STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Danby BF 0130(4)

FAS ROUTE 130 (TH 1), BRIDGE 7 OVER MILL BROOK

March 8, 2022

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I. Site Information

Bridge 7 is a Town owned bridge located on FAS Route 130 (TH 1/Brook Road) approximately 1.3 miles west of the junction with US Route 7. The bridge is located in an S-curve. The existing conditions were gathered from a combination of a Site Visit, the Inspection Report, the Route Log and the existing Survey. See correspondence in the Appendix for more detailed information.

Roadway Classification	Rural Major Collector
Bridge Type	Concrete T-Beam Bridge
Bridge Span	40 feet
Year Built	1928
Ownership	Town of Danby

Need

Bridge 7 carries FAS Route 130 across the Mill Brook. The following is a list of deficiencies of Bridge 7 and FAS Route 130 in this location:

1. The existing concrete T-beams are in satisfactory condition; however, they have patched areas throughout, small pop outs and areas of spalling with exposed reinforcing in the beam ends. Beams 1 & 2 have moderate to heavy saturation with scattered rust staining, small delaminations and areas of spalling with exposed reinforcing. Beam 3 has wide lineal cracking along the base and scattered small delaminations throughout.

2. The substructures are in good condition with only some minor abrasion along the base with some small, voided spalls. There is some map cracking in the ends with efflorescence staining.

3. The existing bridge width is too narrow for the roadway classification and traffic volumes and does not provide adequate shoulder space for shared use.

4. The horizontal curve through the project area is substandard.

5. The sag vertical curve and headlight site distance through the project area are substandard.

6. The bridge does not meet the minimum bank full width requirements.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2025 and 2045.

TRAFFIC DATA	2025	2045
AADT	430	470
DHV	70	75
ADTT	30	45
%T	6.6	9.3
%D	55	55

Design Criteria

The design standards for this bridge project are the Vermont State Standards, dated October 22, 1997. Minimum standards are based on an ADT of 470, a DHV of 75, and a design speed of 30 mph for a Major Collector.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 5.3	9'/1' (20')	9'/2' (22')	Substandard
Bridge Lane and Shoulder Widths	VSS Section 5.3	9'/2' (22')	9'/3' (24')	Substandard
Clear Zone Distance	VSS Table 5.5		7' fill / 7' cut	
Banking	VSS Section 5.13	Varies	8% (max)	
Speed		30 mph (Town Ordinance)	30 mph (design)	
Horizontal Alignment	AASHTO Green Book Table 3-9	R = 371'/430'	R_{min} = 506' @ e = 6.0% R_{min} = 199' @ e = 6.0% for 20 mph warning	Substandard
Vertical Grade	VSS Table 5.6	-8.09% (max)	9% (max) for rolling terrain	
K Values for Vertical Curves	VSS Table 5.1	K_{crest} = 13, K_{sag} = 22	30 crest / 40 sag	Substandard
Vertical Clearance	VSS Section 5.8	No Issues Noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 5.1	223', 184', 192'	200'	Substandard
Bicycle/Pedestrian Criteria	VSS Table 5.8	2' shoulder	3' Shoulder	Substandard
Bridge Railing	Structures Design Manual Section 13	Fascia mounted Heavy Duty Steel Beam Bridge Railing	TL-2	
Hydraulics	VTrans Hydraulics Section	1. Passes Q_{50} storm event with approximately 0.79' of freeboard 2. 28' clear span	1. Pass Q_{50} storm event with 1.0' of freeboard 2. 45'(min) Bank full width	Substandard Hydraulics and BFW
Structural Capacity	SM, Ch. 3.4.1	Not Structurally Deficient	Design Live Load: HL-93	

Inspection Report Summary

Deck Rating	5 Fair
Superstructure Rating	6 Satisfactory
Substructure Rating	7 Good
Channel Rating	8 Very Good

6/25/2020 – This structure should be considered for an extensive deck rehab project or replacement with concrete repairs made to the tee beams. ~JW/MC

6/6/2018 – Deck and t-beams have a considerable amount of deterioration and patches with exposed rebar, delaminations, rust staining, honeycombing and cracks that a rehab or a new deck and superstructure should be considered in the near future. Consider installing a joint at ends of deck due to excessive break up of asphalt.

6/16/2016 – Structure will need rehab in the near future due to the poor deck. Soffit area has been patched in the past but are failing. Delams are still forming with more areas of exposed rebar. ~FRE/TJB

6/23/2014 – Deck soffit continues to deteriorate at a slow pace & town should consider replacement in the next 5 to 10 years. Town should clean heavy gravel debris beneath structure to realign flow from abut 1. ~MJK/SP

6/6/2012 – The aggregation along the left side should be removed and scour protection added along abutment 1. ~JWW

10/20/2011 – Assessment inspection after Tropical Storm Irene (Round #2). Small to medium size trees are resting beneath the span area towards the upstream channel and are in need of removal. ~PLB

5/04/2010 – Satisfactory condition, deck soffit past patching repairs are starting to break up in couple of spots with exposed rebar as deck deterioration progress slowly. T-beams have longitudinally minor to moderate size cracks, small delams and some rust stains. Beams have patching areas done in the past and are holding up fairly well. Past settlement in abutment 2 seems to have ceased. ~MJK/FRE

Hydraulics

The existing structure does not meet the current standards of the VTrans Hydraulic Manual. The existing structure provides 0.79-feet of freeboard at the design storm (2% AEP, Q_{50} storm event), which does not meet the minimum standard of 1-foot. Additionally, it does not meet the stream equilibrium standards for bankfull width (span length). The VTrans Hydraulics Section has made recommendations which can be found in the preliminary hydraulics report in Appendix D.

Utilities

The existing utilities are shown on the Existing Conditions Layout Sheet, and are as follows:

Municipal Utilities

- There are no municipal water or sewer mains in the project area.

Public Utilities

Underground:

- There are no underground utilities in the project area.

Aerial:

- There are no aerial utilities located in close proximity to the bridge.

It is anticipated that relocation of utilities will not be necessary for construction.

Right Of Way

There is an existing 3-rod Right-of-Way (ROW) centered on TH 1. The wingwall in the southeast quadrant is located outside the existing ROW. The existing ROW is plotted on the Existing Conditions Layout Sheet. Depending on the alternative selected, additional ROW may need to be acquired.

Resources
The environmental resources present at this project are shown on the Existing Conditions Layout Sheet, and are as follows:

Biological:

Wetlands/Watercourses
No wetlands are present within the project area.

The Project spans Mill Brook, which is a waterbody that is regulated by the U.S. Army Corps of Engineers (COE). The Ordinary High Water (OHW) mark is the regulatory boundary. A COE General Permit (GP) will be required for impacts below OHW.

Wildlife Habitat

The Project is located over a stream crossing that is identified as brook trout waters and deemed impassible for Aquatic Organism Passage (AOP). The Project is not anticipated to be an issue for AOP because it is a bridge and provides adequate passage. The Project is within a highest priority forest blocks, which provides surface water and riparian areas, riparian and wildlife connectivity and physical landscape diversity.

Rare, Threatened and Endangered Species (R/T/E)

The Project is located within the summer range of the federally and state endangered Indiana bat (Myotis sodalis). It is also located within the summer range of the federally threatened and state endangered northern long-eared bat (M. septentrionalis) and within 3 miles of a northern long-eared bat hibernaculum, Freely Quarry (Agency of Natural Resources, 2021).

