Tab A

DuBois & King inc.

September 28, 2022

Mr. John Echeverria
232 Justin Morrill Memorial Highway
Strafford, VT. 05072
(802) 765-4163

SUBJECT: Strafford BR30 Truss Bridge Adaptive Use Feasibility Study

Dear Mr. Echeverria:

Dubois & King, Inc. (D&K) is providing you and the rest of the Bridge 30 Group the following evaluation of the feasibility of utilizing soon to be decommissioned salvaged steel trusses from a bridge in Ludlow, Vermont with the intent to install the trusses alongside Strafford BR30. Strafford BR30 is a rolled beam bridge constructed in the 1940's needing railing repairs. Installation of the steel trusses alongside will address the critical railing repairs as well as reestablish the visual aesthetics of a historically accurate truss bridge adjacent to the picturesque town green.

Evaluation Tasks Completed:

1. The kick off meeting was held on Tuesday, August 30th at BR30 to review the Scope of Work along with the existing bridge condition and any obvious potential constraints for installing the adaptive use trusses. In attendance were Rich Tetreault, D&K; Mark Neuroth, D&K; John Echeverria; David Grant, Lucy Hemenway, and Rodney Sloat.
   Findings of note from the site visit:
   - Bridge 30 Condition
     - Deck Elements – Railing is damaged from vehicle impact along the upstream side with orange traffic barrels placed along the front as a warning. It also has general deterioration throughout due to years of service. Retrofit scuppers with steel tube downspouts were installed after the original construction, two along each curb line. The underside of deck has some efflorescence though no significant rust stains or impending delamination was noted, suggesting that the deck has remaining useful life.
     - Superstructure – The steel beams have some minor surface rust and are in sound condition.
     - Abutments – Both are well protected with stone riprap and concrete appears sound.
     - Channel – No concerns noted. Waterway opening is relatively shallow, though reportedly has been performing well.
   - Site Constraints To Consider
     - The overall town highway alignment, including concrete bridge deck, is on a horizontal curve. The steel beams on the bridge are straight, with a curved fascia on the deck to match the roadway alignment. The curvature would add complexity to installing the trusses alongside the bridge. A new straight concrete

deck fascia parallel to the trusses will need to be constructed to accommodate the installation alongside it. Scenarios of deck reconstruction vs. full replacement will need to be weighed to best accommodate the new fascia. Considering the overall age of the deck, it is anticipated a full deck replacement rather than limited reconstruction to the outside beam bays is warranted for overall durability when weighing any difference in cost. This can be further vetted during a detailed design.

- Having a new straight bridge deck within a short segment of an overall town highway horizontal curve may create an unexpected visual to travelers. During design a traffic engineer should evaluate the merits of having a centerline paint stripe installed along the roadway across the bridge to help with the general flow of travelers as they navigate the roadway curve.
- There is a utility pole with guy wires at the NW corner of the bridge close to the area necessary to support the truss end. Any need to relocate this pole will have to be confirmed during design detailing.
- There is a laid up stone wall in the SW corner of the bridge in the vicinity of the area necessary to support the truss end. VTrans' historic preservation specialist Kyle Obenauer was consulted and he feels the wall type would not create an adverse effect if impacted considering its apparent age.

2. Inspection of the Ludlow truss bridge at its current location took place on Tuesday, September 6th with Rich Tetreault and John Echeverria attending. Findings of note from the site visit are provided below:
    - Trusses consist of steel members which are generally in good condition. Paint system in many places has peeled away, exposing light to moderate surface rust.
    - Bearing knuckle plates have slotted rust holes along the ends of the lower chord channel sections that will need inspecting and possible strengthening during the cleaning and repainting process.
    - Lower chord stay plates along the bottom have random areas of heavy rusting and roughly 25% will likely need to be replaced.
    - The downstream lower chord near mid span is slightly bent. It may have been impacted by high water debris. The area seems sound, but will need closer inspection during cleaning and painting, possibly warranting a small repair.
    - Truss to floorbeam/deck connections are on a skew to match the abutment skews. Assuming the same connection points to the BR30 fascia beams and deck, new 90 degree angles will need to be installed utilizing the existing rivet holes in the truss members in order to attach the truss the Strafford bridge.
    - Bearing plates are a simple design and may be adequate for reuse. Confirmation will be needed upon inspection during the cleaning and painting process.
    - The steel railing system is in relatively good condition. There are two issues to consider in evaluating the use of the historic truss railing for use as the primary bridge rail on BR30.
        - Most importantly during design an evaluation will need to determine if vehicle impacts to the railing can adequately be transferred to the concrete deck and steel beam superstructure through the connections. The structural ability to develop the lateral stability of the trusses to support rail impacts will need to be confirmed.

