



Minuteman West Bikeway

Rail to Trail



Proposed Minuteman Bikeway Extension Along Railroad Avenue June 9, 2014



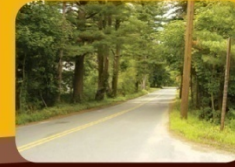
Meeting Purpose

- 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
- Supplemental Study completed 11/2008
- Transportation Enhancement Grant
- 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



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
- 9/23/13 neighborhood meeting held to discuss options and answer questions



Railroad Avenue – Current Conditions

- Right of Way (40 foot with 10 sidewalk easement on south side across from Highland Ave to curve)
- 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 - Current Conditions

- Local Roadway classification
- Traffic includes cars, trucks, buses, bikes
- Low traffic volumes collected in 6/2013, 10/2013, and 11/2013 (less than 4,000 vpd)

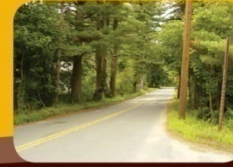




10/25/2010



10/25/2010



Moore and Miller Pedestrian Easement on Rail Road Ave

- A strip of land 10' wide and parallel to and contiguous with the south sideline of Railroad Avenue, as shown on the aforementioned plan, running from the easterly sideline of Lot 1 along Railroad Avenue, to the west sideline of Lot 4B to the land of the Town of Bedford.

(Back of easement about 15 ft from current edge of pavement, 640 ft long – about 35% of project length)

N/P
 GOLDEN CURVE
 REALTY CORP
 BK. 11841 PG. 334
 PLAN 535 OF 1970
 BK. 11841 PG. 152

N/P
 WOODS REALTY TRUST
 ARTHUR T. MILLER, TRUSTEE
 BK. 13138 PG. 184
 PLAN 85 OF 1977

N/P
 WOODS REALTY TRUST
 ARTHUR T. MILLER, TRUSTEE
 BK. 13412 PG. 223
 PLAN 539 OF 1979
 BK. 11841 PG. 152

N/P
 BARNARD REALTY CORP
 BK. 12378 PG. 682
 PLAN 1277 OF 1969
 BK. 11792 PG. 142

ELM BROOK

NORTH BANK OF ELM BROOK
 7081

PARCEL "X"
 19,030 ± S.F.

TO BE RESERVED FOR THE
 POSSIBLE EXPANSION OF
 WOODS #2141 P

PARCEL "X-1"
 34,031 ± S.F.

CONSERVATION
 EASEMENT

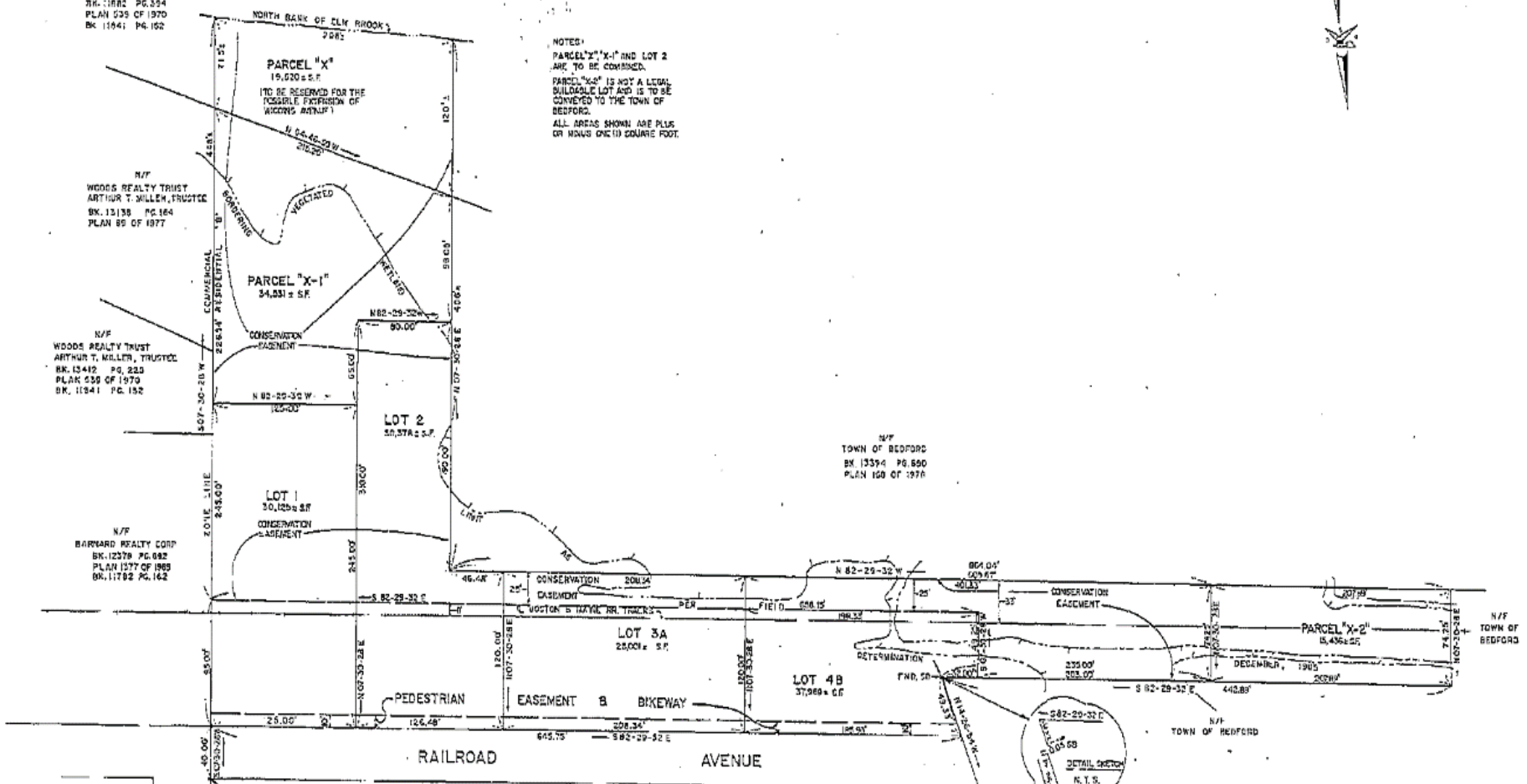
LOT 2
 30,378 ± S.F.

LOT 1
 30,126 ± S.F.

CONSERVATION
 EASEMENT

NOTES:
 PARCEL "X" AND LOT 2
 ARE TO BE CONVEYED.
 PARCEL "X-1" IS NOT A LEGAL
 BUILDABLE LOT AND IS TO BE
 CONVEYED TO THE TOWN OF
 BEDFORD.
 ALL AREAS SHOWN ARE PLUS
 OR MINUS ONE (1) SQUARE FOOT.

