

# I-91 VIADUCT STUDY

Springfield, Massachusetts



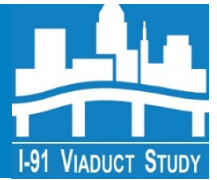
## Public Meeting #3

Sheraton Springfield Monarch Place Hotel  
One Monarch Place – The Mahogany Room  
Springfield, Massachusetts

September 12, 2018



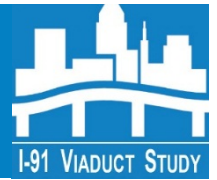
# Welcome & Introductions



- Ethan Britland – Project Manager (MassDOT)
- Michael Clark – Project Manager (MassDOT)
- Mark Arigoni, LA – Principal-in-Charge (MMI)
- Van Kacoyannakis, PE – Traffic (MMI)
- John Hoey - QA/QC (MMI)
- Sarah Paritsky – Public Involvement (Regina Villa)
- Emily Christin – Public Involvement (Regina Villa)



# Agenda



- Welcome and Introductions
- Study Progress & Alternatives Review
- Refresher of the Evaluation Criteria
- Short and Mid-term Improvements
- Draft Recommendations
- Next Steps

# I-91 Viaduct Study Goals, Objectives, and Evaluation Criteria



- **Mobility and Connectivity** – maintain and improve the efficient function of I-91, I-291, associated ramps, and key intersections in the study area, encouraging mode shift through improved bike/ped functionality
- **Safety** – improve bike/ped and vehicular safety throughout the study area, as well as public safety adjacent to the viaduct
- **Environmental Effects** – improve air quality, reduce noise impacts, and decrease environmental impacts such as wetlands incursion and pavement footprint
- **Land Use and Economic Development** – enhance access to existing development parcels and establish new development parcels, while creating more attractive, economically viable riverfront connections
- **Community Effects** – provide fair and equitable treatment for Environmental Justice populations and improve the visual perception of the viaduct
- **Cost** – estimate construction and **long-term** maintenance costs

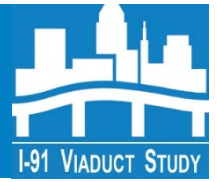


# Project Review: Alternatives Development



- Ten alternatives initially developed
- Additional Assessment Effort (West Side Alternatives)
- 11 Working Group Meetings (WGMs)
- Three Public Meetings (including tonight)
- Three alternatives advanced for analysis
  - Sunken Highway following Current Alignment
  - Sunken Highway following Modified Alignment
  - Reconstructed Elevated Highway
- Detailed Evaluation Criteria Analysis: Alternatives developed to achieve favorable outcomes by balancing community, environmental impacts, engineering complexity, ease of implementation, and costs

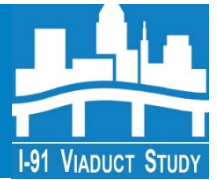
# Refresher of Three Alternatives



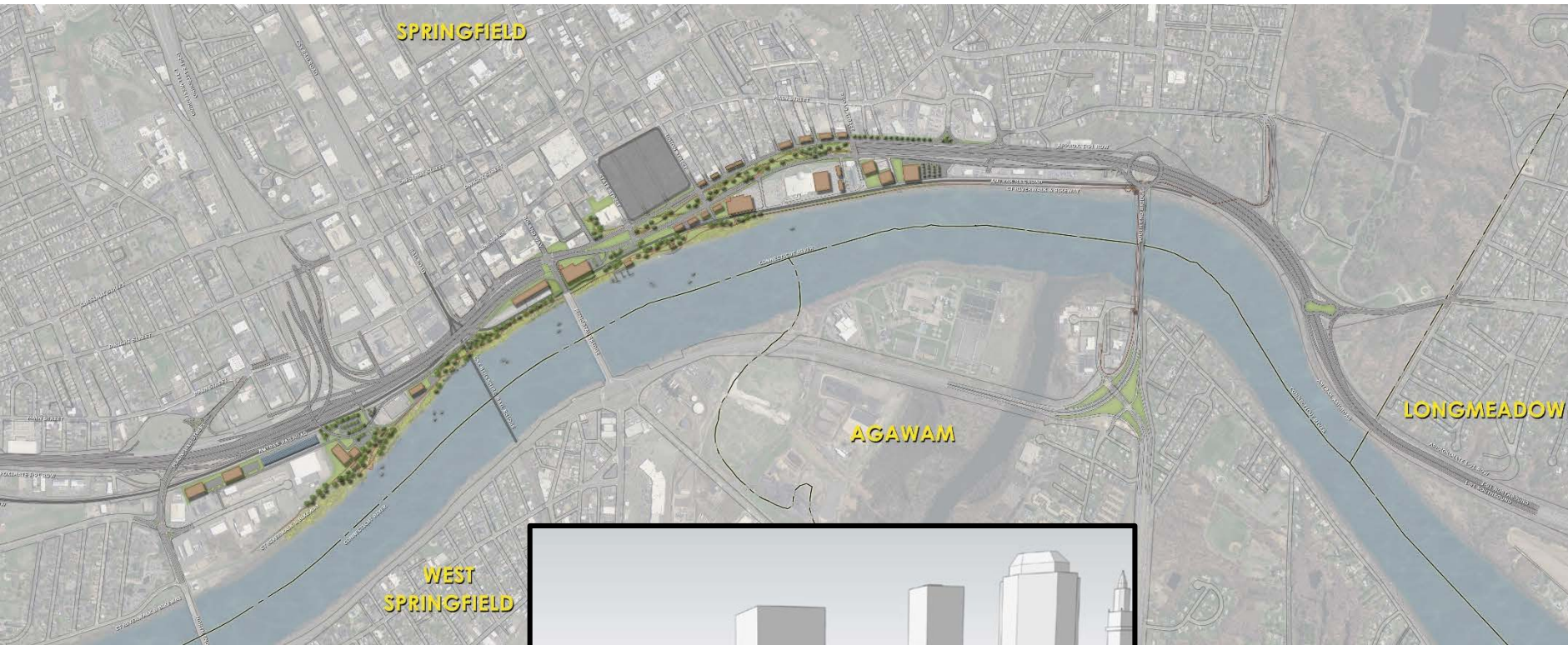
1. Sunken, Tunnel, or Combination(s) following current I-91 Alignment
2. Sunken, Tunnel, or Combination(s) following modified I-91 Alignment (section of combined rail and highway corridor)
3. Reconstructed Elevated Structure (Modern Viaduct)