- The general crash worthiness of the historic rail needs to be acceptable to VTrans. The system has been allowed to be left in service on other Vermont Town Highway bridges utilizing VTrans funding in the past. Hopes are, considering the local context of the setting coupled with the low volume, low speed town highway, the existing truss bridge railing will be approved for reuse.

3. The following intends to provide a conceptual assessment of the feasibility of reusing the trusses as planned. My judgement based on review of the findings, it is feasible to reuse the Ludlow truss as planned. Bridge 30 span length between centerline of bearings is 72 feet and the Ludlow truss span length is 77 feet.
    - Ends of the truss will need new foundations installed just behind the existing Bridge 30 short concrete gravity abutments. Design will need to take into consideration added earth pressures behind the existing battered back face of abutment to address risks of making the existing abutments rotate forward over time. Two options for truss foundation are provided in the cost estimate:
        i. Pile supported bearing seats behind the existing wings to minimize impacts to the existing abutments. This comes with the added costs associated with driving piles but allows the existing substructure to remain in place and reduces excavation and reconstruction requirements. This may require some support of excavation to maintain serviceable traffic though it is possible to design such the depth of excavation is less than option ii.
        ii. Removal and reconstruction of the existing abutment wingwalls to accommodate the truss bearing seats. Cost savings associated with having a shallow foundation will be impacted substantially by the need to support excavation if Bridge 30 needs to maintain a serviceable traffic lane during construction.
    - Connections to the existing bridge deck and fascia girders are necessary for the lateral stability of the trusses and will need to be designed such that live loads are not transferred from steel beam bridge to the trusses. Mitigation of live loads may be provided by using vertical slotted holes in the connection. Connections to the fascia girders will likely require installation of new lines of diaphragms between beams at the connection locations to reduce the torsion in the fascia girders.
    - The existing curved deck will need to be reconstructed and cast parallel to the trusses to provide the preferred visual as well as provide appropriate railing offsets and pedestrian safety. The horizontal clearance will remain the same as currently exists in the narrowest locations and will be slightly wider in a few others.

4. Records collection on file with Town of Strafford and/or VTrans. Record plans were obtained from VTrans for both bridges and are enclosed with this letter submittal.

5. Feasibility of utilizing the Lucy Hemenway property adjacent to BR30 to store the steel truss bridge as well as provide a staging area to clean and repaint them before installation, recognizing the presence and removal of lead paint on the trusses and the existing Strafford BR30 rolled beams will be a key factor in the assessment. VTrans Hazardous Materials Unit Manager, Andy Shively was consultant and offers the attached summary of considerations. It appears feasible to use the land in question for both temporary storage and field cleaning and re-painting; however there are risks associated with it that the landowner needs to be fully aware of.

6. Conceptual Level Cost Estimates:

Bridge 30 Group Truss Adaptive Use Feasibility Conceptual Cost Estimate

Item	Quantity		Unit Cost	Construction	Engineering
1. Ludlow Truss Dismantle & Transport *	1	EA	$0	$0	$0
2. Truss Cleaning, Repairs, & Painting**	1	EA	$250,000	$250,000	$2,500
3. Preliminary Design, Survey, Permitting	1	EA	$50,000	$0	$50,000
4. Deck Replacement					
Deck Concrete	60	CY	$1,800	$108,000	
Assume 250lb/CY rebar	13200	lb	$2.25	$29,700	
Bridge Rail	150	LF	$220	$33,000	
New Joints	65	LF	$150	$9,750	
			Subtotal	$180,450	$18,045
5. Truss Reuse					
Extra Line of Diaphragms at nodes	5650	lb	$3.00	$16,950	
Truss to Bridge Connections	18	EA	$3,000	$54,000	
Truss Bearings	4	EA	$5,000	$20,000	
			Subtotal	$90,950	$13,643
6a. Supports if Pile Supported					
Excavation	149	CY	$32	$4,768	
Pile Cap Conrete	39	CY	$1,600	$62,720	
Assume 150lb/CY rebar	5880	lb	$1.50	$8,820	
Pile driving Equipment	1	EA	$20,000	$20,000	
Piles (Assume HP 12x57)	13680	LF	$3.00	$41,040	
Backfill	109.8	CY	$50.00	$5,490	
Support of Excavation***			$50,000	$4,000	
Traffic Control***			$50,000	$5,000	
			Subtotal	$151,838	$18,221
6b. Supports if Concrete Abutment Supported					
Demo of Existing Wings	1	EA	$20,000	$20,000	
Excavation	320	CY	$32	$10,240	
New bearing seats and wings	42	CY	$1,600	$66,844	
Assume 150lb/CY rebar	6267	lb	$1.50	$9,400	
Backfill	278	CY	$50	$13,911	
Support of Excavation***			$100,000	$8,000	
Traffic Control***			$50,000	$5,000	
			Subtotal	$133,396	$16,007

