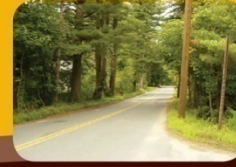




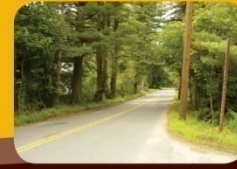
Minuteman West Bikeway

# Rail to Trail



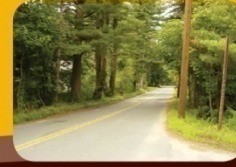
Public Meeting  
Proposed Minuteman Bikeway  
Extension  
Along Railroad Avenue  
September 25, 2013





## Meeting Purpose

- Discuss design options along Railroad Avenue for the bikeway extension



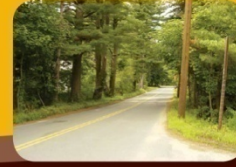
## Project Limits

- The project will extend the bikeway from South Road to Wheeler Drive, for a total length of 1.9 miles
  - Railroad Ave from Depot Park to gravel parking area – 0.32 miles
  - Off road section – 1.6 miles



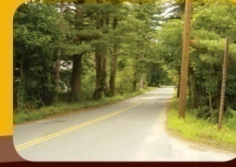
## Project History

- Feasibility Study completed in 11/2005
  - Investigated existing trail condition, wetland locations, regional connectivity, design criteria, funding options
- Supplemental Study completed 11/2008
  - Compared various surface treatments, trail widths, and funding options and criteria
- Transportation Enhancement Grant
  - Preliminary approval received in April 2006.
- Project Presented to Selectmen on 9/15/08
- Field Survey Fall 2010



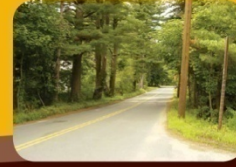
## Project History

- Project Presented to Selectmen in 2009
- Town Meeting voted in 3/23/10 to advance a paved trail to final design (article 18)
- 2012 - DPW submitted a applications to MassDOT for construction funding
  - Responding to comments
  - Finalize request for approval



## Project History

- 2013 – discussed alignment option along Elm Brook with Conservation Commission
- 2013 – presented options to Selectmen
  - Voted to connect the bikeway on Railroad Avenue
  - Finalizing construction funding requests to MassDOT



## Design Standards for Bike Accommodations

- Current MassDOT Design Guide
- 1999 (AASHTO) Guide for the Development of Bicycle Facilities
- Americans with Disabilities Act of 1990
- American Access Board
- 2009 Manual on Uniform Traffic Control Devices (MUTCD)



## Railroad Avenue - Constraints

- Right of Way (40 foot with 10 sidewalk easement in some areas)
- Current pavement width – varies from 20 ft to 28 ft
- Trees
- Geometry at gravel parking area
- Utility poles, hydrants, etc
- Drainage
- Property encroachments
- Driveways





## Railroad Avenue

- Local Roadway classification
- Traffic includes cars, trucks, buses, bikes
- Low traffic volumes collected in June 2013 (less than 4,000 vph)
- Minimum roadway and shoulder widths for bike usage -



## Travel Lane widths

**Exhibit 5-14**  
**Range of Travel Lane Widths (In Feet)**

Area Type	Roadway Type			
	Freeways	Arterials <sup>1</sup>	Collectors <sup>2</sup>	Local Roads
Rural Natural	12	11 to 12	10 to 12	9 to 12
Rural Developed	12	11 to 12	10 to 12	9 to 12
Rural Village	N/A	11 to 12	10 to 12	9 to 12
Suburban Low Density	12	11 to 12	10 to 12	9 to 12
Suburban High Density	12	11 to 12	10 to 12	9 to 12
Suburban Village/Town Center	N/A	11 to 12	10 to 12	9 to 12
Urban	12	11 to 12	10 to 12	9 to 12

1 Lane widths less than the values shown above may be used if a design exception is obtained. See Chapter 2 for a description of the design exception procedure. Situations where narrower lanes may be considered are described below.

2 Minimum 11-foot lanes are required for design speeds of 45 miles per hour or greater.

N/A Not Applicable

Source: Adapted from A Policy on Geometric Design of Highways and Streets, AASHTO 2004, Chapter 4 Cross-Section Elements.



## Shoulder widths

**Exhibit 5-12**  
**Widths of Usable Shoulders (In Feet)**

Area Type	Roadway Type			
	Freeways <sup>1</sup>	Arterials <sup>2</sup>	Collectors <sup>2</sup>	Local Roads
Rural Natural	10 to 12	4 to 12	4 to 10	2 to 8
Rural Developed	10 to 12	4 to 12	4 to 10	2 to 8
Rural Village	N/A	4 to 12	4 to 10	2 to 8
Suburban Low Density	10 to 12	4 to 12	4 to 10	2 to 8
Suburban High Density	10 to 12	4 to 12	4 to 10	2 to 8
Suburban Village/Town Center	N/A	4 to 12	4 to 10	2 to 8
Urban	10 to 12	4 to 12	4 to 10	2 to 8

Source: *Flexibility in Highway Design*, AASHTO 2004. Chapter 6 Cross Section Elements

- 1 Left shoulders are required on Freeways and other divided roadways. See the AASHTO Green Book for left-shoulder guidance.
- 2 Shoulder widths less than the values shown above may be used if a design exception is obtained. See Chapter 2 for a description of the design exception procedure. Situations where narrower shoulders may be considered are described below.

Note: An additional 2-foot offset from the edge of the shoulder is required to vertical elements over 6-inches in height (such as guardrail).



# Rail to Trail

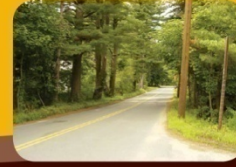


## Traffic Data collected from June 20, 2013 to June 27, 2013

				Bikes	Cars	Buses	Trucks	Total	Total EB/WB	
6/20/2013	Thursday	Eastbound		11	1092	41	280	1424		
		Westbound		10	1109	13	280	1412	2836	
6/21/2013	Friday	Eastbound		13	1254	47	380	1694		
		Westbound		14	1343	20	344	1721	3415	
6/22/2013	Saturday	Eastbound		20	659	1	175	855		
		Westbound		9	641	0	124	774	1629	
6/23/2013	Sunday	Eastbound		3	600	0	132	735		
		Westbound		2	611	0	66	679	1414	
6/24/2013	Monday	Eastbound		7	911	22	398	1338		
		Westbound		8	1102	4	328	1442	2780	
6/25/2013	Tuesday	Eastbound		15	2077	17	706	2815		
		Westbound		15	2489	6	491	3001	5816	Special State Election
6/26/2013	Wednesday	Eastbound		16	932	6	465	1419		
		Westbound		9	1201	3	338	1551	2970	
6/27/2013	Thursday	Eastbound		4	968	6	376	1354		
		Westbound		0	1146	4	286	1436	2790	

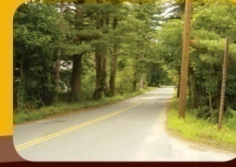


# Rail to Trail



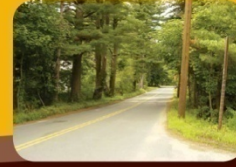
## Alternative cross section considerations

- Right of Way
- Tree Removal
- Character
- Pedestrian accessibility
- Construction costs



## Railroad Ave – Cross Section Options

1. 6 ft sidewalks both sides  
2-10 ft travel lanes with 4 ft shoulders
2. 10 ft sidewalk (south side) w/ 6 ft sidewalk (north side)  
2-11 ft travel lanes and 4 ft shoulders
3. 10 ft off road shared use path (south side)  
5 ft buffer and 2 -12 ft travel lanes (no shldrs)



## Railroad Ave design considerations for all options

- Trees will be replaced at a 2:1 ratio that will be removed due to sidewalk and roadway work
- Driveway aprons will be reconstructed
- Roadway crossing at the parking area will be upgrades to improve visibility



## Option 1 cross section

- Total width of road and sidewalks – 40 ft
- 4 ft shoulder with 10 ft travel lanes
- No land takings
- Maintains 6 foot sidewalks on both sides of roadway
- Reduces tree impacts
- Full roadway and stormwater upgrades
- Reconstruct driveway aprons into properties

