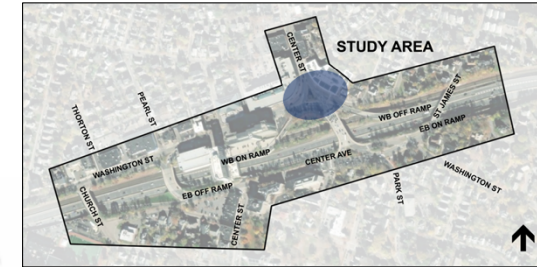
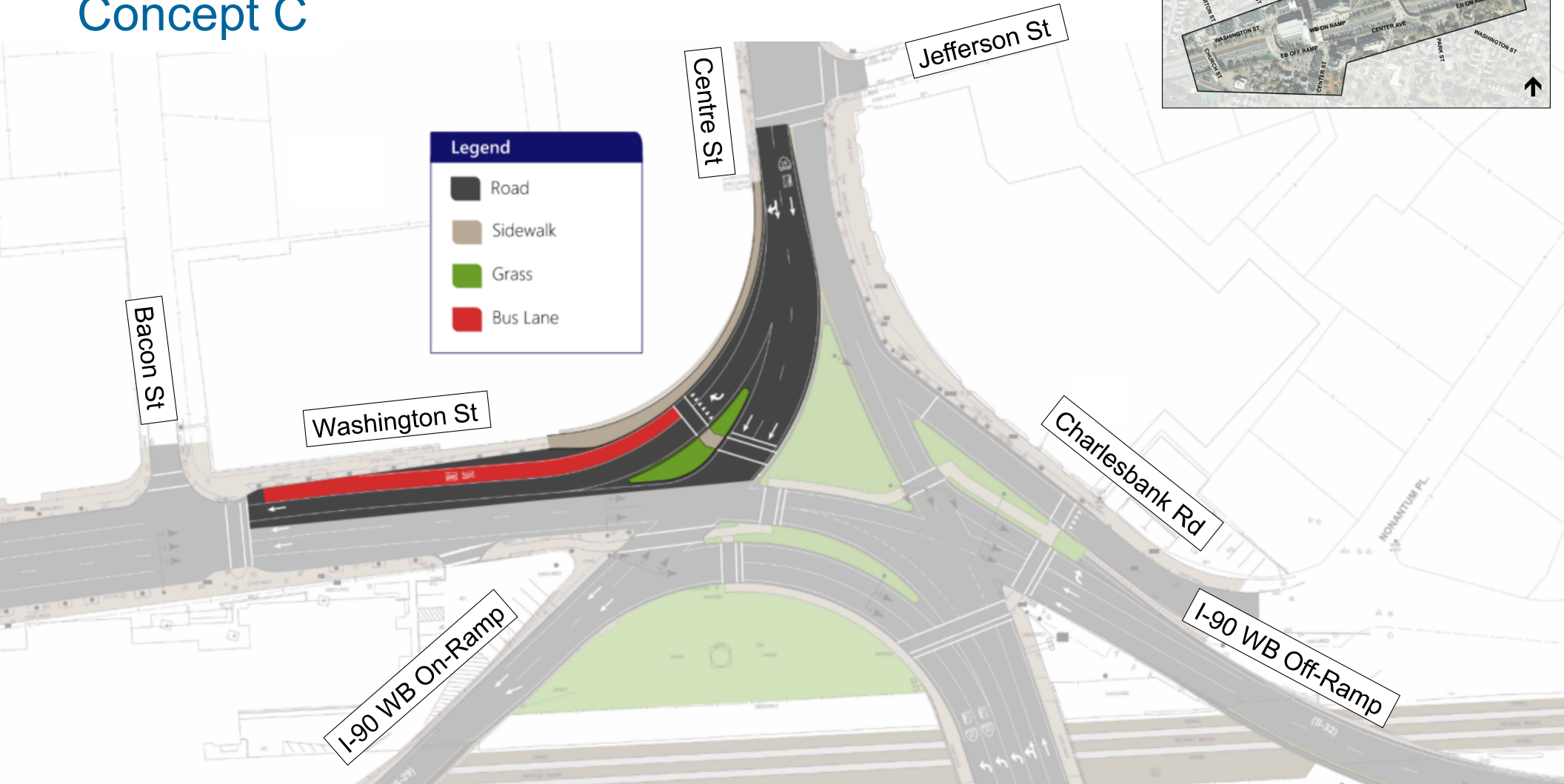
Future Preferred Concept Conditions

- Future No-Build 2032 future traffic volumes at all intersections
- Proposed geometry and signal timings based on preferred concepts for each quadrant