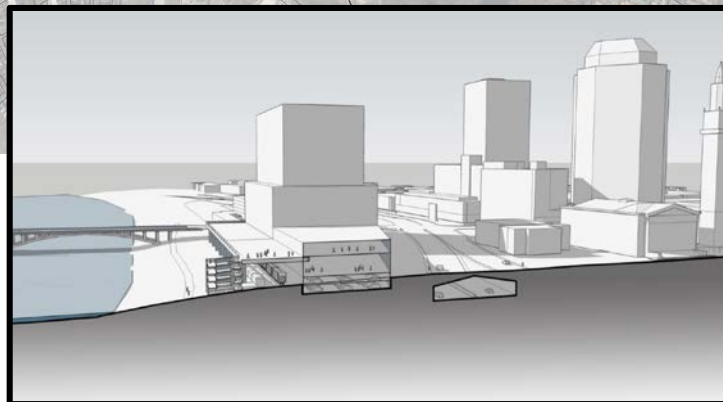
# Alternative No.1



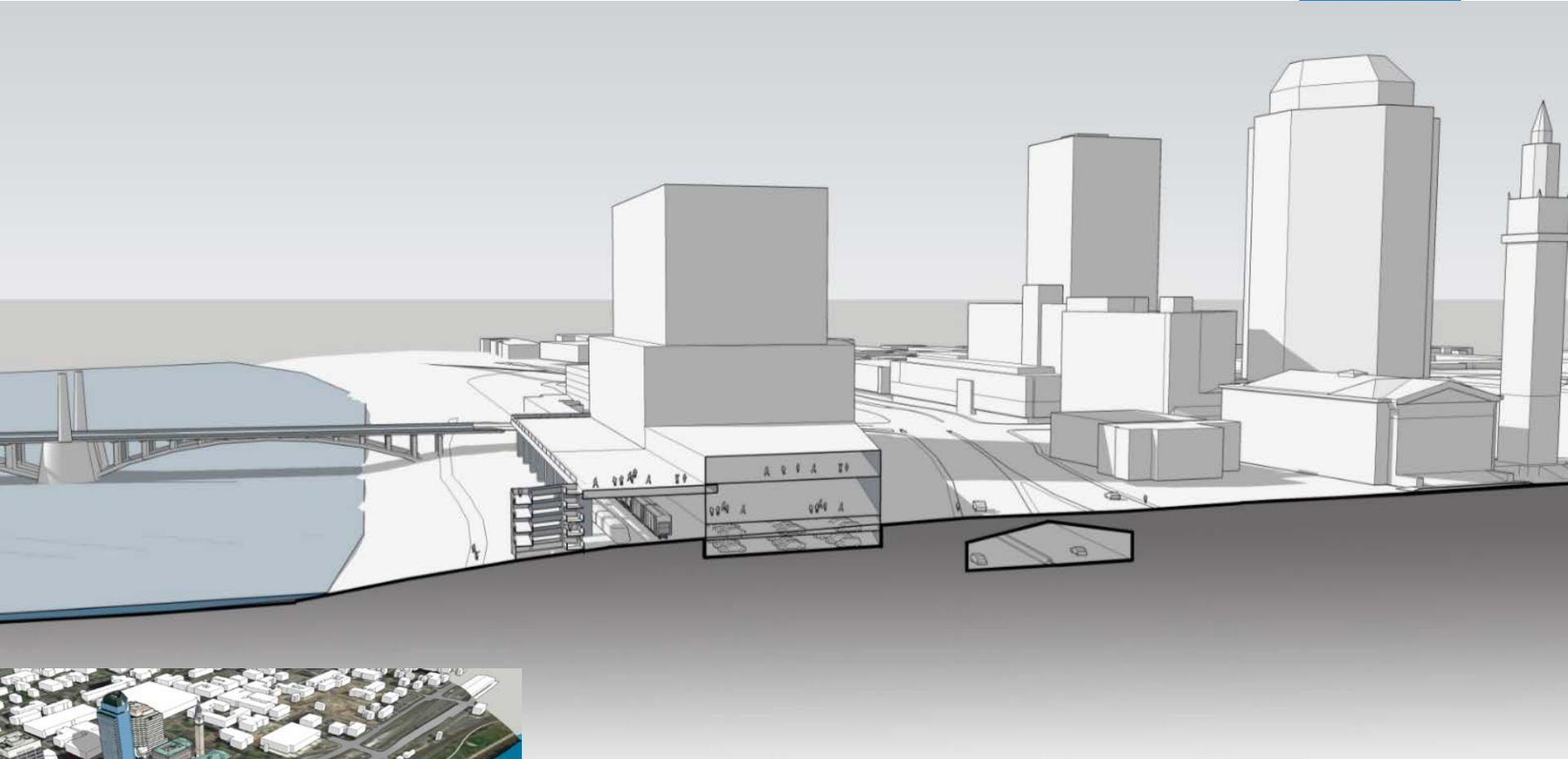
## Sunken following current I-91 Alignment



**Conceptual Planning Study:** This graphic represents a hypothetical development scenario that could be representative of potential future development along the I-91 Viaduct Corridor and is shown for general informational purposes. Any actual future development that occurs along this corridor may vary from this conceptual representation.



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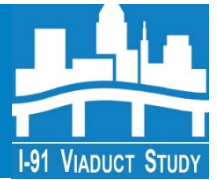
### Alternative #1

September 12, 2018

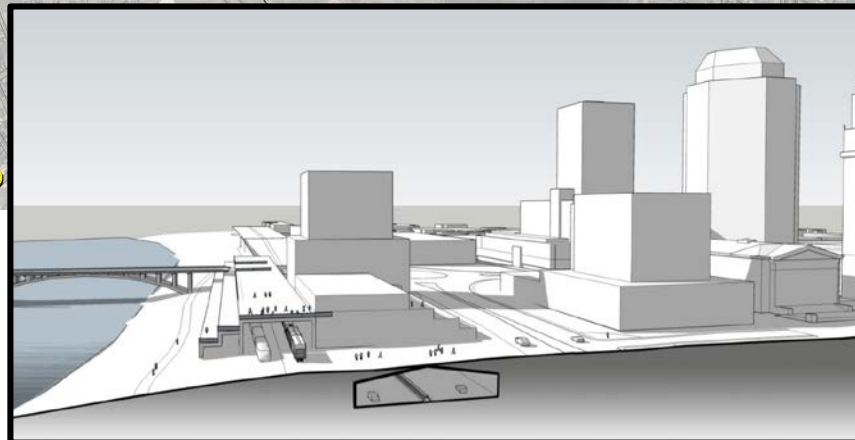
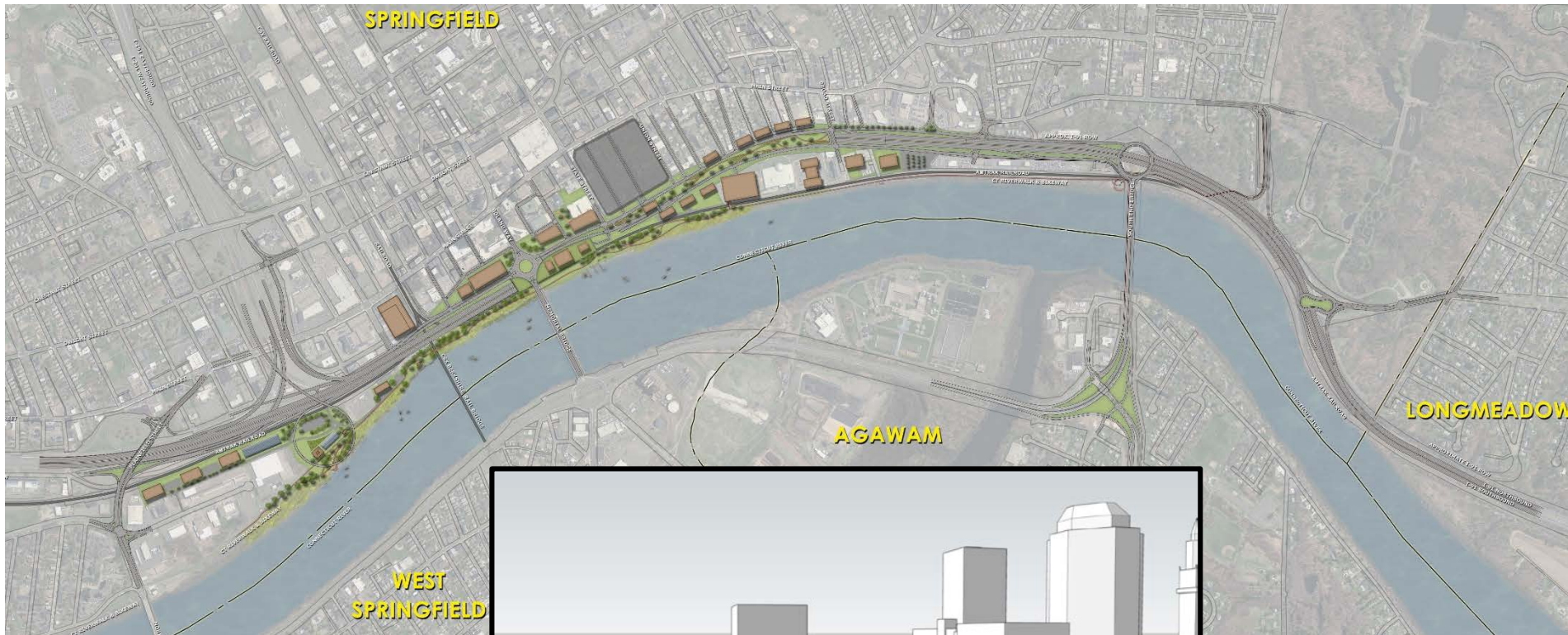