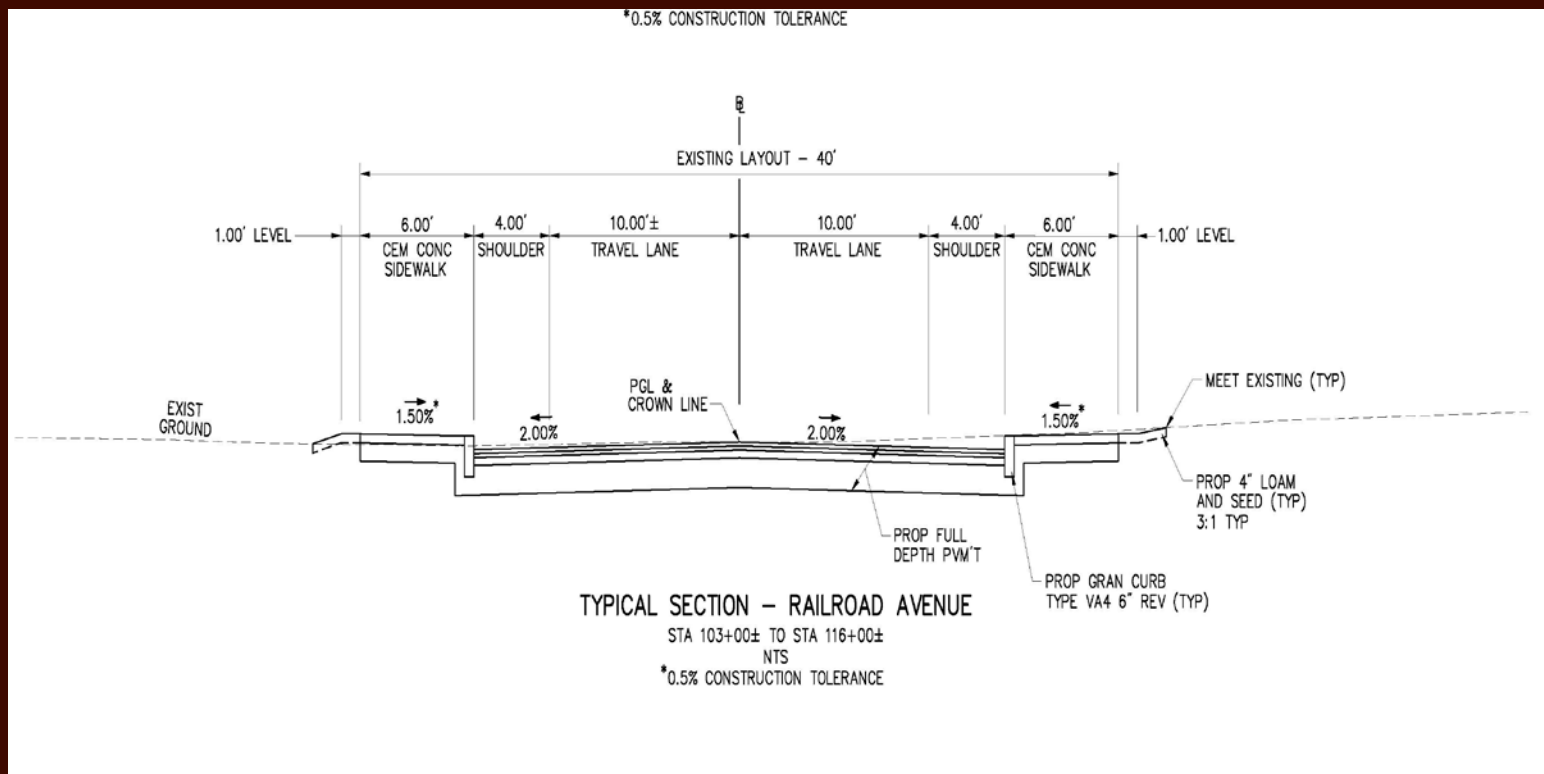




# Rail to Trail



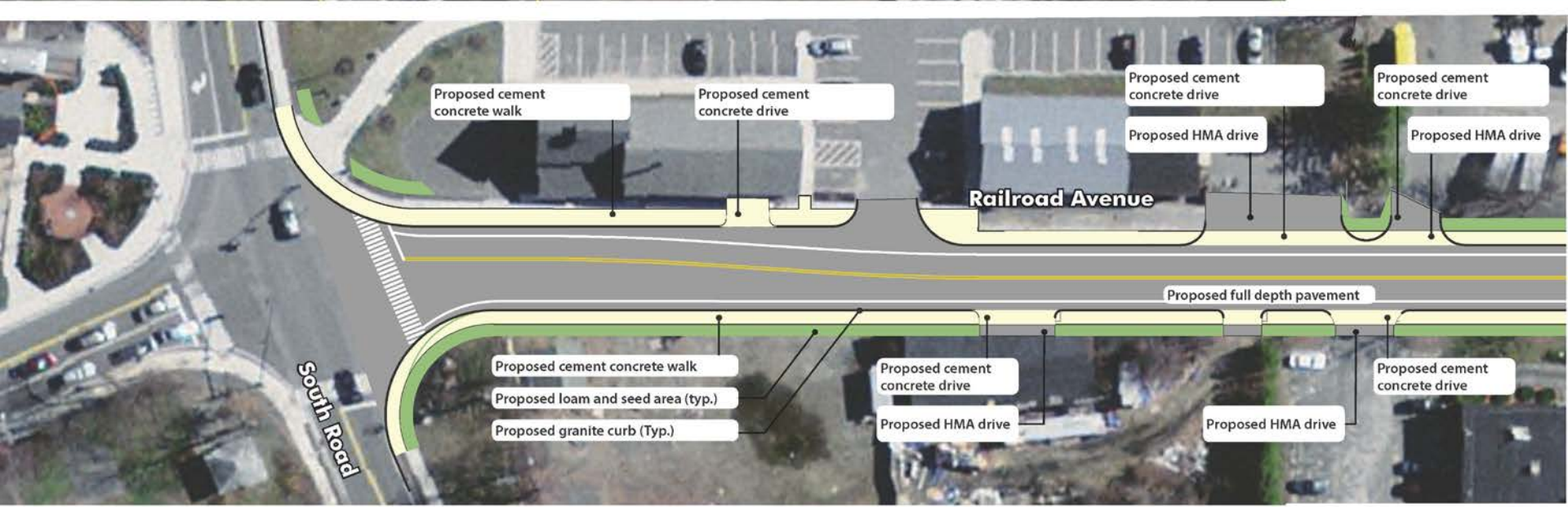
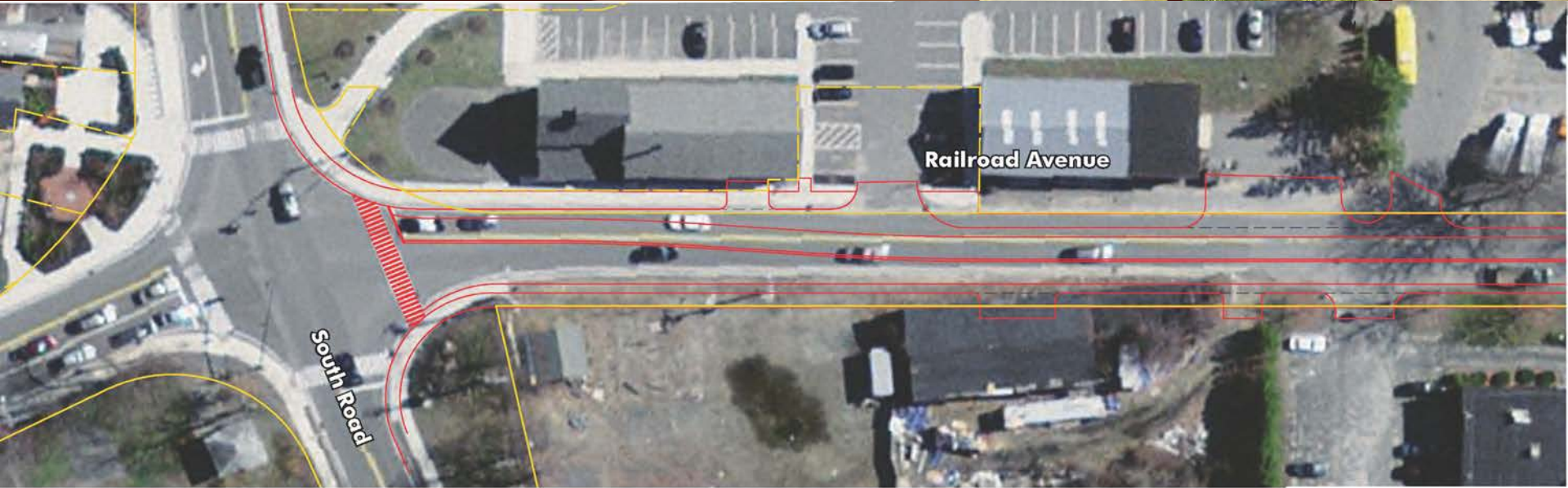
## Railroad Ave Option 1 Cross Section