Vissim Overall Results

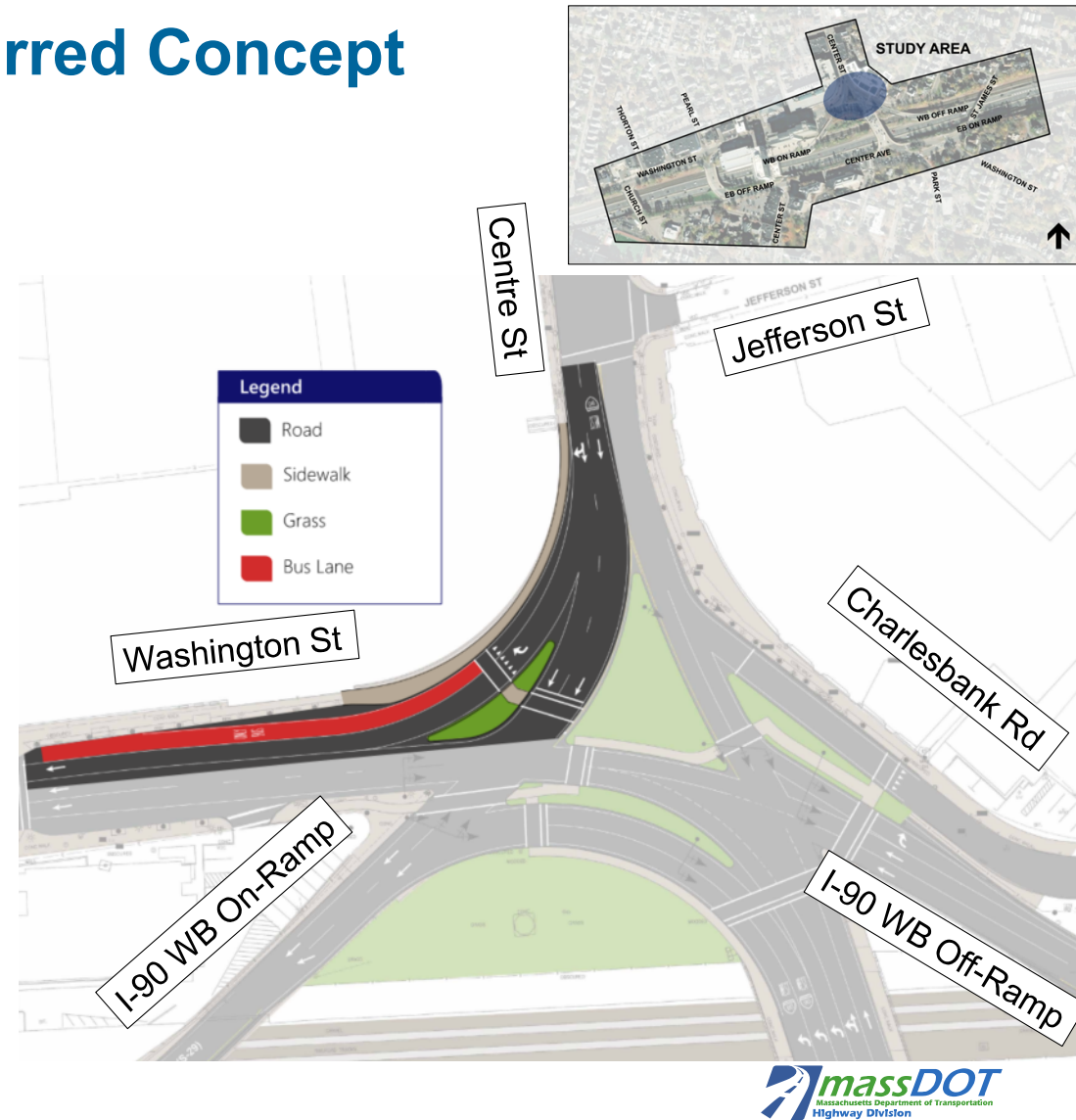
- Within the study area, congestion is still expected to occur in the Future even with the Preferred Concept.
- The Preferred Concept prioritizes improving safety by adding traffic signals to control traffic flow. While this will remove weaving conditions within Newton Corner, it will also increase delays by having vehicles stop at red lights where today there is no stopping.
- As the Preferred Concept moves into the design phase, design details will be determined, including detailed coordinated signal timing patterns for all intersections within the study area.
 - This would allow intersections to operate more efficiently and process additional vehicular demand
 - Adaptive signal infrastructure should be considered during design phase.
- The geometry and lane designation along Centre Avenue eastbound should be further designed to minimize weaving conflicts while accommodating all movements.

Northeast Quadrant — Preferred Concept Concept C



Northeast Quadrant — Preferred Concept

- Issues:
 - Lack of pedestrian crossings
 - Currently only one lane from Centre Street SB onto I-90 WB On-Ramp, but informally used as two lanes
- Changes Modeled:
 - Formalized 2nd southbound lane onto I-90 WB On-Ramp
 - Dedicated bus lane in area of existing MBTA bus stop
 - New pedestrian crossings on northwest, northeast and southeast areas
- Operational Results:
 - Reduced delay for Washington Street Bridge northbound onto I-90 Westbound movement
 - Reduced queues for entire Washington Street Bridge northbound approach
 - Reduced queues for Centre Street southbound approach