N/P
 TOWN OF BEDFORD
 BK. 13394 PG. 650
 PLAN 100 OF 1978



HIGHLAND
 AVENUE

RAILROAD AVENUE

I HEREBY CERTIFY TO THE BEST OF MY PROFESSIONAL
 KNOWLEDGE, INFORMATION AND BELIEF THAT:

- 1) THIS PLAN HAS BEEN PREPARED IN CONFORMITY WITH THE RULES AND REGULATIONS OF THE REGISTRARS OF DEEDS OF THE COMMONWEALTH OF MASSACHUSETTS.
- 2) THIS PLAN SHOWS THE PROPERTY LINES AND THE LINES OF EXISTING OWNERSHIPS, AND THAT THE LINES OF STREETS AND WAYS SHOWN ARE THOSE OF PUBLIC OR PRIVATE STREETS OR WAYS ALREADY COMPLETED, AND THAT NO NEW LINES FOR DIVISION OF EXISTING OWNERSHIP OR FOR NEW WAYS ARE SHOWN.

MAR 5 1981
 DATE REGISTERED PROFESSIONAL LAND SURVEYOR



REFERENCE:

MIDDLESEX REGISTRY OF DEEDS
 SOUTH DISTRICT
 BOOK 11473 PAGE 22-135
 * 13559 * 35
 * 19465 * 240
 PLAN NO. 162 OF 1969
 * 1233 * 1963
 * 821 * 1956
 * 391 * 1951

PLAN OF LAND
 IN
BEDFORD, MASS.
 (MIDDLESEX COUNTY)
 PREPARED FOR: MILLER - MOORE
 SCALE: 1" = 40'
 MARCH 5, 1981

BSC - BEDFORD
 LAND SURVEYORS CIVIL ENGINEERS
 16 NORTH ROAD BEDFORD, MASS.
 A DIVISION OF BOSTON SURVEY CONSULTANTS

FEET 0 20 40 60 80 100
 METERS 0 5 10 20 40
 JOB NO. T-2571.01 DWG. NO. 1342.05A

Middlesex Registry of Deeds,
 Southern District,
 Cambridge, Massachusetts
 Plan No. 162 of 1969
 Rec'd 3-19-81
 at 11:45 AM on 3-19-81
 Rec'd, BK 21023 Page 295

Attest
 [Signature]
 Register





Design Standards for Ped and Bike Accommodations

- Healthy Trans Policy Directive P-13-0001
- Engineering Directive E-14-001
- 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)



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Rail to Trail



Healthy Transportation Policy Directive P-13-0001

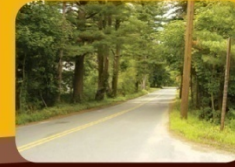
All MassDOT funded and or designed projects shall seek to increase and encourage more pedestrian, bicycle and transit trips. MassDOT has established a statewide mode shift goal that seeks to triple the distance traveled by walking, bicycling and transit by 2030, promoting intermodal access to the maximum extent feasible will help the agency meet this goal.



MassDOT Eng Directive E-14-001

Design Criteria for Pedestrian and Bicycle Accommodation

- Pedestrian Accommodation
 - For projects in urbanized areas on roadways where pedestrians are legally allowed, sidewalks shall be provided on both sides of the roadway.
 - The minimum sidewalk width below which a design exception is required is 5', exclusive of curb.



MassDOT Eng Directive E-14-001 (cont.)

■ Bicycle Accommodation

- The minimum paved outside shoulder or designated bicycle lane width below which a design exception is required is 5', exclusive of any parking lane.
- • In lieu of paved outside shoulders or designated bicycle lanes, protected bicycle facilities (i.e. cycle tracks, side paths, shared-use paths, bicycle paths, etc.) may provide accommodation for bicycles. However, the presence of such facilities does not relieve the designer of the need to properly consider applicable design criteria for outside (right) shoulder width.



Shoulder widths

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

Area Type	Roadway Type			
	Freeways ¹	Arterials ²	Collectors ²	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).

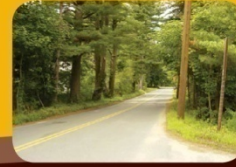


Rail to Trail



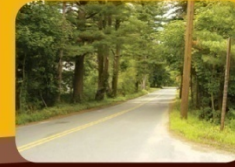
Alternative cross section considerations

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



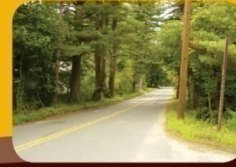
Cross Section Options presented at 9/25/13 meeting

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)



Additional Cross section option

4. Shift roadway to north layout line, 10 ft sidewalk on south edge, 4 ft shoulders, 10ft travel lanes



Option 1 cross section

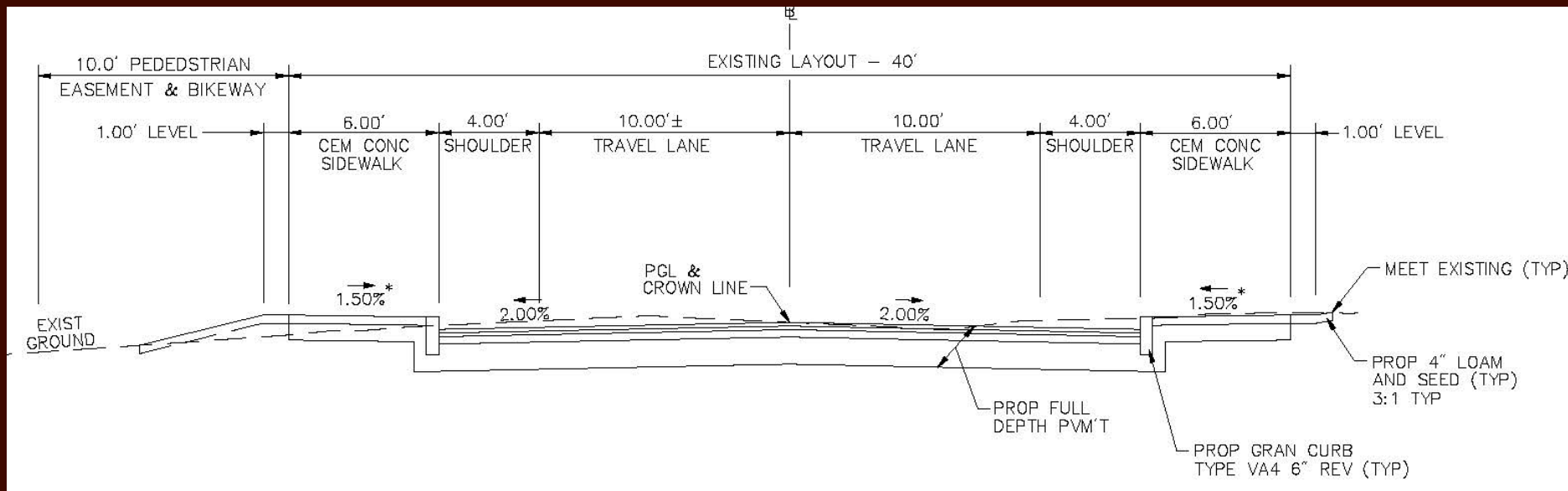
- Total width of road and sidewalks – 40 ft
- No land takings
- Meets Complete Streets policy
- Reduces tree impacts
- Full roadway and stormwater upgrades
- Reconstruct driveway aprons into properties