## Minuteman West Bikeway

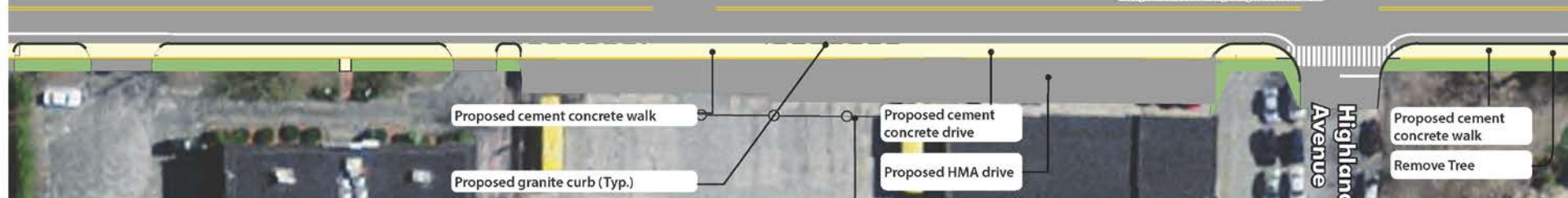
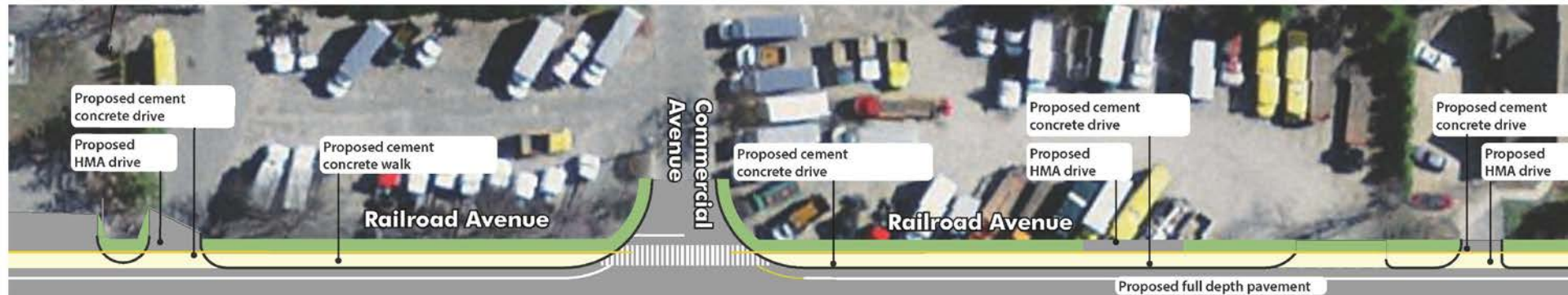
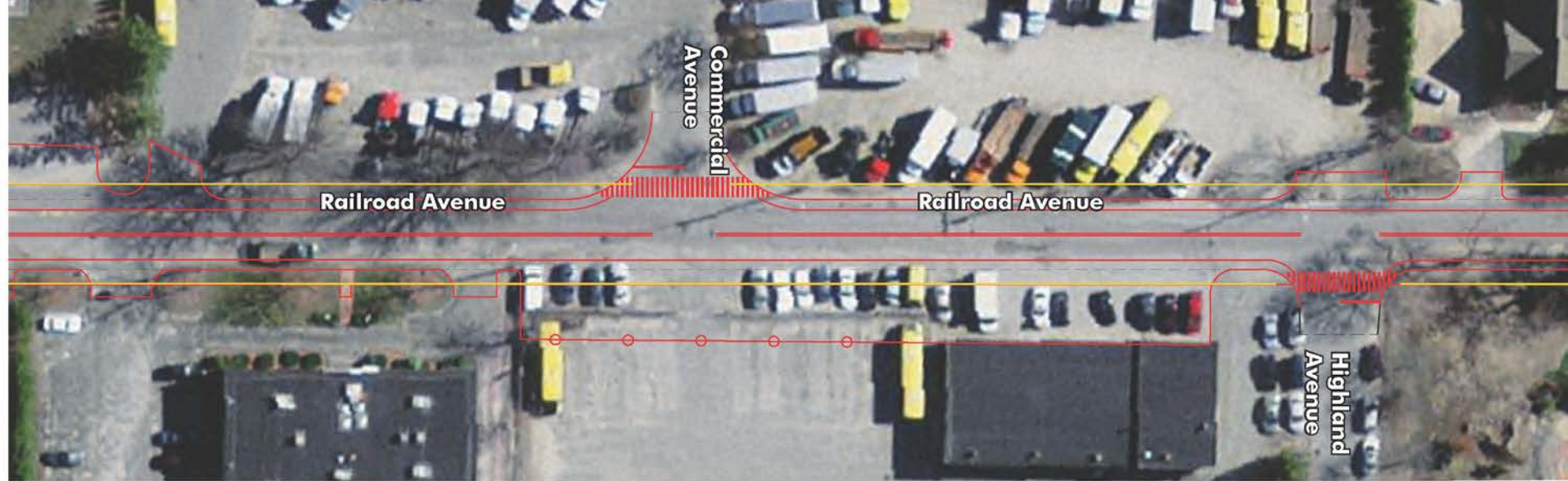
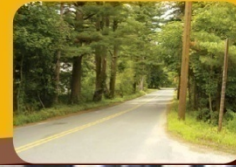
# Rail to Trail





# Minuteman West Bikeway

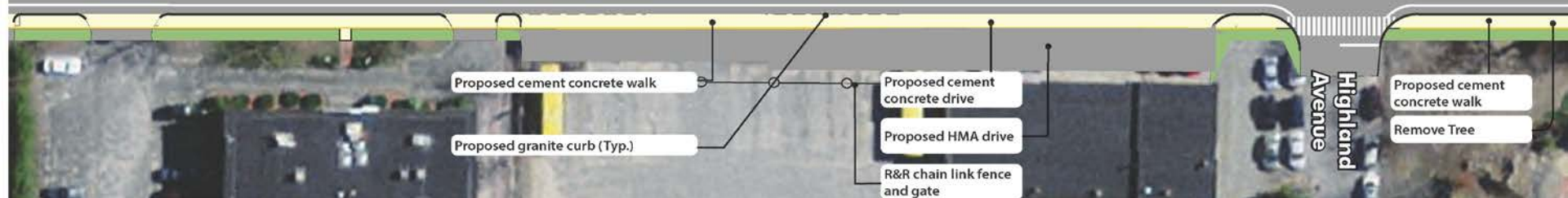
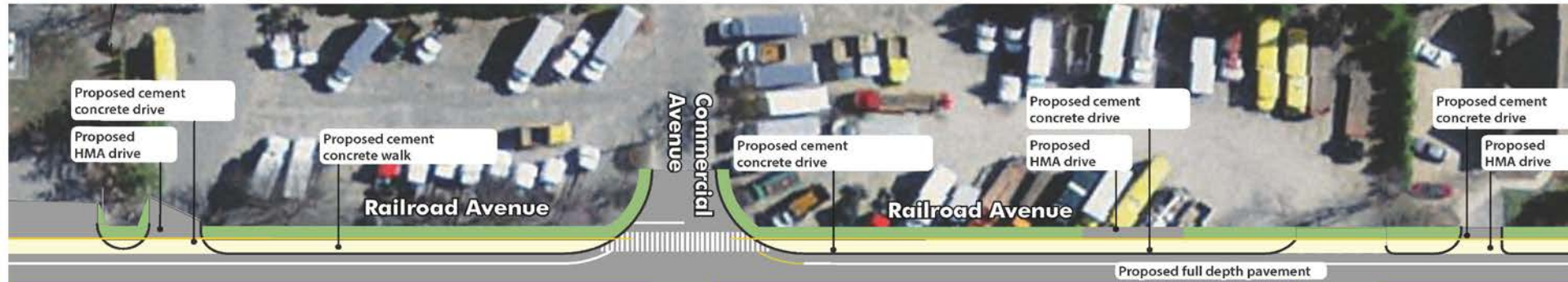
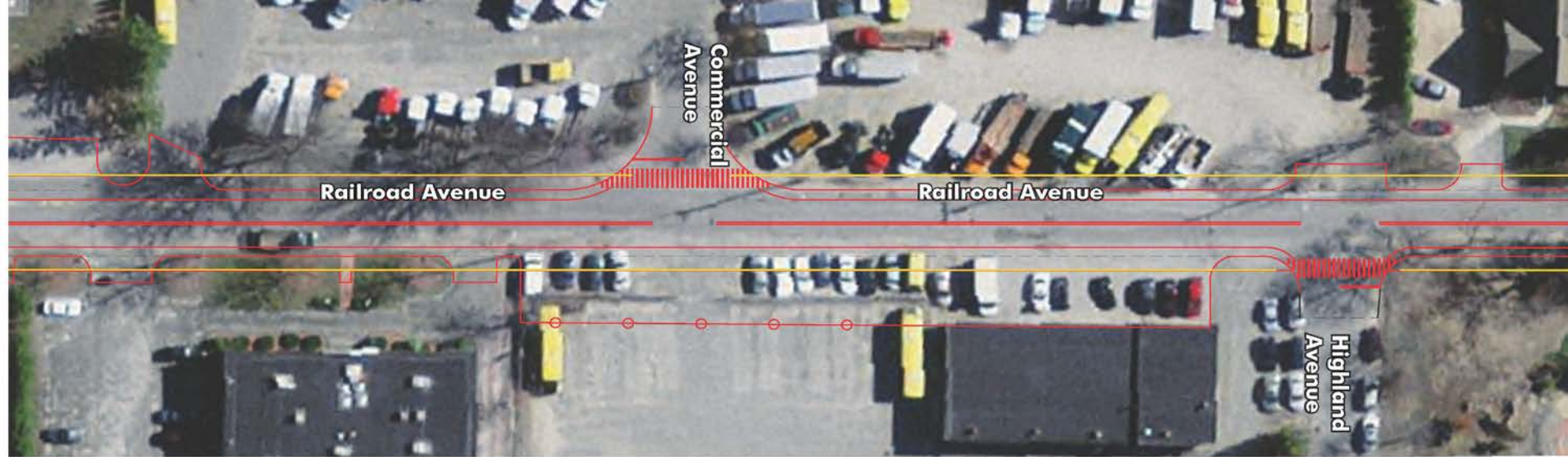
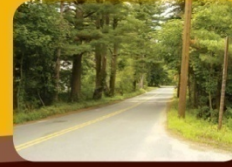
# Rail to Trail