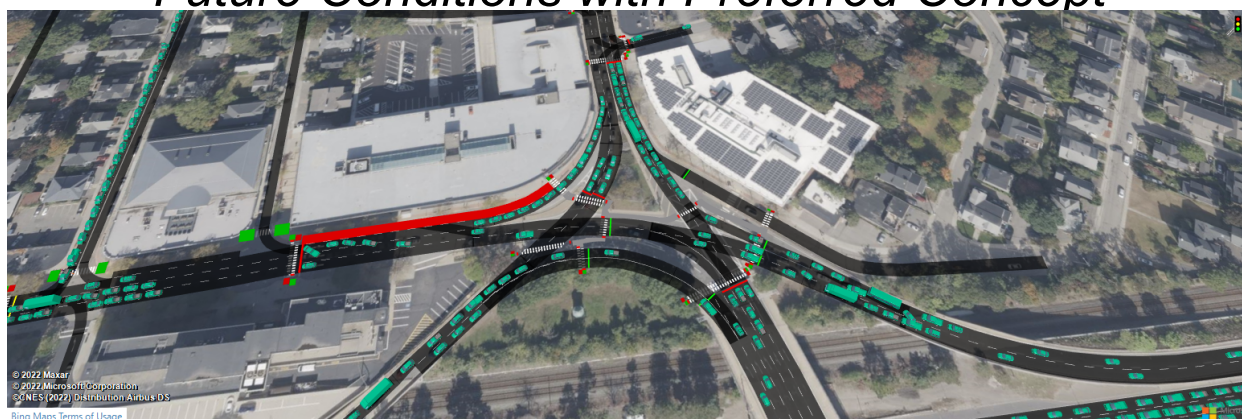


Northeast Quadrant – Vissim Model

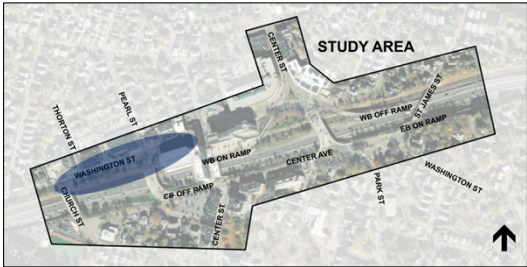
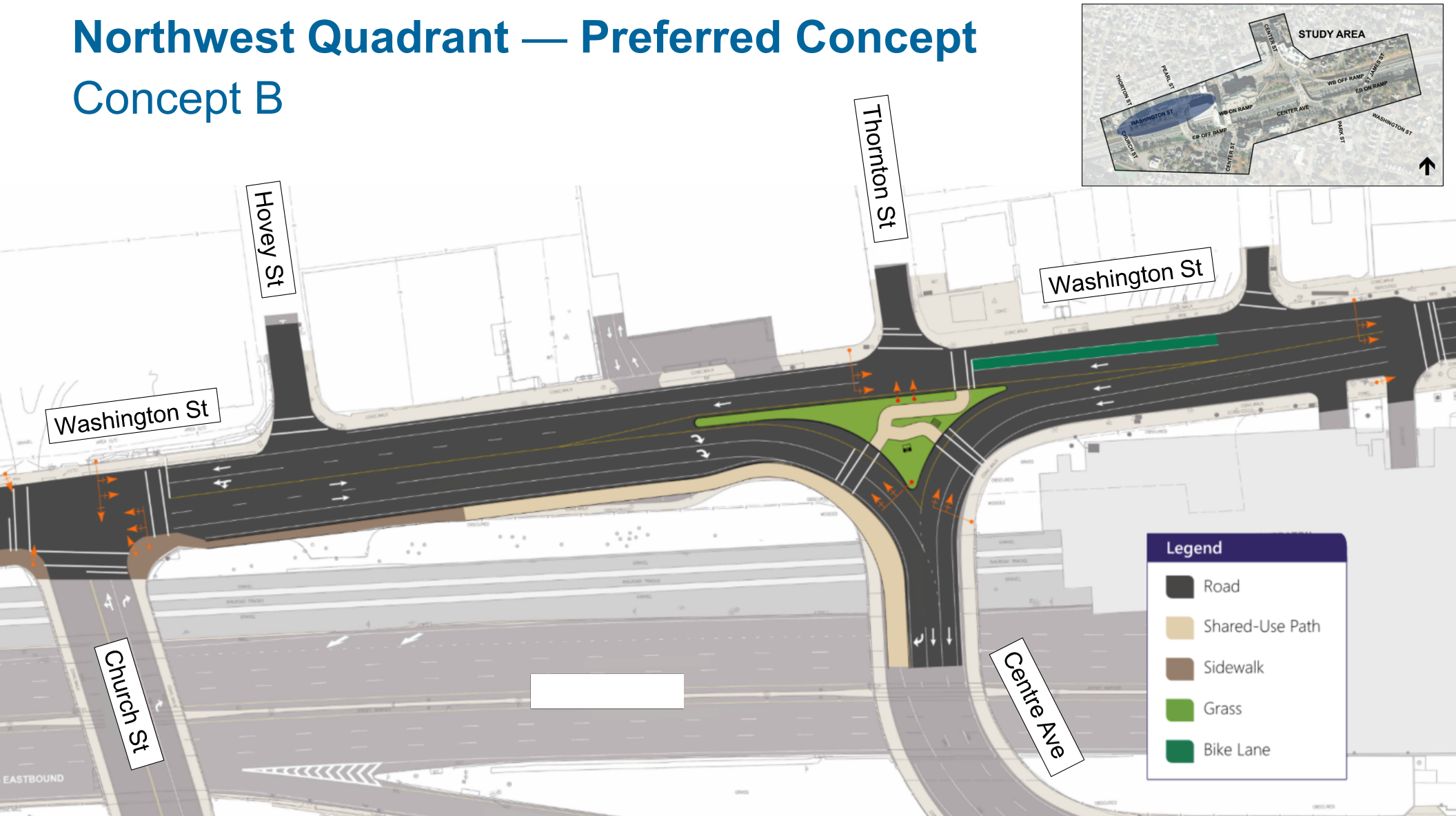
Future No Build Conditions