Rail to Trail



Option 1 Cross Section

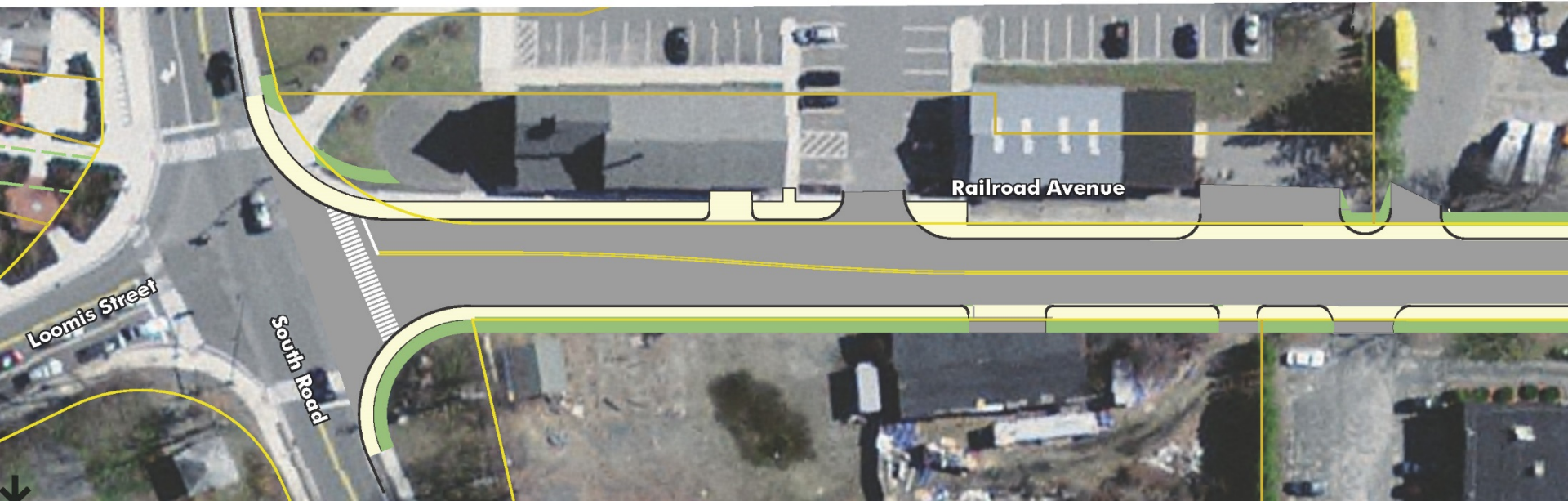
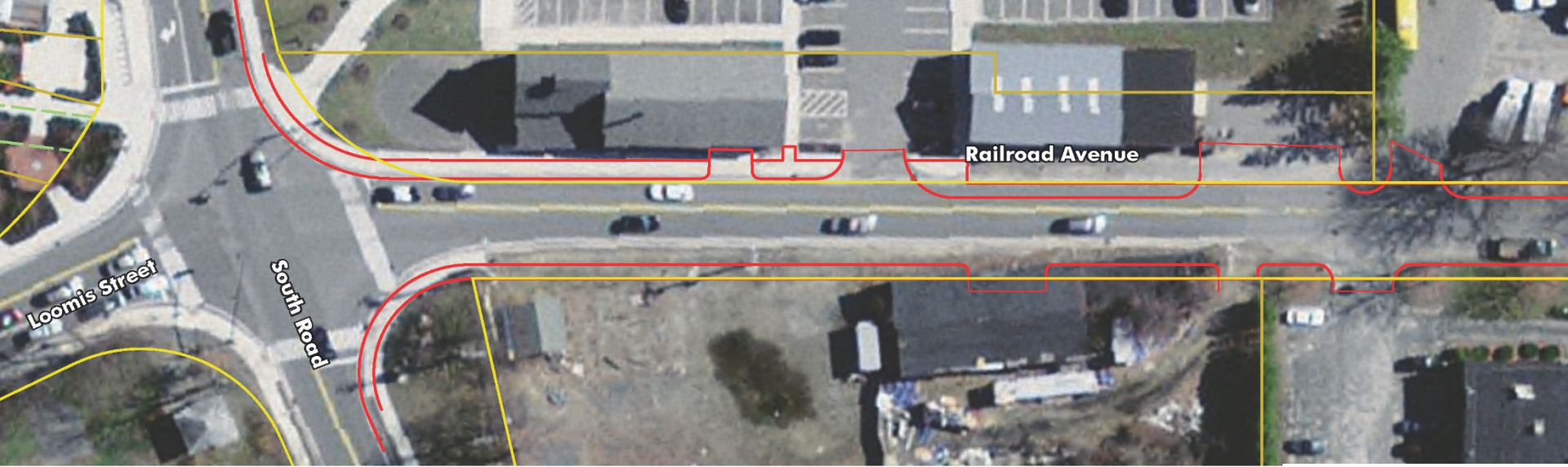


Easement for 35% of project length



Minuteman West Bikeway

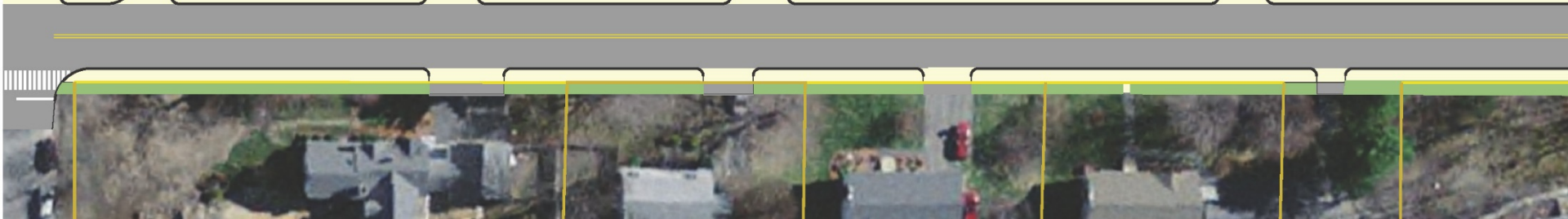
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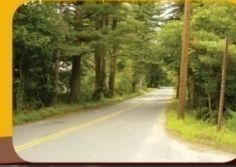
Rail to Trail