# Minuteman West Bikeway

# Rail to Trail





# Minuteman West Bikeway

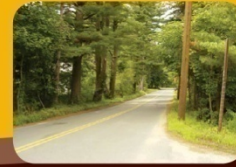
# Rail to Trail



Railroad Avenue

Minuteman Bikepath Extension





## Option 2 cross section

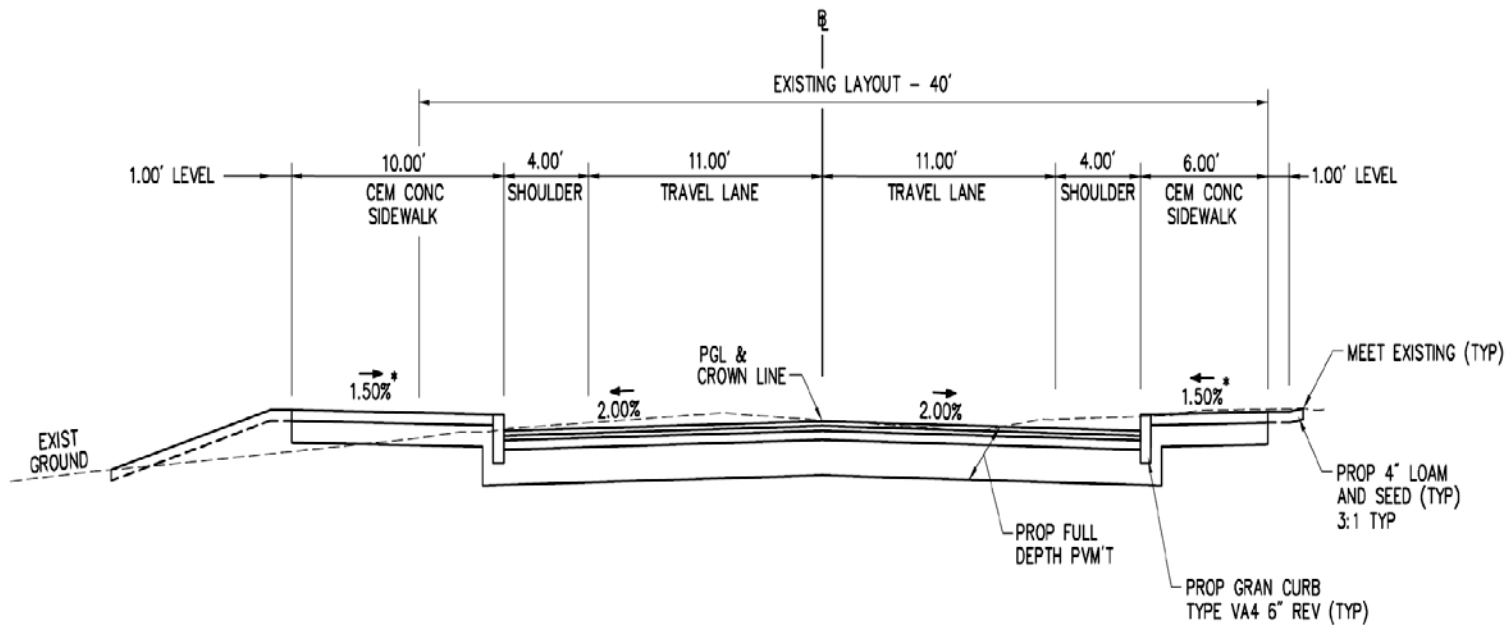
- Total width of road and sidewalk – 46 ft
- 4 ft shoulders with 11 ft lanes
- Will require land takings along entire road within project limits
- 10 ft Widened sidewalks on south side
- 6 ft sidewalks on north side
- Tree impacts are higher than option 1
- Full depth roadway and stormwater reconstruction



# Rail to Trail



## Option 2 cross section

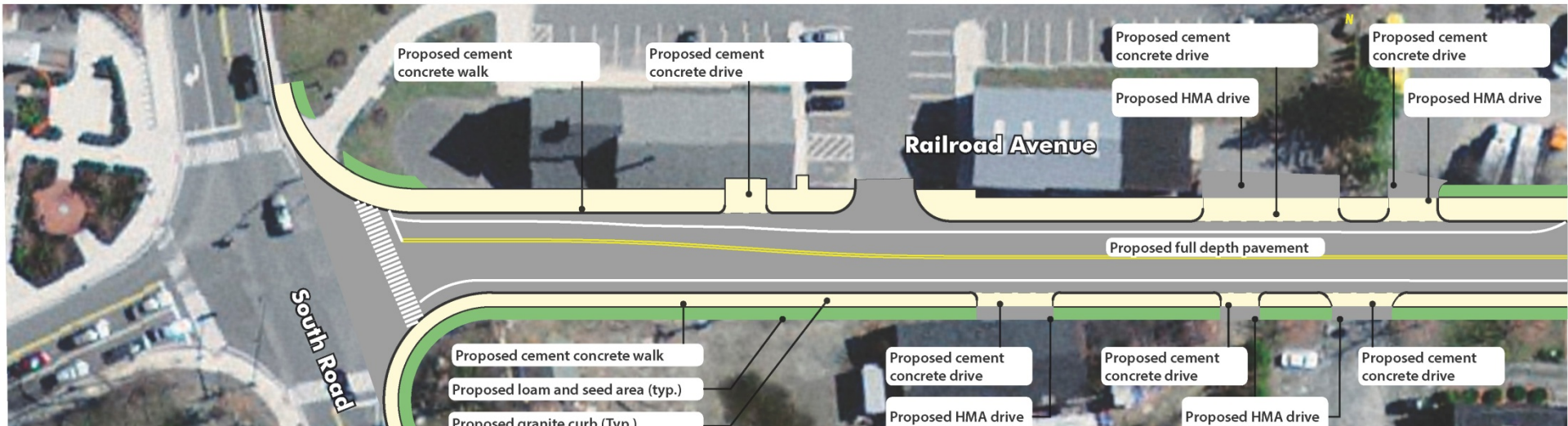
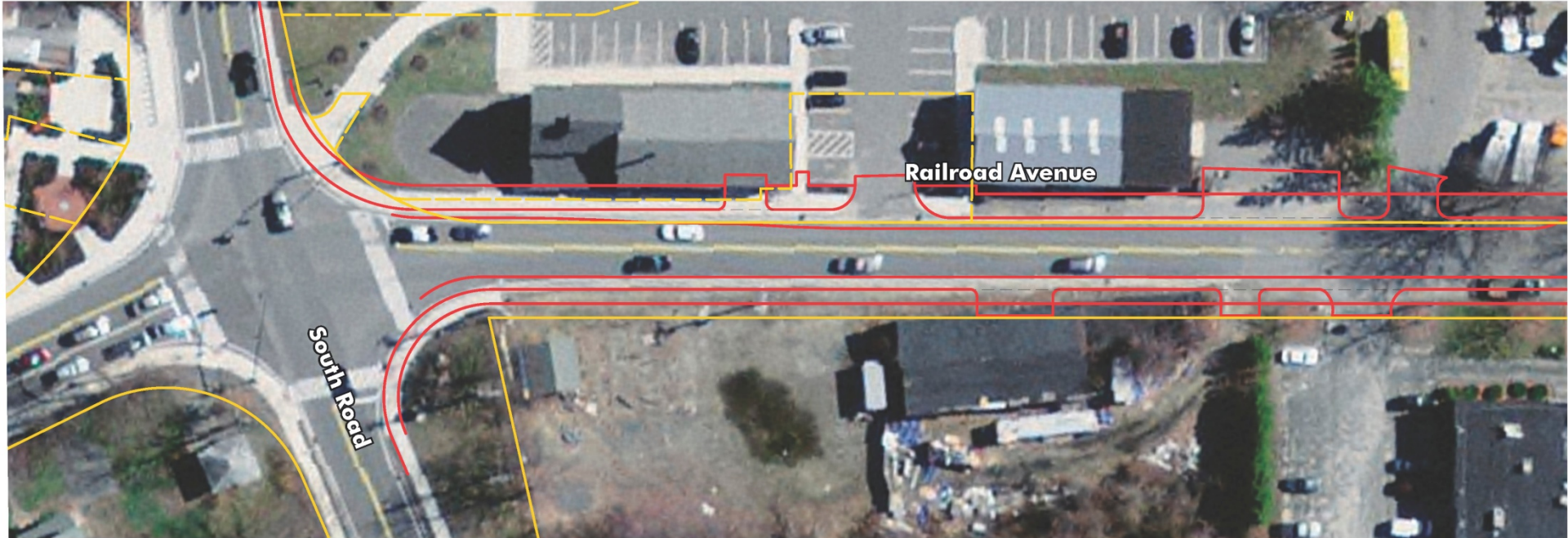
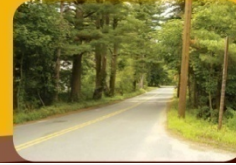