Suitable summer habitat for these species includes trees ≥5 and ≥ 3 inches in diameter, respectively, that contain exfoliating or furrowed bark, cracks, crevices and/or cavities (U.S. Fish and Wildlife Service, 2021). The northern long-eared bat has also been documented roosting in structures with suitable microclimates (Vermont Fish and Wildlife Department, 2016). A habitat assessment, conducted on June 14, 2021, resulted in a finding no potential tree or bridge roosting habitat. No impacts to either of these species are anticipated and time of year (TOY) restrictions will not be required.

Agricultural

According to an ANR Natural Resource Atlas query, soils mapped in the area include Copake gravelly fine sandy loam, 2 to 8 percent slopes (99B) (Prime) and Hinckley gravelly loamy fine sand, 0 to 8 percent slopes (13B) (Prime). Agricultural operations are practiced in the Project vicinity.

Summary

No potential Indianan bat or northern long-eared bat roosting habitat was identified, and no TOY restrictions will be required. Natural resource permitting that may be required, depending on scope, are COE GP and Water Quality related permits.

Hazardous Materials:

According to the Vermont Agency of Natural Resources (VANR) Vermont Hazardous Sites List, there are no hazardous waste sites located in the project area.

Historic:

Bridge 7 is not historic, and there are no above-ground historic properties in the project area.

Archaeological:

There are no areas of archaeological sensitivity within the project limits.

Stormwater:

There are no stormwater concerns for this project.

II. Maintenance of Traffic

The Vermont Agency of Transportation developed an Accelerated Bridge Program in 2012, which focuses on expedited delivery of construction plans, permitting, and Right-of-Way, as well as accelerated construction of projects in the field. One practice that will help in this endeavor is closing bridges for portions of the construction period, rather than providing temporary bridges. In addition to saving money, the intention is to minimize the closure period with accelerated construction techniques and incentives to encourage contractors to complete projects early. The Agency will consider the closure option on projects where rapid reconstruction or rehabilitation is feasible. The use of prefabricated elements and systems for new bridges will also expedite construction schedules. This can apply to decks, superstructures, and substructures. Accelerated Bridge Construction should provide enhanced safety for the workers and the travelling public while maintaining project quality. The following options have been considered:

Option 1: Off-Site Detour

This option would close the bridge and reroute traffic onto an offsite detour. Since the bridge is located on a Class 2 Town Highway, it would be the responsibility of the Town of Danby to choose the preferred detour route, and design and manage the traffic control plan. The Town would also be responsible for management of emergency services throughout the closure period. There are two possible detours that may be considered by the Town which are as follows:

1. Brook Road (FAS 130/TH 1), to Bromley Road and Easy Street, back to Brook Road (3.0 mi end-to-end)

2. Brook Road (FAS 130/TH 1), to Colvin Hill Road and Danby Hill Road, back to Brook Road (3.4 mi end-to-end)

A map of these detour routes can be found in Appendix M.

Coordination for emergency routes prior to the start of construction will need to be determined by the town and the contractor. If work is to occur when school is in session coordination with school officials regarding bus stops will need to be determined. Also, communications and accommodations for postal delivers, newspaper routes, trash services and/or other delivery services interrupted by the project or detour should be communicated with the proper contacts.

Advantages: This option would eliminate the need for a temporary bridge, which would significantly decrease project costs and construction duration. This option would not require the need to obtain rights from adjacent property owners for a temporary bridge. This option reduces the time and cost

of the project both at the development stage and construction. Additionally, the local share would be reduced by 50% if the Town decides to close the bridge during construction.

Disadvantages: Traffic flow would not be maintained through the project site during construction.

Option 2: Phased Construction

Standard phased bridge construction builds one-half of the structure and then the other half while maintaining traffic on one lane of the bridge structure. This allows keeping the road open during construction, while having minimal impacts to adjacent property owners and environmental resources.

While the time required to develop a phased construction project would remain the same, the time required to complete a phased construction project increases because some of the construction tasks have to be performed multiple times. In addition to the increased design and construction costs mentioned above, the costs also increase for phased construction because of the inconvenience of working around traffic and the effort involved in coordinating the joints between the phases. Another negative aspect of phased construction is the decreased safety of the workers and vehicular traffic, which is caused by increasing the proximity and extending the duration that workers and moving vehicles are operating in the same confined space. Phased construction is usually considered when the benefits include reduced impacts to resources and decreased costs and development time by not requiring the purchase of additional ROW.

Based on the current traffic volumes, it is acceptable to close one lane of traffic, and maintain one lane of traffic, both ways, with a traffic signal. However, due to horizontal constraints, this option is not being considered. In order to keep one lane open to traffic, approximately 12 feet of the existing bridge width needs to remain for Phase 1. The existing bridge is 22 feet wide, which does not provide enough of a working width to make this method advantageous unless the new bridge is constructed wider than the minimum standard. Additionally, this option would increase the design and construction costs, while not improving the existing substandard horizontal alignment.

Phased construction would not be possible at this site without shifting the alignment of the proposed bridge, widening the proposed bridge, or using a temporary bridge for one of the phases. None of those options are ideal. Additionally, phased construction would result in a longer, more expensive, and less safe construction project, and thus, it will not be considered further.

Option 3: Temporary Bridge

From a constructability standpoint, a temporary bridge would be easier to construct on the downstream side of the road. A temporary bridge would be difficult to place on the upstream side due to the close proximity of the Brook to the road. A temporary bridge would require additional rights from adjacent property owners and would require a significant amount of tree clearing.

A one-way temporary bridge would be adequate based on the daily traffic volumes. Due to the substandard sight distance, any one-way temporary bridge should be signalized. See the Temporary Bridge Layout Sheets in Appendix P.

Advantages: Traffic flow can be maintained through the project corridor during construction.

Disadvantages: This option would require additional Right-of-Way acquisition for placement of the temporary bridge. There would be decreased safety to the workers and to vehicular traffic, because of cars driving near the construction site, and construction vehicles entering and exiting the

construction site. This traffic control option would be costly, and time consuming, as construction activities would take a second construction season, in order to set up the temporary bridge.

III. Alternatives Discussion

Bridge 7 is not considered structurally deficient; however, the existing T-beams are only in fair to satisfactory condition and continue to deteriorate, with large areas of delaminations on the deck soffit. The travel way and shoulders on the bridge are too narrow, and the hydraulic opening and clearspan are substandard.

No Action

This alternative would involve leaving the bridge in its current condition. Although the bridge is not in imminent danger of collapse, it will eventually be posted for lower traffic loads. In the interest of safety to the traveling public, the No Action alternative is not recommended. No cost estimate has been provided for this alternative since there are no immediate costs.

Structure Rehabilitation

While there are many substandard features associated with this stretch of Brook Road, such as shoulder widths, clear span, alignment, and bicycle accommodations, the superstructure is the item that will require work within the next 10 years. Thus, the primary goal of a rehabilitation option will be to rectify the superstructure issues. There are two types of superstructure rehabilitation options available for concrete structures: minor rehabilitation and superstructure replacement.

Alternative 1: Minor Rehabilitation

This rehabilitation option includes the minimal amount of work necessary to extend the useful life of the bridge. Any loose concrete on the underside of the beams and deck is removed from the structure. Then forms are constructed such that a thin layer of new concrete can be placed to replace this removed concrete. There are several disadvantages with this method of rehabilitation in this situation. The first is that most of the patching is overhead; this requires the work to take place in difficult circumstances, where the work is taking place in the river. The concrete must be removed without spoiling the river and the new concrete must be placed from underneath the bridge. Second, having newer non-chloride laced concrete adjacent to the existing concrete usually exacerbates the rate of deterioration of the remaining concrete which surrounds the patch. This can be mitigated for approximately 20 years with the addition of sacrificial anodes into the patched structure.

Any bridge seat and substructure repairs would be included for this alternative as well. Both bridge joints would be replaced with flexible joint material. Bearings would be evaluated and replaced as necessary.