** Assumed to be part of the VTrans' Ludlow Project*
*** Potentially part of the VTrans' Ludlow Project*
**** If road cannot be closed for construction operations*

Total Cost	Construction	Engineering
Case a For Substructure on Piles Behind Wings	**$673,238**	**$102,408**
Mobilization (10%)	$67,324	
	$740,562	**$102,408**
Case b For Shallow Foundation with Wing Reconstruction	**$654,796**	**$100,195**
Mobilization (10%)	$65,480	
	$720,275	**$100,195**

Does not include paving, striping, approach work, or peripherals

SUMMARY

My judgement, based on the findings above, is that it is feasible to adaptively reuse the trusses in Ludlow for placement alongside Strafford BR30. However, the project will require additional design and evaluation to develop truss end bearing support at the abutments along with lateral stability connections to the existing bridge. It is understood truss dismantling, transport, and rehabilitation options are still under review between the Bridge 30 Group and the Vermont Agency of Transportation. Interim storage of the trusses along with potential cleaning and repainting on the Hemenway property will require hazardous material risk management agreements between the VTrans, The Town, and the Property Owner.

Very truly yours,

Richard Tetreault, P.E.
Transportation Division Director
DuBois & King, Inc.

Strafford BR30 Truss Bridge Adaptive Use Feasibility Study - Attachment

From: Shively, Andy <Andy.Shively@vermont.gov>
Sent: Friday, September 9, 2022 9:40 AM
To: rtetreault <rtetreault@dubois-king.com>
Subject: RE: Storing and Re-painting Historic Steel Trusses

Morning Rich, good to speak with you last week. Sorry it took me all week to respond.

I more often end up drawn into scenarios like this after the fact, so I appreciate the sensitivity of the addressing liability issues about this up front. In this case, the liability issue is specific to storing weathered steel bridge components with an existing lead based coating on private property. Under a strict interpretation statute (10 VSA C15 SS6616), As the *"owner"* of the steel and the *remaining lead based coating* the Agency would be subject to joint and several responsibility should a " Spill" or "release" of coating to ground surface occur. Joint and several in this instance means liability could include the Agency *and* the landowner.

I included both "Spill" and "Release" as mechanisms that would trigger liability but I think there is a distinction between those triggers. A spill is commonly viewed as something that can be resolved fairly simply. Dig it up and dispose properly (Very simplistic). A release is commonly something that is larger in scale or scope and requires further investigation to determine the degree and extent of the contaminant distribution and develop a remedial plan (Corrective Action Plan).. Spill response and cleanup is not as robust of a regulatory burden than a CAP and does not require the same degree of regulatory oversight (CAP public notification and comment periods are one example)

As an example, I have approached cleaning up spills expecting them to small in scale or scope only to recognize that the issue is not something we can just easily remediate. In those circumstances the incident is opened as a Spill (with an initial spill number assigned to the property) but are referred onto Hazardous Sites (and assigned a Hazardous Site number) because the scale of the issue is much larger than originally supposed.

I think there are two paths forward under these regulatory conditions.

The first path is to give or donate the steel to the landowner and provide full disclosure of the existence of a lead coating. Under that scenario the new owner of the steel would also be the landowner so the joint and several liability triggers would remain with the landowner alone. I do not see that as a very attractive option for the landowner.

The second path would be for the Agency to retain ownership (and primary liability) need to provide assurances to the landowner to address any loose of lead to the environment that may occur. Under either scenario I think it would be beneficial to provide mitigating measures (wrap and monitor) to minimize the uncontrolled lose of coatings that might be moved around by the wind. By implementing some attempt to mitigate coating lose, I think it would be an easier case to define as a spill rather than a release. Thus avoiding hazardous Site designation but not a Spills designation. This may be the most reasonable option but it would need to occur within the context of informed consent.

