# I-91 Viaduct Study

Springfield, Massachusetts

# Working Group Meeting #5

One Financial Plaza
1350 Main Street
Springfield, Massachusetts

Milone & MacBroom

massDOT
Massachusetts Department of Transportation

January 28, 2016

# Welcome & Introductions

- Michael Clark – Transportation Planner (MassDOT)
- Ethan Britland – Project Manager (MassDOT)
- Mark Arigoni, L.A. – Principal-in-Charge (MMI)
- Van Kacoyannakis, P.E. – Traffic (MMI)
- John Hoey – Facilitator (MMI)
- Sarah Paritsky – Public Involvement (Regina Villa)

# Agenda

- Welcome & Introductions
- Overview of Public Informational Meeting #1 & Working Group Meeting #4
- Summary of Work Completed to Date
- Refinement of Evaluation Criteria
- Refinement of Alternatives
- Next Steps

# Review of Public Informational Meeting #1

- Study Purpose & Process
- Public & Stakeholder Involvement Process
- Regional & Primary Study Areas
- Goals & Objectives
- Evaluation Criteria
- Existing Conditions- Issues, Constraints, & Opportunities
- Public Health – Integrated Health Impact Assessment (HIA)
- (2040) Future “No Build Conditions

# Summary of Work Completed Since Last Working Group Meeting

- Continued Fine Tuning the Evaluation Criteria
- Completed Initial Public Informational Meeting
- Completed Future No Build Traffic Micro-Simulations
- Continued Refinement of Preliminary Alternatives & Discussion of Potential Impacts & Benefits of Each
- Continued Process of defining short and mid-term solutions to improve safety, health and traffic flow

# Refinement of Evaluation Criteria

- Significant MASSDOT & MASSDPH Coordination

Massachusetts Department of Public Health
Bureau of Environmental Health

- Comprehensive Evaluation Criteria that include Health Pathways within…..
  - Mobility & Accessibility, Safety, Environmental Effects
  - Land Use & Economic Development
  - Community Effects, and Cost

# Refinement of Evaluation Criteria

- Mobility & Accessibility (Sample)
  - Roadway Operations Functionality, Travel Time, Ped/Bike Functionality
    - Description, Data, Source/Tool, Health Pathway

| Criteria | Measure | | | | |
|---|---|---|---|---|---|
| 1 Mobility and Accessibility | | | | | |
| 1.1 Roadway Operational Functionality | | Description | Data | Source/Tool | Health Pathway |
| 1.1.1 | Provide acceptable intersection level of service | Delay or LOS change in total number of intersections | Change in delay in minutes and LOS by approach and for total intersection | Synchro (Microsimulation Software) | Does this relate to congestion and thereby |
| 1.1.2 | Provide acceptable intersection level of service | V/C change by total number of intersections | Volume to capacity ratios (V/C) by approach and for overall intersection | Synchro (Microsimulation Software) | longer commute and less time for family, activities etc |
| 1.1.3 | Provide acceptable intersection level of service | Queue length changes in feet for total number of intersections - Calculated 50th and 95th percentile queues | Queue length by lane and approach in feet | Synchro (Microsimulation Software) | |
| 1.1.4 | Provide or maintain acceptable merge, diverge, and weave level of service on I-91 mainline | Change in LOS at merge, diverge and weave locations on limited access roadways | LOS by location | Highway Capacity Software/Manual 2010 | Does this related to safety? Yes |
| 1.1.5 | I-91 mainline and on and off-ramp level of service | Change in LOS on limited access ramps and highway segments | LOS by location | Highway Capacity Software/Manual 2010 | |
| 1.2 Travel Time | | Description | Data | Source/Tool | |
| 1.2.1 | Average vehicular travel time along I-91 corridor | Change in travel time along I-91 between two points (tbd) | Travel time in minutes for a given distance during AM and PM peak hours (tbd) | TransCAD (Macro Travel Demand Model) | Safety from Traffic: Accident likelihood at given speed |
| 1.2.2 | Average vehicular travel times throughout primary study area | Change in travel time between A to B travel pairs | Travel time in minutes for a given distance for A to B points (tbd) through delay reduction | Synchro/VISSIM | Safety from Traffic: Accident likelihood at given speed |
| 1.3 Pedestrian and Bicycle Functionality and Connectivity | | Description | Data | Source/Tool | |
| 1.3.1 | Improve local access from the downtown urban cores to the riverfront (ie Connecticut Riverwalk), open space, environmental resources, and activity centers (ie Basketball Hall of Fame) | Change in number or quality of connections between downtown and riverfront, to open space, environmental resources, retail, goods and social services, and activity centers | Number and quality of connections across I-91 and rail line, to open space, environmental resources, and activity centers | ARCGIS/Conceptual Plans/BEQ/PEQ/Walkscore | Active Transportation, Economic Opportunity, Gentrification, Displacement |
| 1.3.2 | Improve access to community resources and social services | Change in number or quality of connections to schools, health care, social services, etc. | Number and quality of connections to schools, health care, social services, etc. | | |
| 1.3.3 | Improve access to retail, goods, commerical activity centers | Change in number or quality of connections to goods and employment centers | Number and quality of connections to goods and employment centers | | |
| 1.3.4 | Improve access to Union Station | Change in vehicular, bicycle, pedestrian and transit network to promote connectivity to Union Station | Additional sidewalk, bike path, bicycle facilities, bus stops and amenities | ARCGIS/Conceptual Plans | Active Transportation, Economic Opportunity, Gentrification, Displacement |
| 1.3.5 | Provide regional bicycle and pedestrian connectivity | Promote longer distance commuting and recreational trips through improved access to regional bicycle and pedestrian facilities | Change in number or quality of connections. Population reached. | ARCGIS/Conceptual Plans | Active Transportation, |
| 1.4 Mode Shift | | Description | Data | Source/Tool | |
| 1.4.1 | Increase transit mode share | Improve access to public transportation or increase in transit services | Change in access to or amount of transit services (bus stops, amenities, route changes, etc.) | | Active Transportation, |
| 1.4.2 | Increase bicycle and pedestrian mode share | Improve access or quality of bicycle and pedestrian facilities. Increase pedestrian and bicyclist perception of safety | Change in linear feet of sidewalk, linear feet of designated bicycle facilities | | Active Transportation, Safety from Traffic |