# Alternative No. 2



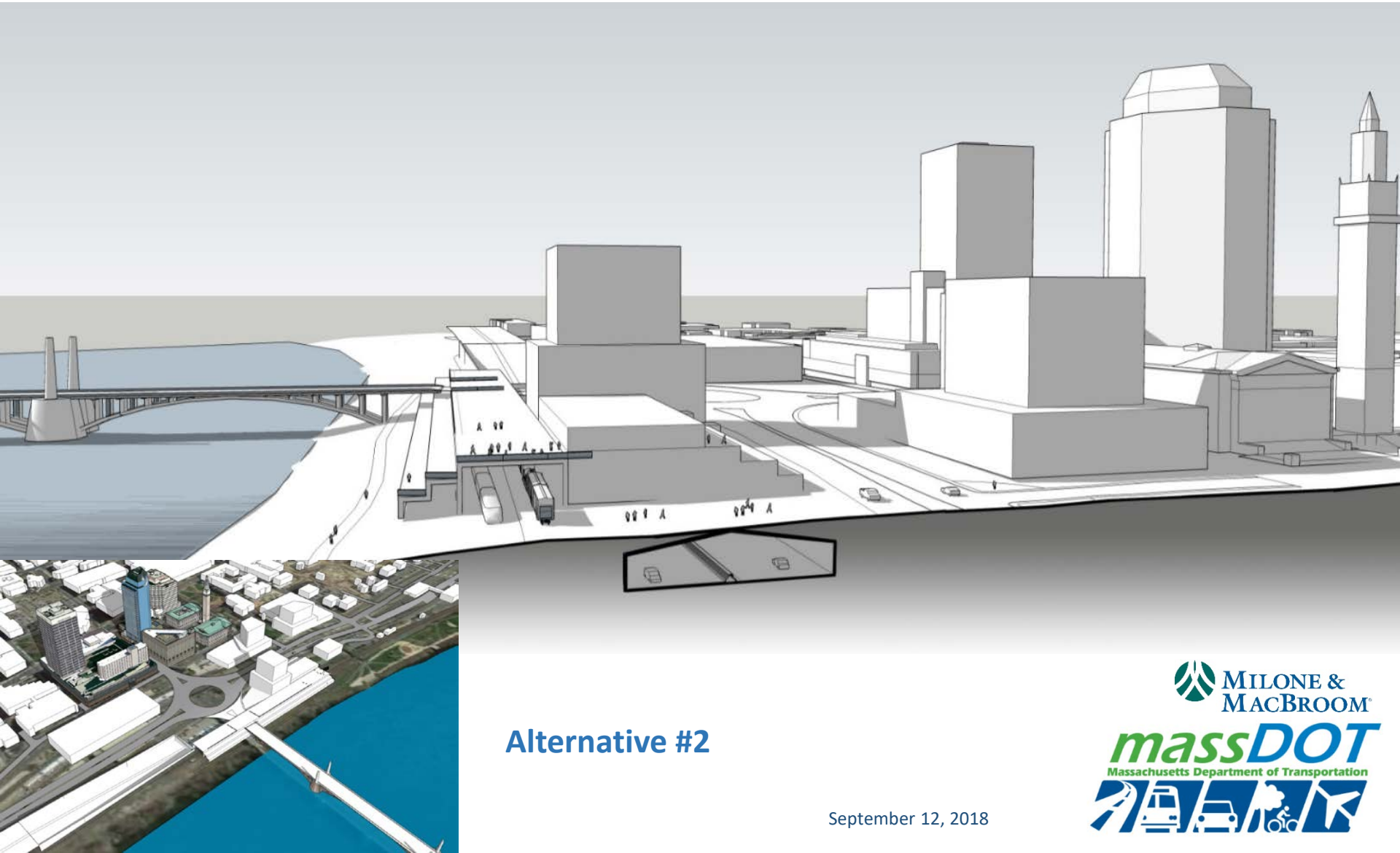
## Sunken following modified I-91 Alignment