ALTERNATIVE 2  
TYPICAL SECTION



# Minuteman West Bikeway

# Rail to Trail

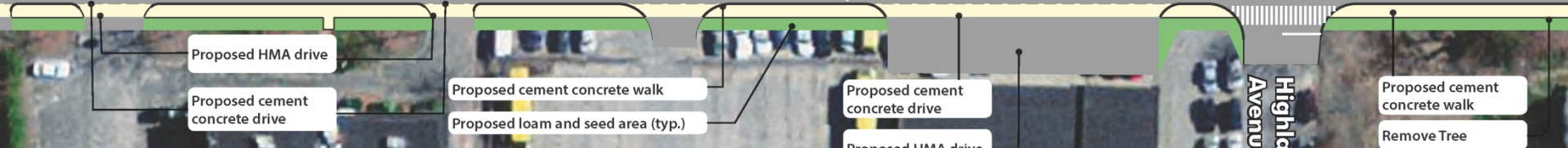
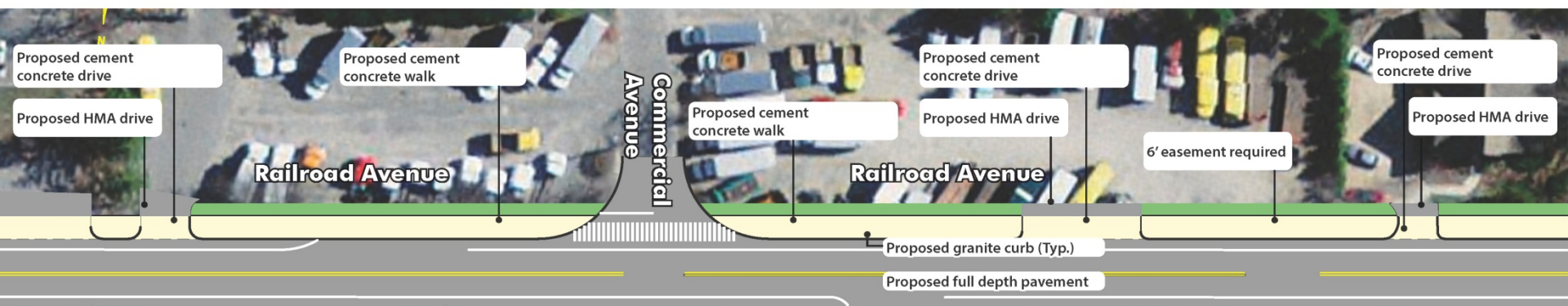
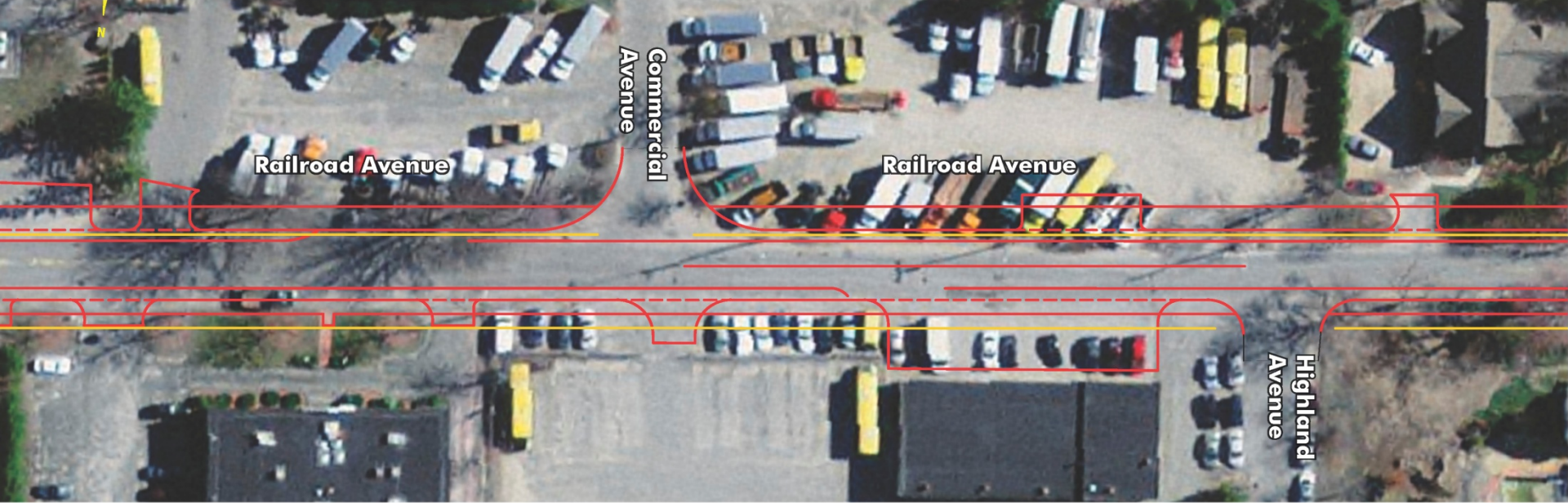
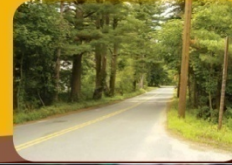






# Minuteman West Bikeway

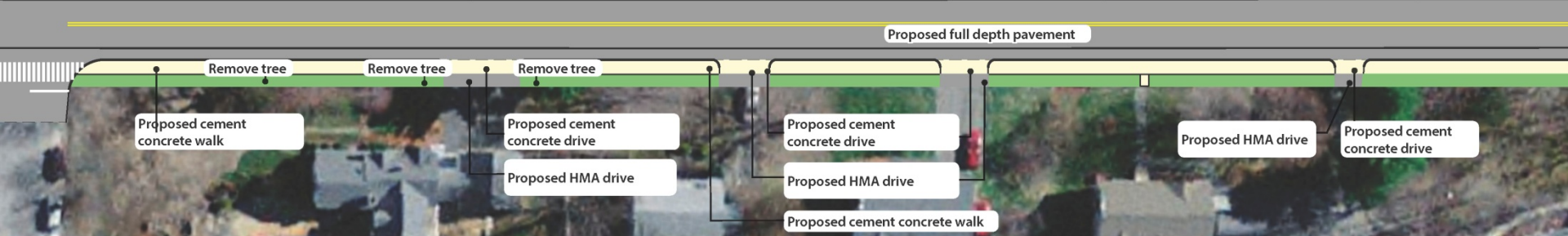
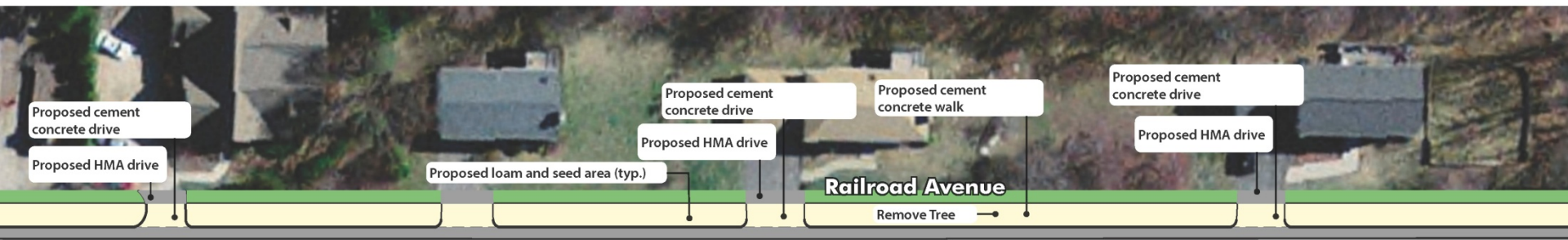
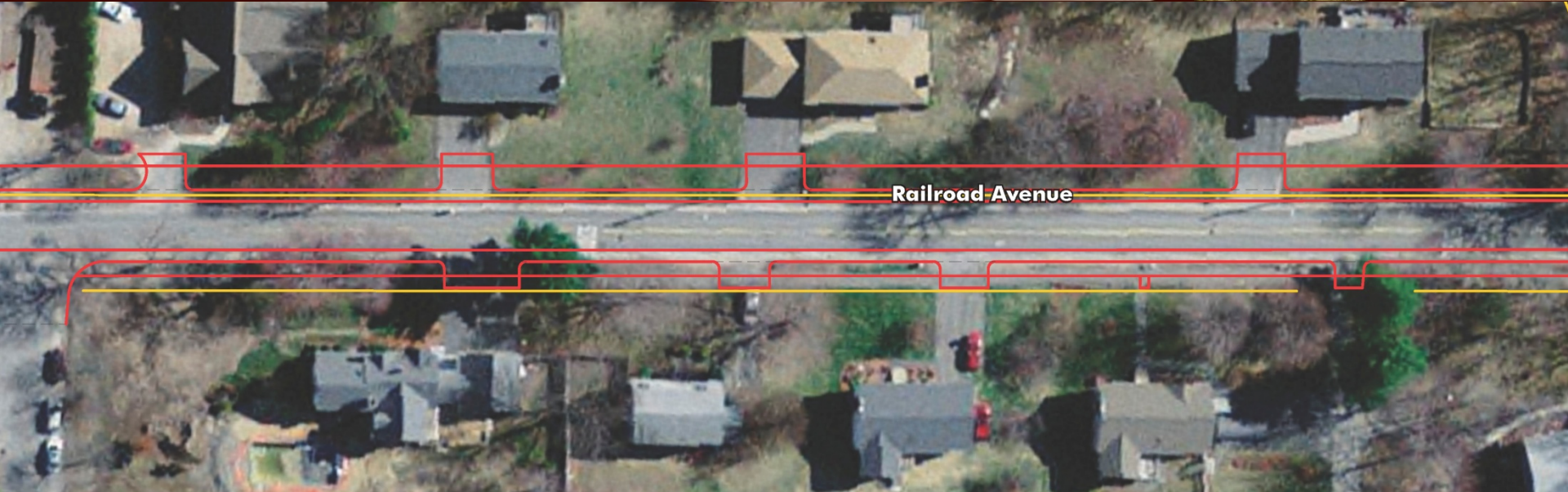
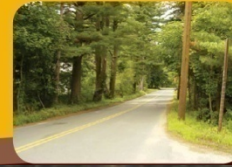
# Rail to Trail