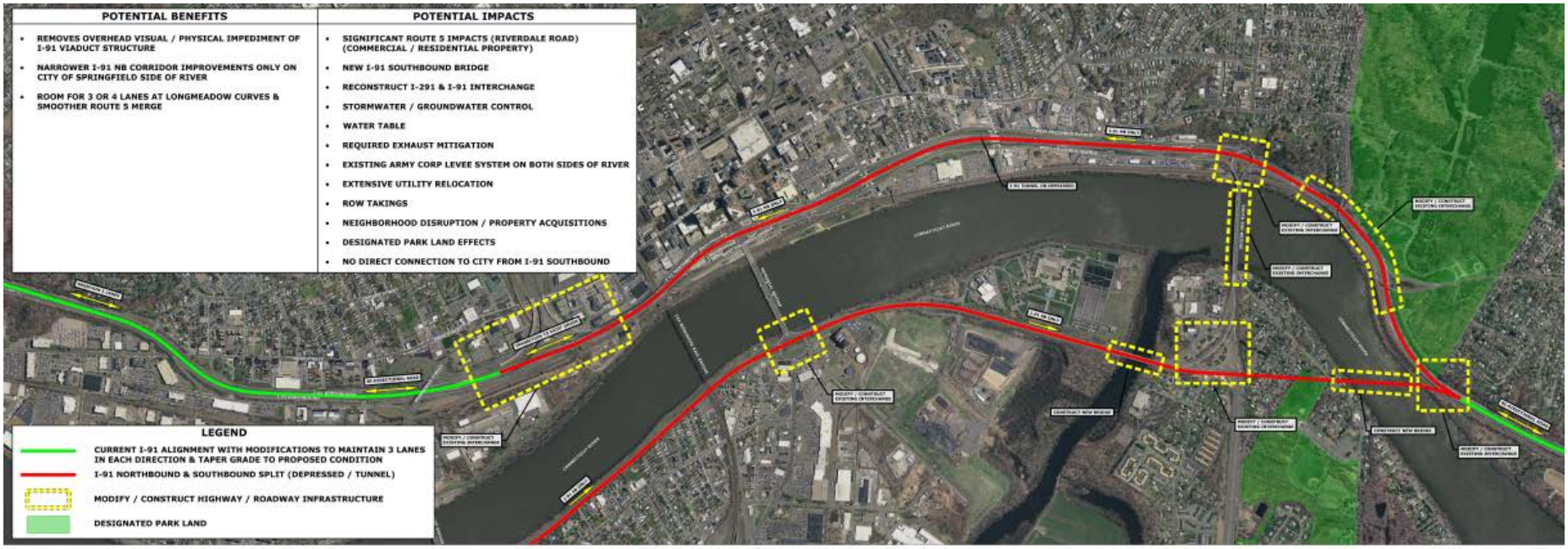
# Alternatives Development

- Reassessment (Impacts & Benefits) & Refinement of Preliminary Concepts Presented/Discussed at Working Group Meeting #4
- Elimination & Regrouping of Alternatives Developed

# Alternatives Removed

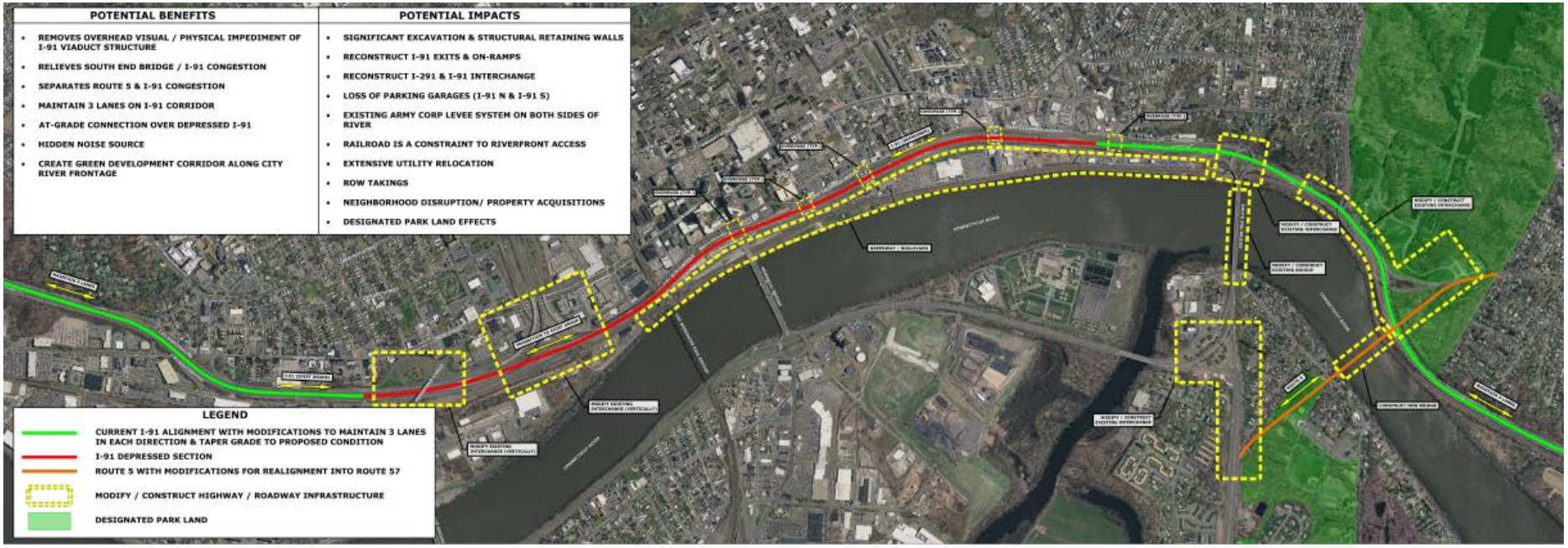
- Significant Impacts, Limited Improvements
- Alternatives removed from further consideration in this study
  - I-91 North & Southbound Split (East & West Side)
  - New Route 5 Bridge Connection (East & West Side)
  - I-91 relocated to Route 5 Corridor, connection to MassPike (West Side)
  - Tunnel Only Option