Most of this work can be accomplished without impacting traffic on Brook Road. Individual lanes may need to be closed during replacement of the joints and while a membrane and paving is occurring.

This alternative would address the deterioration issues of the existing bridge. However, the substandard bridge width, hydraulic opening, and bank full width would not be addressed.

Alternative 2: Superstructure Replacement

Since the existing T-beams are integral with the deck, replacement of the deck only is not recommended. A superstructure replacement option for this bridge would include a new superstructure, railings, and bridge seats with repairs as follows:

- The existing concrete T-Beams beams would be removed, new bridge and a new cast-in-place deck/superstructure would be constructed. The existing superstructure is slightly substandard for hydraulics. By replacing the existing T-beams with a shallow superstructure, such as solid slabs, the new superstructure may be able to meet the minimum hydraulic requirements for freeboard.

- The existing bridge seats would be cut down and new bridge seats would be poured to accommodate the new superstructure. A silane application should be applied to all exposed substructure concrete as part of the project.

The existing substructure is in good condition, and it is reasonable to assume that the existing substructure can safely carry anticipated traffic loads for an additional 40 to 50 years.

The existing lane widths and shoulders on the bridge are 9 feet wide and 2 feet wide respectively; this does not meet the minimum standard of 9 feet and 3 feet respectively. It is proposed that 9-foot lanes with 3-foot shoulders be constructed for this alternative. Given the U-back wing walls on the east side and the existing fascia mounted railing additional superstructure width will require cutting off the tops of wing walls and using moment slabs to support bridge railing.

Advantages: This alternative would address the deterioration issues of the existing bridge, with minimal upfront costs. This option would have minimal impacts to adjacent properties and resources. The current bridge does not meet the minimum width standards; this option will widen the bridge to meet the minimum standard.

Disadvantages: This option would match the existing horizontal and vertical alignments, which are substandard. The new superstructure would have a design life greater than that of the remaining substructures. This option would not address the substandard bank full width.

Maintenance of Traffic: The possible options here would be either an offsite detour or a temporary bridge.

Alternative 3: Full Bridge Replacement On Alignment

Due to the layout of the Mill Brook at the project site, the current horizontal alignment will be considered even though it is substandard. The existing horizontal curves would meet standards for a reduced speed warning, which should be considered as part of the project.

This alternative would replace the existing bridge with a new superstructure as well as a new substructure at the existing location. The various considerations under this option include: the bridge width and length, skew, superstructure type and substructure type.

a. Bridge Width

The current curb to curb width is approximately 22 feet. This does not meet the minimum standard of 24 feet. Since a new 75+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A 24 foot width bridge will be proposed.

b. Bridge Length and Skew

The existing bridge is 40 feet long with a 45-degree skew. This provides a clearspan normal to the channel of approximately 28 feet. This clearspan does not meet the ANR bank full width requirement of 45 feet. In order to meet the minimum hydraulic and stream equilibrium standards, a span length of approximately 70 feet is recommended. A 45-degree skew will be recommended in order to match the site conditions.

c. Superstructure Type

The possible 70' length bridge types that are most commonly used in Vermont, are a cast-in-place or precast steel and composite concrete deck, and NEXT beams. Due to the large skew, and curved roadway alignment NEXT Beams are not possible. The superstructure depth is not critical for meeting hydraulic standards, so the superstructure type shall be determined at a later time.

d. Substructure Type

No record plans are available. The VTrans geotechnical section conducted a site visit on April 23rd and observed that the Mill Brook streambed and embankments are primarily composed of cobbles and boulders. No exposed bedrock outcroppings were observed in the vicinity of the project during the site visit; however, the upstream wingwalls of both abutments appeared to be cast directly onto large boulders present at the site. Any new foundation would likely be either reinforced concrete abutments founded on spread footings or piles. Borings should be drilled early in the design phase to verify the in-situ conditions and choose the most appropriate substructure type. The preliminary geotechnical report can be found in Appendix E.

e. Maintenance of Traffic:

Either a temporary bridge or an offsite detour could be utilized for traffic control at this site.

Alternative 4: Full Bridge Replacement Off Alignment

This alternative would replace the existing bridge with a new superstructure as well as a new substructure on a new alignment at the existing crossing. The various considerations under this option include: the alignment, the bridge width and length, skew, superstructure type and substructure type.

a. Alignment

The current horizontal alignment does not meet the current standards, so an off-alignment option downstream from the existing bridge will be evaluated. The horizontal alignment can be significantly improved by replacing the S-curve with one single curve with an approximate 1,800-foot radius. This option would have impacts to the properties downstream of the existing bridge and would extend the project limits by approximately 600 feet.

b. Bridge Width

The current curb to curb width is approximately 22 feet. This does not meet the minimum standard of 24 feet. Since a new 75+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A 24 foot width bridge will be proposed.

c. Bridge Length and Skew

The off-alignment option would increase the skew of the roadway to the brook. As such, a longer bridge span or a larger skew would be necessary. The existing bridge is 40 feet long with a 45-degree skew. This provides a clearspan normal to the channel of approximately 28 feet. This clearspan does not meet the ANR bank full width requirement of 45 feet. In order to meet the minimum hydraulic and stream equilibrium standards, a span length of approximately 70 feet is recommended. A skew of 60 degrees would be recommended to match the site conditions. The structure may be lengthened in order to reduce the skew of the abutments.

d. Superstructure Type

The possible 70' length bridge types that are most commonly used in Vermont, are a cast-in-place or precast steel and composite concrete deck, and NEXT beams. Due to the large skew, and curved roadway alignment NEXT Beams are not possible. The superstructure depth is not critical for meeting hydraulic standards, so the superstructure type shall be determined at a later time.

e. Substructure Type

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f. Maintenance of Traffic:

Traffic would be maintained on an offsite detour or on an upstream temporary bridge for this alternative. The proposed alignment would not provide enough width to maintain traffic on the existing bridge, even if constructed in phases.

IV. Alternatives Summary

Based on the existing site conditions, bridge condition, and recommendations from hydraulics, there are several viable alternatives:

Alternative 1: Minor Rehabilitation with Minimal Impacts to Traffic
Alternative 2a: Superstructure Replacement with Traffic Maintained on Off-Site Detour
Alternative 2b: Superstructure Replacement with Traffic Maintained on a Temporary Bridge
Alternative 3a: Full Bridge Replacement with Traffic Maintained on Off-Site Detour
Alternative 3b: Full Bridge Replacement with Traffic Maintained on Temporary Bridge
Alternative 4a: Full Bridge Replacement Off Alignment with Traffic Maintained on Off-Site Detour
Alternative 4b: Full Bridge Replacement Off Alignment with Traffic Maintained on a Temporary Bridge