From an informed consent perspective, it is appropriate the Agency clearly inform the landowner of the presence of lead based coating that may flake from the stored steel but all reasonable measures are

taken to store the steel in such condition that exposure to and / or release of lead based coatings is minimized. In the event a spill does occur, the Agency would be responsible for cleaning it up but the landowner would have a Spill designation associated with there property, not a Hazardous Sites designation. I have had several conversations with DEC staff who agree with my perspective.

I hope this was helpful and comprehensive enough to communicate to the landowner. If you have any questions or would like additional details feel free to let me know. Hopefully it won't take me a week to follow up.

Reach out anytime by cell. I'm not on standby pager any more so Rosa or Jim (new Haz Coordinator) would just refer you on to me anyway.
Enjoy the afternoon and weekend.

Andy Shively, Hazardous Materials Unit Manager
Pollution Prevention & Compliance | HazMat Unit
District Maintenance & Fleet Division
Vermont Agency Transportation
2178 Airport Road | Barre, VT 05641
802-229-8740 cell | 802-250-4666 Emergency Page
andy.shively@vermont.gov

VERMONT
AGENCY OF TRANSPORTATION

Tab B

Google Maps

Strafford

Bridge 30 Project Area # 1

Map data ©2022 Google 200 ft

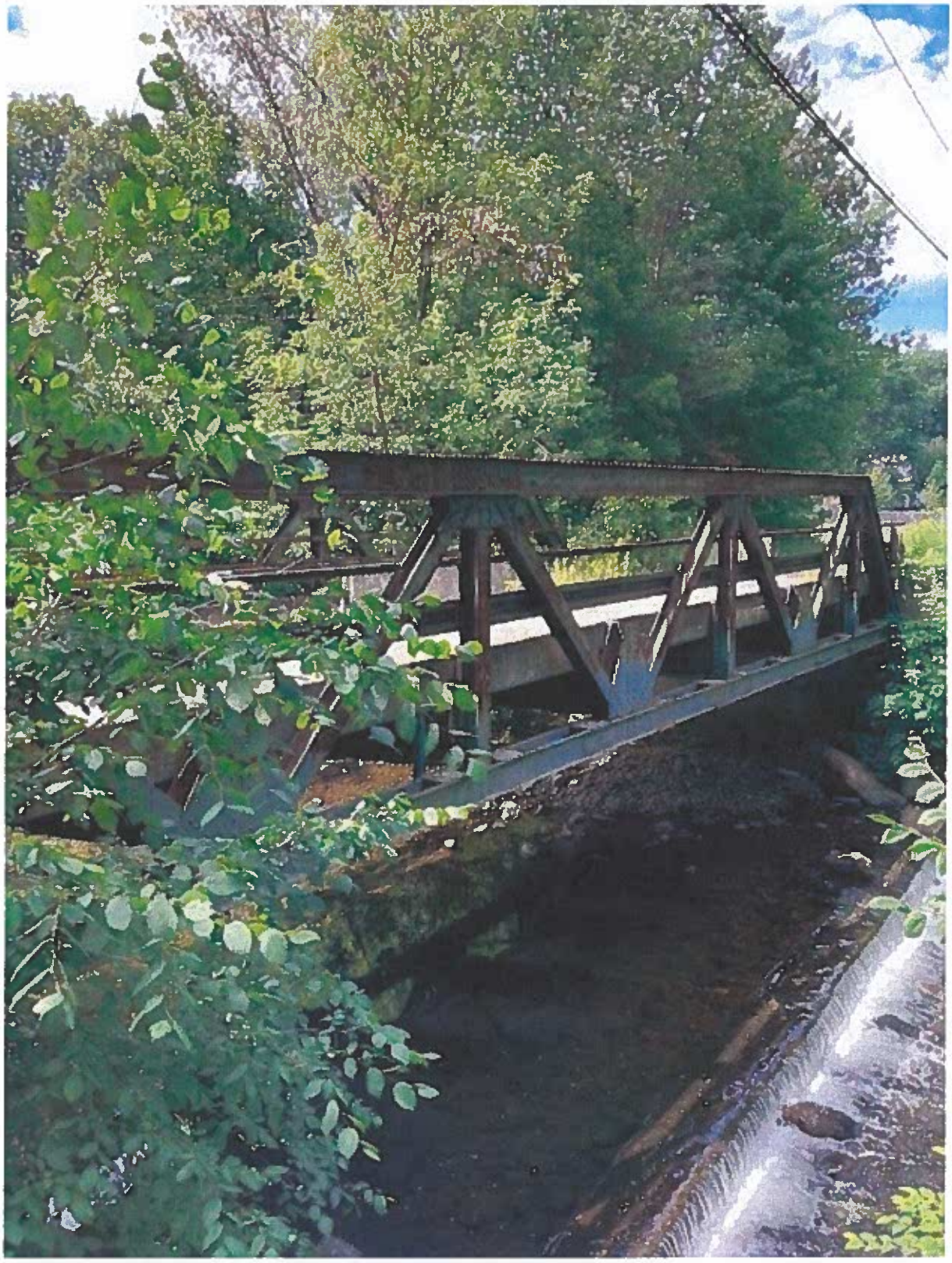
Google Maps

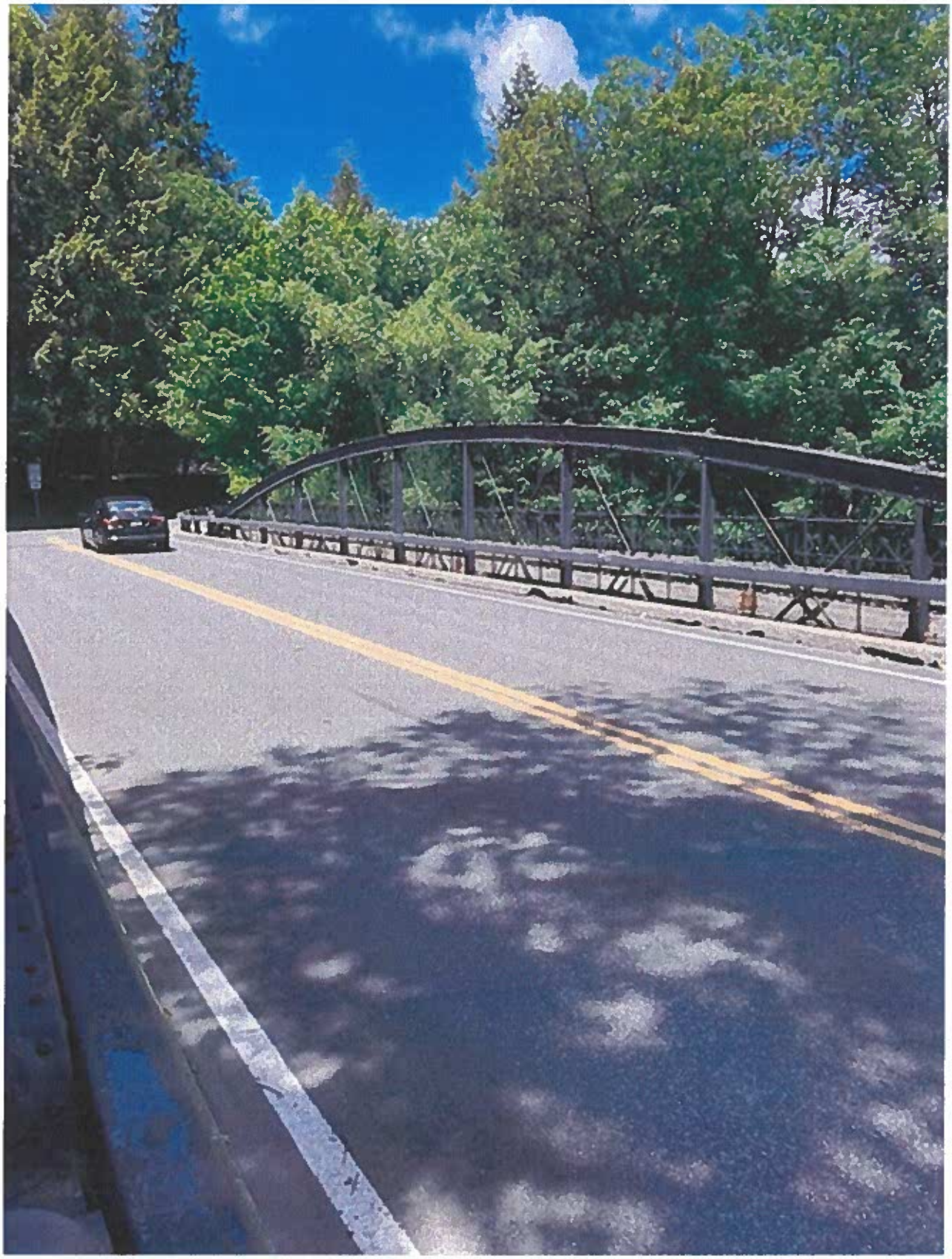
Strafford

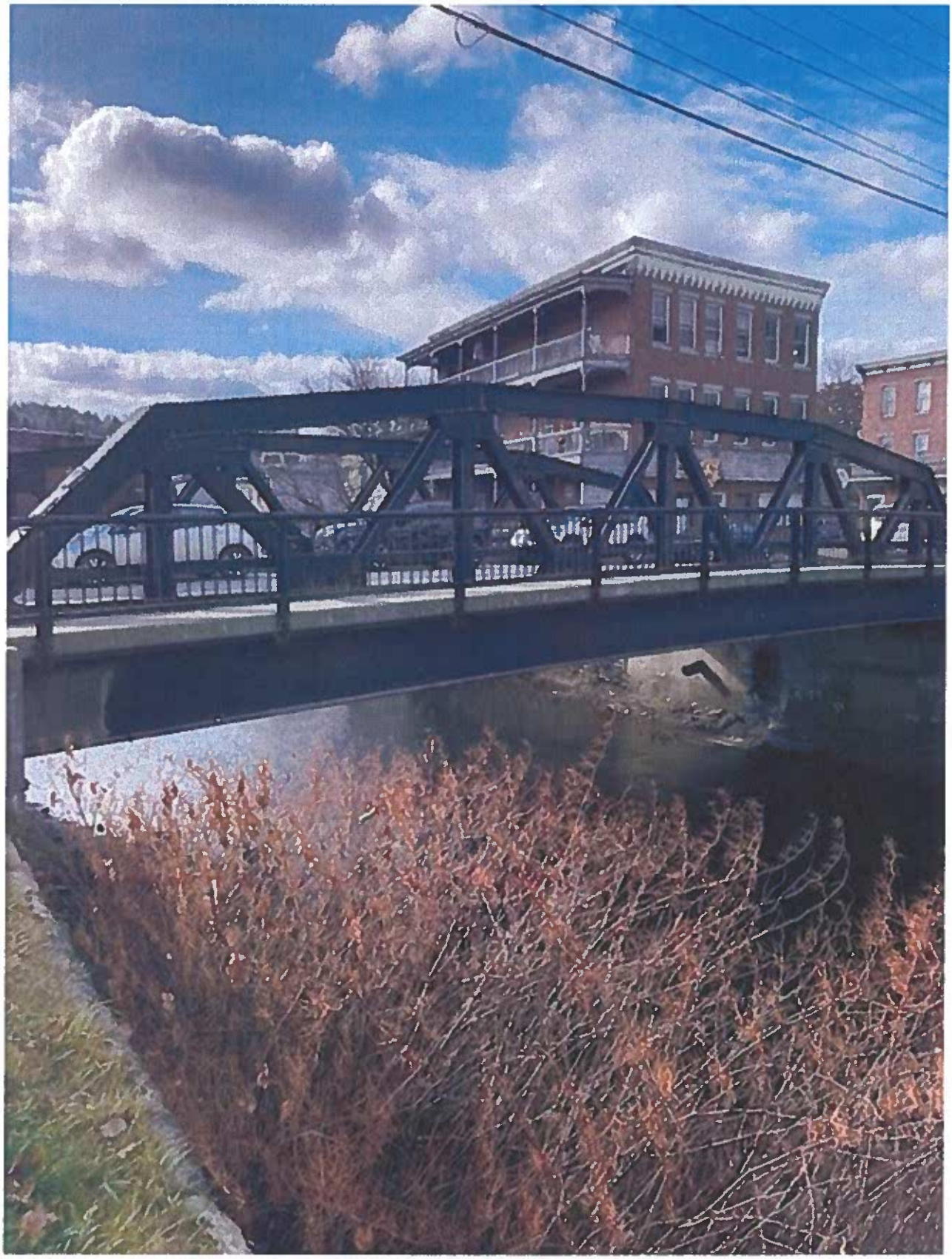
