



Memorandum

To: Matt Waitkins - AICP
Senior Transportation Planner
Nashua Regional Planning Commission
Metropolitan Planning Organization
30 Temple Street, Suite 310, Nashua,
NH 03060

Date: October 1, 2022

Project #: 52922.01

From: Gregory L. Bakos, PE

Re: On-Call Engineering
Task # 11 – Amherst: Baboosic Greenway - North 01

As requested, VHB has performed an evaluation and estimated the cost for completing bike and pedestrian related improvements on Segment "North 01" of the planned Baboosic Greenway in Amherst. The below cost estimate is provided to assist the Nashua Regional Planning Commission (NRPC) and the New Hampshire Department of Transportation (NHDT) in considering this project for inclusion in the Ten-Year-Plan (TYP).

Project Purpose and Need

The stated primary purpose of the Baboosic Greenway is to create a regional spine for a broader off-road trail network for the purposes of enhancing safety, increasing regional multimodal mobility, and expanding accessibility for persons who are unable to transport themselves by motor vehicle. Refer to Amherst's project proposal which includes substantial documentation on the Purpose and Need and the many benefits that the Greenway will bring to the community.

Proposed Improvements

This proposed project will complete a segment of the Baboosic Greenway in the northeast portion of the town of Amherst. This specific segment is referred to as "North 01" and will span approximately 11,625 feet from the town of Bedford border west and south to Walnut Hill Road in Amherst.

Refer to the attached schematic plans by VHB and to the documentation provided by the Town of Amherst for more information on the proposed improvements.

Trail Improvements:

The southern mile-long portion of this segment will be on existing low volume and low speed privately owned residential gravel roads that require no improvements other than the installation of wayfinding signs at key intersections. These gravel roads pass through wooded areas and past a handful of camps on their way north to a connection with the proposed improved rail trail on the former Manchester & Milford Branch railroad bed.

The rail trail portion of this segment will be relatively easy to construct since the steel rail and wood ties have all been removed and the rail bed is reportedly in good condition. Vegetation has taken hold along much of the rail bed so clearing and stump removal, grading and compaction will be required before applying a granular trail surface. The improved trail width is proposed to be 10-foot wide plus 2-foot shoulders. Grading and minor earthwork will be required to form the required subbase width and to reestablish drainage swales on both sides.

The east end of the rail trail ends at the Bedford town line, and it is reported that Bedford is eager to continue the rail trail to the east from the Amherst line.

2 Bedford Farms Drive
Suite 200
Bedford, NH 03110-6532
P 603.391.3900

The plans for this segment include a quarter mile northern spur trail called the Bragdon Farm Spur that will connect the rail trail to NH Route 101. It will also access a popular town-owned sledding hill and a local winery.

Structures:

There are two significant impediments along the rail trail portion of this segment. These include Baboosic Brook and Camp Road which both break the continuity of the existing rail bed. The proposal is to span Baboosic Brook with a 60-foot-long prefabricated pedestrian bridge with a clear railing-to-railing width of 12 feet. The proposal is to pass through the high Camp Road embankment with a 12' x 12' precast concrete box culvert which is technically classified as a bridge since the span is greater than 10-feet. The length of the culvert is estimated to be 40-feet. It should be noted that at an-grade trail crossing of Camp Road does not appear to be feasible because the approaches would each need to be on the order of 600-feet long to satisfy Americans with Disabilities Access (ADA) requirements and this would be cost prohibitive and infeasible because of the close proximity of Baboosic Brook. It should also be noted that the 12-foot vertical dimension of the precast culvert is partially dictated by the fact that there is significant equestrian activity in the area, and it is expected that the trail will attract people on horses. The requires including a granular surface through the culvert as well as ample head room. Similarly, the railing design on the pedestrian bridge over Baboosic Brook should consider equestrian use.

Other Considerations

The following information is provided for context and to help assess the challenges and readiness of this proposed project.