V. Cost Matrix[1]

Danby BF 0130(4)		Do Nothing	Alt 1a	Alt 2a	Alt 2b	Alt 3a	Alt 3b	Alt 4a	Alt 4b
			Minor Rehabilitation	Superstructure Replacement		Full Bridge Replacement On-Alignment		Full Bridge Replacement Off-Alignment	
			Temporary Lane Closures	a. Offsite Detour	b. Temporary Bridge	a. Offsite Detour	b. Temporary Bridge	a. Offsite Detour	b. Temporary Bridge
COST	Bridge Cost	$0	716,250	714,450	776,550	1,775,700	1,930,050	2,150,550	2,150,550
	Removal of Structure	$0	0	35,200	35,200	66,000	66,000	66,000	66,000
	Roadway	$0	108,000	235,000	229,000	316,000	344,000	1,120,000	1,120,000
	Maintenance of Traffic	$0	19,040	77,300	244,040	107,300	274,040	227,300	534,040
	Construction Costs	$0	843,290	1,061,950	1,284,790	2,265,000	2,614,090	3,563,850	3,870,590
	Construction Engineering & Contingencies	$0	252,987	159,293	192,719	520,950	653,523	605,855	774,118
	Accelerated Premium	$0	0	0	0	0	0	0	0
	Total Construction Costs w CEC	**$0**	1,096,277	1,221,243	1,477,509	2,785,950	3,267,613	4,169,705	4,644,708
	Preliminary Engineering[2]	**$0**	200,000	300,000	350,000	350,000	400,000	430,000	900,000
	Right of Way	**$0**	5,000	5,000	25,000	5,000	25,000	5,000	5,000
	Total Project Costs	$0	1,301,277	1,526,243	1,852,509	3,140,950	3,692,613	4,604,705	5,549,708
	Annualized Costs	$0	65,064	30,525	37,050	41,879	49,235	61,396	73,996
TOWN SHARE			32,532	38,156	92,625	157,048	369,261	230,235	554,971
TOWN %			5%	2.50%	5%	5%	10%	5%	10%
SCHEDULEING	Project Development Duration[3]	NA	4 Years	4 Years	4 Years	4 years	4 years	4 years	4 Years
	Construction Duration	NA	3 months	4 months	18 months	6 months	18 months	6 months	18 months
	Closure Duration (If Applicable)	NA	NA	2 months	NA	Construction Season	NA	Construction Season	NA
ENGINEERING	Typical Section - Roadway (feet)	20	20	20	20	22	22	22	22
	Typical Section - Bridge (feet)	9/1 (22)	9/1 (22)	9/1 (22)	9/1 (22)	9/2 (24)	9/2 (24)	9/2 (24)	9/2 (24)
	Geometric Design Criteria	Substandard horizontal and vertical alignment	Substandard horizontal and vertical alignment	Substandard horizontal and vertical alignment	Substandard horizontal and vertical alignment	Substandard horizontal and vertical alignment	Substandard horizontal and vertical alignment	Meets minimum standards	Meets minimum standards
	Traffic Safety	No Change	Improved	Improved	Improved	Improved	Improved	Improved	Improved
	Alignment Change	No Change	No	No	No	No	No	Yes	Yes
	Bicycle Access	No Change	No Change	Improved	Improved	Improved	Improved	Improved	Improved
	Pedestrian Access	No Change	No Change	Improved	Improved	Improved	Improved	Improved	Improved
	Hydraulics	Substandard Hydraulics and BFW	Substandard Hydraulics and BFW	Substandard BFW	Substandard BFW	Meets minimum standards	Meets minimum standards	Meets minimum standards	Meets minimum standards
	Utilities	NA	No Change	No Change	No Change	No Change	No Change	No Change	No Change
OTHER	ROW Acquisition	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Road Closure	No	No	Yes	No	Yes	No	Yes	No
	Design Life	10	20	50	50	75	75	75	75

[1] Costs are estimates only, used for comparison purposes.
[2] Preliminary Engineering costs are estimated starting from the end of the Project Definition Phase.
[3] Project Development Durations are starting from the end of the Project Definition Phase.

VI. Conclusion

We recommend **Alternative 2a**; to replace the existing superstructure while maintaining traffic on an offsite detour.

Structure:
The superstructure replacement option has the lowest annualized cost as well as the lowest cost to the Town. The superstructure replacement option will also address the deteriorating condition of the T-beams. While the existing superstructure is slightly substandard for hydraulics, it is recommended that the existing T-beams are replaced with a shallow superstructure type, such as solid slabs to improve freeboard for hydraulics. The existing bridge seats will be cut down and new bridge seats poured to accommodate the new superstructure.

The proposed new superstructure will be widened 2-feet to meet the minimum standard for width and provide two 9-foot travel lanes with 3-foot shoulders.

Since the substructure is rated as good, it is reasonable to assume that it has 50 years of life remaining. While the structure does not meet the minimum bank full width requirements, it does meet the minimum hydraulic standard for capacity. By choosing a deck and superstructure replacement, the closure duration can be reduced, and the very high cost of a temporary bridge can be avoided, and the cost of new substructures can be saved. The scope of work includes minor surface repairs as necessary to the abutments. By choosing a rehabilitation project versus a full bridge replacement project, the local share is reduced by 50%.

Traffic Control:
It is recommended that traffic be maintained on an offsite detour. This option will have minimal impacts to adjacent properties and will not require additional Right-of-Way acquisition for placement of a temporary bridge. The AADT on TH 1 is 430, which is considered relatively low. Additionally, there are several reasonable detour routes that could be signed by the Town of Danby. Therefore, it is reasonable to close the road and reroute traffic while the new bridge is constructed. By not providing a temporary bridge, both the project development time and the project cost are significantly reduced. Additionally, by closing the bridge to traffic during construction, the local share is reduced by 50%.

VII. Appendices

- Appendix A: Site Pictures
- Appendix B: Town Map
- Appendix C: Bridge Inspection Report
- Appendix D: Hydraulics Memo
- Appendix E: Preliminary Geotechnical Information
- Appendix F: Resource ID Completion Memo
- Appendix G: Natural Resources Memo
- Appendix H: Archeology Memo
- Appendix I: Historic Memo
- Appendix J: Hazardous Sites Map
- Appendix K: Community Input
- Appendix L: Crash Data
- Appendix M: Detour Routes
- Appendix N: Plans