Future Conditions with Preferred Concept

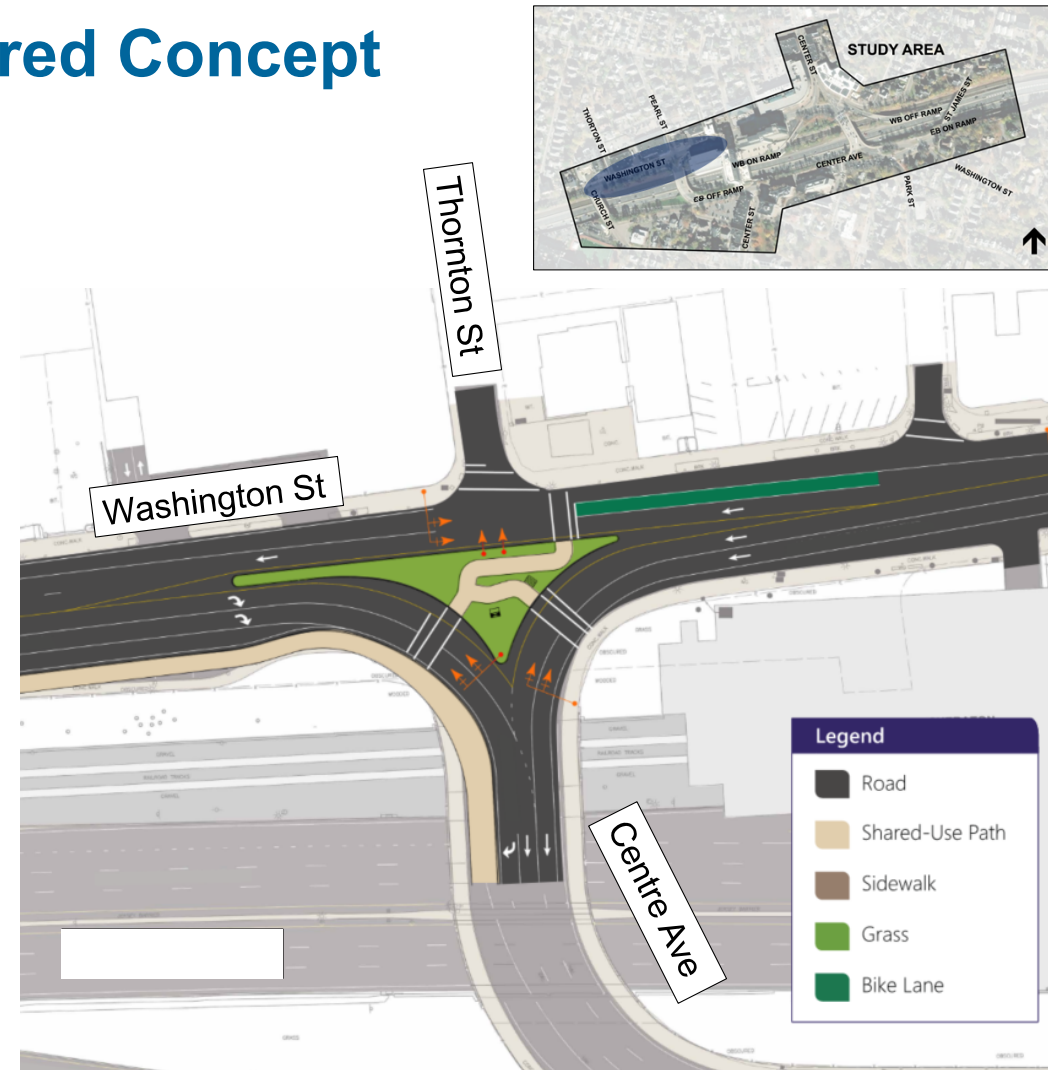


Northwest Quadrant — Preferred Concept Concept B



Northwest Quadrant — Preferred Concept

- Issues:
 - Lack of pedestrian crossings
 - Difficult weaving maneuvers on the bridge
- Changes Modeled:
 - Signalized the EB and WB approaches to the bridge and Wash St WB at Thornton St
 - One single lane for through movements on Washington St WB
 - New pedestrian crossings connecting to the center median
- Operational Results:
 - While the new signal will help control a challenging weave, both Washington Street approaches will experience some additional delay where today drivers are not required to stop
 - Queues at the new signal not expected to extend to upstream intersections at Church Street and Peabody Street

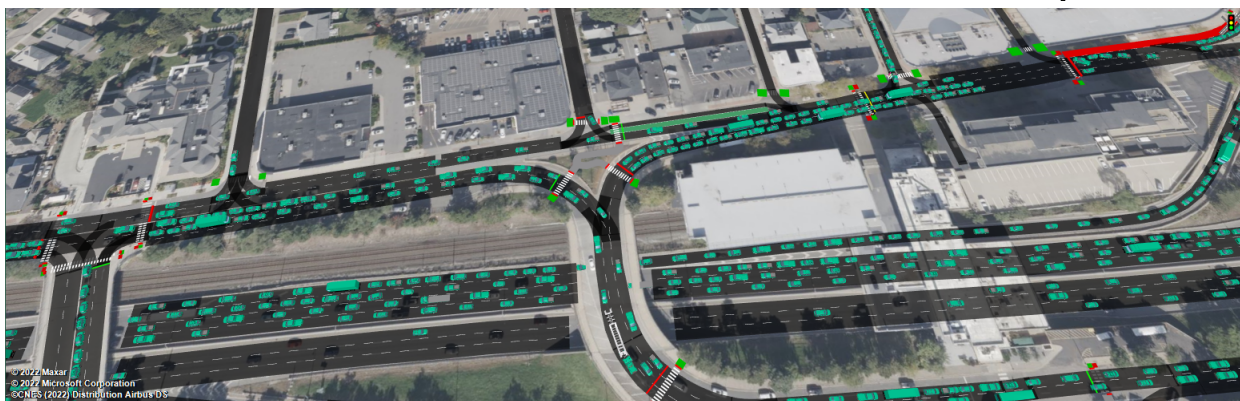


Northwest Quadrant – Vissim Model

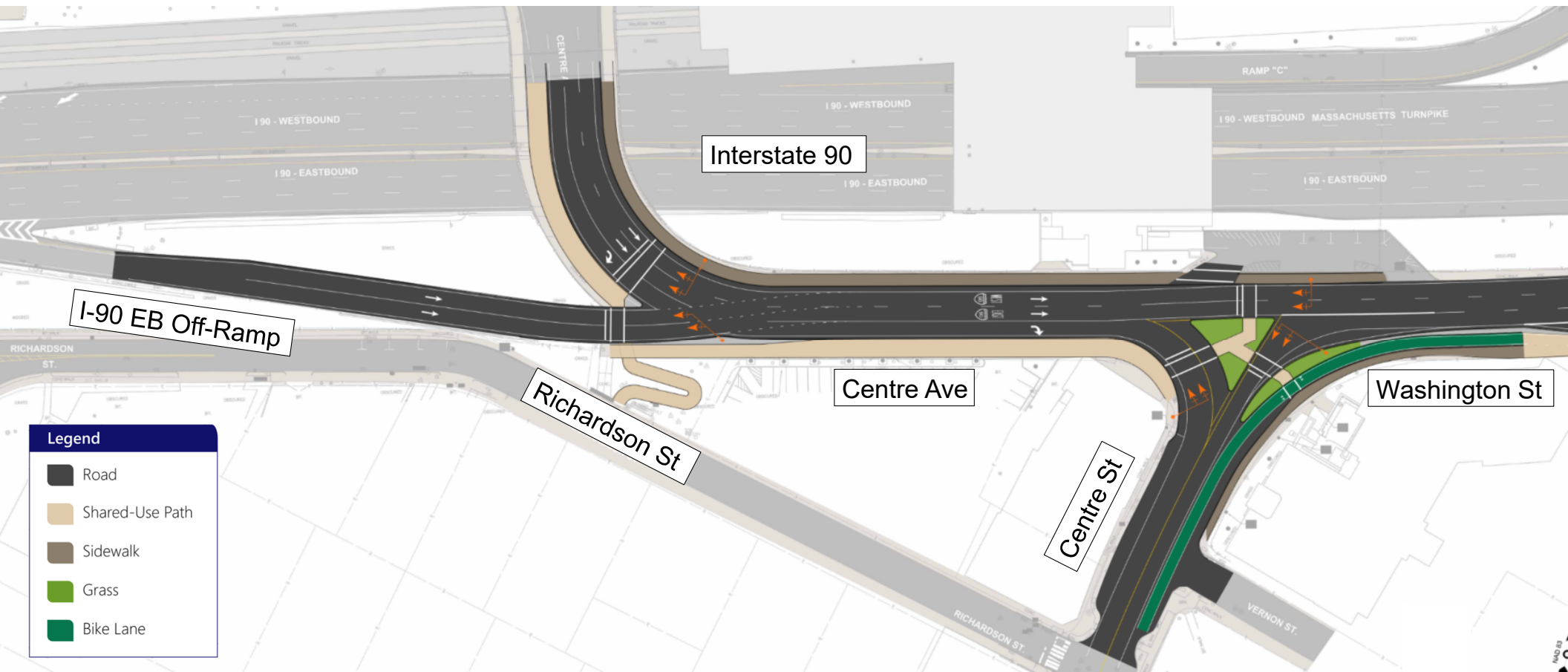
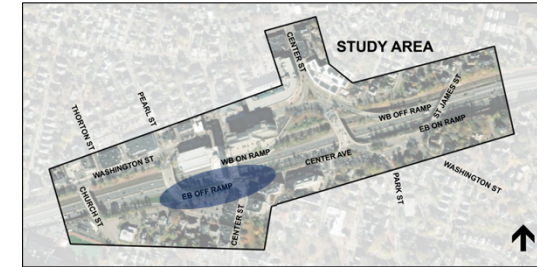
Future No Build Conditions