Right-of-Way

The Town has been actively pursuing rights to the rail trail corridor and to pass over the private roads. Some sections have been secured whereas others are either in process or contact has yet to be made with the owners. The goal is for the Town to secure all the rights by the time the project funding is available.

Natural Resources

There will be environmental considerations within the construction portions of this segment. Permits will be required for the proposed stream crossing at a minimum, and assuming federal funds are use the project will need to complete NEPA documentation that will include a wide range of natural resource documentation and cultural resources review. At the current high level overview, it does not appear that environmental impacts will pose a significant challenge.

Project Cost Estimate

VHB based the below costs on an interpretation of the materials provided by the community as well as additional online data gathering, design assumptions, and engineering judgement.

Estimated Bridge Costs

Based on the information provided by the Town it is understood that this segment will include a new precast concrete Box Culvert bridge that is 12' x 12' (assumed to be the opening dimensions) to cross under Camp Road. The box

culvert is noted to be 40' in length. Based on this, a cost of \$500 per square foot of proposed deck area (14' wide x 40' long) yields a cost of \$280,000 for Construction not including any trail work to access the bridge location. Access to the site is reasonable given the location of Camp Road, a low volume Town Road. It is assumed Camp Road can be open cut given the limited amount of traffic and that there are nearby alternative routes to NH Route 101.

Another bridge is also required for the Greenway to cross over Baboosic Brook west of Camp Road. There is a roadway bridge just upstream of this location, Camp Road over Baboosic Brook (093/153), noted to be 40' in length. Based on this a cost of \$1,000 per square foot of proposed deck area (60' long x 16' wide) yields a cost of \$960,000 for Construction not including any trail work to access the bridge location. Access to the site is reasonable given the location of Camp Road to the east and Red Gate Lane to the west.

Estimated Trail Costs

The rail trail construction is assumed to be relatively straight forward given that the former railroad bed is noted to be in good condition. The primary costs will be for clearing and scarifying the rail bed for stumps and roots, grading the rail bed to the desired width, reestablishing drainage swales, replacing any old or failed cross culverts, applying the proposed granular trail surface and seeding the side slopes. The work will also require standard erosion control measures along its length. VHB assumes a 4-inch finished thickness for the rail trail surface material to a width of 10-feet. The material will be a modified stone dust that has been used successfully in New Hampshire on rail trails such as the 54-mile-long Northern Rail Trail.

Design and Permitting Costs

It is assumed that the project will be advanced as a Local Public Agency (LPA) project administered locally and following the prescribed LPA project development process with NHDOT oversight. This is significant since the process has cost implications. In determining the design phase costs VHB applied rule of thumb percentages adjusted for the anticipated permitting or other complexities.

Summary of Estimated Project Costs

Based on the above discussions and the attached concept plan VHB developed program level estimates of probable cost broken out by primary components as shown on the attached spreadsheet.

Proposed Improvements:	PE	ROW	Construction	Totals
New Multi-Use Trail Bridge (Box Culvert) under Camp Road	\$100,000	\$0	\$ 280,000	\$ 380,000
New Multi-Use Trail Bridge over Baboosic Brook	\$200,000	\$0	\$ 960,000	\$1,160,000
Rail Trail Improvements	\$ 50,000	\$0	\$ 279,000	\$ 329,000
Totals	\$ 350,000	\$0	\$1,519,000	\$ 1,869,000