Appendix A: Site Pictures

Picture 1: Looking east over Bridge 7

Picture 2: Looking west over Bridge 7

Picture 3: Looking downstream

Picture 4: Looking upstream

Picture 5: Downstream fascia

Picture 6: Eastern abutment

Picture 7: Eastern abutment

Picture 8: Western abutment

Picture 9: T-beam deterioration

Picture 10: T-beam deterioration

Picture 11: T-beam deterioration

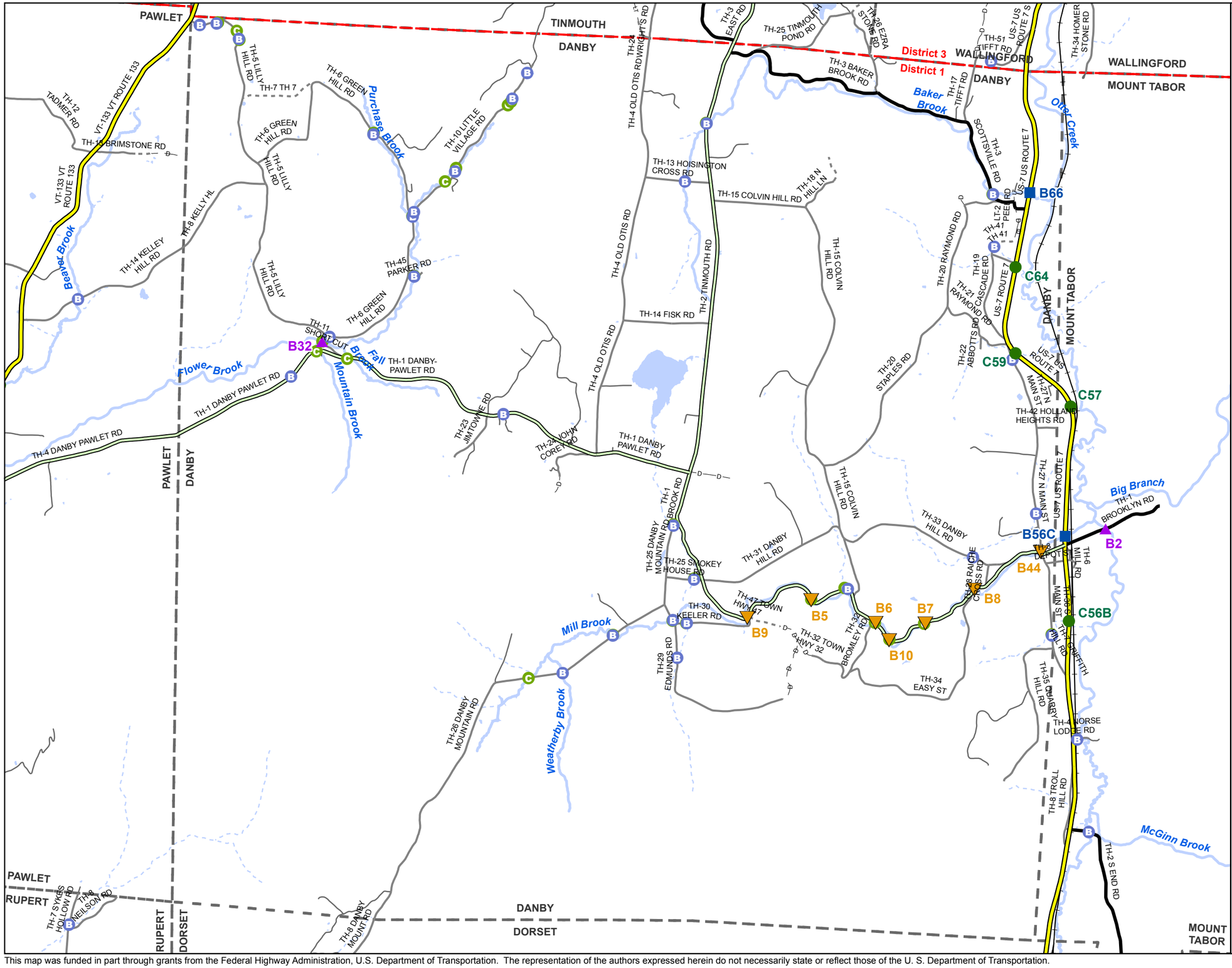
Picture 12: Eastern abutment

Picture 13: Wingwall

Picture 14: Wingwall

Picture 15: Upstream fascia and wingwall

Appendix B: Town Map



This map was funded in part through grants from the Federal Highway Administration, U.S. Department of Transportation. The representation of the authors expressed herein do not necessarily state or reflect those of the U. S. Department of Transportation.

Appendix C: Bridge Inspection Report

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

Vermont Agency of Transportation ~ Structures Section ~ Bridge Management and Inspection Unit

Inspection Report for : DANBY **Bridge No.:** 00007 **District:** 1

Located on: TR 01 **over** MILL BROOK **approximately** 1.3 MI W JCT. U.S.7 **Owner:** TOWN-OWNED

CONDITION

Deck Rating: 5 FAIR
Superstructure Rating: 6 SATISFACTORY
Substructure Rating: 7 GOOD
Channel Rating: 8 VERY GOOD
Culvert Rating: N NOT APPLICABLE
Federal Str. Number: 200130000711062
Federal Sufficiency Rating: 56.8
Deficiency Status of Structure: ND

AGE and SERVICE

Year Built: 1928 **Year Reconstructed:** 0000
Service On: 1 HIGHWAY
Service Under: 5 WATERWAY
Lanes On the Structure: 02
Lanes Under the Structure: 00
Bypass, Detour Length (miles): 27
ADT: 000420 **% Truck ADT:** 06
Year of ADT: 2017

GEOMETRIC DATA

Length of Maximum Span (ft): 0040
Structure Length (ft): 000044
Lt Curb/Sidewalk Width (ft): 0
Rt Curb/Sidewalk Width (ft): 0.5
Bridge Rdwy Width Curb-to-Curb (ft): 21.9
Deck Width Out-to-Out (ft): 23
Appr. Roadway Width (ft): 020
Skew: 45
Bridge Median: 0 NO MEDIAN
Min Vertical Clr Over (ft): 99 FT 99 IN
Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD
Min Vertical Underclr (ft): 00 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: CONCRETE T-BEAM
Number of Approach Spans: 0000 **Number of Main Spans:** 001
Kind of Material and/or Design: 1 CONCRETE
Deck Structure Type: 1 CONCRETE CIP
Type of Wearing Surface: 6 BITUMINOUS
Type of Membrane: 2 PREFORMED FABRIC
Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 1 MEETS CURRENT STANDARD
Transitions: 0 DOES NOT MEET CURRENT STANDARD
Approach Guardrail: 1 MEETS CURRENT STANDARD
Approach Guardrail Ends: 1 MEETS CURRENT STANDARD
Structural Evaluation: 4 MEETS MINIMUM TOLERABLE CRITERIA
Deck Geometry: 3 INTOLERABLE, CORRECTIVE ACTION NEEDED
Underclearances Vertical and Horizontal: N NOT APPLICABLE
Waterway Adequacy: 7 SLIGHT CHANCE OF OVERTOPPING BRIDGE & ROADWAY
Approach Roadway Alignment: 6 EQUAL TO MINIMUM CRITERIA
Scour Critical Bridges: 5 STABLE FOR CALCULATED SCOUR

DESIGN VEHICLE, RATING and POSTING

Load Rating Method (Inv): 1 LOAD FACTOR(LF)
Posting Status: A OPEN, NO RESTRICTION
Bridge Posting: 5 NO POSTING REQUIRED
Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED
Posted Vehicle: POSTING NOT REQUIRED
Posted Weight (tons):
Design Load: 2 H 15

INSPECTION

Insp. Date: 062020 **Insp. Freq. (months):** 24 **X-Ref. Route:** **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

6/25/2020 This structure should be considered for an extensive deck rehab project or replacement with concrete repairs made to the tee beams. JW/MC

6/6/2018 Deck and t-beams have a considerable amount of deterioration and patches with exposed rebar, delaminations, rust staining, honeycombing and cracks that a rehab or a new deck and superstructure should be considered in the near future. Consider installing a joint at ends of deck due to excessive break up of asphalt.

6/16/2016 Structure will need rehab in the near future due to the poor deck. Soffit area has been patched in the past but are failing. Delams are still forming with more areas of exposed rebar. ~FRE/TJB

6/23/14 Deck soffit continues to deteriorate at a slow pace & town should consider replacement in the next 5 to 10 years. Town should clean heavy gravel debris beneath structure to realign flow from abut 1. MJK SP

6/6/12 The aggregation along the left side should be removed and scour protection added along abutment 1. JWW

10/20/2011 Assessment inspection after Tropical Storm Irene (Round #2). Small to medium size trees are resting beneath the span area towards the upstream channel and are in need of removal. PLB

05/04/10 Satisfactory condition, deck soffit past patching repairs are starting to break up in couple of spots with exposed rebar as deck deterioration progress slowly. T-beams have longitudinally minor to moderate size cracks, small delams and some rust stains. Beams have patching areas done in the past and are holding up fairly well. Past settlement in abutment 2 seems to have ceased. ~MJK/FRE

Appendix D: Hydraulics Memo

VERMONT

State of Vermont
Structures and Hydraulics Section
Barre City Place
219 North Main Street, Barre, VT 05641
vtrans.vermont.gov

Agency of Transportation

[phone] 802-595-6493

TO: Laura Stone, Structures, Scoping Engineer

CC: Nick Wark, Hydraulics Engineer

FROM: Jeff DeGraff, Hydraulics Project Engineer

DATE: January 10, 2022

SUBJECT: Danby BF 0130(4), pin#12j618
Danby, Brook Road, Br7, over Mill Brook
Site location: MM 7.32
Coordinates: 43.338896, -73.013057

We have completed our hydraulic study for the above referenced site, and offer the following for your use:

On 10/6/2021the hydraulics unit met with ANR at the site. During the site visit a consistent bankfull width (BFW) measurement of 41 to 50 feet. ANR indicated that a design span of 45 to 46 feet would be adequate and was confirmed in an email on 10/8/2021.