Future Conditions with Preferred Concept

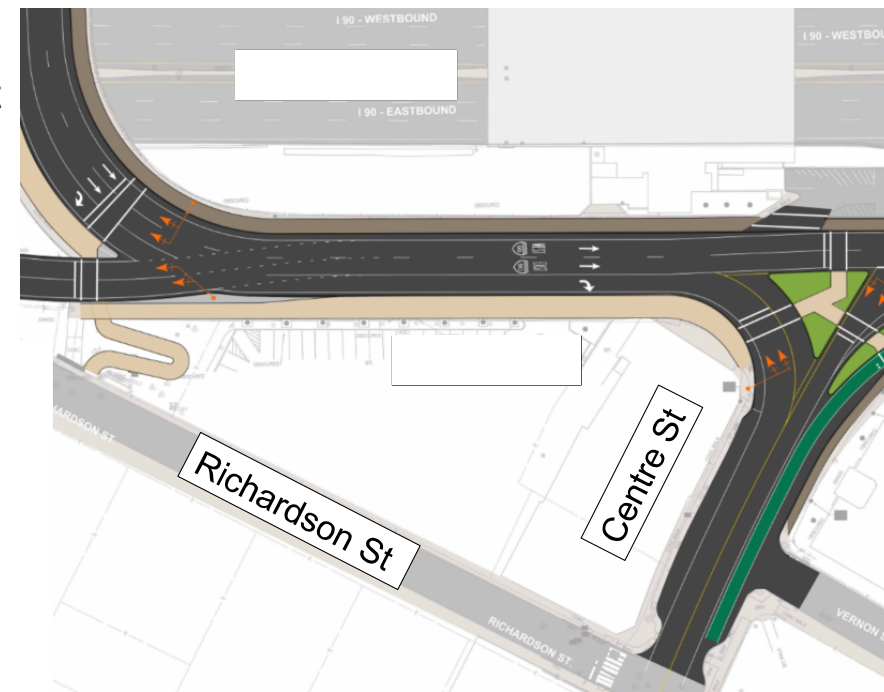
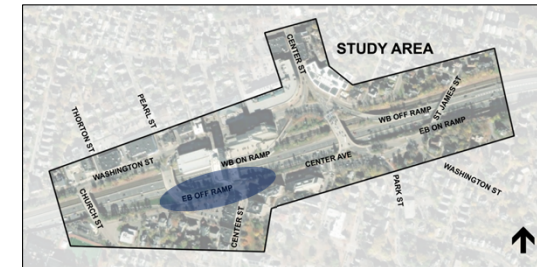


Southwest Quadrant — Preferred Concept Concept B



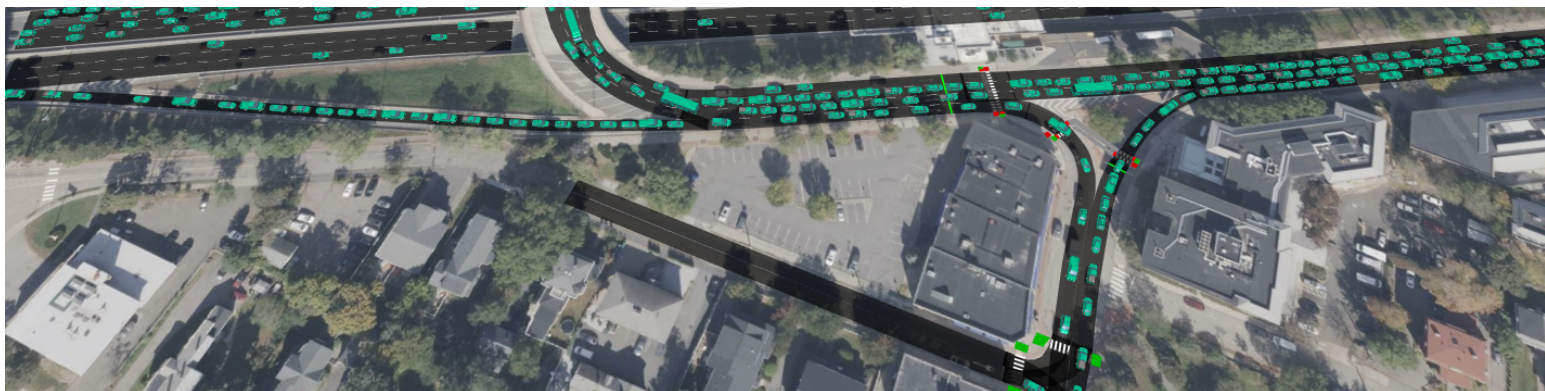
Southwest Quadrant — Preferred Concept

- Issues:
 - Lack of pedestrian crossings
 - Long queues on the I-90 EB off-ramp
 - Weaving maneuvers between off-ramp and Centre St
- Changes Modeled:
 - Signalized the Off-Ramp at Centre Ave EB and included pedestrian crossings
 - Two lanes on the I-90 EB Off-Ramp
 - Three lanes on Centre Ave EB bet Centre St
- Operational Results:
 - EB Off-Ramp Queues will be reduced by up
 - Signal timing adjustments could handle demand of I-90 EB Off-Ramp and approaches
 - All movements at intersection of Centre St to operate at LOS D or better