Minuteman West Bikeway

Rail to Trail



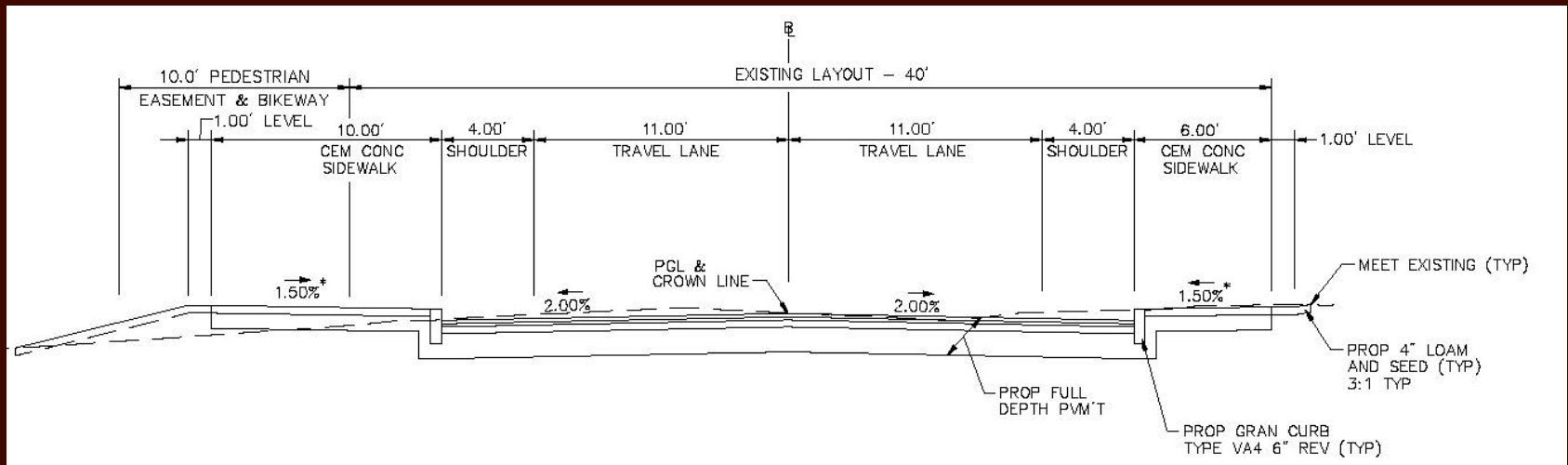


Option 2 Cross Section

- Total width of road and sidewalk – 46 ft
- Will require land takings along entire road
- Tree impacts are higher than option 1
- Full depth roadway and stormwater reconstruction



Option 2 Cross Section

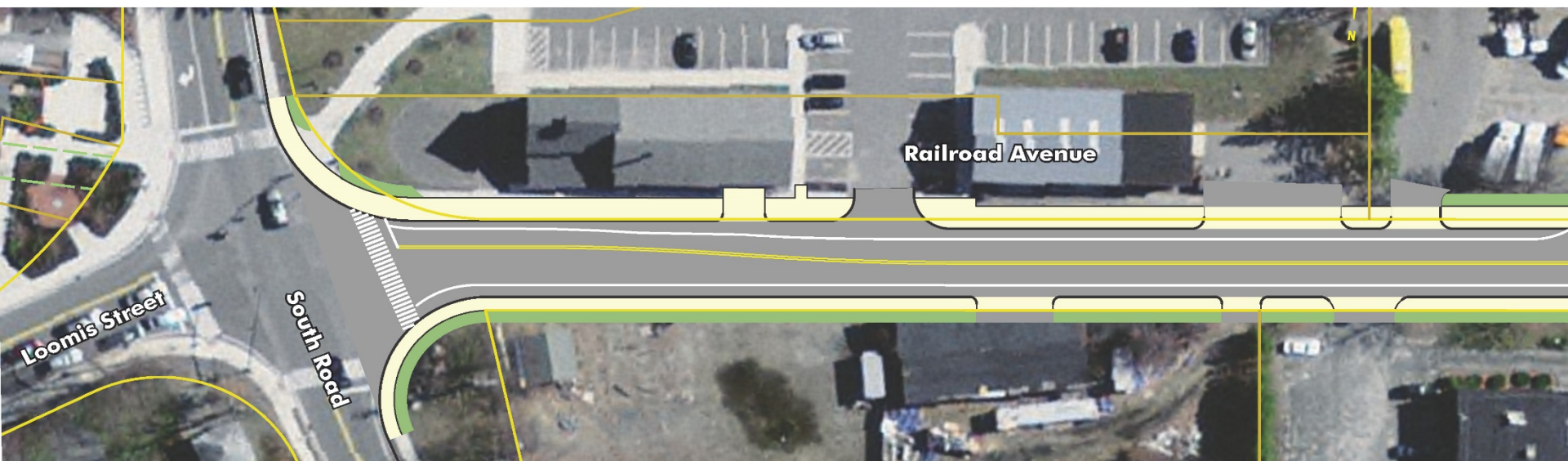
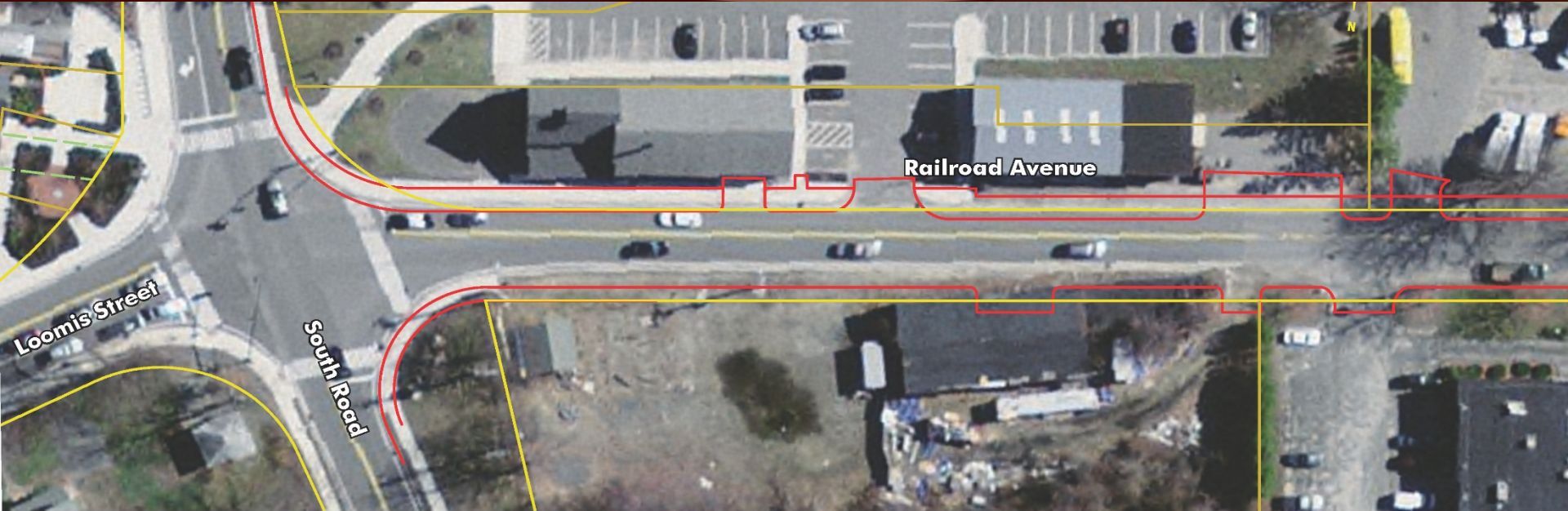
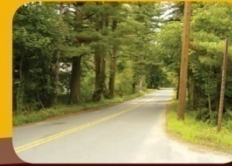