# North & Southbound Split



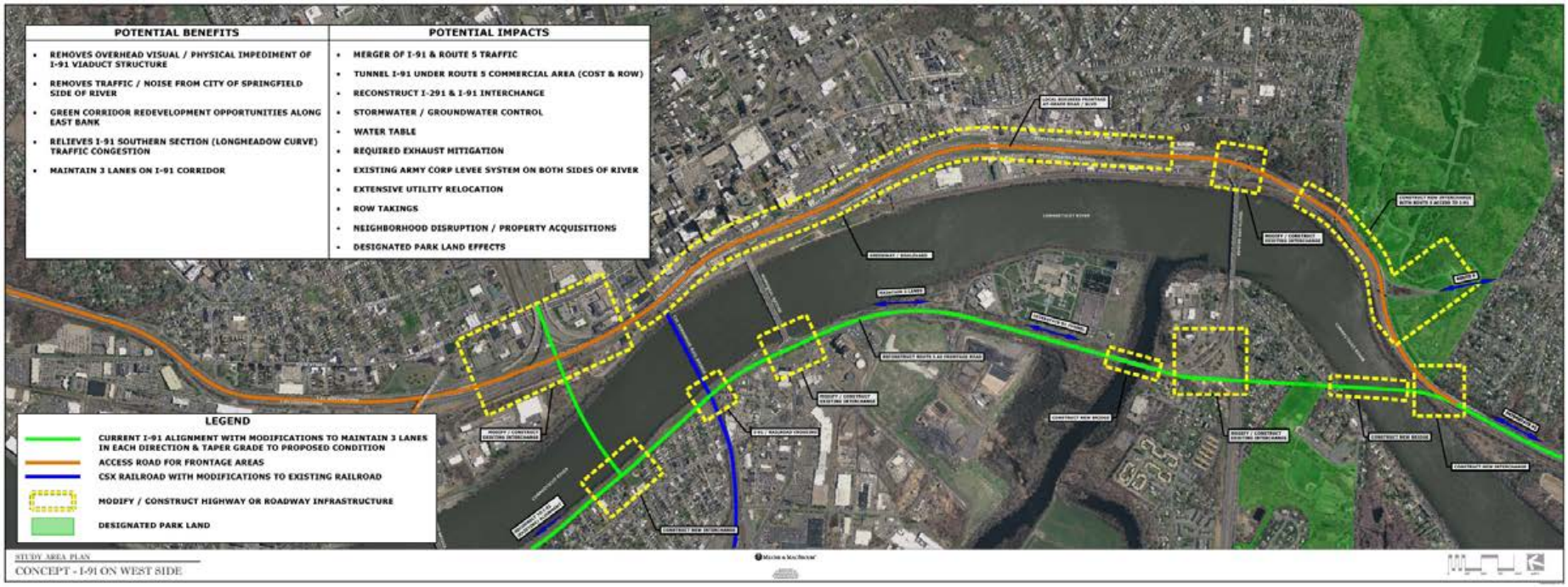

STUDY AREA PLAN
CONCEPT - NORTH & SOUTHBOUND SPLIT

# Route 5 Realignment

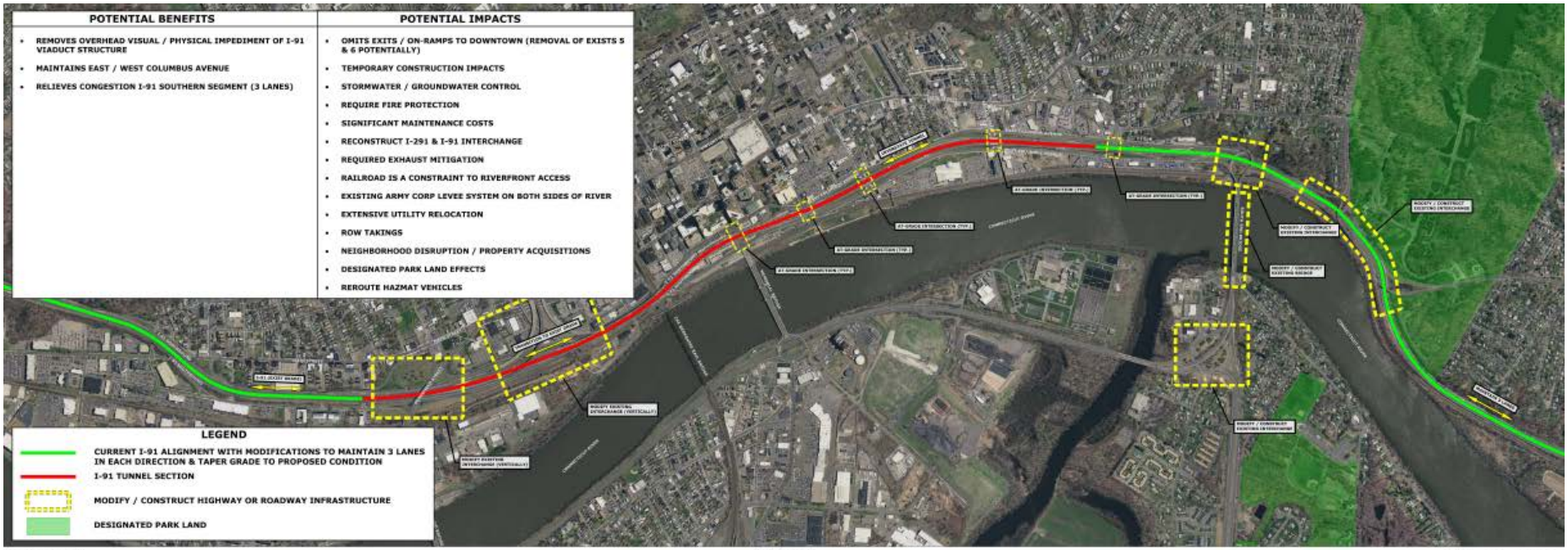



STUDY AREA PLAN
CONCEPT - ROUTE 5 REALIGNMENT

# I-91 on West Side (Utilizing Route 5 Corridor to MassPike Ramps)



# Tunnel Only Section



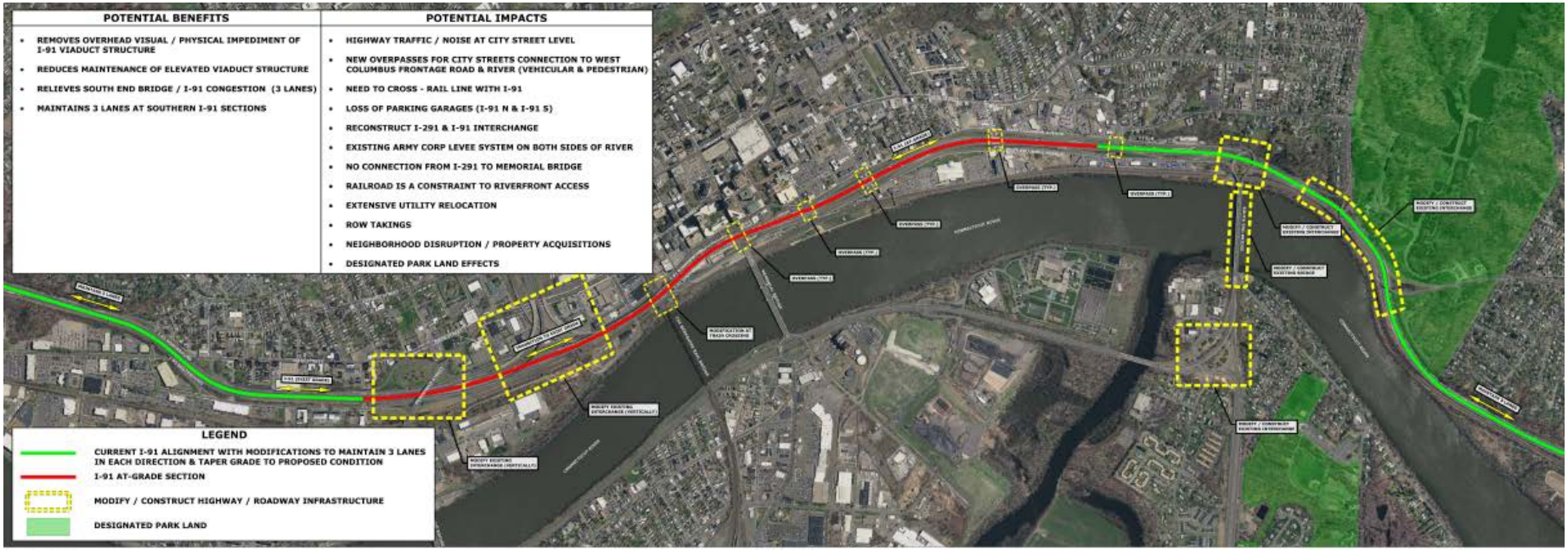
# Tunnel Only Section

| POTENTIAL BENEFITS | POTENTIAL IMPACTS |
|---|---|
| • REMOVES OVERHEAD VISUAL / PHYSICAL IMPEDIMENT OF I-91 VIADUCT STRUCTURE | • OMITS EXITS / ON-RAMPS TO DOWNTOWN (REMOVAL OF EXISTS 5 & 6 POTENTIALLY) |
| • MAINTAINS EAST / WEST COLUMBUS AVENUE | • TEMPORARY CONSTRUCTION IMPACTS |
| • RELIEVES CONGESTION I-91 SOUTHERN SEGMENT (3 LANES) | • STORMWATER / GROUNDWATER CONTROL |
| | • WATER TABLE |
| | • SIGNIFICANT MAINTENANCE COSTS |
| | • RECONSTRUCT I-291 & I-91 INTERCHANGE |
| | • REQUIRED EXHAUST MITIGATION |
| | • RAILROAD IS A CONSTRAINT TO RIVERFRONT ACCESS |
| | • EXISTING ARMY CORP LEVEE SYSTEM ON BOTH SIDES OF RIVER |
| | • EXTENSIVE UTILITY RELOCATION |
| | • ROW TAKINGS |
| | • NEIGHBORHOOD DISRUPTION / PROPERTY ACQUISITIONS |
| | • DESIGNATED PARK LAND EFFECTS |

# Alternatives Refinement

- Regrouping of Alternatives Developed
  - At-Grade Highway
  - Relocated Rail Line (West Side)
  - Relocated Highway (West Side)
  - Reconstructed Elevated Structure (Modern Viaduct)
  - Sunken or Tunnel, or Combination
  - Enhanced Existing Viaduct (Short, Mid-term, Long-term)