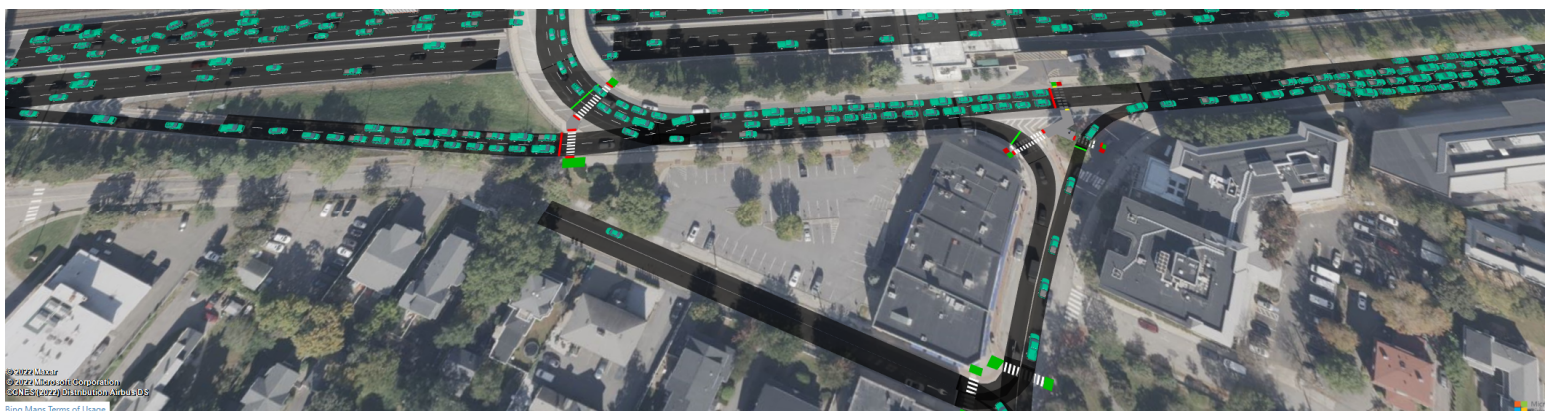


Southwest Quadrant – Vissim Model

Future No Build Conditions



Future Conditions with Preferred Concept

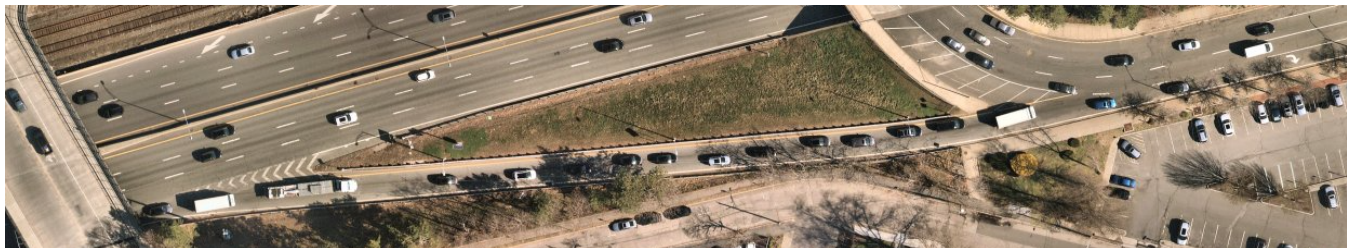


I-90 EB Off-Ramp – Queue Summary

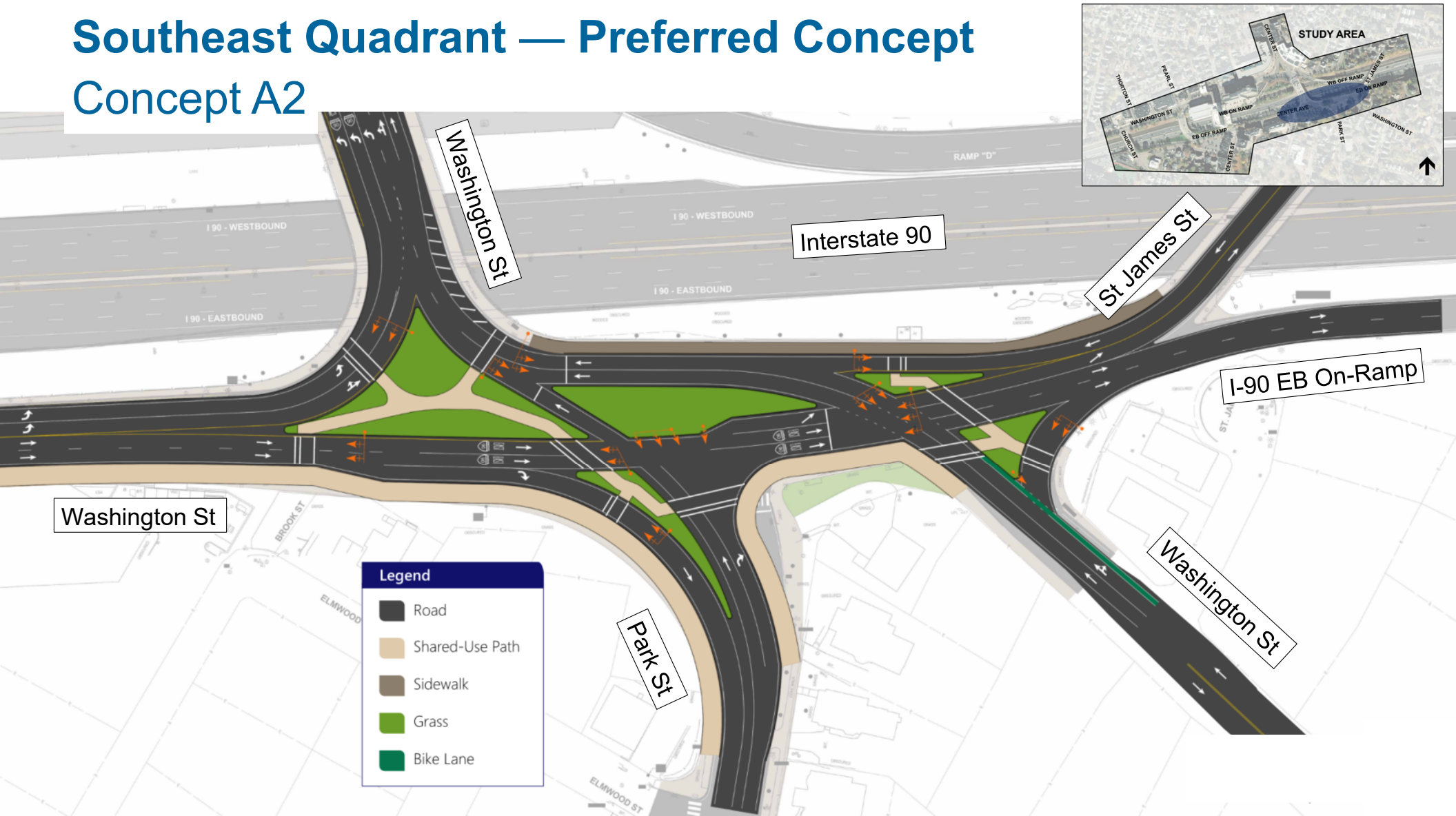
I-90 EB Off-Ramp at Centre Avenue EB (aka Washington Street EB)