Easement for 35% of project length



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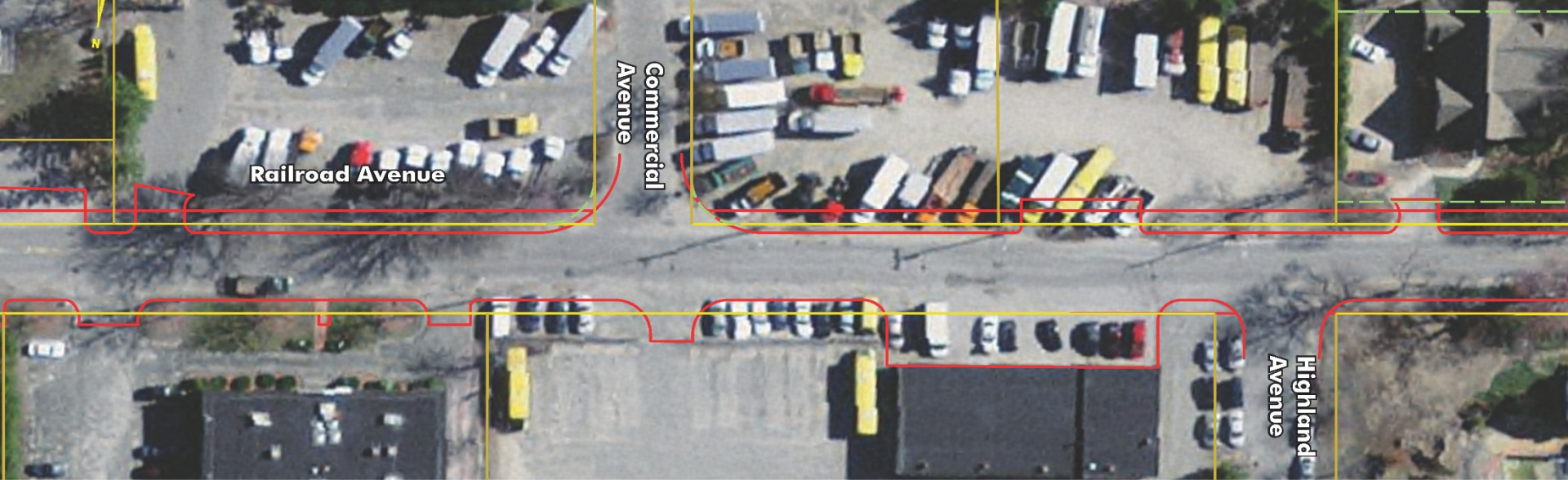
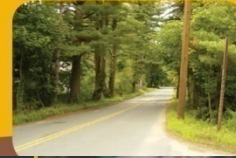
Rail to Trail





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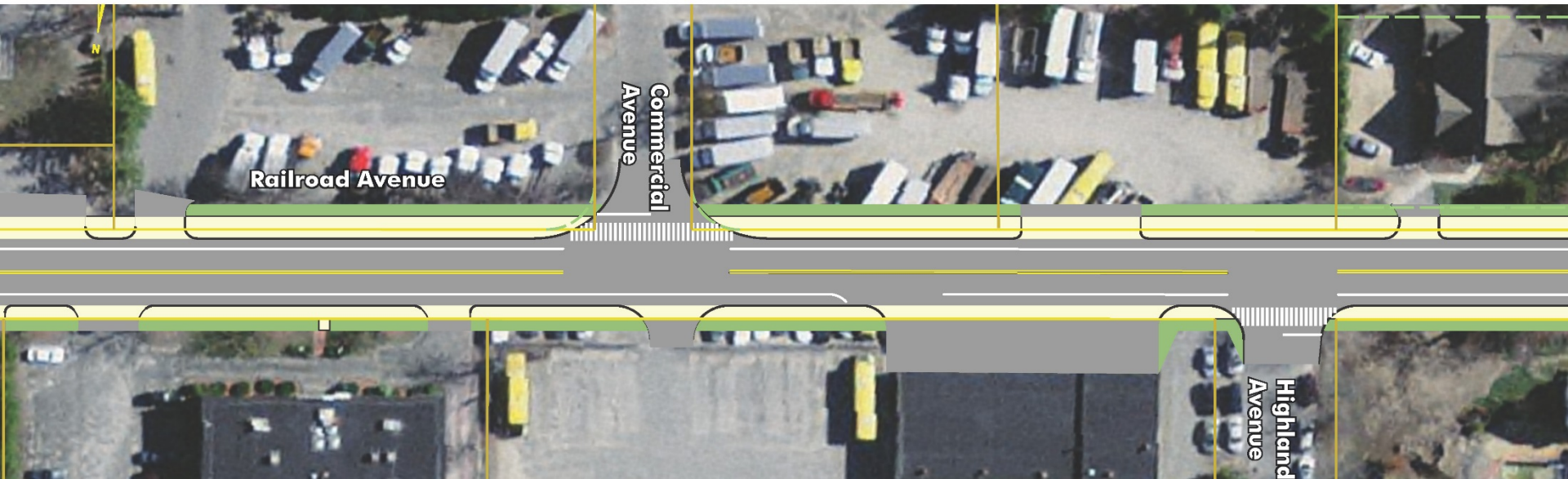
Rail to Trail