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Alternative #2

September 12, 2018

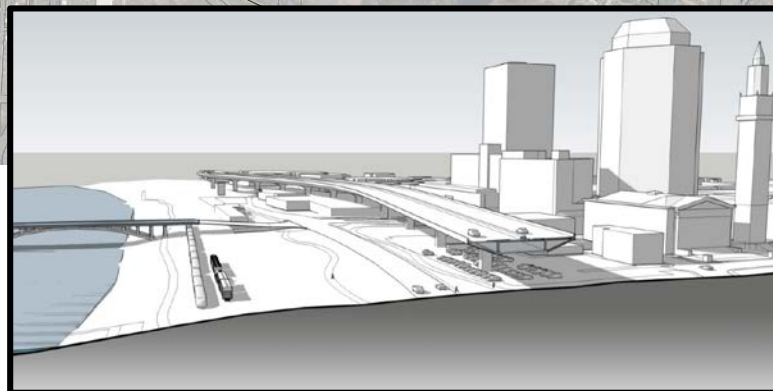
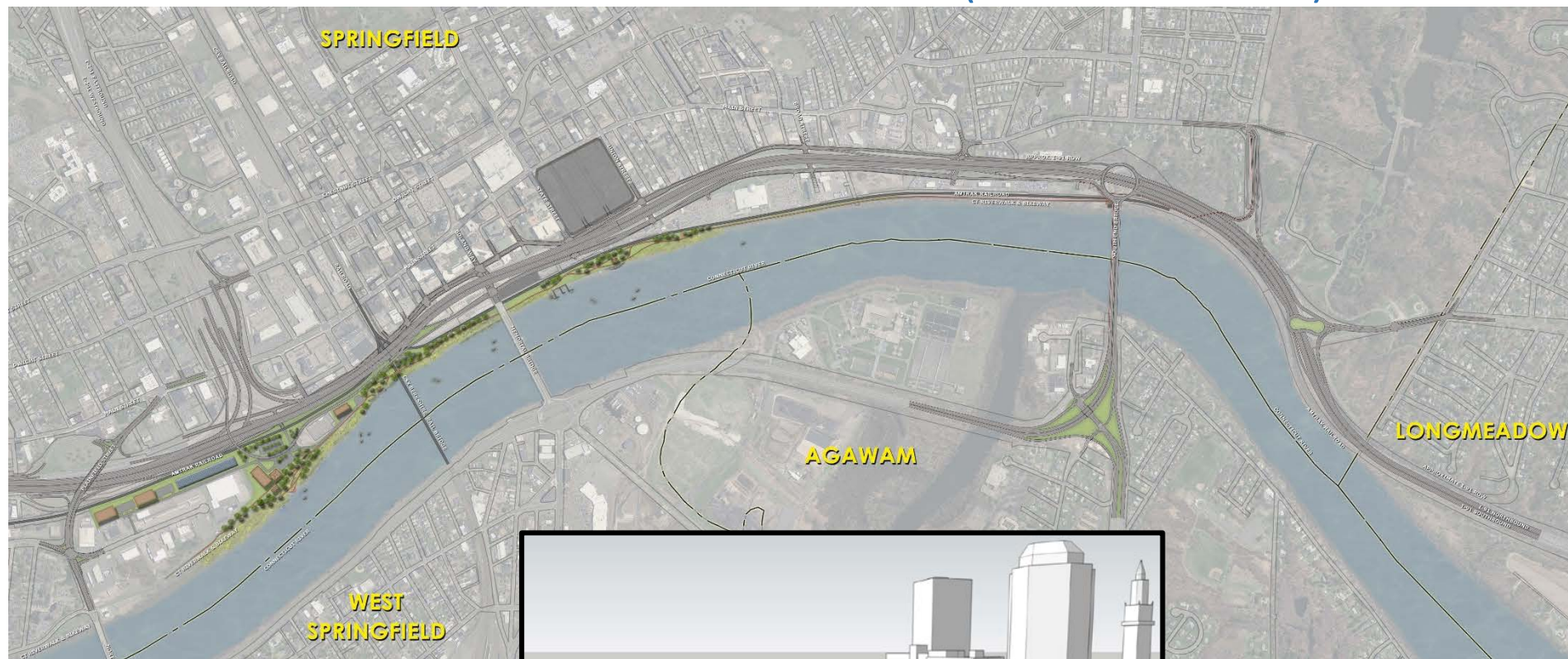




# Alternative No. 3

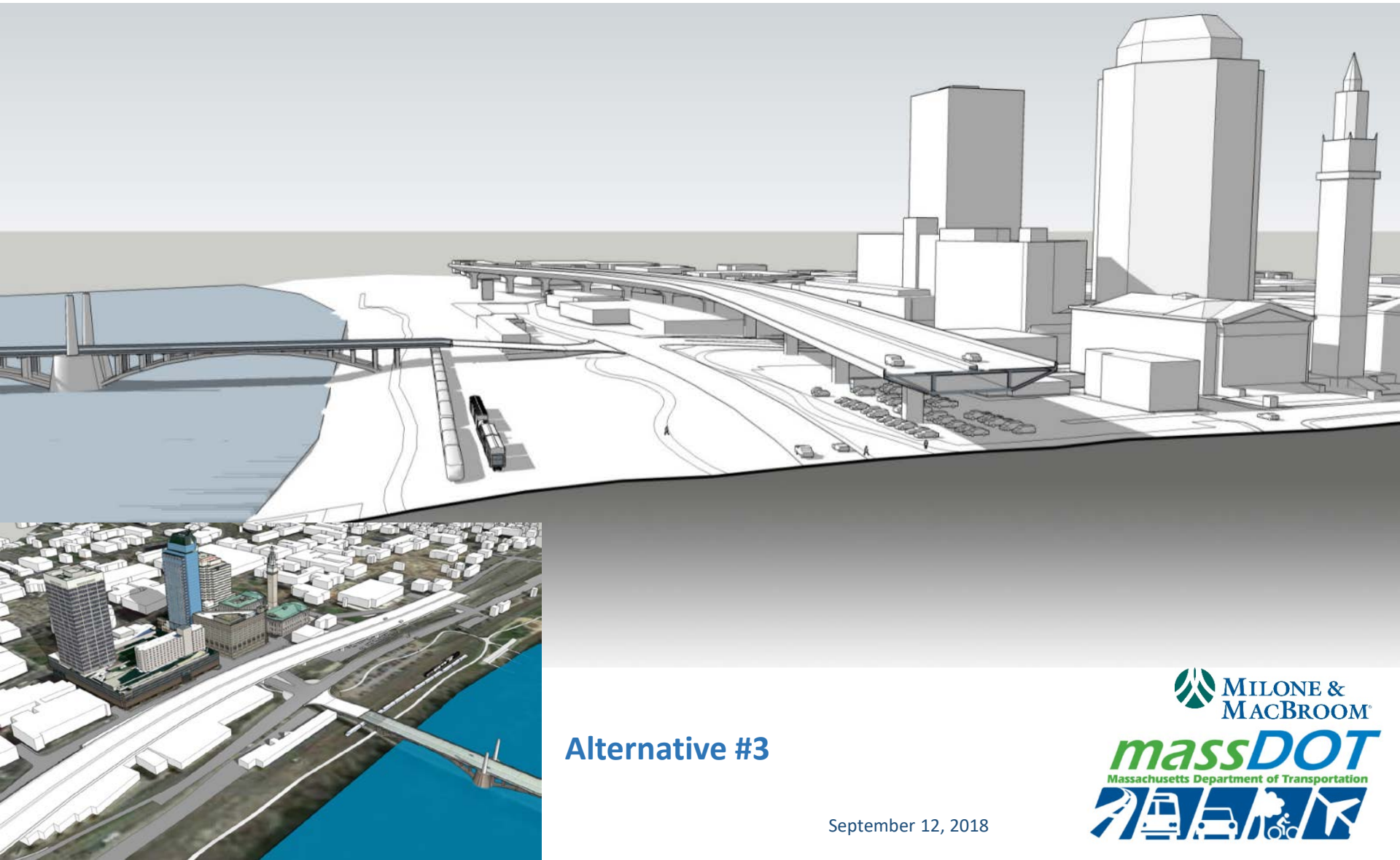


## Reconstructed Elevated Structure (Modern Viaduct)



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Alternative #3

September 12, 2018





## Evaluation Criteria / Comments



- A workbook was developed to function as a stand alone document providing information to support ratings shown in the Evaluation Criteria.
- Comments were generated by the Working Group following WGM #10.
- Responses to comments were provided and posted to the study website



### 1-91 Viaduct Study – Evaluation Criteria

Workbook

6/15/2017



21. Vindict Study  
inc. 15, 2017

Evaluation Criteria Description  
MME 8/30/97: 16

1. **Mobility and Accessibility**—This set of criteria was developed to evaluate each alternative's ability to maintain or improve the convergence of regional traffic through the corridor, while enhancing the connectivity of all modes of transportation into and around the City and its waterfront.