Condition	Future No Build	Future with Preferred Concept	Change
<u>Weekday Morning</u>			
Average Queue (ft)	2,992	1,780	-1,212
95 th Queue (ft)	3,049	2,765	-284
<u>Weekday Evening</u>			
Average Queue (ft)	2,994	2,389	-605
95 th Queue (ft)	3,043	3,030	-13

Note: Off-ramp is unsignalized under Existing and Future No Build Conditions and is signalized under Future with Preferred Concept Conditions.

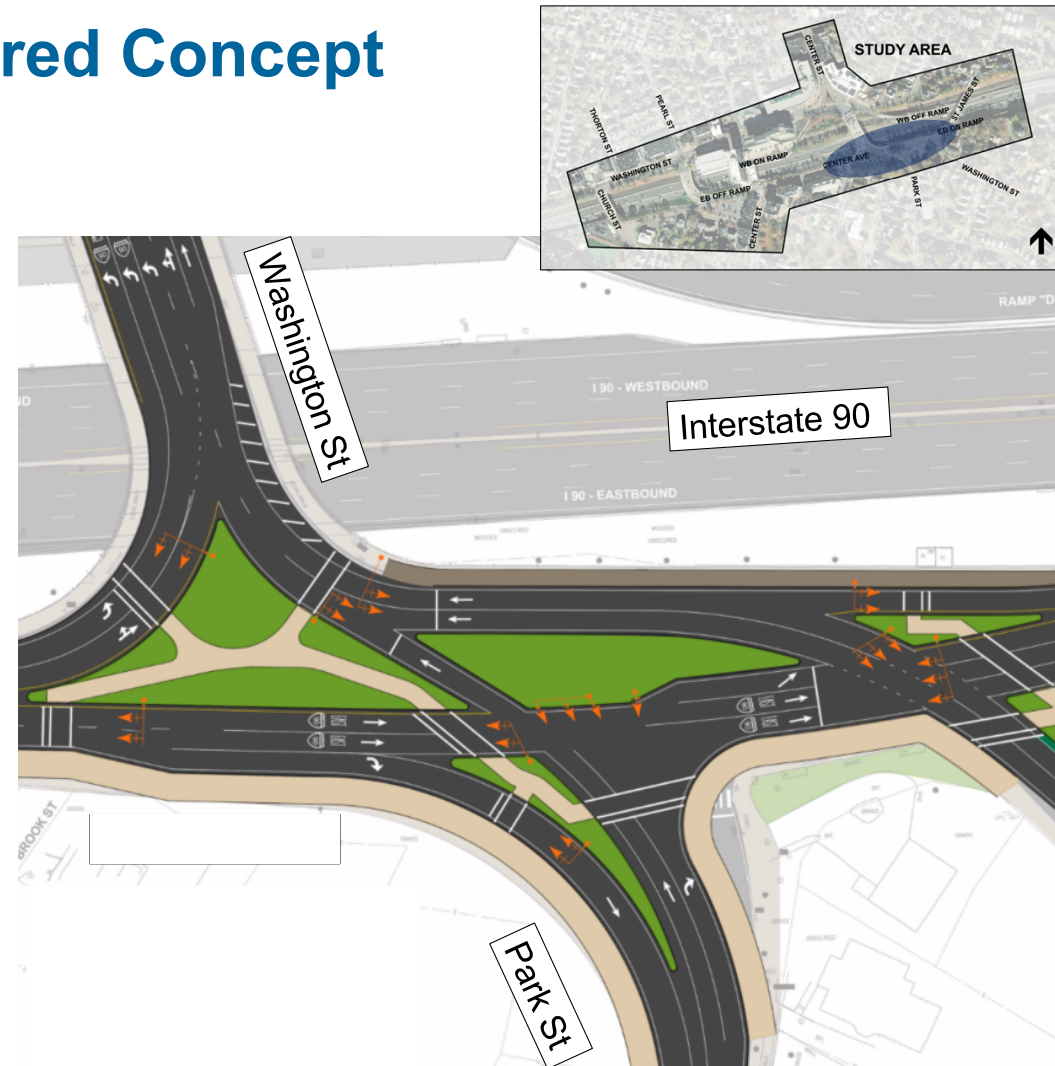


Southeast Quadrant — Preferred Concept Concept A2



Southeast Quadrant — Preferred Concept

- Issues:
 - Difficult weaving maneuvers on the bridge
 - Crosswalks not located in most desirable locations
- Changes Modeled:
 - Signalized the EB and WB approaches to the bridge
 - Revised lane geometry for Wash St EB
 - Updated signal timings at all intersections
- Operational Results:
 - No increase to queues at most approaches within quadrant
 - Reduced queues for Washington Street NB approach (coming from Brighton)
 - New signals at base of bridge help control weaving, improving safety and reducing queues on the bridge.