# At-Grade Section

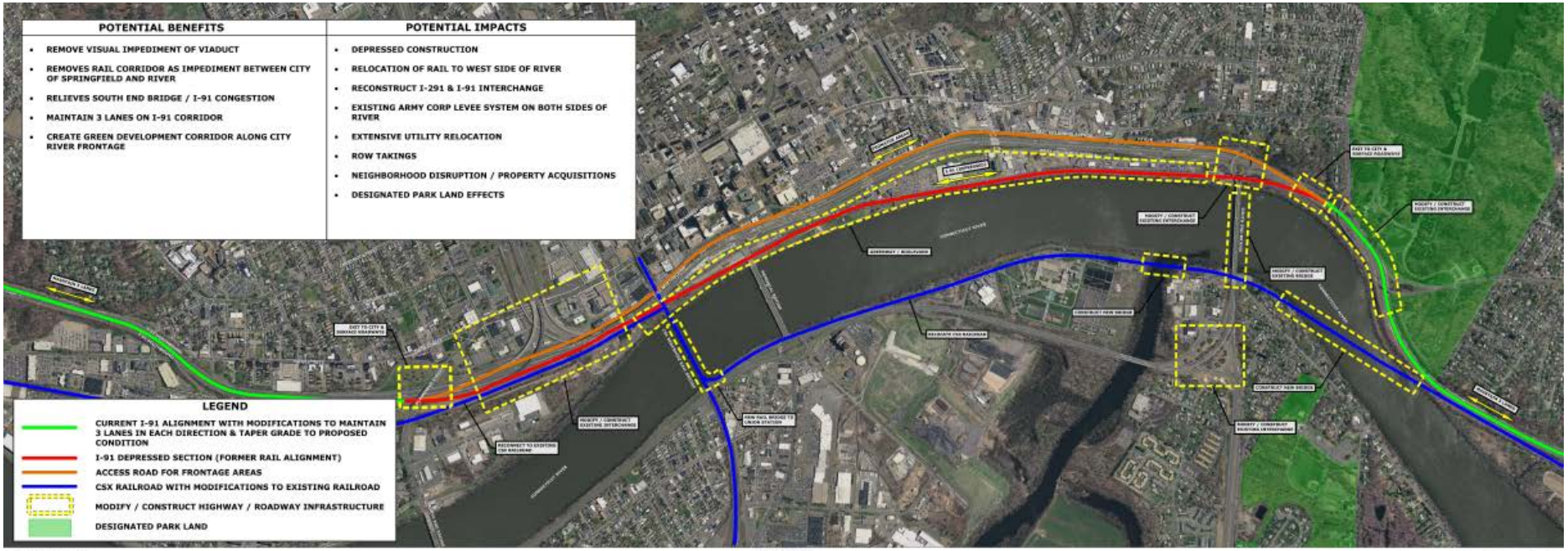


# At-Grade Section Example

# At-Grade Section

| POTENTIAL BENEFITS | POTENTIAL IMPACTS |
|---|---|
| • REMOVES OVERHEAD VISUAL / PHYSICAL IMPEDIMENT OF I-91 VIADUCT STRUCTURE | • HIGHWAY TRAFFIC / NOISE AT CITY STREET LEVEL |
| • REDUCES MAINTENANCE OF ELEVATED VIADUCT STRUCTURE | • NEW OVERPASSES FOR CITY STREETS CONNECTION TO WEST COLUMBUS FRONTAGE ROAD & RIVER (VEHICULAR & PEDESTRIAN) |
| • RELIEVES SOUTH END BRIDGE / I-91 CONGESTION (3 LANES) | • NEED TO CROSS - RAIL LINE WITH I-91 |
| • MAINTAINS 3 LANES AT SOUTHERN I-91 SECTIONS | • LOSS OF PARKING GARAGES (I-91 N & I-91 S) |
| | • RECONSTRUCT I-291 & I-91 INTERCHANGE |
| | • EXISTING ARMY CORP LEVEE SYSTEM ON BOTH SIDES OF RIVER |
| | • NO CONNECTION FROM I-291 TO MEMORIAL BRIDGE |
| | • RAILROAD IS A CONSTRAINT TO RIVERFRONT ACCESS |
| | • EXTENSIVE UTILITY RELOCATION |
| | • ROW TAKINGS |
| | • NEIGHBORHOOD DISRUPTION / PROPERTY ACQUISITIONS |
| | • DESIGNATED PARK LAND EFFECTS |

# Relocated Railroad
# I-91 on former Rail Right-of-Way




STUDY AREA PLAN
CONCEPT - RAILROAD ROW

# Relocated Railroad
# I-91 on former Rail Right-of-Way

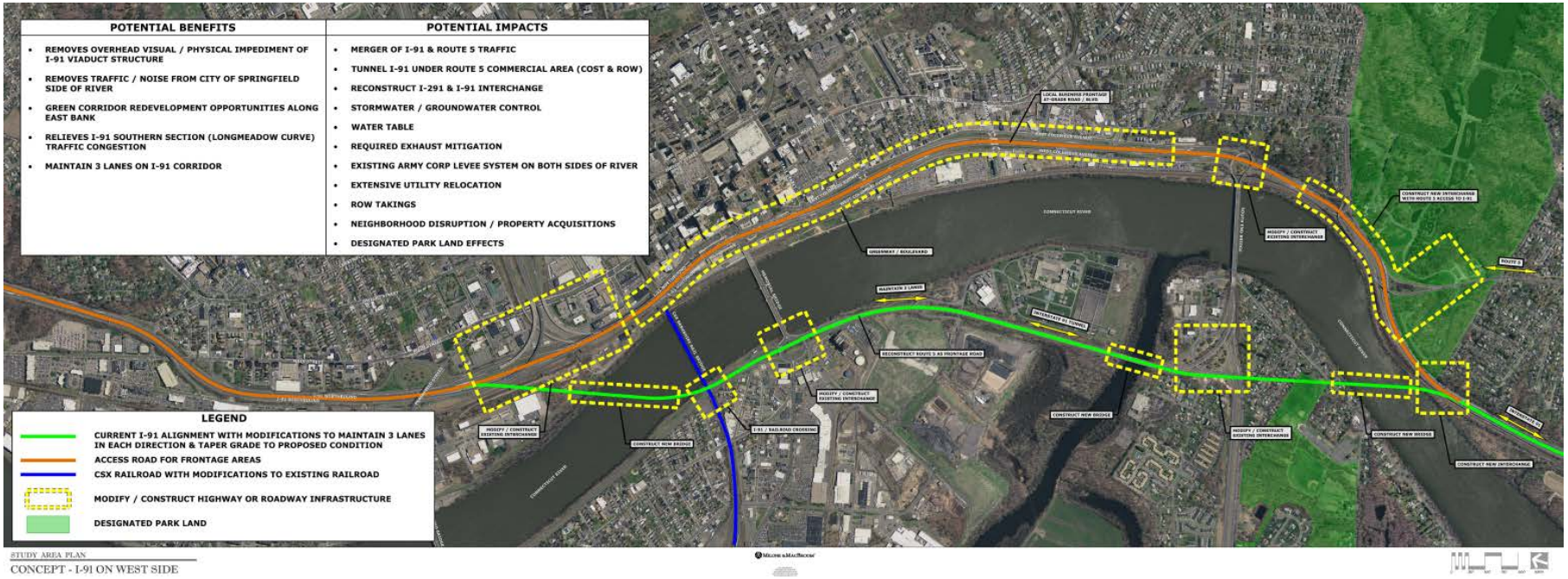
| POTENTIAL BENEFITS | POTENTIAL IMPACTS |
|---|---|
| • REMOVE VISUAL IMPEDIMENT OF VIADUCT | • DEPRESSED CONSTRUCTION |
| • REMOVES RAIL CORRIDOR AS IMPEDIMENT BETWEEN CITY OF SPRINGFIELD AND RIVER | • RELOCATION OF RAIL TO WEST SIDE OF RIVER |
| • RELIEVES SOUTH END BRIDGE / I-91 CONGESTION | • RECONSTRUCT I-291 & I-91 INTERCHANGE |
| • MAINTAIN 3 LANES ON I-91 CORRIDOR | • EXISTING ARMY CORP LEVEE SYSTEM ON BOTH SIDES OF RIVER |
| • CREATE GREEN DEVELOPMENT CORRIDOR ALONG CITY RIVER FRONTAGE | • EXTENSIVE UTILITY RELOCATION |
| | • ROW TAKINGS |
| | • NEIGHBORHOOD DISRUPTION / PROPERTY ACQUISITIONS |
| | • DESIGNATED PARK LAND EFFECTS |