Brook Road is a Major Collector Road. Therefore, Design Storm Flow is 2% AEP (Q50).

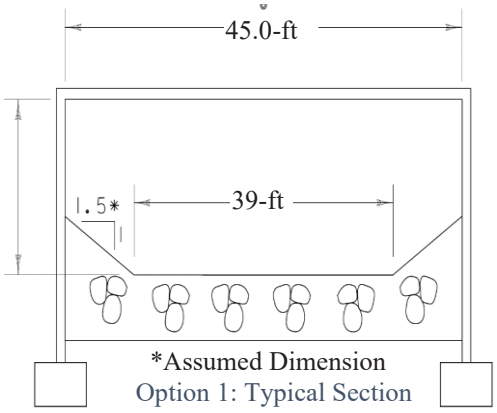
The following was analyzed:

Existing Conditions: Single 40-foot Span Concrete T-Beam Bridge

- Span normal to flow is approximately 27 to 28-feet with a low beam elevation of 926.32-feet
- Provides 0.79-feet of freeboard at the 2% AEP and the inlet is submerged during the 1% AEP.
- Roadway overtopping occurs during flows equal to greater than the 2% AEP.
- The Existing Conditions does not meet current hydraulic or environmental standards.

Option 1: Single 45-foot Span 3-Sided bridge

- Low beam elevation of 926.32 feet (same as existing)
- Provides 2.60- and 1.83-feet of freeboard during the design and the 1% AEP, respectively.
- Does not increase the 100-year base flood elevations
- Assumes no changes to the existing structure alignment/skew



Option 1: Typical Section

VERMONT

Stone Fill, Type IV is to be used to protect any disturbed channel banks or roadway slopes at the structure's inlet and outlet. A final scour countermeasure design will be performed during final design.

A preliminary scour analysis was performed as part of this study assuming a D50 of 57 mm (2.25 inches) and a scour depth of 1.5-feet was determined. For preliminary design assume that the bottom of footing elevation is 6-feet below the streambed or founded on ledge. A final scour analysis will be performed during the final design phase.

Other similar sized structures could be considered for this site. If another alternative is considered, coordinate with the Hydraulics Unit to perform additional analyses.

Please contact us with any questions, or to check substructure configuration scenarios.

Appendix E: Preliminary Geotechnical Information

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Laura Stone, P.E., P.I.I.T. Project Manager

AJA

From: August Arles, Geotechnical Engineer

Date: April 29th, 2021

Subject: Danby BF 0130(4) Preliminary Geotechnical Information

1.0 INTRODUCTION

As requested, we have completed our preliminary geotechnical investigation of Bridge No. 7 on FAS Route 0130 (Brook Rd.) over Mill Brook, located approximately 1.0 mile west of the intersection of FAS Route 0130 and North Main Street in the town of Danby, VT. Bridge No. 7 is a single span concrete T-beam bridge with a concrete cast-in-place deck. The subject project is currently in the scoping phase. This review included the examination of as-built record plans, in-house historical boring log files, well log data, and hazardous site information on file at the Vermont Agency of Natural Resources (ANR), published surficial and bedrock geologic maps, as well as an in-person site visit conducted by a member of the Geotechnical Engineering Section.

2.0 SUBSURFACE INFORMATION

2.1 Published Geologic Data

Mapping conducted in 1970 for the Surficial Geologic Map of Vermont shows the project site consists of exposed bedrock (Doll, 1970).

According to the Bedrock Map of Vermont from 2011, published by the USGS and State of Vermont, the project site is underlain with bedrock consisting of dolostone and phyllite of the Winooski Dolostone Formation (Ratliffe, et. al, 2011).

The Geotechnical Engineering Section maintains a GIS based historical record of subsurface investigations, which contains electronic records for the majority of borings completed in the past 10 years. Research for this project showed that there was no project located within a 0.5-mile radius. However, borings from a previous subsurface investigation for project Danby BF 0130(3), located about 1.6 miles west on Brook Rd, conducted between December 2014 and February 2015 report encountering bedrock between approximate elevations of 1230.2 ft and 1226.4 ft.

2.2 Water Well Logs

The Vermont ANR maintains a record of private and public wells drilled in their Atlas database. Published online, these logs may provide general characteristics of the soil strata and depth to bedrock in the area. The closest well, TAG 13, located approximately 1,171 ft from the project site, reported bedrock at a depth of 20 ft bgs.

2.3 Hazardous Materials and Underground Storage Tanks

The ANR Atlas also maintains a database of all known hazardous waste sites and underground storage tanks. According to their published data there is one hazardous site within a 0.5-mile radius. Located approximately 1,362 ft from the project site at 329 Easy St in Danby, VT, the site reportedly consists of a residential heating oil contaminant discovered after two underground tanks were removed. The location of this project is not on the Hazardous Site List and no impact from other hazardous waste sites is anticipated.

2.4 Record Plans

There were no record plans, foundation information, or subsurface information available for this project.

3.0 FIELD OBSERVATIONS

A site investigation was conducted on April 23rd, 2021 by a member of the Geotechnical Engineering Section. From that site visit, it was observed that no overhead utility wires were present at the project site, as shown in Figure 3.1. The Mill Brook streambed and embankments are primarily composed of cobbles and boulders. No exposed bedrock outcroppings were observed in the vicinity of the project during the site visit; however, the upstream wingwalls of both abutments appeared to be cast directly onto large boulders present at the site, as seen in Figure 3.2 and Figure 3.3. The fill behind the western downstream abutment seemed to be composed of cobbles and sandy material with apparent voids present throughout, as seen in Figure 3.4. Due to the steep slopes on either side of the bridge, borings would most likely need to be drilled from within the travel lanes of the roadway.

Figure 3.1: *Looking west along Route FAS 0130, note no overhead utilities present near the bridge.*

Figure 3.2: *Facing eastern upstream wingwall, note wingwall cast around large boulder present.*

Figure 3.3: *Western upstream wingwall of bridge, note wingwall cast around large boulder present.*

Figure 3.4 *Western downstream wingwall of bridge, note voids present within cobble and sand backfill.*

Figure 3.5: *Large boulder present upstream of bridge, note presence of cobbles and boulders in streambed.*

4.0 RECOMMENDATIONS

4.1 Deck Replacement

Based on the information reviewed during this investigation this structure appears to be a good candidate for a deck replacement assuming the loads from the replacement deck are similar in magnitude to the existing loads. If a replacement deck will increase the loading on the existing abutments, then a detailed geotechnical assessment of the abutments may be required to assess their capacity to support the increased loads.

If a deck replacement is selected as the preferred alternative, recommend that scour protection meeting current Agency requirements be designed and added in front of the abutments. Addressing these issues during the deck replacement project should help to ensure the abutments perform as expected during the design life of the replacement deck.

4.2 Substructure Replacement

Based on this information, possible foundation options for a bridge replacement option include the following:

- Reinforced concrete abutments founded on spread footings or piles
- Precast or steel arch bridge with spread footings founded on soil or bedrock
- Concrete rigid frame supported on H-piles, micro-piles, or spread footings
- Integral abutments supported on a single row of H-Piles
- Semi-integral abutments founded on spread footings on bedrock

If a bridge replacement is selected as the preferred alternative, we recommend advancing a minimum of one test boring at each abutment location on opposite sides of the roadway at the locations of the proposed abutments in order to assess the subsurface conditions more fully at the site including, but not limited to, the soil properties, groundwater conditions, and depth to bedrock (if applicable). If shallow bedrock is encountered during drilling operations, additional borings will likely be required to profile the bedrock elevation across the footprint of the proposed structure.