Southeast Quadrant – Vissim Model

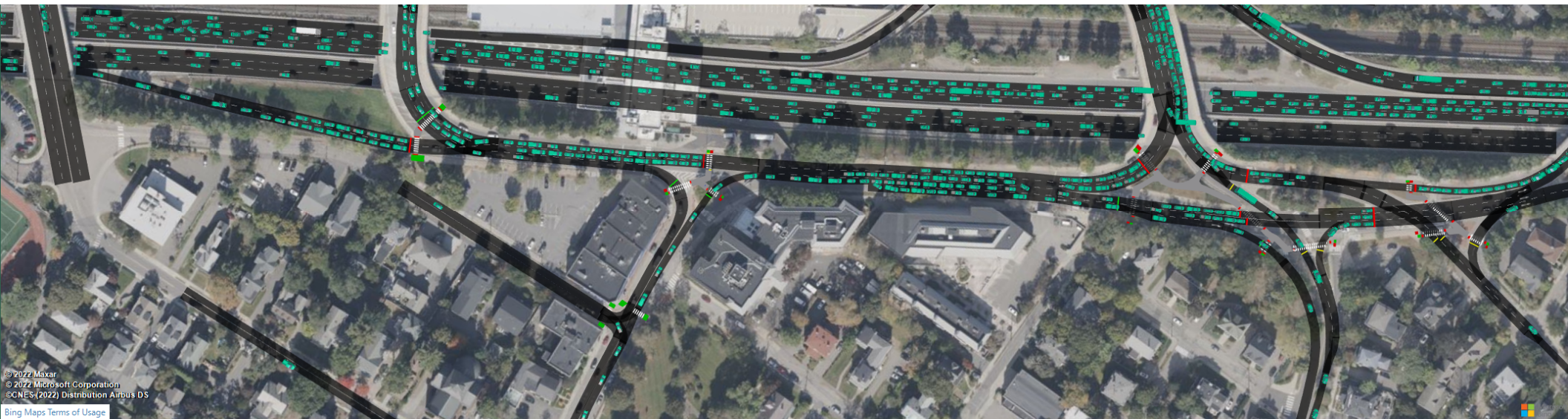
Future No Build Conditions



Future Conditions with Preferred Concept



Centre Avenue / Washington Street EB – Vissim Model

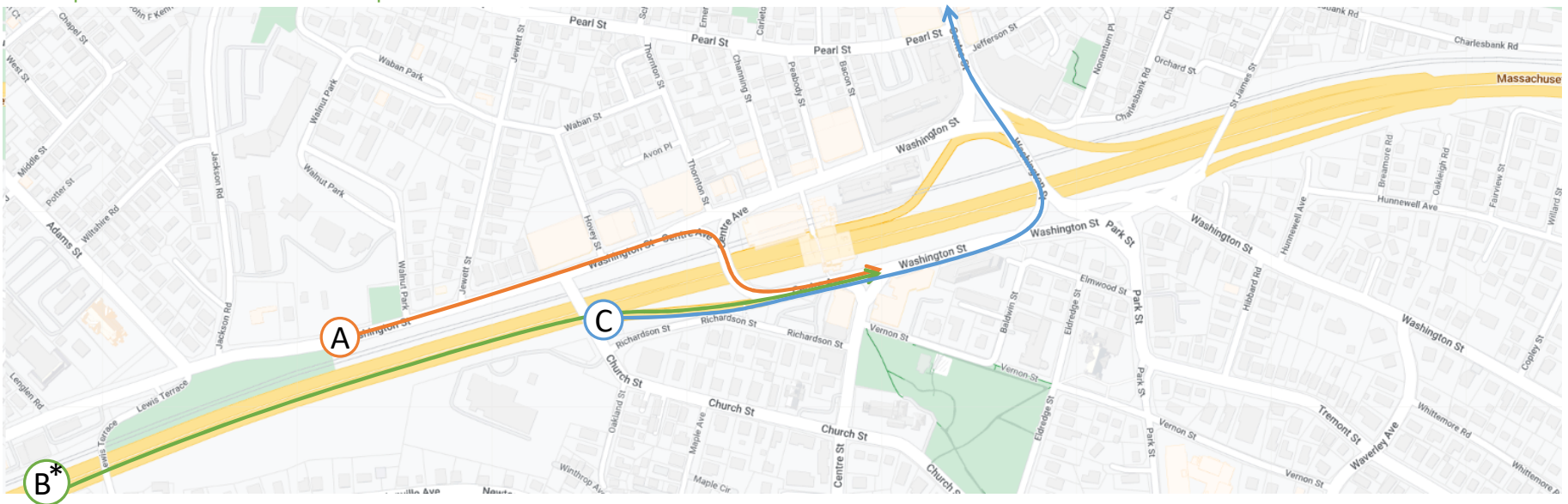


- The geometry and lane designation along Centre Avenue eastbound should be further designed to minimize weaving conflicts while accommodating all movements.

Vissim Travel Time Analysis Results

Travel Time (minutes)		Future No-Build	Future with Preferred Concept	% Change from No-Build
Weekday Morning				
A	Washington St EB from Walnut Park to Centre St (south)	2 min	6 min	+ 4 min
B	I-90 EB* to Washington St EB at Centre St (south)	>20 min	9 min	- 10 min
C	I-90 EB Off-Ramp to Centre St NB at Pearl St	5-6 min	7-8 min	+ 2 min
Weekday Evening				
A	Washington St EB from Walnut Park to Centre St (south)	3-4 min	11-12 min	+ 8 min
B	I-90 EB* to Washington St EB at Centre St (south)	>20 min	10 min	- 10 min
C	I-90 EB Off-Ramp to Centre St NB at Pearl St	7-8 min	7-8 min	n/a

*Start point 1.6 mi before exit ramp



Vissim Travel Time Analysis Results

Travel Time (minutes)		Future No-Build	Future with Preferred Concept	Change from No-Build
Weekday Morning				
A	Centre St SBR from Pearl St to Bacon St	1-2 min	2-3 min	+ 1 min
B	Centre St NB from Richardson St to I-90 WB On-Ramp	1-2 min	3-4 min	+ 2 min
C	Washington St NB from Waverley Ave to I-90 WB On-Ramp	2-3 min	2-3 min	n/a
Weekday Evening				
A	Centre St SBR from Pearl St to Bacon St	1-2 min	4-5 min	+ 3 min
B	Centre St NB from Richardson St to I-90 WB On-Ramp	3-4 min	3-4 min	n/a
C	Washington St NB from Waverley Ave to I-90 WB On-Ramp	3-4 min	2-3 min	- 1 min