### 1.1 Roadway Operational Functionality

### 1.1.1 Intersection Level of Service

Level of service (LOS) is a term used to qualitatively describe the operating conditions of a roadway based on factors such as speed, travel time, maneuverability, delay, and safety. The level of service of a facility is designated with a letter, A to F, with A representing the best operating conditions and the worst. For the LOS-D level of service is for signalized intersections. Typically, LOS that exist on a section of a street is considered acceptable. In this criterion, only those intersections that scored a LOS E or worse for either the morning (AM) and afternoon (PM) peak periods were used for analysis.

### 1.1.2 Volume to Capacity Ratio

Volume to capacity ratio is in which the volume ( $V$ ) is the total number of vehicles passing a point in one hour and the capacity ( $C$ ) for the maximum number of cars that can pass a certain point for a reasonable traffic condition. In other words, this measurement of effectiveness deals with ability of the roadway to handle the number of vehicles expected to be on those roads in 2043. A higher ratio value will be a more negative result.

### 1.2.3 Queue Length

Queue length is a line of vehicles waiting to proceed through an intersection. Slowly moving vehicles joining the back of the queue are usually considered part of the queue. The internal queue dynamics can involve starts and stops. A *queue-moving line* of vehicles is often referred to as a moving queue or a platoon. For this criterion, the queues were added for all approaches at all of the studied intersections. Any reductions in queue lengths would be a positive result.

[illegible]

Ranking	Symbol	
2	●	Better
1	◐	Same-Better
0	◑	Same
-1	◒	Same-Worse
-2	○	Worse



# Evaluation Criteria / Comments



- The Evaluation Criteria was further developed and refined based on comments provided following the WG meeting in June 2017)
- Mapping & Ratings (Harvey Ball/Numeric) were reviewed and revised as necessary.



August 30, 2017

Mr. Michael Clark  
Office of Transportation Planning  
Massachusetts Department of Transportation  
10 Park Plaza, suite #4150  
Boston, MA 02116

RE: I-91 Working Meeting #10 – Evaluation Criteria Workbook Comments  
MMI #3869-16-4

Dear Michael:

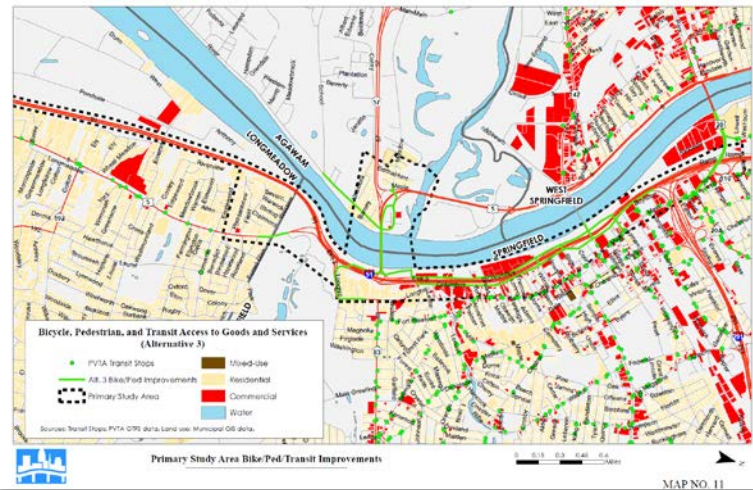
We are in receipt of the comments received regarding the above-referenced project and offer the following responses to them:

Comments from Richard Masse (DOT) to Milone & MacBroom Inc.:

- C1. The simulations that were viewed at the end of the meeting, for the I-91 side, in the second half where it moves north from the peanut to focus on the South End bridge rotary, the NB queue at the approach to the rotary seems to grow throughout the simulation and it looks like the approach may be above capacity. Although there is a gap on the rotary coming up right at the end of the simulation, it is unclear that the volume on the approach is going to be able to clear.
- R1. A slip lane has been added for vehicles heading onto I-91 and East Columbus Avenue, which has alleviated the potential backup under this scenario. Simulations have been revised accordingly.
- C2. Van – you mentioned something about the volume in the simulation being conservatively large, that you had volumes larger than modeled that were in the simulation, or something like that. Can you please elaborate on that or provide some info for all the approaches to the South End bridge rotary. Is a NB bypass lane needed? SB also looks to be building quite a queue. Screenshot below.
- R2. We chose to show a representative clip of the entire "Longmeadow curve section" in a short period of time and to keep the file size manageable. A conservative approach was taken in the analysis by adding vehicles to represent the peak queuing for all ramps and approaches in a short period of time for visualization purposes. We did this to better represent some of the anticipated queuing for the ramps at the "peanut" shaped interchange, which we believe would happen at a different time period than the South End Bridge Rotary section congestion.

Milone & MacBroom, Inc., One Financial Plaza, 1350 Main Street, Suite 1012, Springfield, Massachusetts 01103  
(413) 241-6920 Fax (413) 241-6911  
www.miloneandmacbroom.com

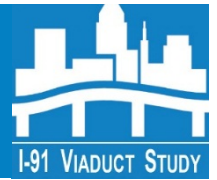
Connecticut • Maine • Massachusetts • New Hampshire • New York • Vermont