CONSTRUCTION COST ESTIMATE

PROJECT : Nashua Regional Planning Commission TYP Project Candidates

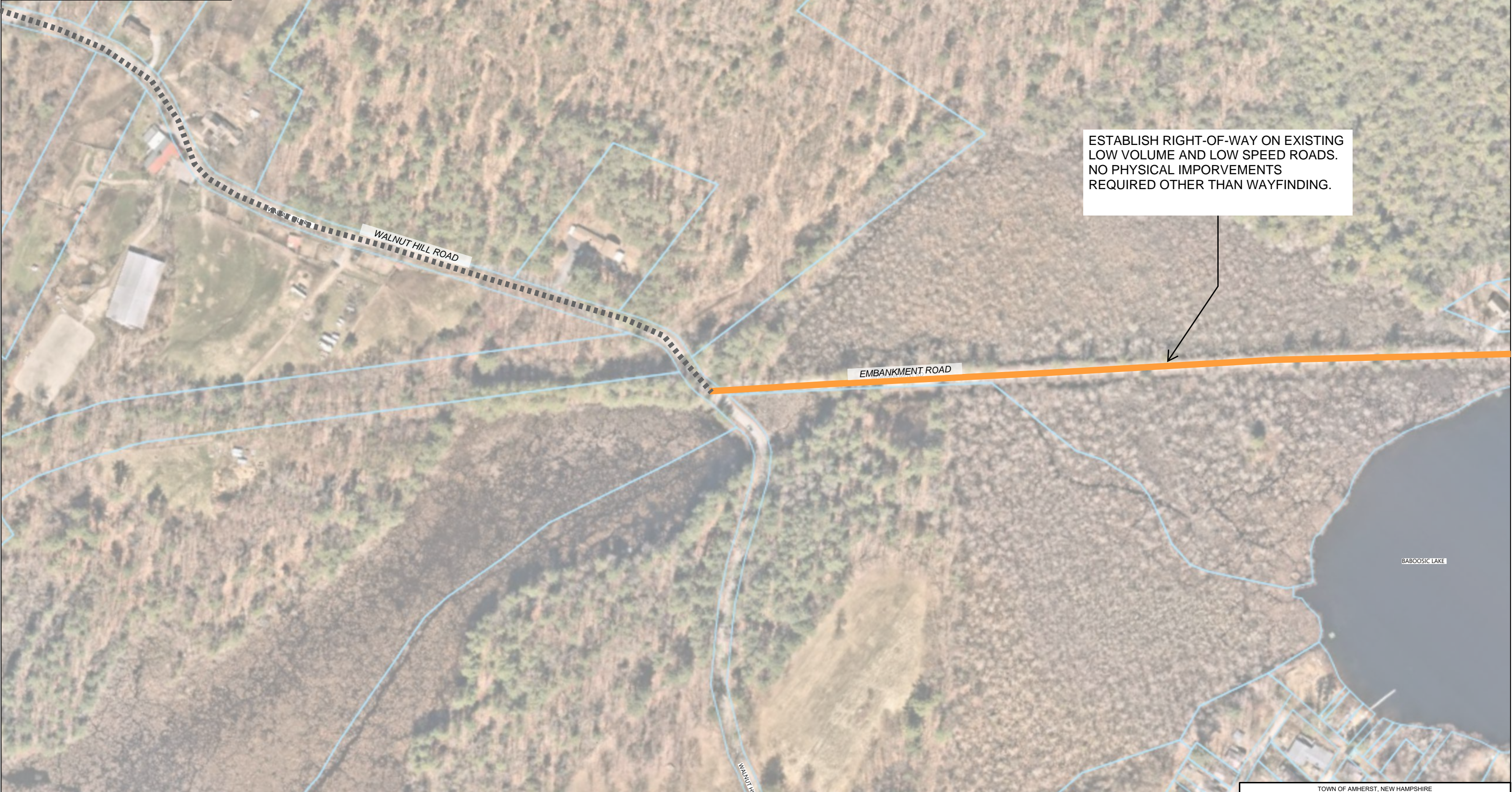
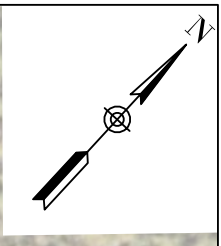
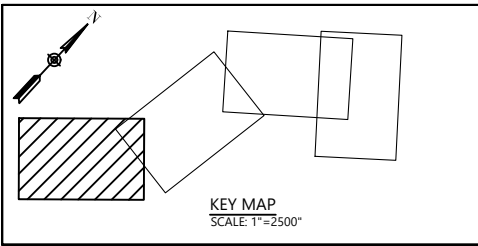
LOCATION : **Baboosic Greenway NORTH-01**