# Railroad Relocation Example (New Bridge)

Public domain images

# Railroad Right-of-Way Example

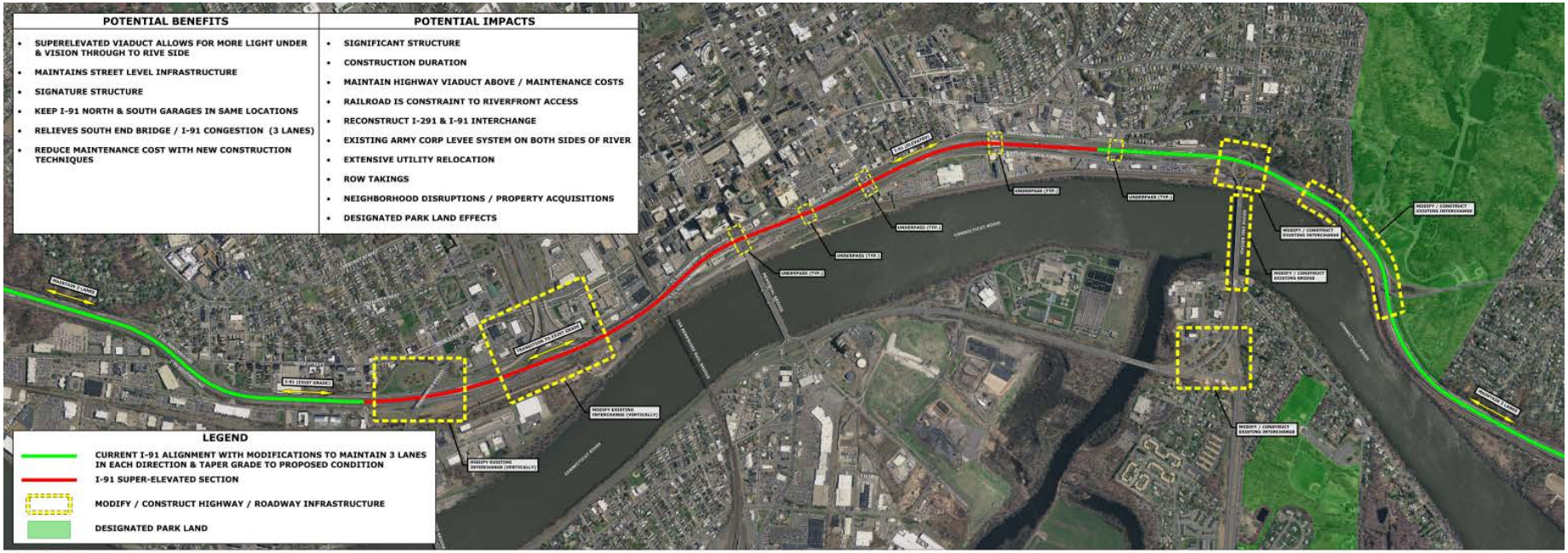
# I-91 on West Side
# (Three New Bridges Option)



# I-91 on West Side

| POTENTIAL BENEFITS | POTENTIAL IMPACTS |
|---|---|
| • REMOVES OVERHEAD VISUAL / PHYSICAL IMPEDIMENT OF I-91 VIADUCT STRUCTURE | • MERGER OF I-91 & ROUTE 5 TRAFFIC |
| • REMOVES TRAFFIC / NOISE FROM CITY OF SPRINGFIELD SIDE OF RIVER | • TUNNEL I-91 UNDER ROUTE 5 COMMERCIAL AREA (COST & ROW) |
| • GREEN CORRIDOR REDEVELOPMENT OPPORTUNITIES ALONG EAST BANK | • RECONSTRUCT I-291 & I-91 INTERCHANGE |
| • RELIEVES I-91 SOUTHERN SECTION (LONGMEADOW CURVE) TRAFFIC CONGESTION | • STORMWATER / GROUNDWATER CONTROL |
| • MAINTAIN 3 LANES ON I-91 CORRIDOR | • WATER TABLE |
| | • REQUIRED EXHAUST MITIGATION |
| | • EXISTING ARMY CORP LEVEE SYSTEM ON BOTH SIDES OF RIVER |
| | • EXTENSIVE UTILITY RELOCATION |
| | • ROW TAKINGS |
| | • NEIGHBORHOOD DISRUPTION / PROPERTY ACQUISITIONS |
| | • DESIGNATED PARK LAND EFFECTS |