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# Public Health Activities



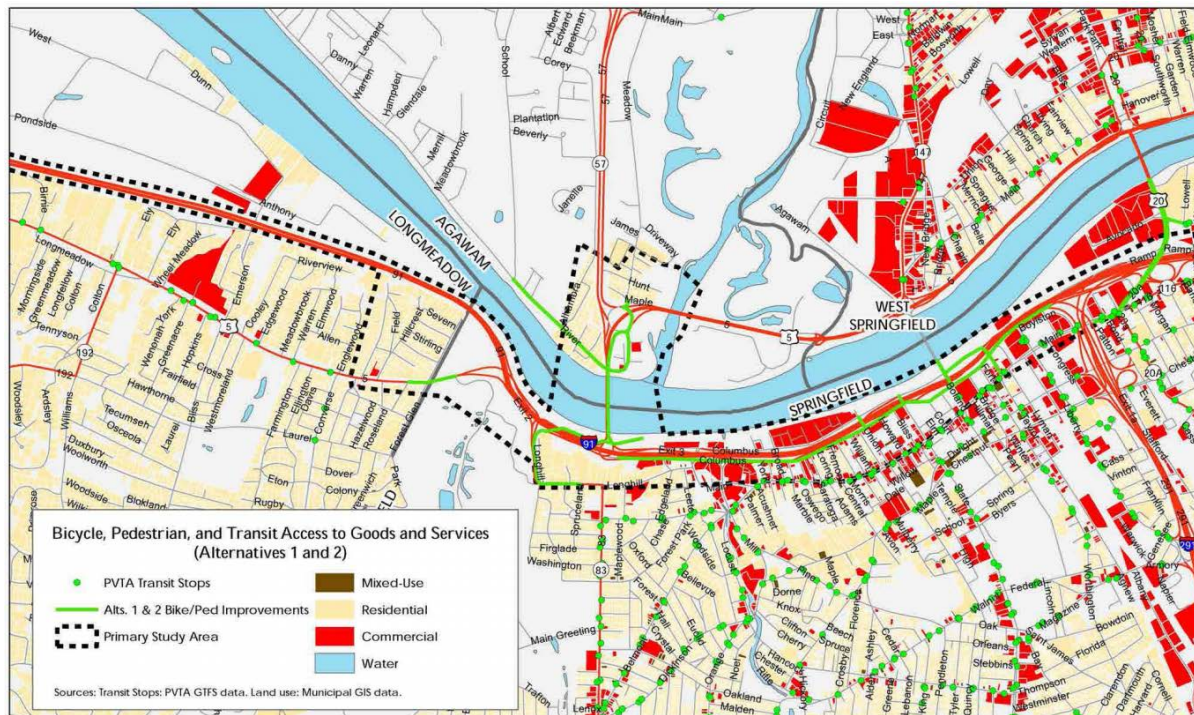
- Baseline health assessment informed Existing Conditions data collection
  - Characterizing baseline health information that are directly related to transportation and land-use decisions
    - Hospitalizations for Asthma and Heart Attack; Pediatric Asthma data; Small Area Estimates from a survey (BRFSS) for hypertension, obesity, diabetes, F/V consumption, physical activity rates
- Key informant interviews conducted through UMass graduate course
  - Examine the I-91 Viaduct Study evaluation criteria for community relevance
  - Outreach to community members and groups
    - Live Well Springfield, Baystate Health, Arise for Social Justice, Springfield Climate Justice, cities of Springfield and West Springfield



# Public Health Activities

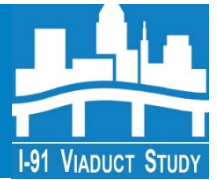


- Development of overlay maps to identify vulnerable areas and populations





# Public Health Activities



- MassDOT and DPH continued to coordinate during alternatives evaluation process
- Evaluation criteria intended to incorporate health benefits and impacts but ultimate utility was limited
  - Data availability and robustness too limited to draw conclusions
  - Planning concepts and evaluation outputs require further specificity to inform public health analysis

# Comparison of Alternatives



Note: Build Alternative cost estimates include component improvements

	Sunken Highway Following Current Alignment	Sunken Highway Following Modified Alignment	Reconstructed Elevated Highway
Mobility and Connectivity	Some reduction in number of merge, diverge, and weave locations  Improvement in vehicular travel time along I-91 and study area	Highest reduction in number of merge, diverge, and weave locations  Minimal change in vehicular travel time along I-91 and decline in study area	Some reduction in number of merge, diverge, and weave locations  Improvement in vehicular travel time along I-91 and smaller improvement in study area
Safety	Reduction of on-ramps/off-ramps improves bike/ped conditions  Redesign of 15 crash clusters	Reduction of on-ramps/off-ramps improves bike/ped conditions  Redesign of 15 crash clusters	Reduction of on-ramps/off-ramps improves bike/ped conditions  Redesign of 15 crash clusters
Environmental Effects	Slight increase in VMT and decrease of air quality  27,000 square feet of wetlands impacts  Reduced noise impacts	Slight increase in VMT and decrease of air quality  27,000 square feet of wetlands impacts  Reduced noise impacts	Virtually no change in VMT or air quality  27,000 square feet of wetlands impacts  Similar noise impacts
Land Use and Economic Development	468,800 square feet of space over highway created  Potential for \$2.2 million in annual tax revenue at full build-out	553,800 square feet of space over highway created  Potential for \$3.5 million in annual tax revenue at full build-out	13,800 square feet of space over highway created  Potential for \$300,000 in annual tax revenue at full build-out
Community Effects	Potential for greenspace and better connection to Riverfront  10-15 year construction duration	Potential for greenspace and better connection to Riverfront  10-15 year construction duration	Potential for activation of space underneath viaduct  8-12 year construction duration
Cost (in 2040 dollars)	\$3.78 billion	\$3.74 billion	\$3.14 billion

All alternatives compared against Rehab Option  
Rehabilitation of viaduct under current alignment at existing elevation