VHB PROJECT NO. 52922.01

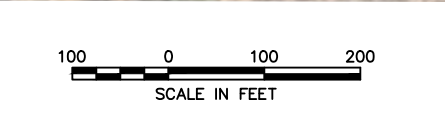
DATE: 10/2/2022

TYPE: **Program Level Conceptual Estimate**

	ITEM DESCRIPTION	UNIT	UNIT PRICE	QUANTITY	TOTAL COST
201.1	CLEARING AND GRUBBING	AC	\$ 10,000.00	3.5	\$35,000
214	FINE GRADING	U	\$ 10,000.00	1	\$10,000
304.4	CRUSHED STONE (FINE GRADATION) (F)	CY	\$ 40.00	0	\$0
304.7	STONE DUST WEARING SURFACE	TON	\$ 25.00	1220	\$30,500
607.5340	WOOD FENCE (SPLIT RAIL), 4'-0" HIGH	LF	\$ 25.00	200	\$5,000
615.0301	TRAFFIC SIGN TYPE C	SF	\$ 90.00	20	\$1,800
645.531	SILT FENCE	LF	\$ 4.00	8000	\$32,000
645.7	STORM WATER POLLUTION PREVENTION PLAN	U	\$ 4,000.00	1	\$4,000
646.51	TURF ESTABLISHMENT WITH MULCH, TACKIFIERS AND LOAM	SY	\$ 5.00	8200	\$41,000
	LANDSCAPING	U		0	\$0
692	MOBILIZATION	UNIT	\$ 10,000.00	1	\$10,000
698.13	FIELD OFFICE TYPE C	MON	\$ 1,800.00	6	\$10,800
699	MISCELLANEOUS TEMPORARY EROSION AND SEDIMENT CONTROL	\$	\$ 4,000.00	1	\$4,000
SUBTOTAL					\$184,000
MISCELLANEOUS ITEMS (10%)					\$18,400
CONTINGENCIES (20%)					\$36,800
SUBTOTAL:					\$239,000
TRAIL ENGINEERING (PE) (INLCUDING PERMITTING)					\$50,000
TRAIL CONSTRUCTION ENGINEERING, INSPECTION AND TESTING					\$40,000
TRAIL TOTAL					\$329,000
<u>STRUCTURES:</u>					
PREFABRICATED 60' X 16' PEDESTRIAN BRIDGE					\$960,000
12' X 12' BOX CULVERT UNDER CAMP ROAD					\$280,000
TOTAL ESTIMATED STRUCTURE CONSTRUCTION COST					\$1,240,000
STRUCTURE ENGINEERING (PE) (INLCUDING PERMITTING & AGENCY COORDINATION)					\$300,000
ROW					\$0
ESTIMATED PROJECT TOTAL:					\$1,869,000

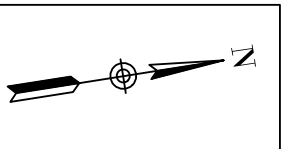
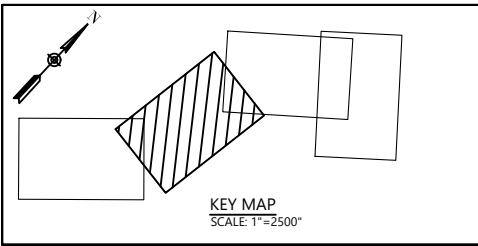


ESTABLISH RIGHT-OF-WAY ON EXISTING
 LOW VOLUME AND LOW SPEED ROADS.
 NO PHYSICAL IMPORVEMENTS
 REQUIRED OTHER THAN WAYFINDING.