# Minuteman West Bikeway

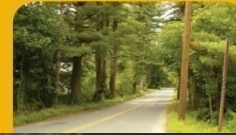
# Rail to Trail

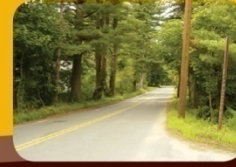




# Minuteman West Bikeway

# Rail to Trail





## Railroad Ave Option 3 cross section

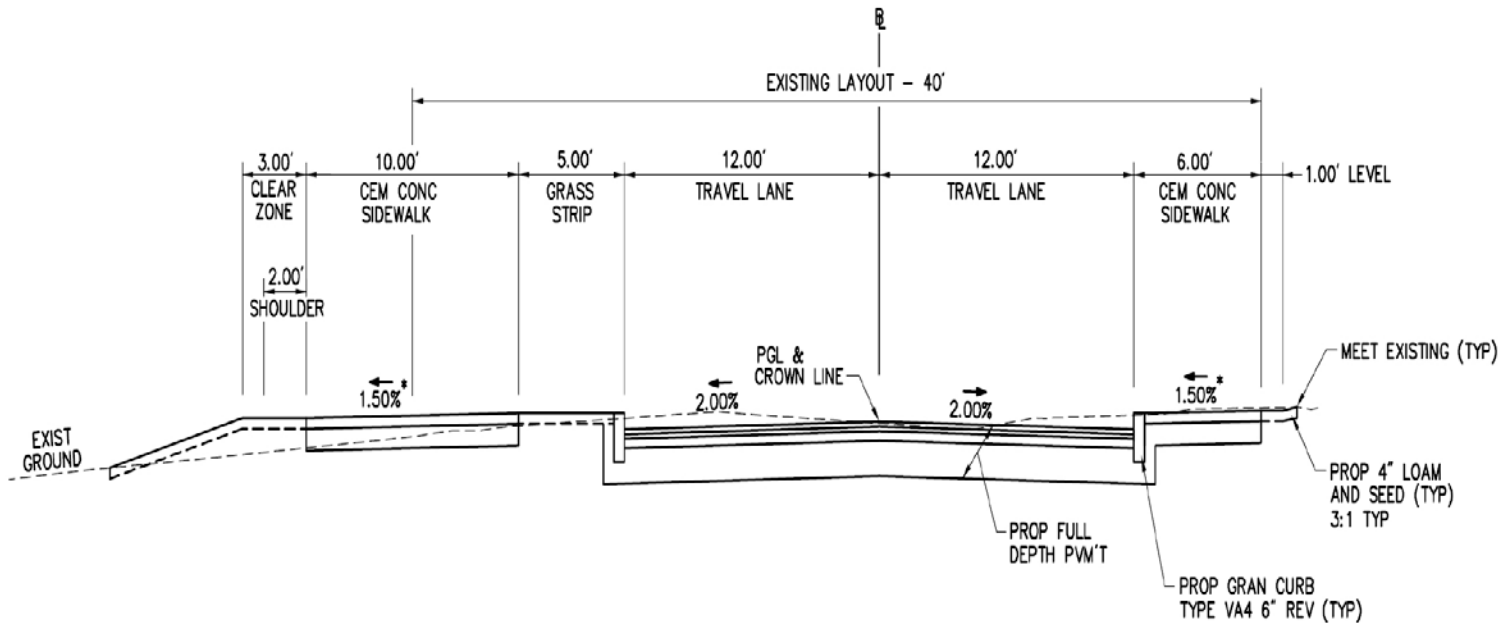
- Total width of road and sidewalks – 45 ft
- Share the road symbols on 12 ft lanes
- Will require land takings along entire road within project limits
- Widens sidewalks on south side to 10 ft with grass strip
- 6 ft sidewalks on north side
- Tree impacts are higher than option 1
- Full depth roadway and stormwater reconstruction



# Rail to Trail



## Option 3 cross section

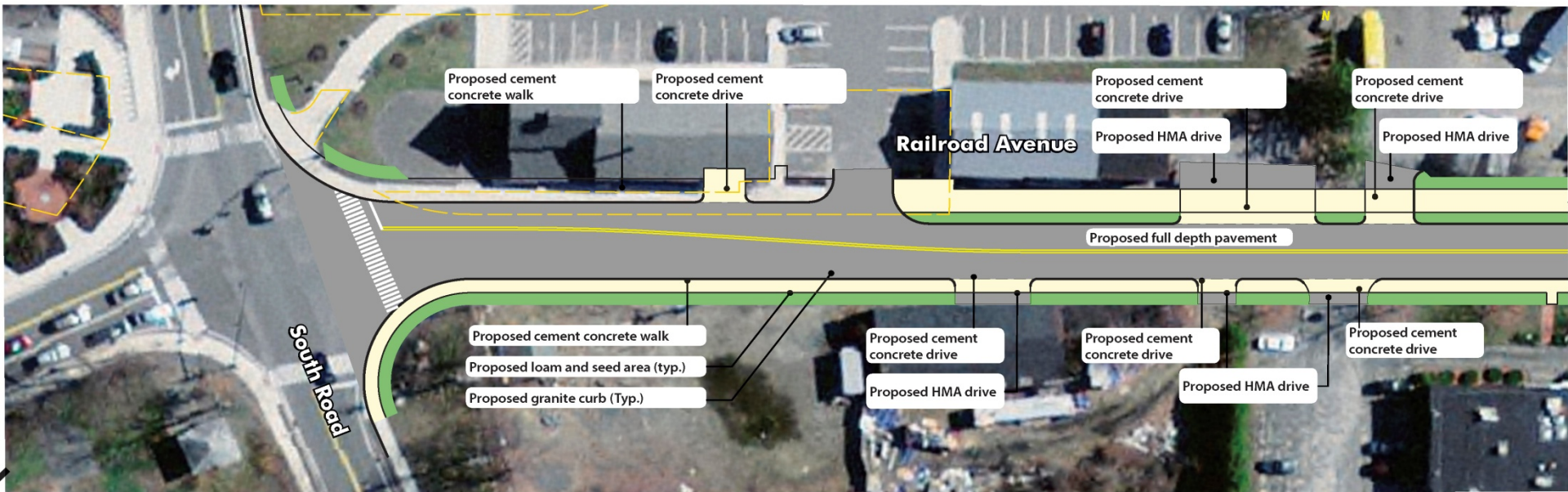
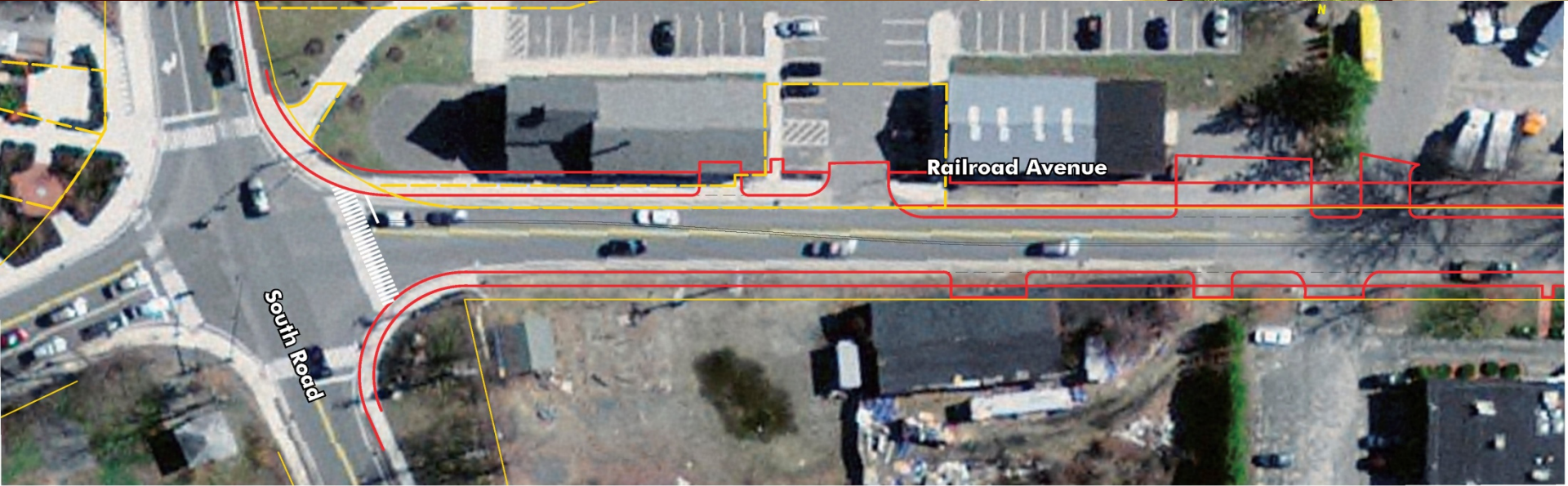