# Reconstructed Elevated Section



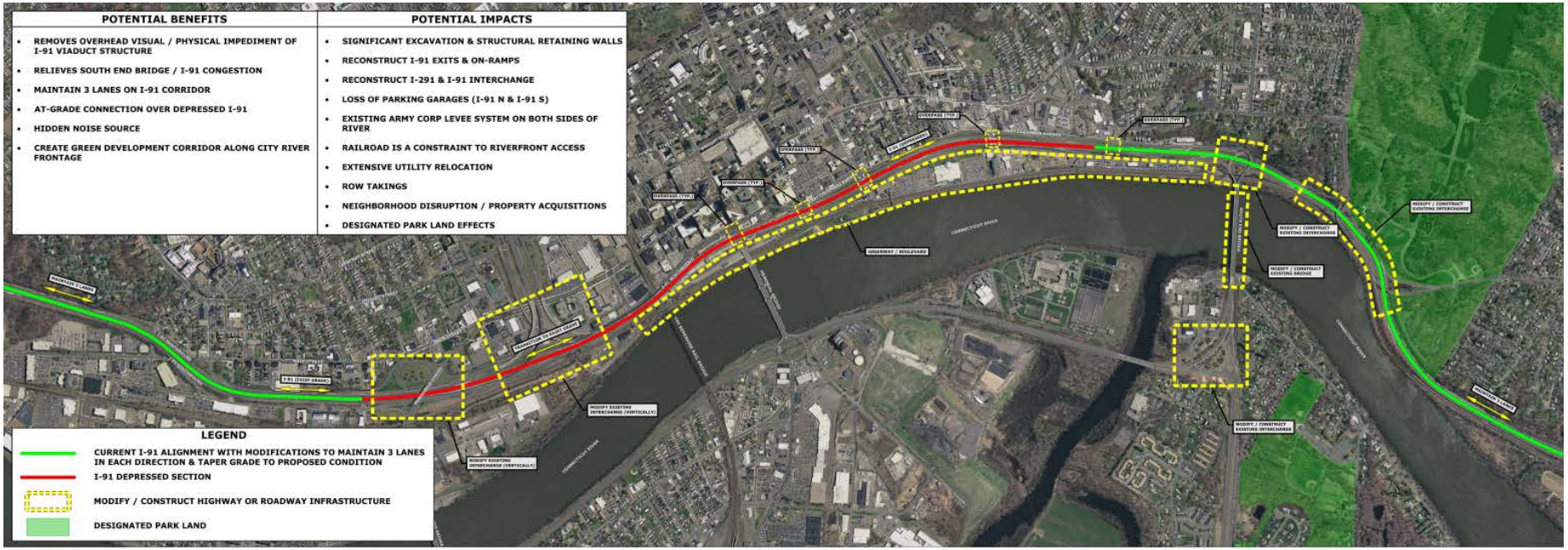

STUDY AREA PLAN
CONCEPT - ELEVATED SECTION

# Reconstructed Elevated Section

| POTENTIAL BENEFITS | POTENTIAL IMPACTS |
|---|---|
| • SUPERELEVATED VIADUCT ALLOWS FOR MORE LIGHT UNDER & VISION THROUGH TO RIVE SIDE<br>• MAINTAINS STREET LEVEL INFRASTRUCTURE<br>• SIGNATURE STRUCTURE<br>• KEEP I-91 NORTH & SOUTH GARAGES IN SAME LOCATIONS<br>• RELIEVES SOUTH END BRIDGE / I-91 CONGESTION (3 LANES)<br>• REDUCE MAINTENANCE COST WITH NEW CONSTRUCTION TECHNIQUES | • SIGNIFICANT STRUCTURE<br>• CONSTRUCTION DURATION<br>• MAINTAIN HIGHWAY VIADUCT ABOVE / MAINTENANCE COSTS<br>• RAILROAD IS CONSTRAINT TO RIVERFRONT ACCESS<br>• RECONSTRUCT I-291 & I-91 INTERCHANGE<br>• EXISTING ARMY CORP LEVEE SYSTEM ON BOTH SIDES OF RIVER<br>• EXTENSIVE UTILITY RELOCATION<br>• ROW TAKINGS<br>• NEIGHBORHOOD DISRUPTIONS / PROPERTY ACQUISITIONS<br>• DESIGNATED PARK LAND EFFECTS |

# Elevated Section Example

# Sunken, Depressed, or Tunnel






January 28, 2016

# Sunken, Depressed or Tunnel

| POTENTIAL BENEFITS | POTENTIAL IMPACTS |
|---|---|
| • REMOVES OVERHEAD VISUAL / PHYSICAL IMPEDIMENT OF I-91 VIADUCT STRUCTURE<br>• RELIEVES SOUTH END BRIDGE / I-91 CONGESTION<br>• MAINTAIN 3 LANES ON I-91 CORRIDOR<br>• AT-GRADE CONNECTION OVER DEPRESSED I-91<br>• HIDDEN NOISE SOURCE<br>• CREATE GREEN DEVELOPMENT CORRIDOR ALONG CITY RIVER FRONTAGE | • SIGNIFICANT EXCAVATION & STRUCTURAL RETAINING WALLS<br>• RECONSTRUCT I-91 EXITS & ON-RAMPS<br>• RECONSTRUCT I-291 & I-91 INTERCHANGE<br>• LOSS OF PARKING GARAGES (I-91 N & I-91 S)<br>• EXISTING ARMY CORP LEVEE SYSTEM ON BOTH SIDES OF RIVER<br>• RAILROAD IS A CONSTRAINT TO RIVERFRONT ACCESS<br>• EXTENSIVE UTILITY RELOCATION<br>• ROW TAKINGS<br>• NEIGHBORHOOD DISRUPTION / PROPERTY ACQUISITIONS<br>• DESIGNATED PARK LAND EFFECTS |