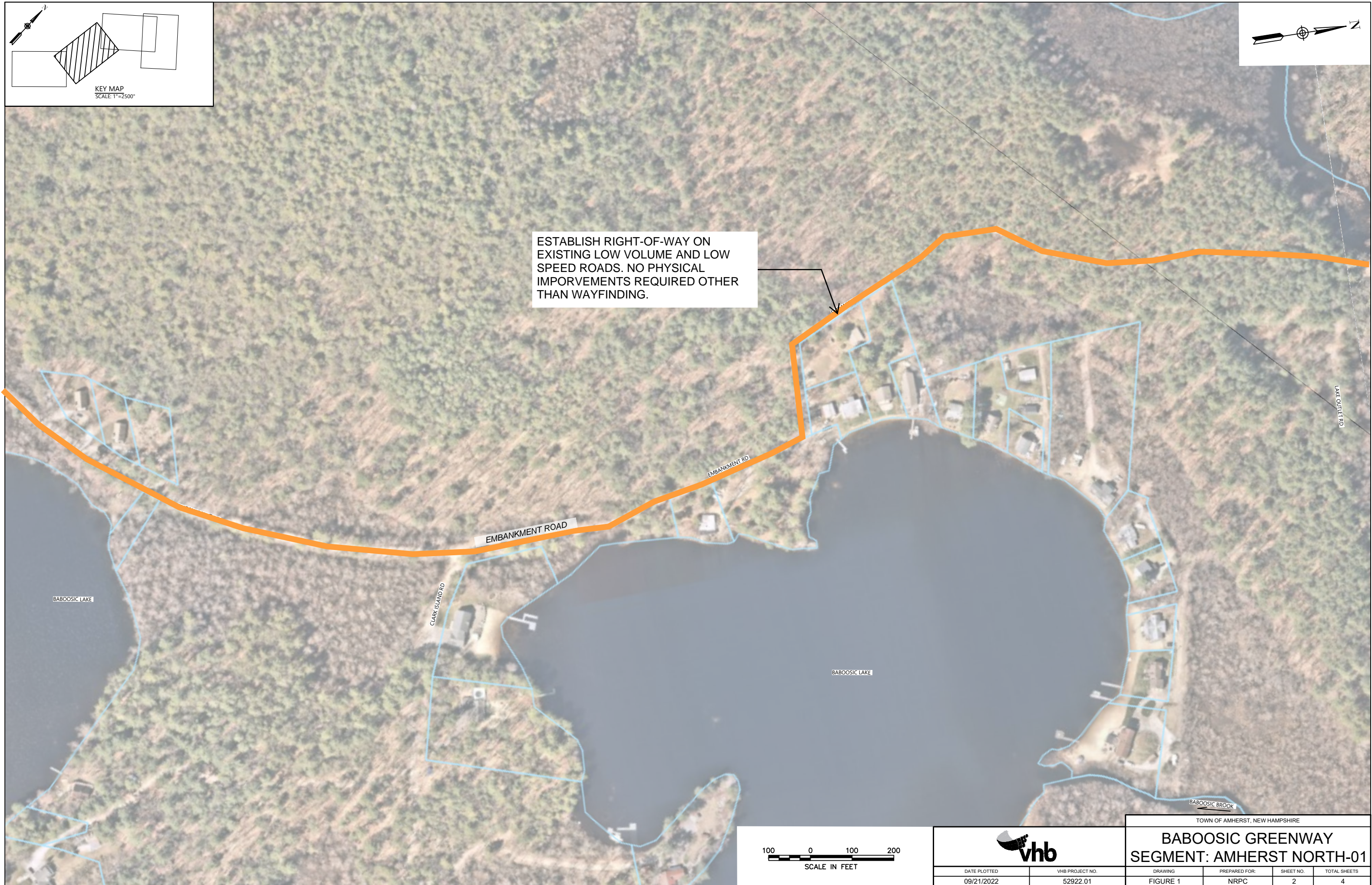


		DATE PLOTTED	VHB PROJECT NO.
		09/21/2022	52922.01

TOWN OF AMHERST, NEW HAMPSHIRE				
BABOOSIC GREENWAY				
SEGMENT: AMHERST NORTH-01				
DRAWING	PREPARED FOR:	SHEET NO.	TOTAL SHEETS	
FIGURE 1	NRPC	1	4	

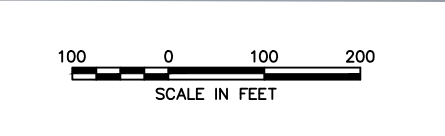


ESTABLISH RIGHT-OF-WAY ON EXISTING LOW VOLUME AND LOW SPEED ROADS. NO PHYSICAL IMPROVEMENTS REQUIRED OTHER THAN WAYFINDING.