ALTERNATIVE 3  
TYPICAL SECTION



# Minuteman West Bikeway

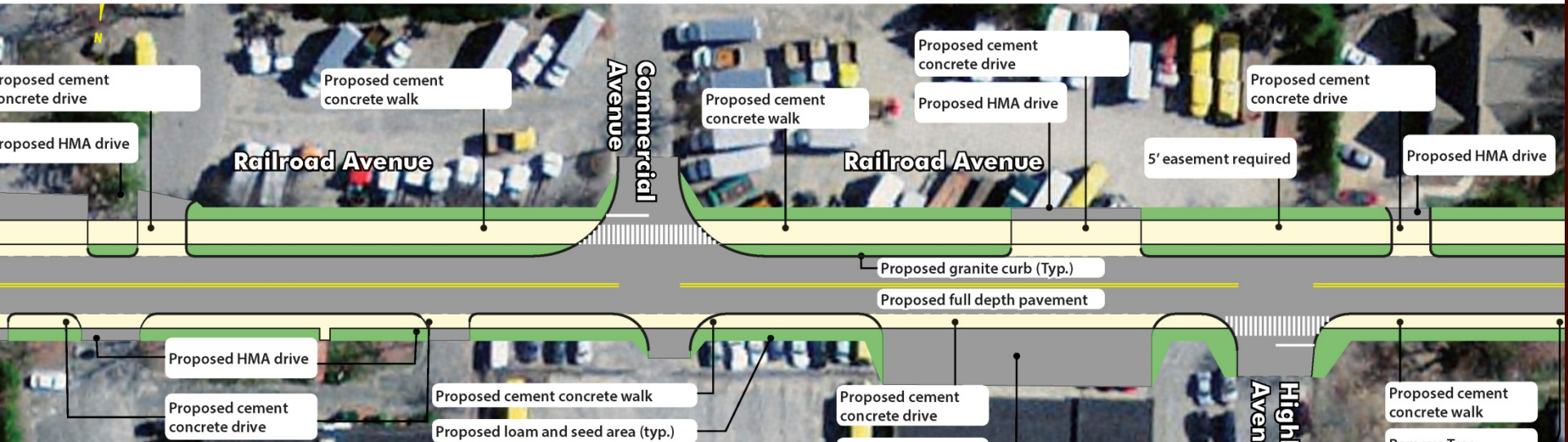
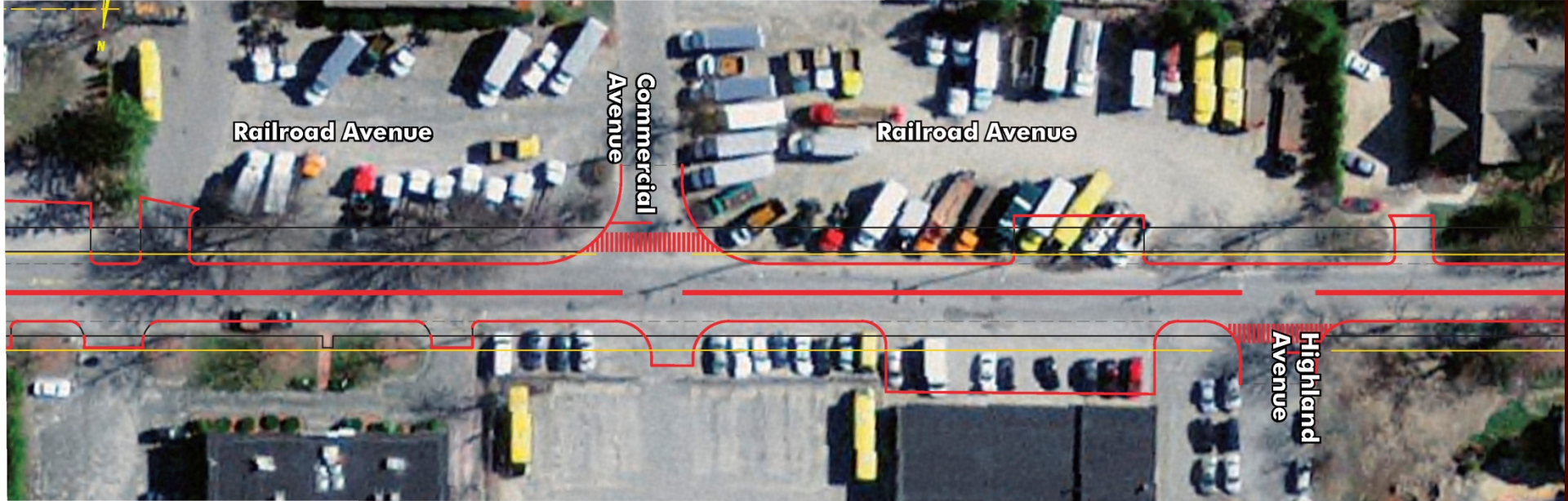
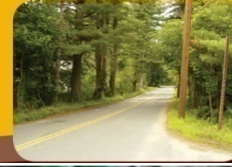
# Rail to Trail





# Minuteman West Bikeway

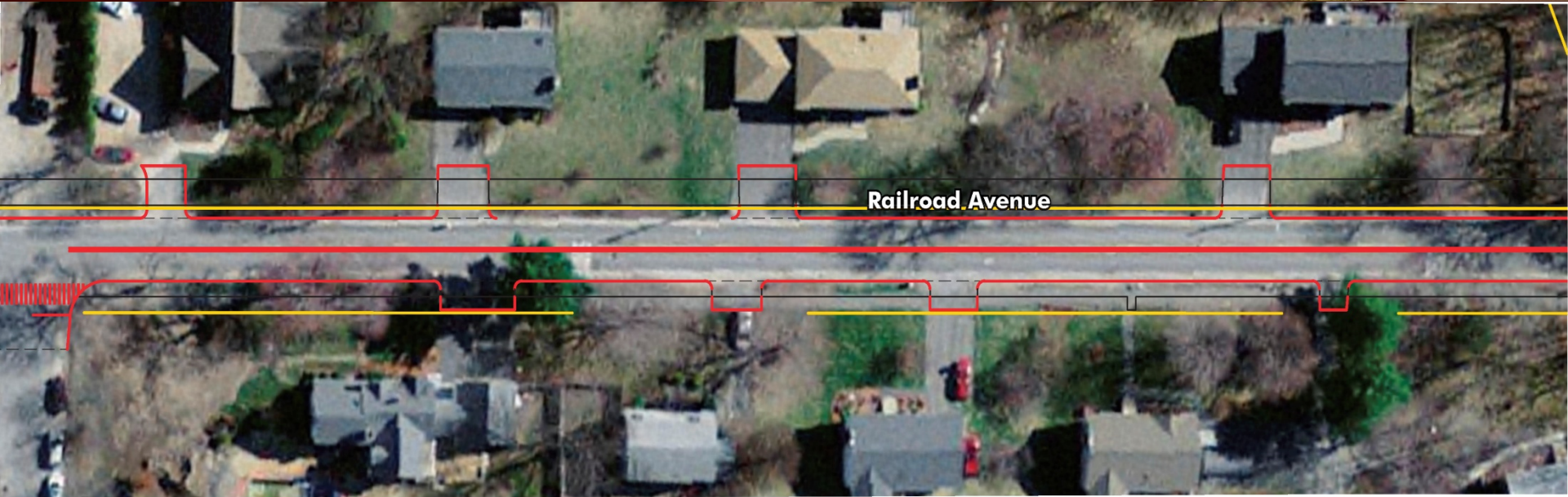
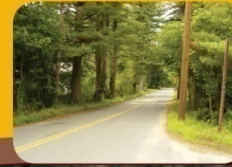
# Rail to Trail



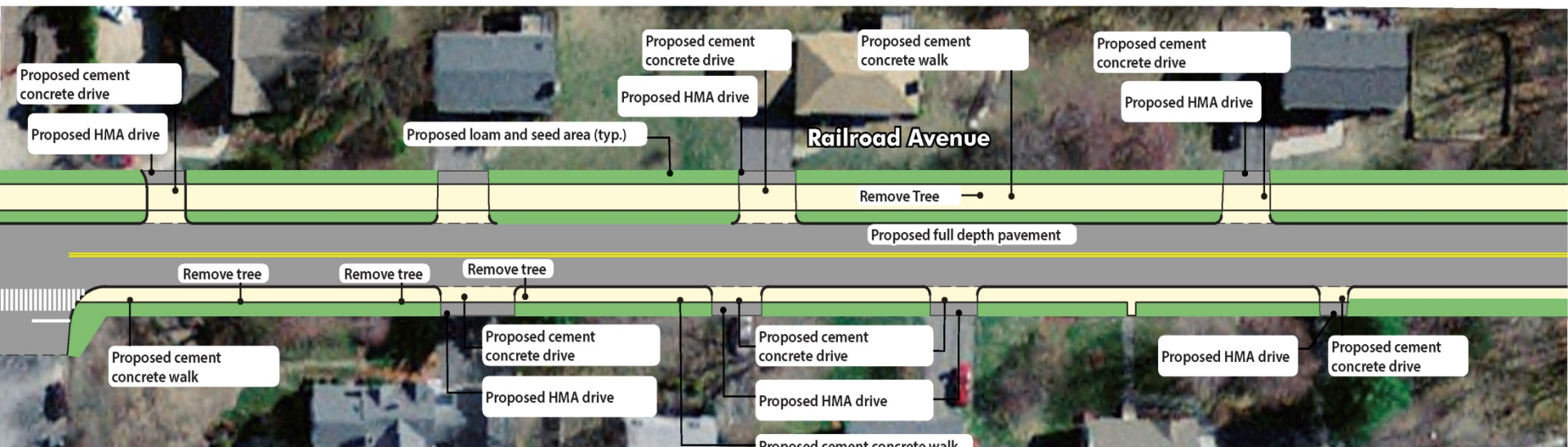


# Minuteman West Bikeway

# Rail to Trail



Railroad Avenue

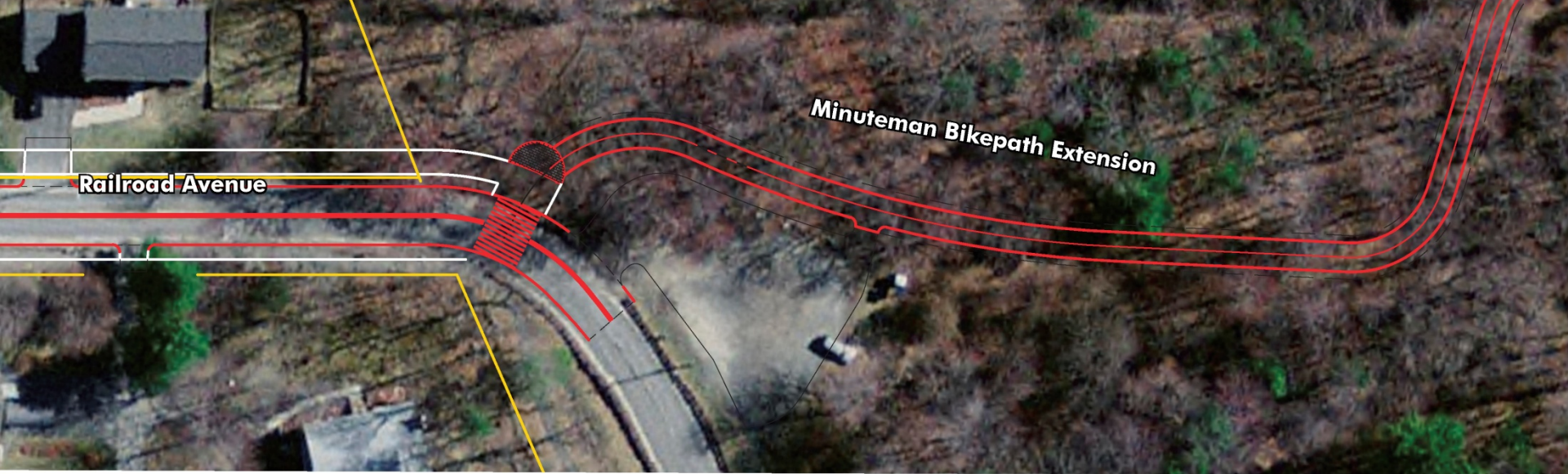
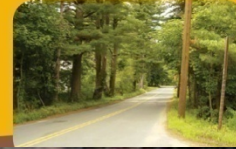






# Minuteman West Bikeway

# Rail to Trail



Railroad Avenue

Minuteman Bikepath Extension



Minuteman Bikepath Extension

Railroad Avenue

Proposed HMA Driveway

Proposed cement concrete drive

Proposed HMA drive

Proposed cement concrete walk

Proposed loam and seed area (typ.)