# Sunken Section Example

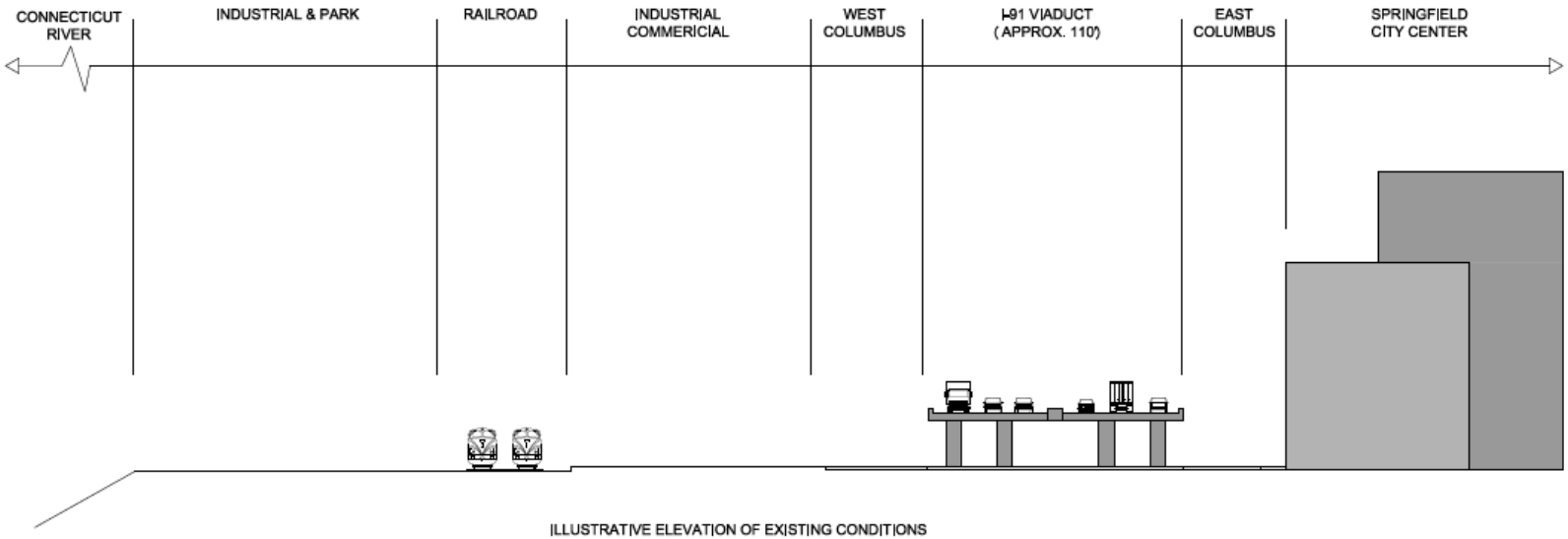
# Sunken Section Example

*Before*

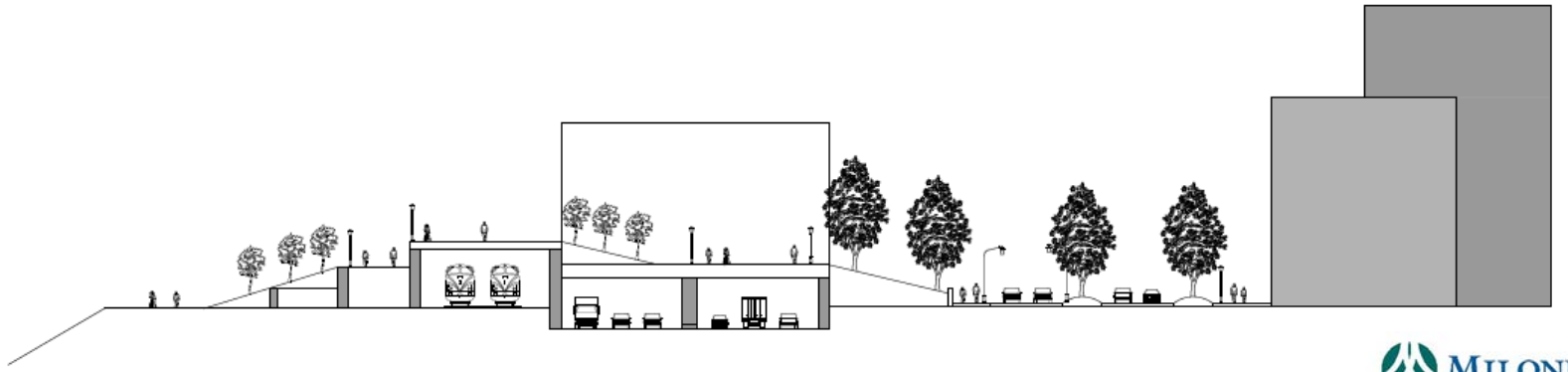
*After*

# Sunken/Tunnel Example

# Sunken/Tunnel Example




ILLUSTRATIVE ELEVATION OF EXISTING CONDITIONS
I-91 VIADUCT CORRIDOR

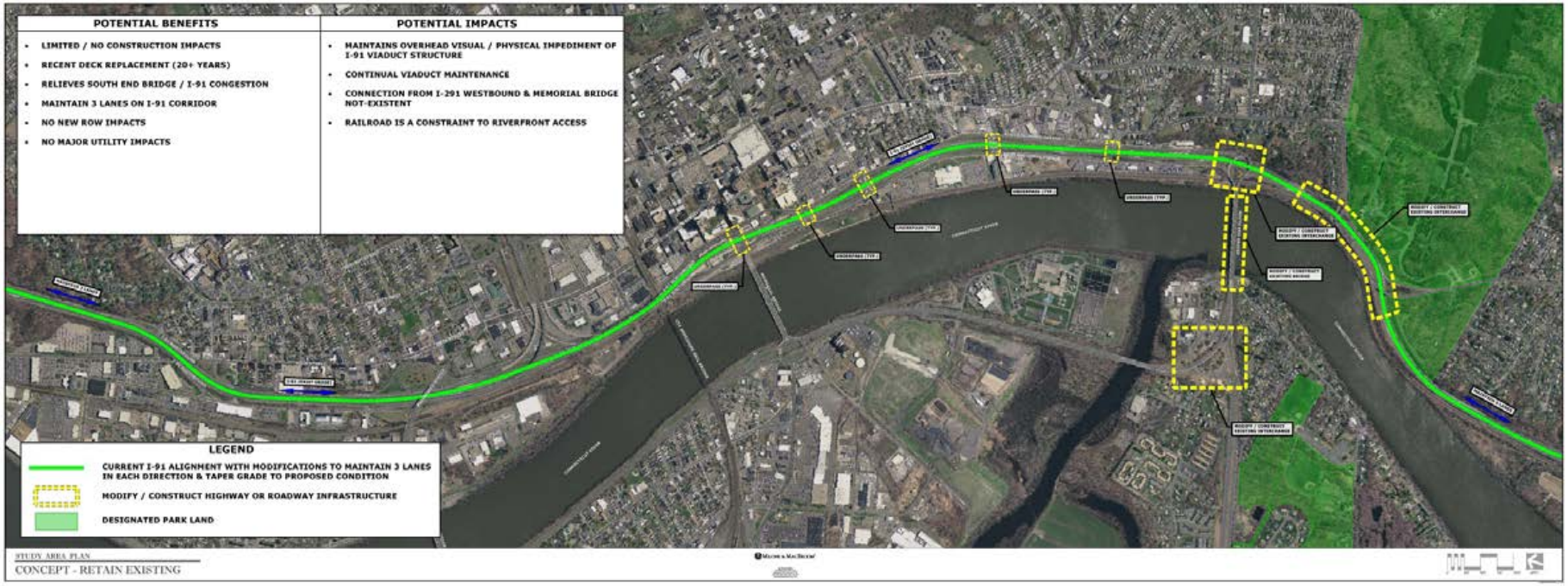


ILLUSTRATIVE ELEVATION OF PROPOSED
PARTIALLY DEPRESSED I-91 VIADUCT CORRIDOR

NOTE:
THIS ELEVATION IS INTENDED FOR INFORMATIONAL PURPOSES ONLY AND IS CONCEPTUAL IN NATURE. THE ELEMENTS DEPICTED ARE IN GENERAL CONFORMANCE WITH ACTUAL SIZE AND SCALE.

0 20' 40' 60' 80'

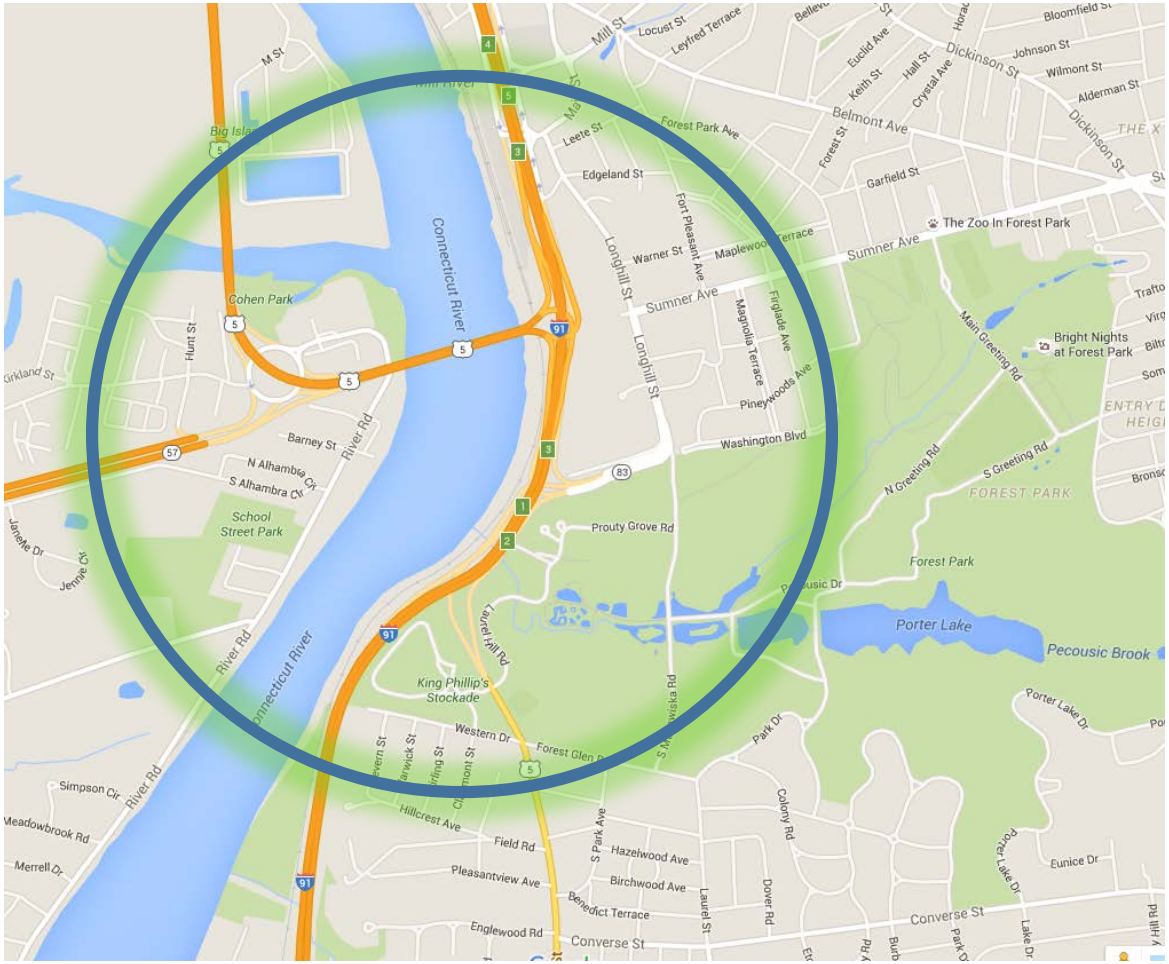
# Enhance Existing



# Enhance Existing (Deck Replacement)

| POTENTIAL BENEFITS | POTENTIAL IMPACTS |
|---|---|
| • LIMITED / NO CONSTRUCTION IMPACTS | • MAINTAINS OVERHEAD VISUAL / PHYSICAL IMPEDIMENT OF I-91 VIADUCT STRUCTURE |
| • RELIEVES SOUTH END BRIDGE / I-91 CONGESTION | • RECENT DECK REPLACEMENT (20+ YEARS) |
| • MAINTAIN 3 LANES ON I-91 CORRIDOR | • CONTINUAL VIADUCT MAINTENANCE |
| • NO NEW ROW IMPACTS | • CONNECTION FROM I-291 WESTBOUND & MEMORIAL BRIDGE NOT-EXISTENT |
| • NO MAJOR UTILITY IMPACTS | • RAILROAD IS A CONSTRAINT TO RIVERFRONT ACCESS |