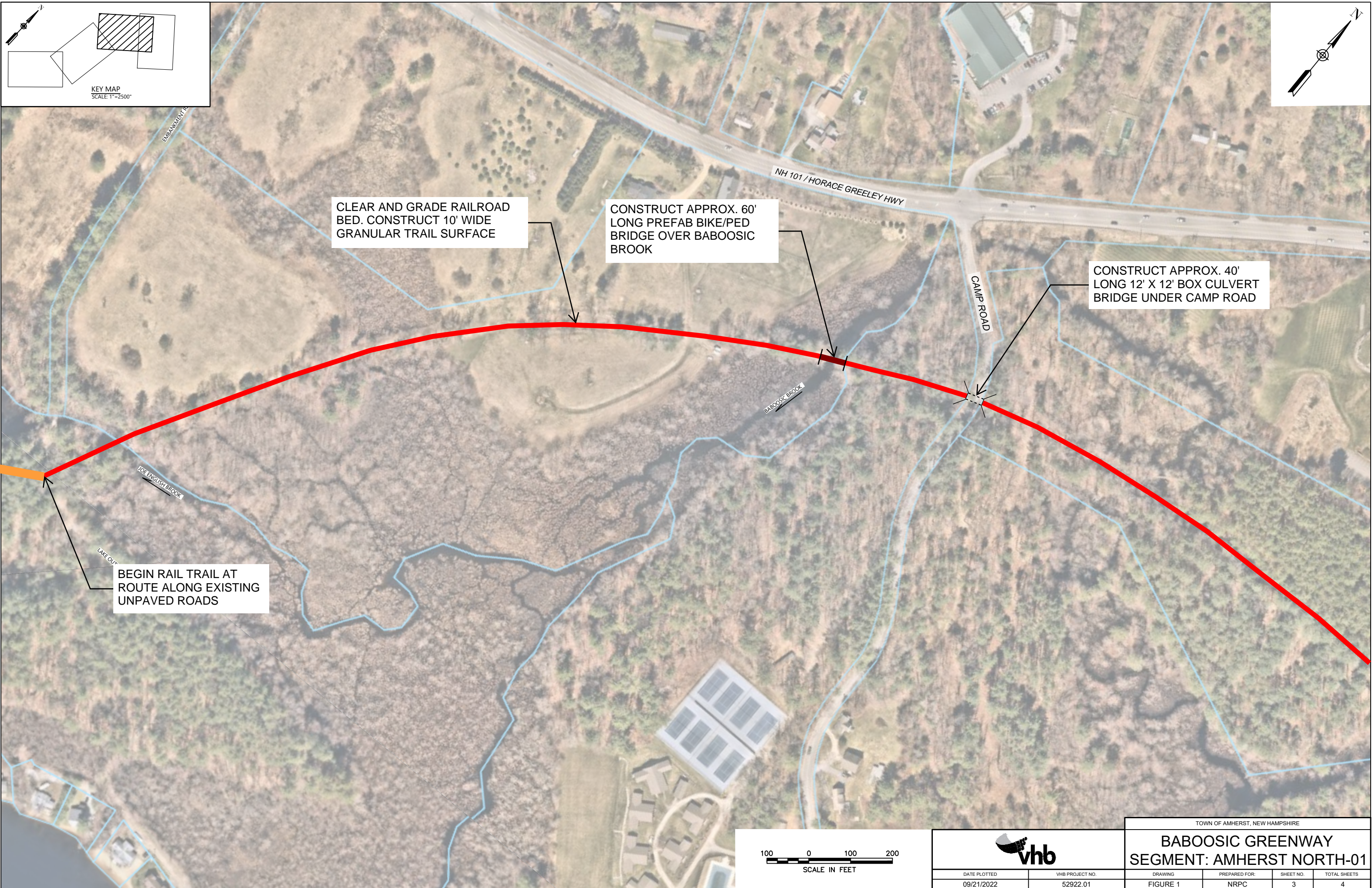
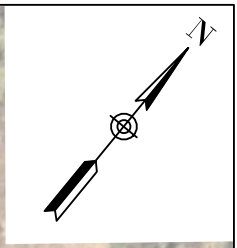
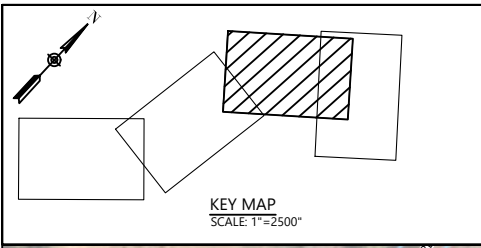
TOWN OF AMHERST, NEW HAMPSHIRE