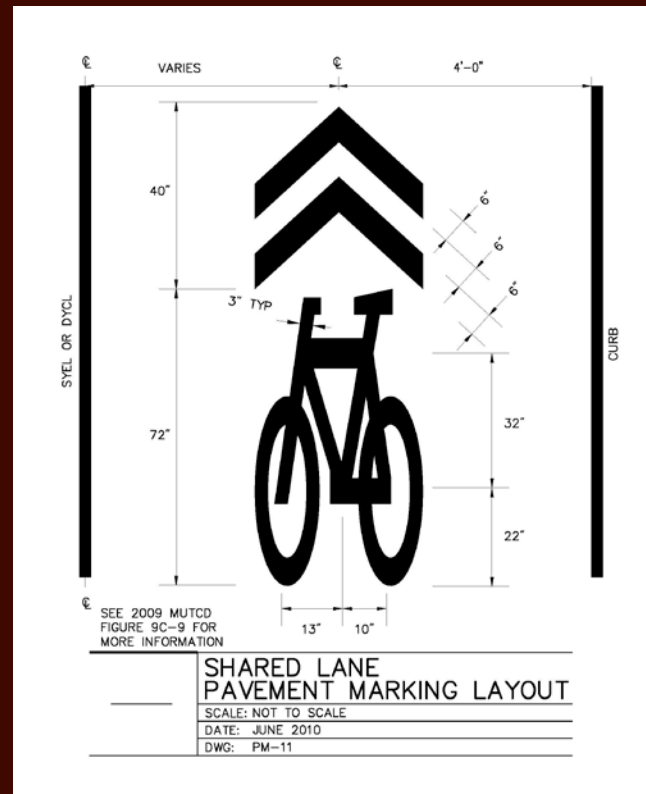
Proposed full depth pavement



# Rail to Trail



## Shared lane pavement markings





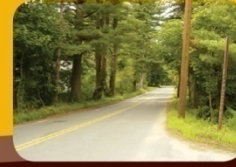
Minuteman West Bikeway

# Rail to Trail



## Railroad Avenue





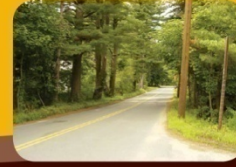
## Railroad Avenue Crossing

- Passive signal system
  - No warrant required
  - No mast arm
- Hybrid pedestrian signals
  - Requires more than 20 ped/bikes crossing during one hour to be installed
  - Overhead installation



Minuteman West Bikeway

# Rail to Trail



## Rail Road Ave Crossing – Passive Signal System





Minuteman West Bikeway

# Rail to Trail



## Pedestrian Hybrid System



*Pedestrian Hybrid Beacon (HAWK) System*



Minuteman West Bikeway

# Rail to Trail



## Parking at Railroad Ave

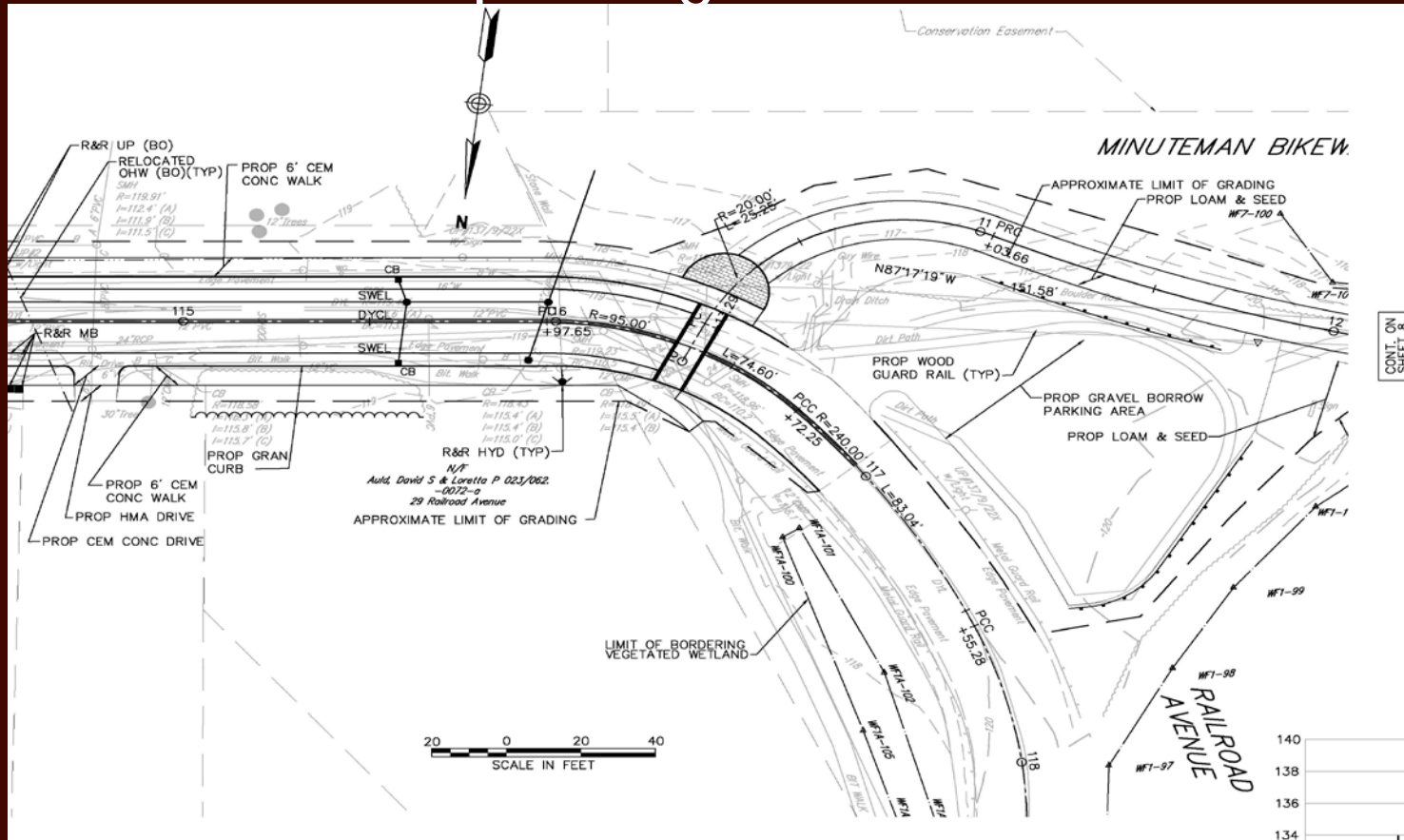




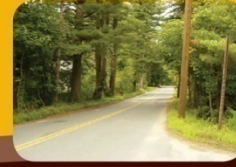
# Rail to Trail



## Railroad Ave parking area







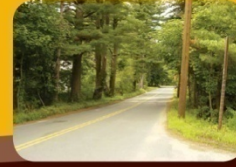
## Next Steps

- Address comments from this meeting
- Submit response letter to MassDOT for construction support
- Submit preliminary design plans to MassDOT for review
- Meet with property owners as design develops
- Secure construction advertisement date

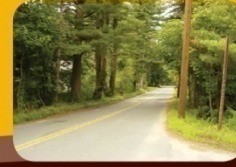


Minuteman West Bikeway

# Rail to Trail



Questions or Comments?

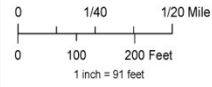


## Elm Brook Alternative Option

Study needs to be completed to determine if this is a viable alignment for a transportation corridor

- Path cross section and surface material consistency
- South Road crossing options
- Wetland Impacts (greater than 5,000 sf)
- Elm Brook Flood Plain Impacts
- Miller Moore Conservation Restriction
- Elm Brook Conservation Area
- Land Takings
- Potential mitigation requirements
- Funding eligibility
- Design/permitting and land taking schedule

# Minuteman Bikeway Alternate Design Feasibility



The information displayed on this or any other map produced by the Town of Bedford is for reference purposes only. The Town of Bedford does not guarantee the accuracy of the data. Users are responsible for determining the suitability for their own individual needs.

All information is from the Town of Bedford's Geographic Information System (GIS) database. Any questions or concerns should be addressed to the Town GIS Analyst.

Map by Bedford Public Works  
March 2011