Railroad Avenue

Commercial Avenue

Highland Avenue



Railroad Avenue

Commercial Avenue

Highland Avenue



Minuteman West Bikeway

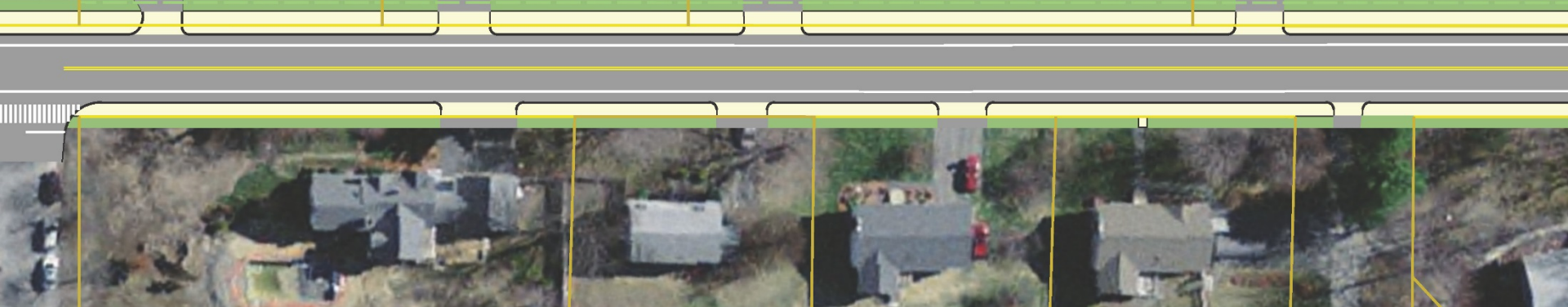
Rail to Trail



Railroad Avenue



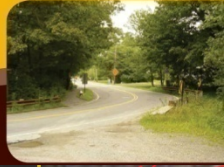
Railroad Avenue





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Option 3 Cross Section

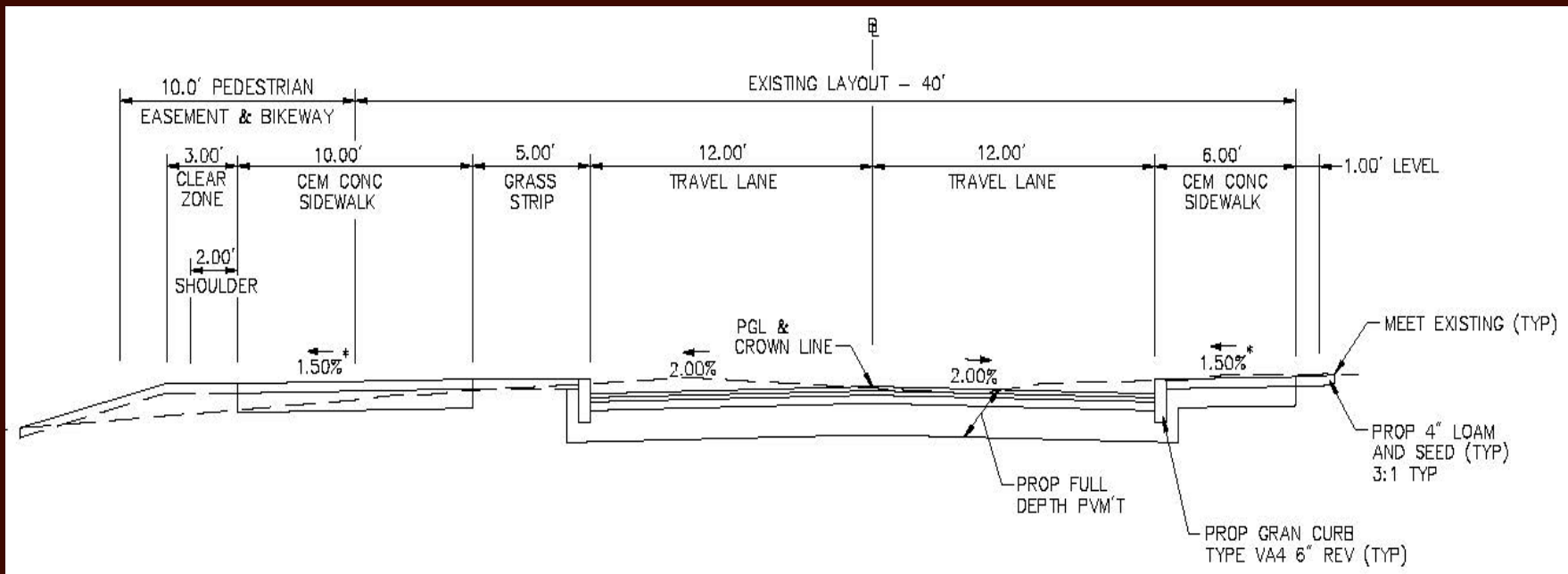
- Total width of road and sidewalks – 45 ft (w/ 3 ft clear zone)
- Share the road symbols on 12 ft lanes
- Will require land takings along entire road within project limits
- Tree impacts are higher than option 1
- Full depth roadway and stormwater reconstruction



Rail to Trail



Option 3 Cross Section

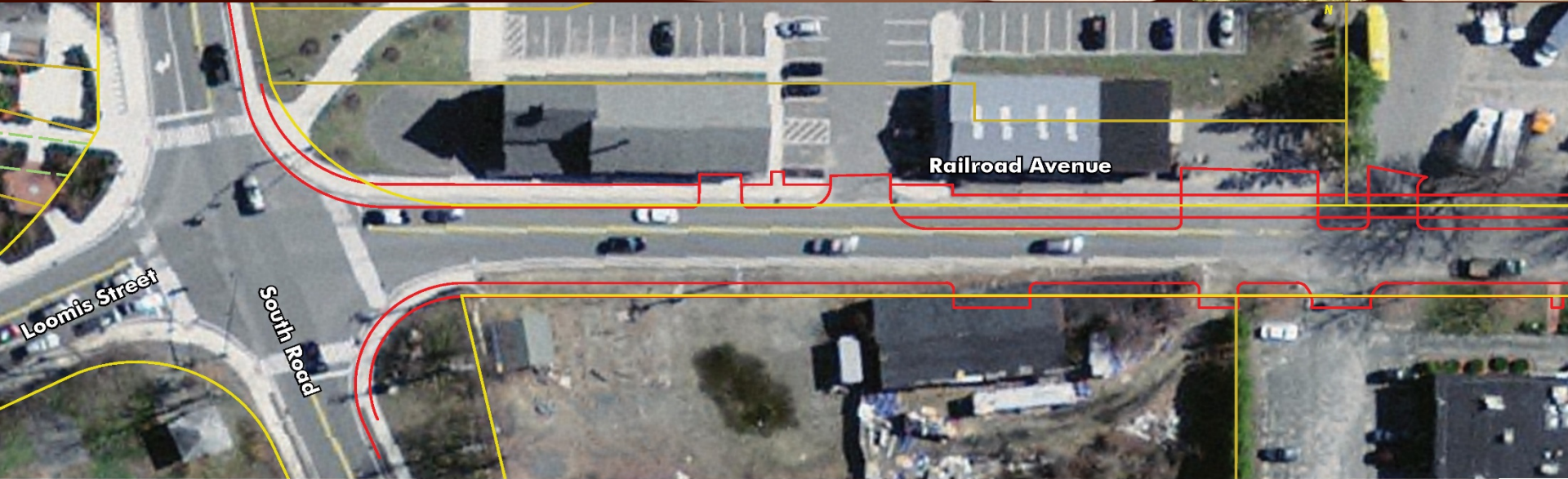
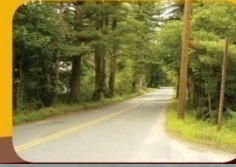