2040 Cost - \$695 M

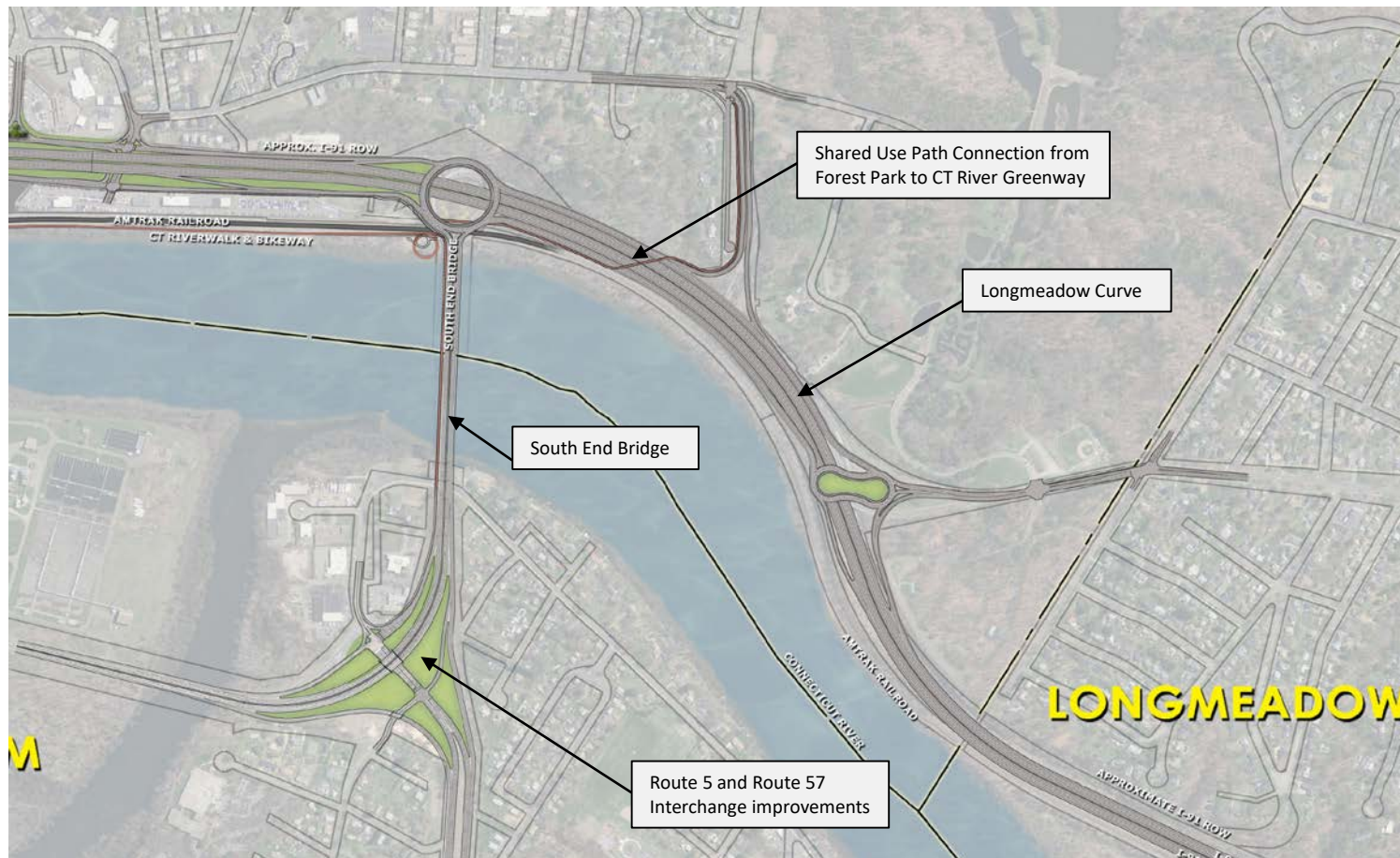


# Short and Mid-Term Alternatives



- Associated projects (part of the Alternatives) **outside of the Viaduct** which serve study goals and objectives
- Can be implemented as stand-alone projects or in logical groups or phases

# Longmeadow Curve Area Improvements

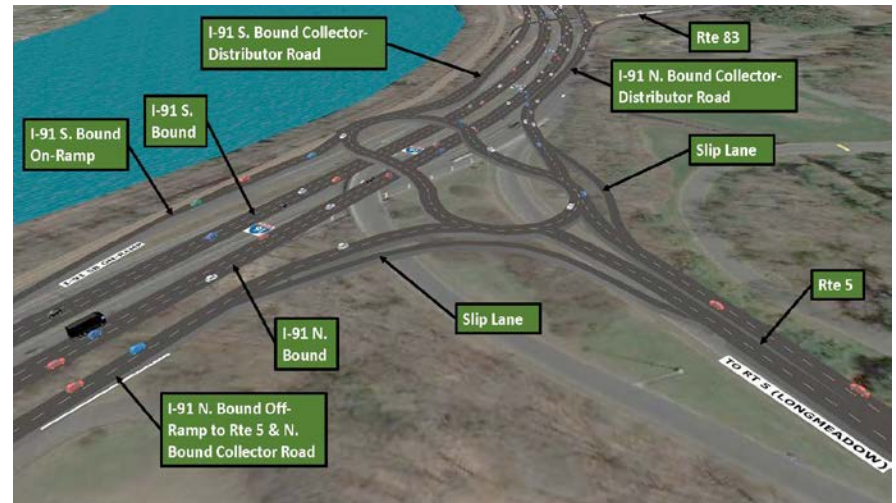
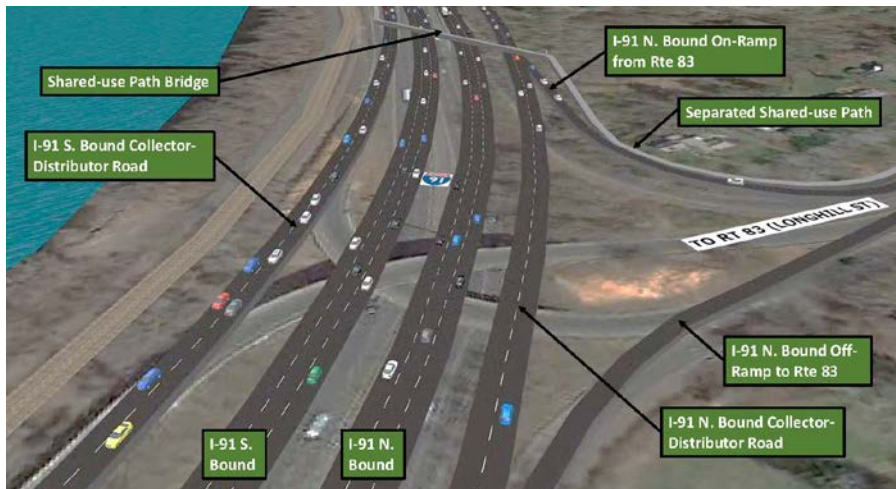
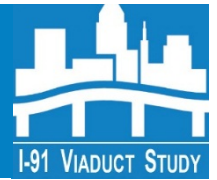


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MACBROOM

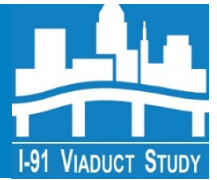




# Longmeadow Curve Area Improvements



# Longmeadow Curve Area Improvements





# Longmeadow Curve Area Improvements



- Construction of collector-distributor roads along I-91 mainline and roundabouts at South End Bridge and U.S. Route 5
  - Ability to access I-91 southbound from US-5 in Longmeadow
- Elimination of weaving hazards along I-91 mainline
- Elimination of US-5/MA-57 rotary in Agawam for operational and safety improvements
- Creation of pedestrian access from Forest Park to Connecticut Riverwalk and Bikeway in Springfield across South End Bridge to Agawam



Estimated 2040 costs:

Longmeadow Curve - \$213 million

South End Bridge - \$206 million

US-5/MA-57 interchange in Agawam - \$157 million

Bicycle/pedestrian bridge - \$20 million

# I-291 Southbound to I-91 Southbound On-Ramp Relocation

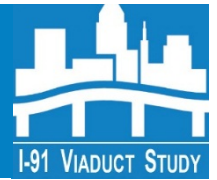


- Shifts on-ramp from left-hand entrance onto I-91 to right-hand entrance
- Eliminates weaving movements from on-ramp to Exit 7 towards Memorial Bridge
- Restriping with deck replacement project to discourage weaving movements
- Estimated 2040 cost - \$152 million





# Plainfield Street / Route 20 Improvements



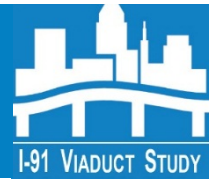
- New bridges over I-91 and railroad tracks
- Third lane of westbound vehicular travel
- Bicycle and pedestrian improvements
- Intersection reconstruction at Main Street and Avocado Street
- Estimated 2040 cost - \$76 million



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MACBROOM



# Short Term Improvements



Safety and aesthetic improvements underneath viaduct

Improvements or relocation of pedestrian bridge behind former Luxe Burger/BHOF

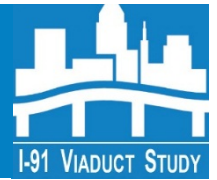


Cost estimates for each of the short term improvements are equal to or less than \$2 million in 2018 dollars