**BABOOSIC GREENWAY
SEGMENT: AMHERST NORTH-01**



	DATE PLOTTED	VHB PROJECT NO.
	09/21/2022	52922.01

DRAWING	PREPARED FOR:	SHEET NO.	TOTAL SHEETS
FIGURE 1	NRPC	2	4



CLEAR AND GRADE RAILROAD
BED. CONSTRUCT 10' WIDE
GRANULAR TRAIL SURFACE

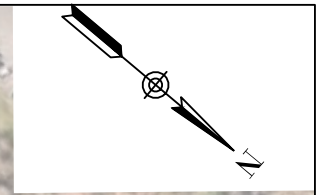
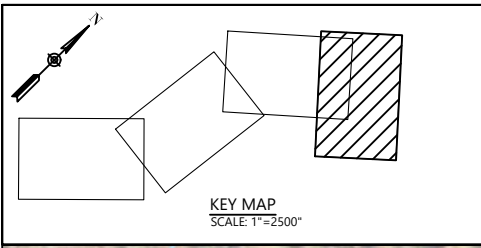
CONSTRUCT APPROX. 60'
LONG PREFAB BIKE/PED
BRIDGE OVER BABOOSIC
BROOK

CONSTRUCT APPROX. 40'
LONG 12' X 12' BOX CULVERT
BRIDGE UNDER CAMP ROAD

BEGIN RAIL TRAIL AT
ROUTE ALONG EXISTING
UNPAVED ROADS



		TOWN OF AMHERST, NEW HAMPSHIRE	
		BABOOSIC GREENWAY SEGMENT: AMHERST NORTH-01	
DATE PLOTTED	VHB PROJECT NO.	DRAWING	PREPARED FOR:
09/21/2022	52922.01	FIGURE 1	NRPC
		SHEET NO.	TOTAL SHEETS
		3	4