5.0 CLOSING

The Geotechnical Engineering Section can assist in performing an assessment of the existing abutments if a deck replacement is selected as the preferred alternative, and if replacement of the deck will increase the loading. A detailed geotechnical assessment may be required to assess the capacity of the abutments to support the increased loading and check for any potential stability issues. If a bridge replacement is selected as the preferred alternative, the Geotechnical Engineering Section can assist in designing a subsurface investigation that efficiently gathers adequate subsurface information for the alternative chosen.

If you have any questions or would like to discuss this report, please contact us via email.

6.0 REFERENCES

Doll, C. G., 1970, Surficial Geologic Map of Vermont, Vermont Geological Survey, Montpelier, VT.

Ratcliffe, N. M., Stanley, R. S., Gale, M. H., Thompson, P. J., Walsh, G. J., 2011, Bedrock Geologic Map of Vermont, Vermont Geological Survey, Montpelier, VT.

Vermont Agency of Natural Resources Department of Environmental Conservation, Natural Resources Atlas, www.anr.vermont.gov/maps/nr-atlas%20, accessed 4/15/21.

SPM

Reviewed by: Stephen Madden, Geotechnical Engineer

cc: Electronic Read File/MG
Project File/CEE
AJA

Z:\Highways\CMB\GeotechEngineering\Projects\Danby BF 0130(4)\REPORTS\Danby BF 0130(4) Preliminary Geotechnical Report.docx

Appendix F: Resource ID Completion Memo

OFFICE MEMORANDUM

AOT - PDB - ENVIRONMENTAL SECTION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Laura Stone, Project Manager
FROM: Julie Ann Held, Environmental Specialist
DATE: August 4, 2021
Project: Danby BF 0130(4)

ENVIRONMENTAL RESOURCES:

Archaeological Resources:	___ Yes	_X_ No	See Archaeological Resource ID Memo
Historic Resources:	___ Yes	_X_ No	See Historic Resource ID Memo
Wetlands:	___ Yes	_X_ No	See Natural Resource ID Memo
Aquatic Organism Passage:	___ Yes	_X_ No	See Natural Resource ID Memo
Agricultural Soils:	___ Yes	_X_ No	See Natural Resource ID Memo
Wildlife Habitat:	___ Yes	_X_ No	See Natural Resource ID Memo
Endangered Species:	_X_ Yes	___ No	See Natural Resource ID Memo
Stormwater Considerations:	___ Yes	_X_ No	See Stormwater Resource ID Memo-See drainage considerations
6(f) Properties:	___ Yes	_X_ No	
Hazardous Waste:	___ Yes	_X_ No	
Urban Background Area:	___ Yes	_X_ No	
Wild Scenic Rivers:	___ Yes	_X_ No	
Act 250 Permits:	___ Yes	_X_ No	
FEMA Floodplains:	_X_ Yes	___ No	This project is located within a Zone A Flood Hazard Area.
Flood Hazard Area:	_X_ Yes	___ No	This project is located within a Type A Flood Hazard Area, depending on the scope of work a FHARC permit may be required
River Corridor:	_X_ Yes	___ No	This project is located within a River Corridor at Mill Brook, coordination with the River Management Engineer may be required.
US Coast Guard:	___ Yes	_X_ No	
Lakes and Ponds:	___ Yes	_X_ No	
Other:	___ Yes	_X_ No	

cc:
Project File

Appendix G: Natural Resources Memo

State of Vermont
Highway Division-Project Delivery Bureau-Environmental
219 N. Main Street
Barre, VT 05641
Phone (802) 595-6708
www.aot.state.vt.us

To: Julie Ann Held, VTrans Environmental Specialist

From: Meg Lout, VTrans Biologist

Date: June 21, 2021

Subject: Danby BF0130(4) - Natural Resource ID

I have reviewed Danby BF0130(4) (the Project) for presence of natural resources (see **Figure 1**). My review encompasses area within 0.5 mile of the Project and included wetlands and waterways, wildlife habitat, agricultural soils, and rare, threatened and endangered species. I have reviewed existing mapping (Natural Resource Atlas and NRCS Soils) and imagery to capture natural resource presence and conducted a site reconnaissance visit on June 14, 2021.

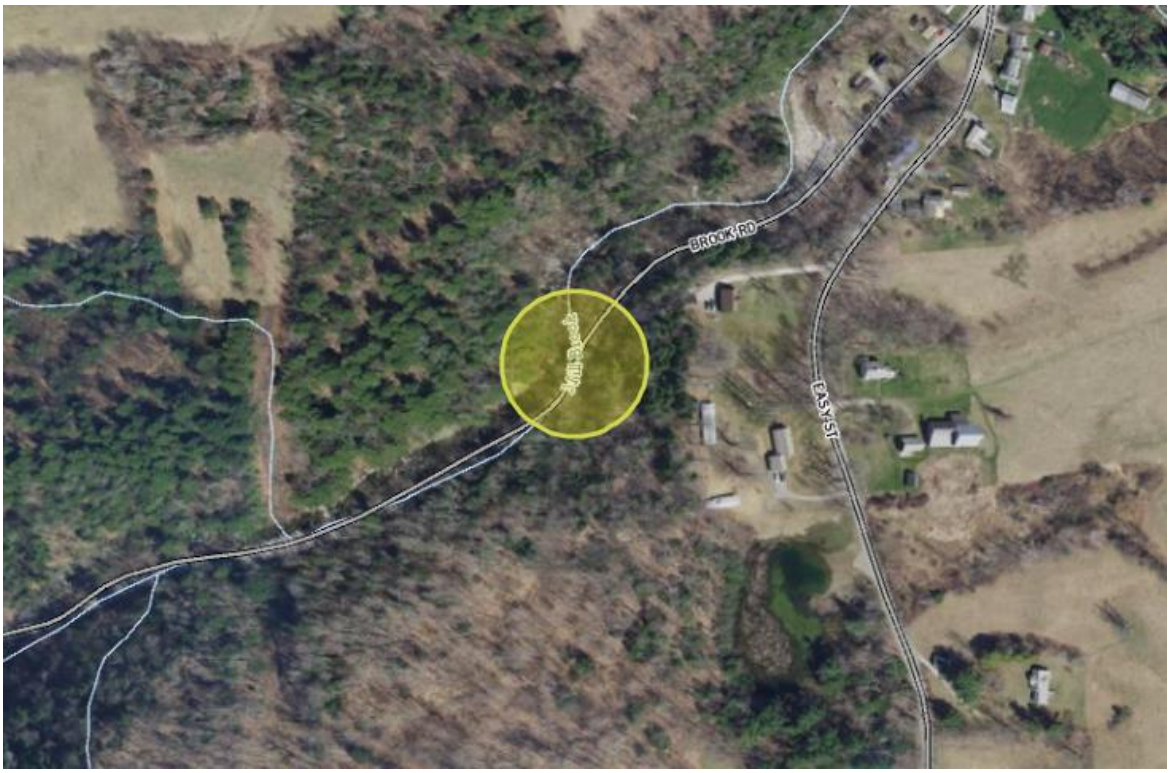


Figure 1. Location of the Danby BF0130(4) Project.

Wetlands
No wetlands were identified during a site visit and no Vermont Wetlands Permit (VWP) will be required.

Watercourses
The Project spans Mill Brook, which is a waterbody that is regulated by the U.S. Army Corps of Engineers (COE). The Ordinary High Water (OHW) mark is the regulatory boundary. A COE General Permit (GP) will be required for impacts below OHW.