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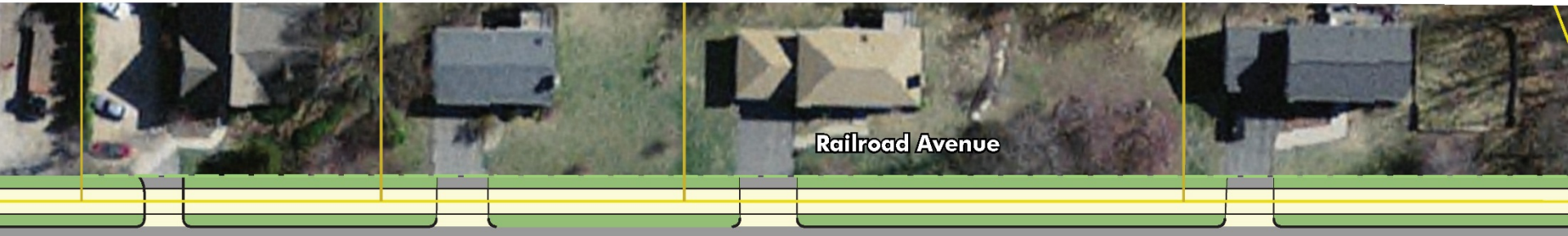
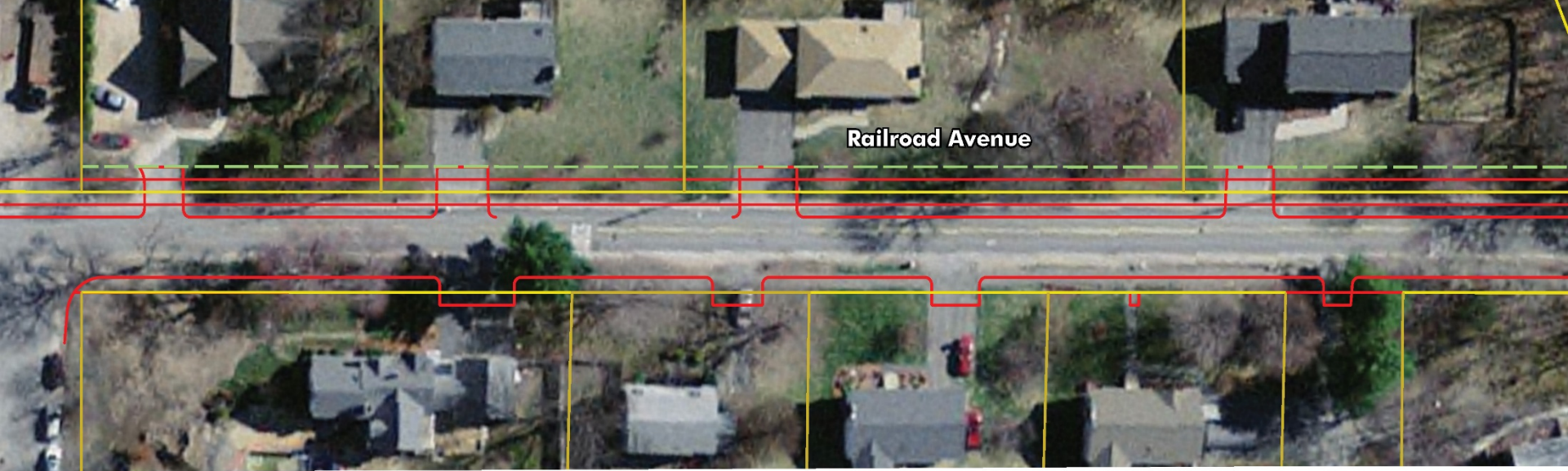
Rail to Trail





Minuteman West Bikeway

Rail to Trail





Minuteman West Bikeway

Rail to Trail



Railroad Avenue

Minuteman Bikepath Extension



Railroad Avenue

Minuteman Bikepath Extension

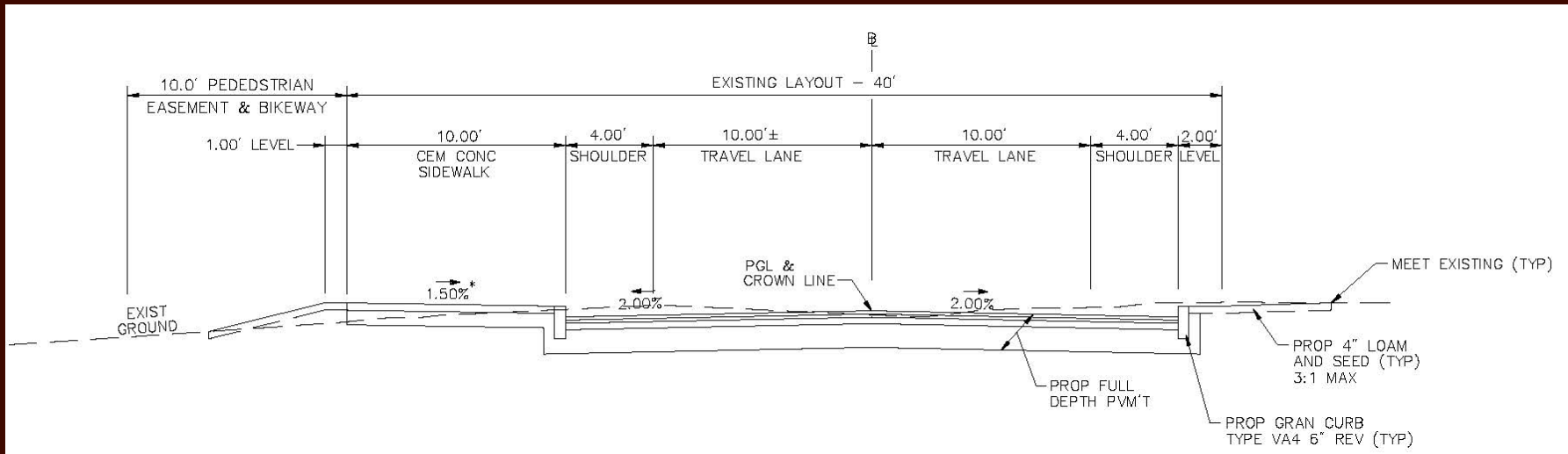


Option 4 Cross Section

- Total width of roadway – 38 ft
- 4 ft shoulders
- Remove all trees on north side of roadway
- No land takings
- Full depth roadway construction and drainage upgrades
- Impacts Railroad Ave geometry with South Rd and Loomis St.