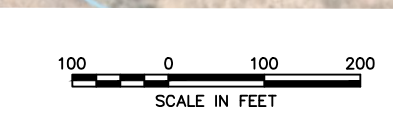
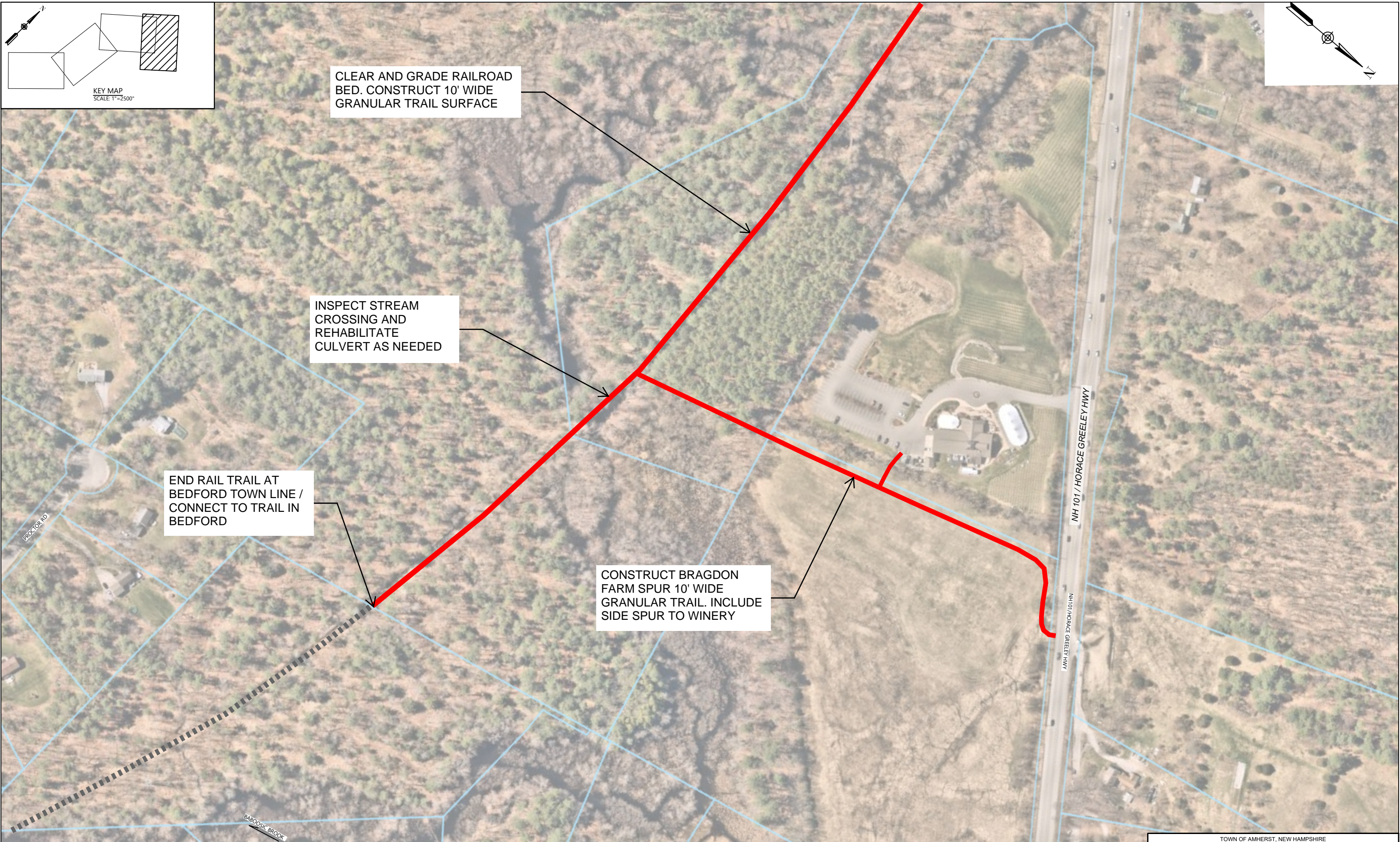


CLEAR AND GRADE RAILROAD
BED. CONSTRUCT 10' WIDE
GRANULAR TRAIL SURFACE

INSPECT STREAM
CROSSING AND
REHABILITATE
CULVERT AS NEEDED

END RAIL TRAIL AT
BEDFORD TOWN LINE /
CONNECT TO TRAIL IN
BEDFORD

CONSTRUCT BRAGDON
FARM SPUR 10' WIDE
GRANULAR TRAIL. INCLUDE
SIDE SPUR TO WINERY



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TOWN OF AMHERST, NEW HAMPSHIRE				
BABOOSIC GREENWAY SEGMENT: AMHERST NORTH-01				
DRAWING	PREPARED FOR:	SHEET NO.	TOTAL SHEETS	
FIGURE 1	NRPC	4	4	