MILONE & MACBROOM



# Short Term Improvements



Add a shared-use path to east side of US-5 in Springfield - link Forest Park with Longmeadow

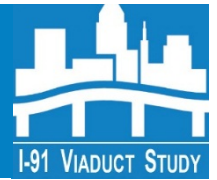


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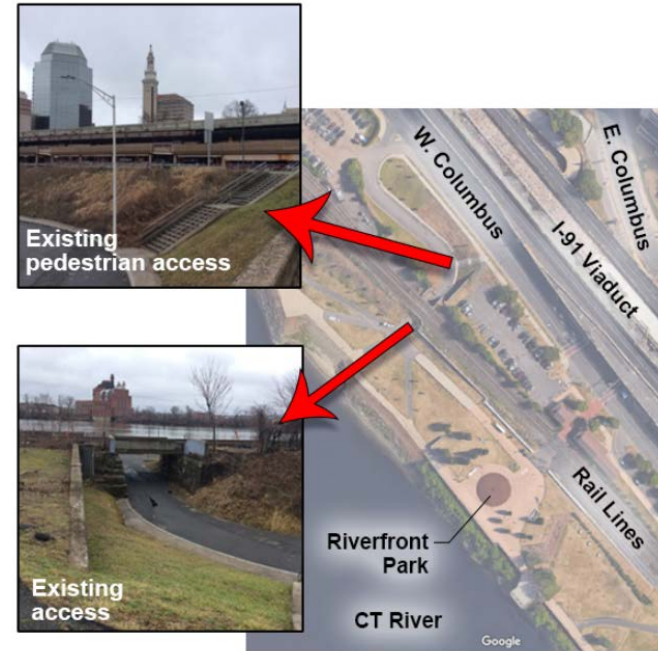




# Short Term Improvements



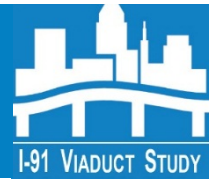
Improvements to walkway underneath railroad to Riverfront Park north of State Street



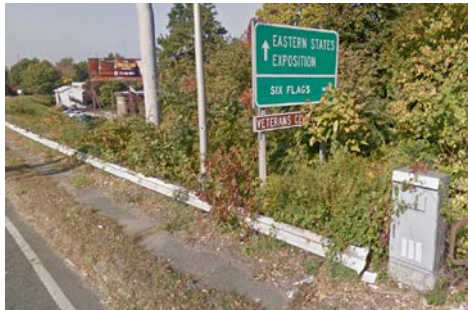
Improve at-grade pedestrian crossing to Riverfront Park south of State Street (active crossing)



# Short Term Improvements



Provide ADA accessible ramp or switchback from bridge to River Road for bicyclists and pedestrians

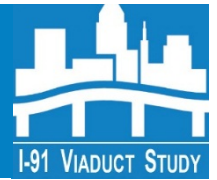


Cost estimates for each of the short term improvements are equal to or less than \$2 million in 2018 dollars





# Cost Estimates



- Associated Projects - can be constructed regardless of Alternative (\$826M)
  - Longmeadow Curve - \$213 million
  - South End Bridge - \$206 million
  - US-5/MA-57 interchange in Agawam - \$157 million
  - I-291 SB to I-91 SB entrance - \$152 million
  - Plainfield Street / Route 20 improvements (north of I-291) - \$76 million
  - CT Riverwalk/Bikeway improvements - \$20 million
  - Under viaduct improvements – (approx.) \$2 million

# Cost Estimates



Alt. 1 – Sunken in Current Alignment

Alt. 2 – Sunken in New Alignment

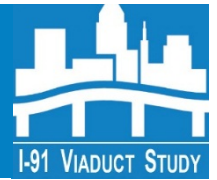
Alt. 3 – Reconstructed Elevated

Alternative	Rehab	Alt. 1	Alt. 2	Alt. 3
<b>Viaduct Section</b>	\$695 M	\$2.95 B	\$2.91 B	\$2.31 B
<b>Associated Projects</b>	\$826 M	\$826 M	\$826 M	\$826 M
<b>Order of Magnitude Construction Cost (in 2040 dollars)</b>	\$1.52 B	\$3.78 B	\$3.74 B	\$3.14 B

All Alternative costs include I-91 SB/I-291 NB and I-291 SB/I-91 NB ramp systems, which may require replacement prior to expected lifespan of viaduct.

- **Component breakdowns for Build Alternatives:**
  - I-91 through downtown core (Alts. 1/2) - \$2.475-2.5 billion
  - I-91 through downtown core (Alt. 3) - \$1.875 billion
  - I-91/I-291 interchange (all) - \$407-424 million
  - I-91 northern touchdown (all) - \$33 million
  - E/W Columbus Avenue frontage road improvements - \$155-160 million
- **Associated Projects - can be constructed regardless of Alternative (\$826M)**
  - Longmeadow Curve - \$213 million
  - South End Bridge - \$206 million
  - US-5/MA-57 interchange in Agawam - \$157 million
  - I-291 SB to I-91 SB entrance - \$152 million
  - Plainfield Street / Route 20 improvements (north of I-291) - \$76 million
  - CT Riverwalk/Bikeway improvements - \$20 million
  - Under viaduct improvements – (approx.) \$2 million

# Draft Recommendations



- **Viaduct Rehabilitation** selected as the option for a long-term project with several **short and mid-term associated projects**
  - Longmeadow Curve Area improvements
  - I-291 SB to I-91 SB ramp relocation
  - Route 20 improvements in Springfield
  - Short-term alternatives around the viaduct
  
- MassDOT to work with municipal (local cities and towns) and regional (PVPC) parties to initiate the project development process
  - For locally-owned infrastructure, municipalities and PVPC pursue with MassDOT support
  - For MassDOT infrastructure, MassDOT pursues with local and regional support. Given transportation funding constraints, prioritization of the mid and short term improvements needs to be established regionally and is subject to availability and funding.



# Next Steps



## ■ Draft Report Published for Public Comment

- Report can be accessed at the study website: [www.mass.gov/i-91-viaduct-study](http://www.mass.gov/i-91-viaduct-study)
- Comments due by October 10, 2018
- To comment:
  - Email the Project Manager: Michael Clark, [Michael.clark@state.ma.us](mailto:Michael.clark@state.ma.us)
  - Call: 857-368-8867 or TTY: 857-368-0655
  - Mail: Office of Transportation Planning  
Attn: Michael Clark/I-91 Viaduct Study  
Massachusetts Department of Transportation Planning  
10 Park Plaza, Suite #4150, Boston, MA 02116

## ■ Final Report issued after 30 day public comment period



# Questions & Comments



## Contacts:

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Ethan Britland, Project Manager

Phone: 857-368-8840

Email: [ethan.britland@state.ma.us](mailto:ethan.britland@state.ma.us)

## Study Website Link:

[www.mass.gov/i-91-viaduct-study](http://www.mass.gov/i-91-viaduct-study)

# Thank you!