# I-91 Lane Drop, South End Bridge, & Route 83 Connection



# I-91 Lane Drop, South End Bridge, & Route 5 Connection

# I-91 Lane Drop, South End Bridge, & Route 83 Connection

**Single Point**

**Diverging Diamond**

# Route 5 & 57 Connection

- Direct Route 5 to 57 from South End Bridge
- Direct Route 5 south to 57 connection over rotary
- New South End Bridge
- New Bridge over Westfield River

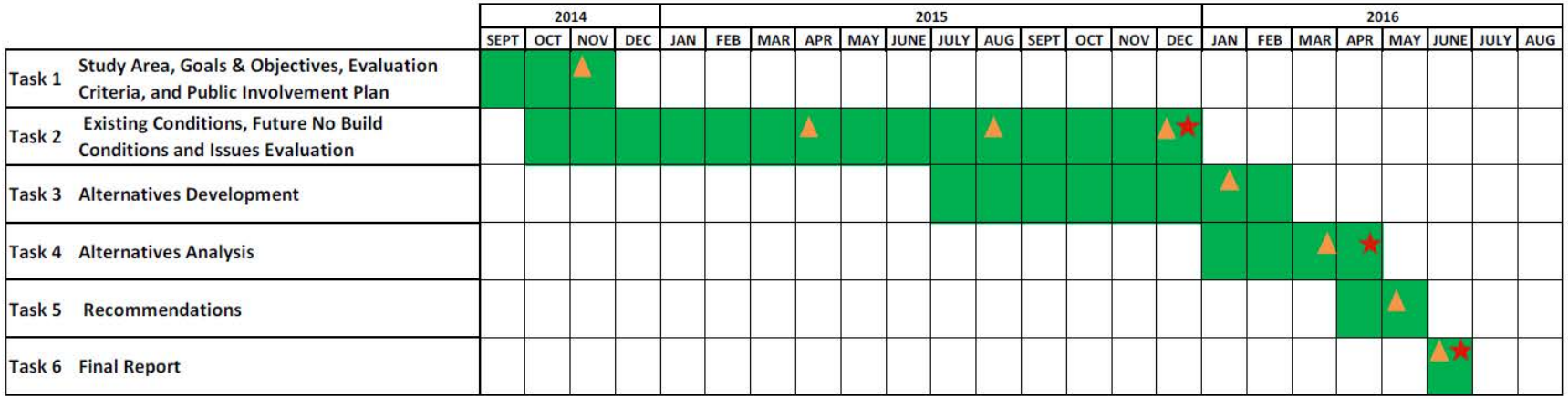
# I-91 and 291 Connection

- Over the top from 291 to 91 south (right side)
- Split exit to serve Memorial Bridge (right side)
- Over R.R. Tracks
- Works with an Elevated Viaduct only

# Short-Term & Medium-Term Recommendations

- Pavement Marking and Signing Improvements
- Signage for Walkability
- Improved Wheelchair Ramps and ADA Accessibility at Intersections
- Provide Bike Lanes and/or Shared Bike Routes
- Enhanced Under Viaduct Pedestrian Plazas (Lighting)
- Signal Optimization, timing changes
- Minor Geometric Improvements, Auxiliary Lanes, Improved Radii at Intersection Corners
- Improvements to Crossings with Railroad at Riverfront Park

# Maintaining Project Schedule



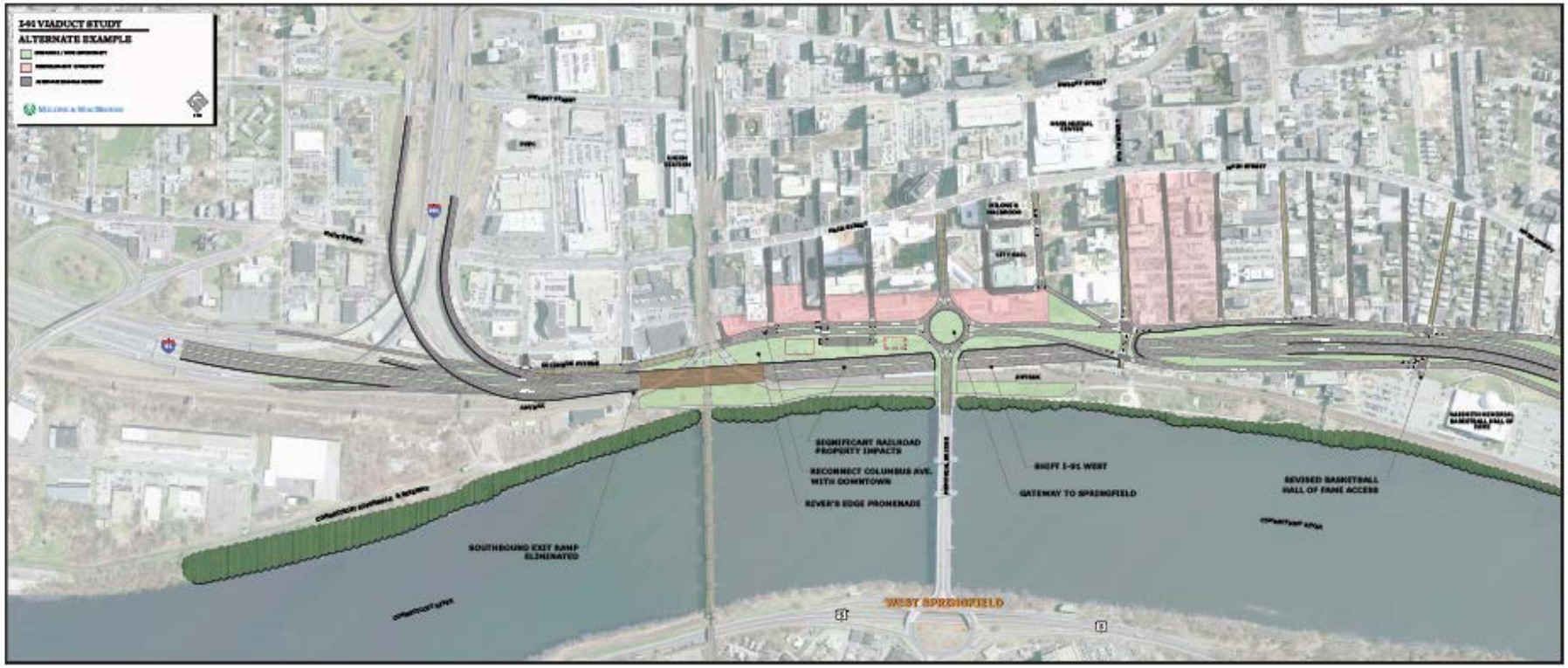

Working Group Meeting

Public Meeting

# Next Steps

- Define Set of Preferred Alternatives
- Finalize Evaluation Criteria
- Define Short-term and Medium-term Alternatives to Improve Safety, Traffic Flow and Health-based on 2040 No-Build Micro-Simulations
- More Detailed Development of Preferred Alternatives
- Conduct Additional WG Meetings (March)
- Next Public Meeting (April)

# Long-Term Alternatives Example




Working Group Member Comments/Questions are **Encouraged**, but orderly. Thank you.

# Questions & Comments

**Contacts:**

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Michael Clark, Transportation Planner
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Email: michael.clark@state.ma.us

**Study Website Link:**
www.massdot.state.ma.us/i91viaductstudy