Bridge 30 Project Area # 2

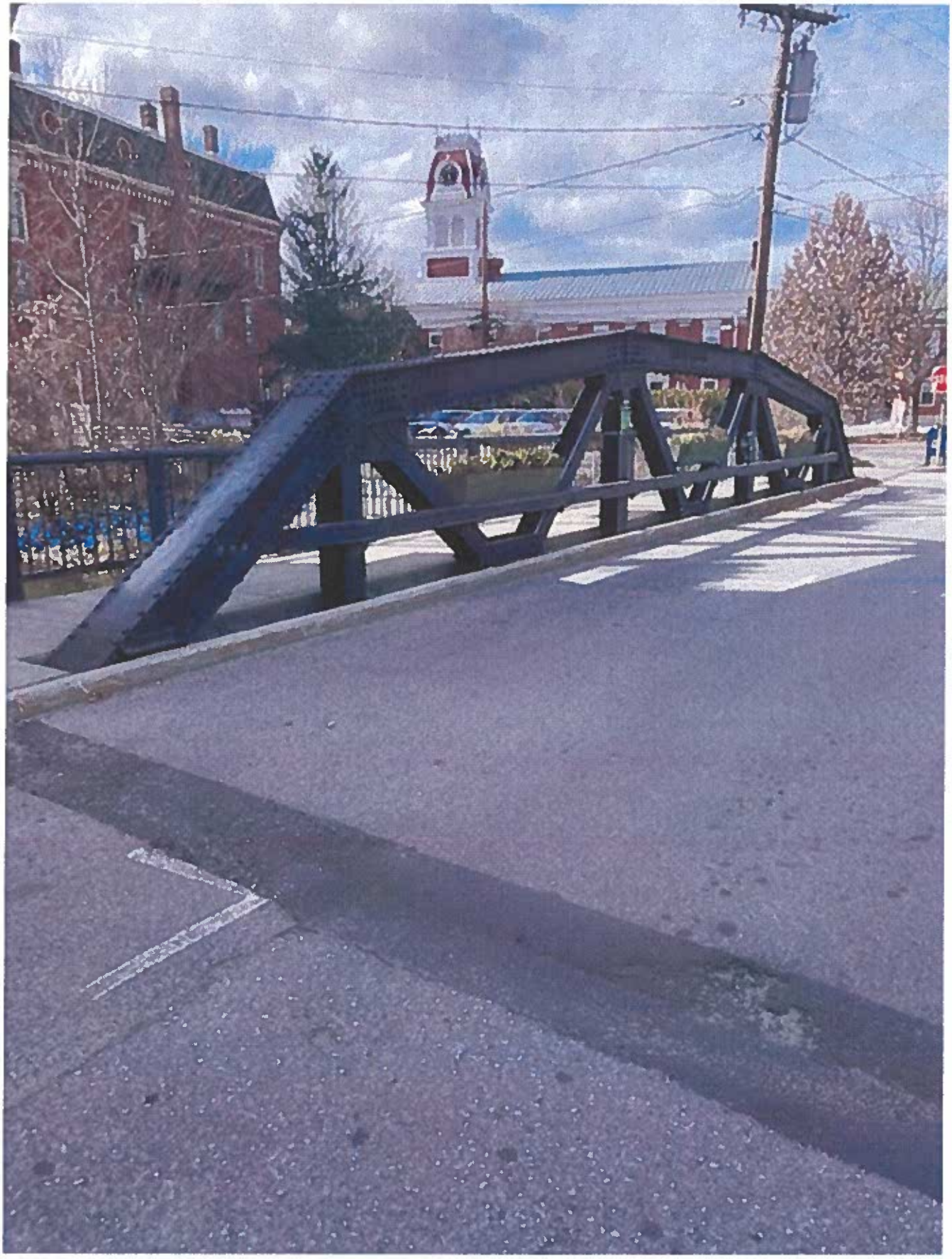
Map data ©2022 Google 100 ft

Tab C







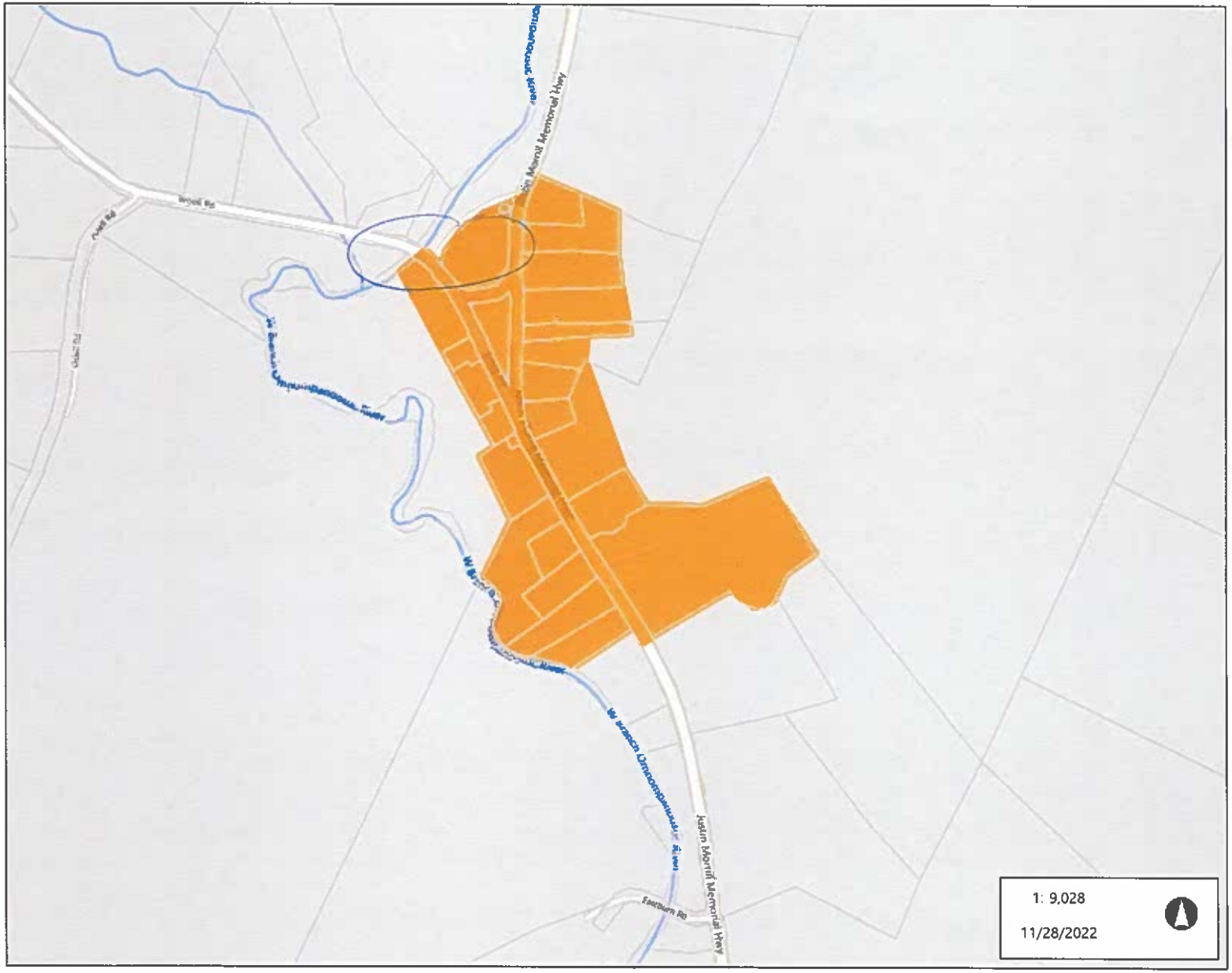


Tab D

VERMONT

Strafford Village Town Center

Provided by the Planning Atlas Dept. of Housing & Community Development



Legend

- Village Center Boundary
- Downtown District Boundary
- Town Boundaries
- VT State Boundary

1: 9,028

11/28/2022

Notes

0.3 0 0.14 0.3 Miles

WGS_1984_Web_Mercator_Auxiliary_Sphere

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Tab E

Village Designation

Strafford Village
Strafford, Vermont

August 7, 2018

Proposed Village Designation Boundary

Nat'l Register Historic District

Property Uses

Mixed-Use

Public/ Civic

Residential

Commercial

1. Meeting House
2. Stone Soup
3. Mixed Use: Post Office/ Strafford Historical Society/ Apartments
4. Town Office
5. United Church of Christ
6. Justin Morrill Homestead/ Morrill Memorial & Harris Library

0 0.02 0.04 0.08 Miles

N E S W

TRORC
Two Rivers-Ottauquechee
REGIONAL COMMISSION
trorc.org