Option 4 Cross Section

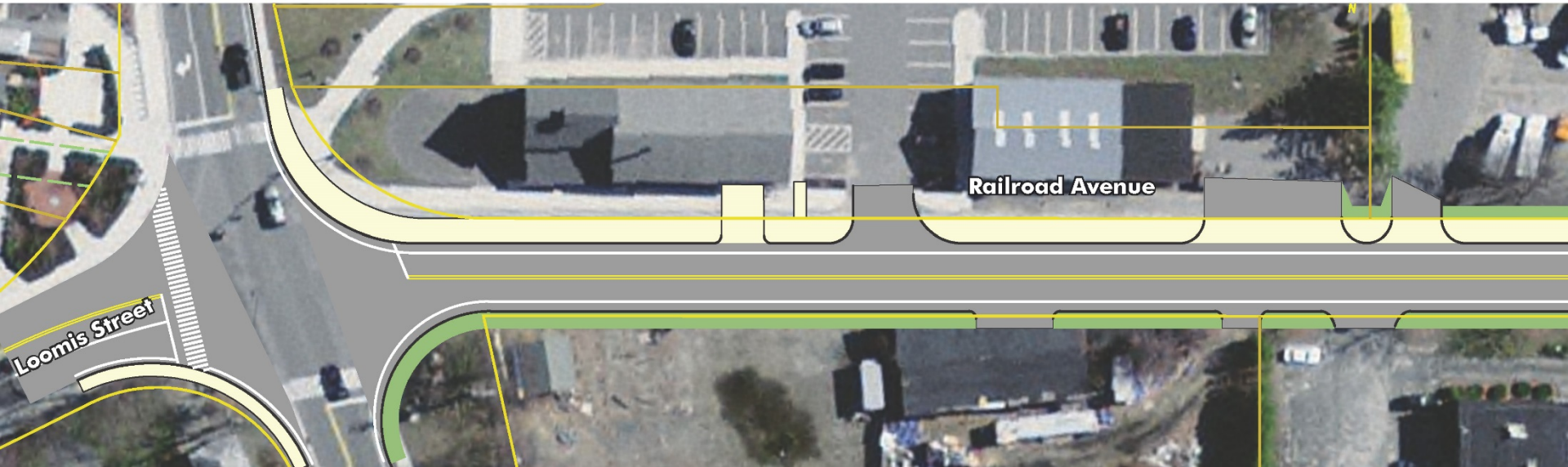
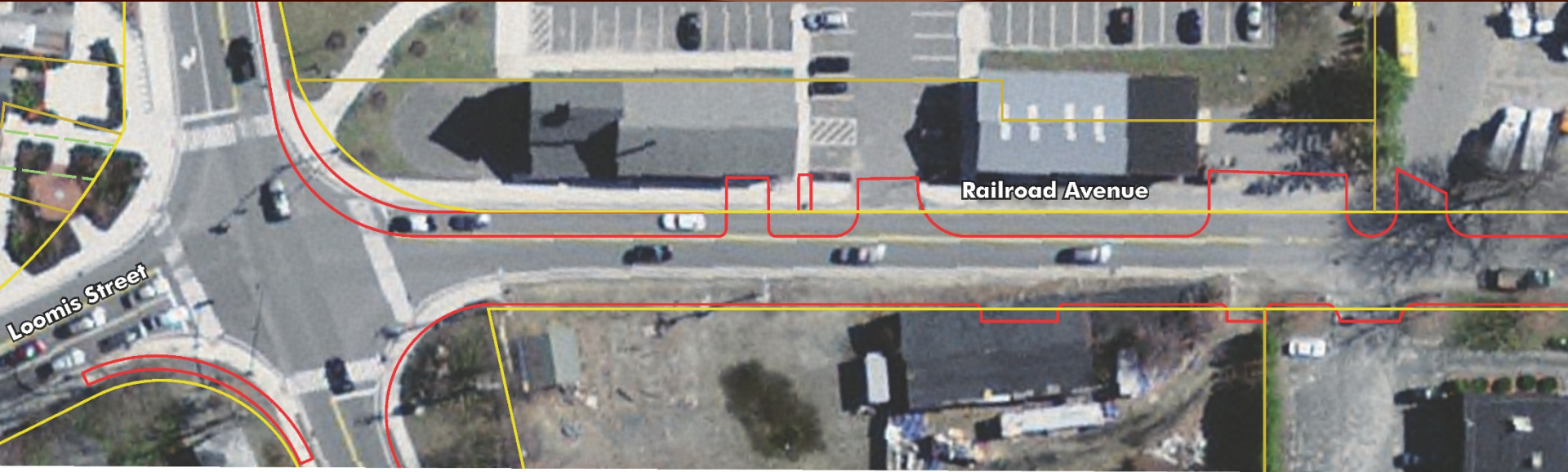


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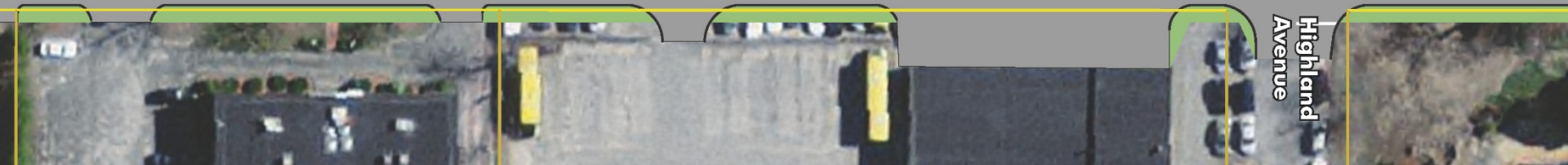
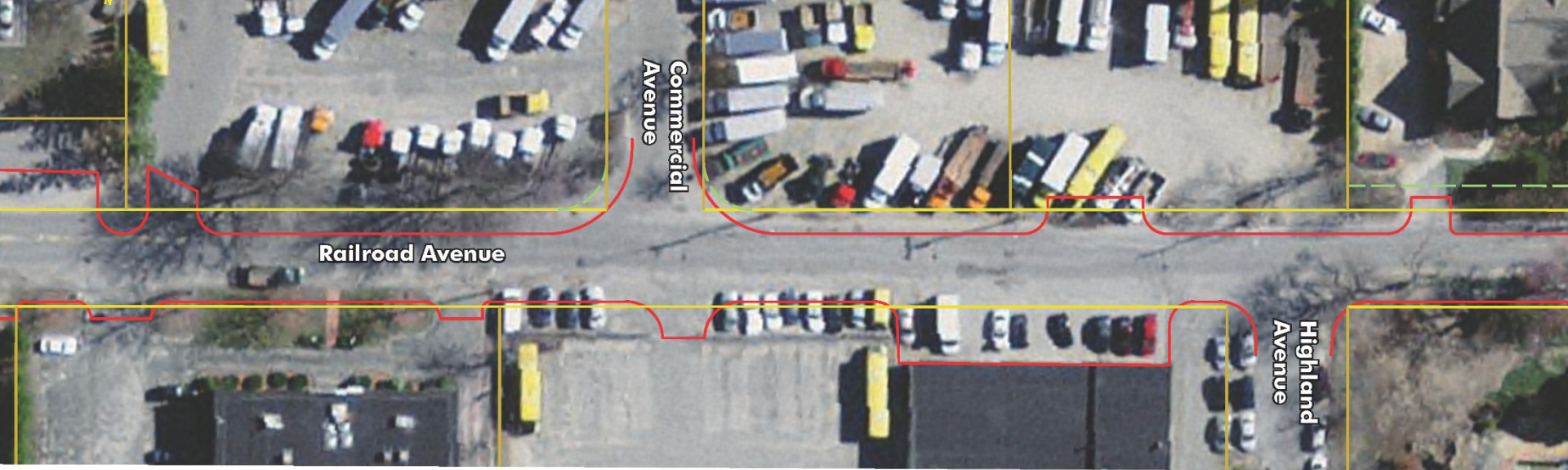
Rail to Trail





Minuteman West Bikeway

Rail to Trail





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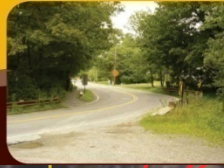
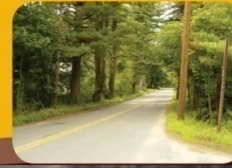
Rail to Trail





Minuteman West Bikeway

Rail to Trail





Railroad Avenue Ped 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





Questions from 9/25/13 Meeting

- What is a clear zone
- Where is the easement
- Is there a truck exclusion
- Will there be curbing along the bus property
- Should there be a signal at Commercial Ave
- Will there be a traffic study?
- Traffic counts were collected at the end of June
- Speed limits along RR Ave be reduced (currently posted 30 mph)
- Has a drainage study been done for Railroad Ave
- Options 2 and 3 will impact driveway lengths
- This project will comply with Complete Streets philosophy
- The traffic counts should include bike traffic (separate from motorcycle)



Comments from 9/25/13 Meeting

- Impacts of bikepath on residential properties (including value)
- Sharing road/path on high volume road
- Driveway sight distance
- Bike crossing on roadway
- Elm Brook Alternative option should be considered
- Resident notification of bikepath on Railroad Ave



Next Steps

- Submit preliminary design plans to MassDOT for review
- Meet with property owners as design develops
- Secure construction advertisement date

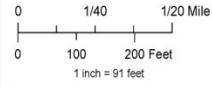


Elm Brook Alternative Option

Issues to be considered:

- 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