Wildlife Habitat
I have completed a review of wildlife habitat using the Agency of Natural Resources (ANR) biofinder and natural resource mapping. The Project is located over a stream crossing that is identified as brook trout waters and deemed impassible for Aquatic Organism Passage (AOP). The Project is not anticipated to be an issue for AOP because it is a bridge and provides adequate passage. The Project is within a highest priority forest blocks, which provides surface water and riparian areas, riparian and wildlife connectivity and physical landscape diversity.

Rare, Threatened and Endangered Species (R/T/E):
The Project is located within the summer range of the federally and state endangered Indiana bat (*Myotis sodalis*). It is also located within the summer range of the federally threatened and state endangered northern long-eared bat (*M. septentrionalis*) and within 3 miles of a northern long-eared bat hibernaculum, Freely Quarry (Agency of Natural Resources, 2021).

Suitable summer habitat for these species includes trees ≥5 and ≥ 3 inches in diameter, respectively, that contain exfoliating or furrowed bark, cracks, crevices and/or cavities (U.S. Fish and Wildlife Service, 2021). The northern long-eared bat has also been documented roosting in structures with suitable microclimates (Vermont Fish and Wildlife Department, 2016). A habitat assessment, conducted on June 14, 2021, resulted in a finding no potential tree or bridge roosting habitat. No impacts to either of these species are anticipated and time of year (TOY) restrictions will not be required.

Agricultural Soils
According to an ANR Natural Resource Atlas query, soils mapped in the area include Copake gravelly fine sandy loam, 2 to 8 percent slopes (99B) (Prime) and Hinckley gravelly loamy fine sand, 0 to 8 percent slopes (13B) (Prime). Agricultural operations are practiced in the Project vicinity.

Summary
No potential Indianan bat or northern long-eared bat roosting habitat was identified, and no TOY restrictions will be required. Natural resource permitting that may be required, depending on scope, are COE GP and Water Quality related permits.

References

Agency of Natural Resources, Natural Resource Atlas, viewed 6/21/2021, https://anrmaps.vermont.gov/websites/anra5/.

USFWS, Information for Planning and Consultation 2021, viewed 6/17/2021, https://ecos.fws.gov/ipac///.

Vermont Fish and Wildlife Department. 2016. Bats and Bridges Flow Chart. Provided by Alyssa Bennett, Small Mammals Biologist for the Vermont Fish and Wildlife Department.

Vermont Fish and Wildlife Department. 2017. Regulatory Review Guidance for Protecting the Northern Long-eared Bats and its Habitats, https://vtfishandwildlife.com/sites/fishandwildlife/files/documents/Conserve/RegulatoryReview/Guidelines/Regulatory_Review_Guidelines_for_Protecting_Northern_%20Long-eared_Bats_and_Their_Habitats_(2-2017).pdf.

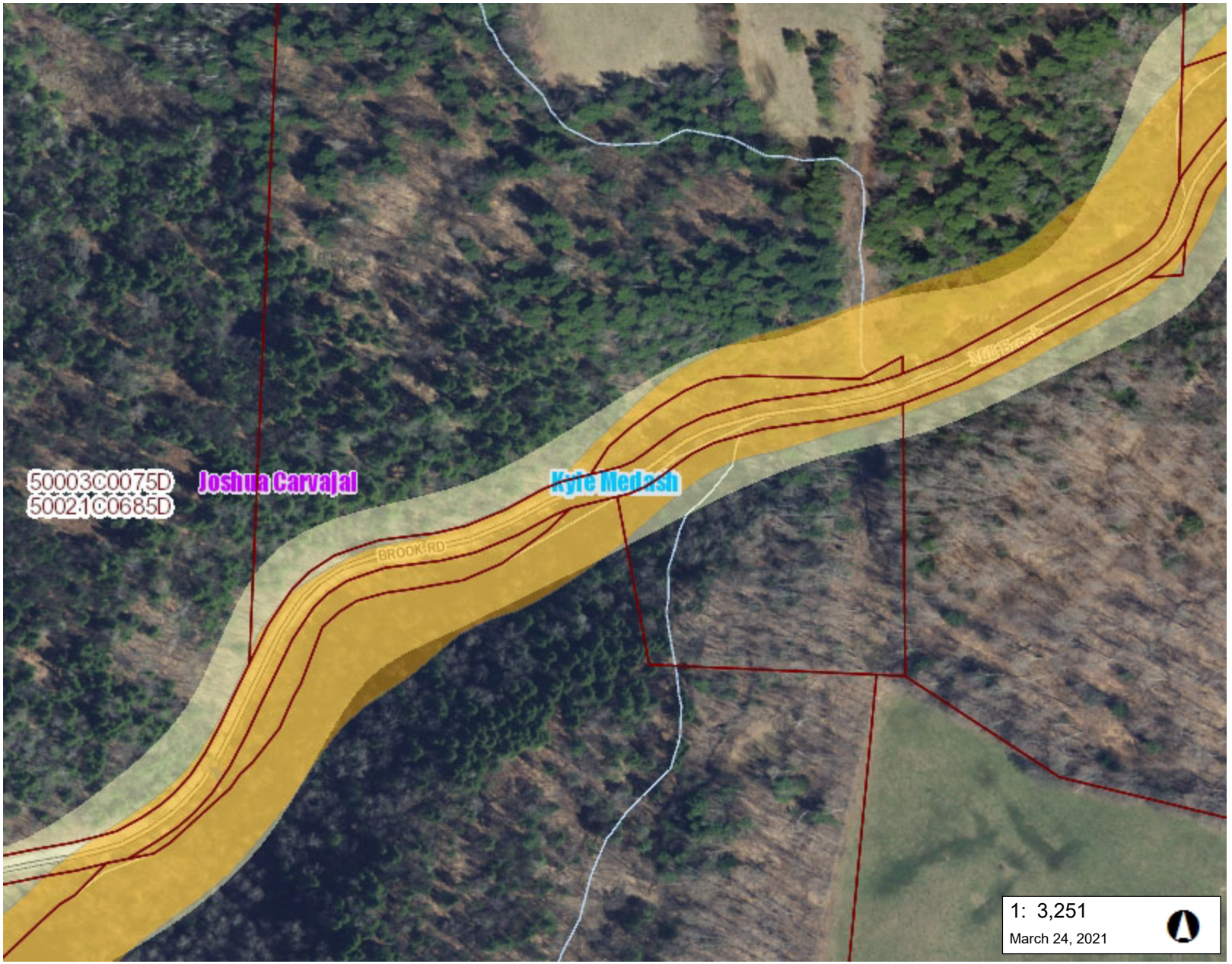
Cc

Natural Resource Environmental File

Floodplains Rivers Map

Vermont Agency of Natural Resources

vermont.gov



LEGEND

- DFIRM X-Sections
- DFIRM - Letter of Map Revisio
- DFIRM Panels
- DFIRM Floodways
- Flood Hazard Areas (Only FEM
  - AE (1-percent annual chance floodp
  - A (1-percent annual chance floodpl
  - AO (1-percent annual chance zone feet)
  - 0.2-percent annual chance flood ha
- River Corridors (Aug 27, 2019)
- .5 - 2 sqmi.
- .25-.5 sqmi.
- River Corridor Easement
- River Management Engineer D
- Floodplain Manager Regions
- Parcels (standardized)
- River Area
- VTRANS State and Town Long
- VTRANS State Short Structure
- Town Bridge
- Town Culvert
- Roads
  - Interstate
  - US Highway; 1
  - State Highway
  - Town Highway (Class 1)
  - Town Highway (Class 2,3)

NOTES

Map created using ANR's Natural Resources Atlas

165.0 0 82.00 165.0 Meters

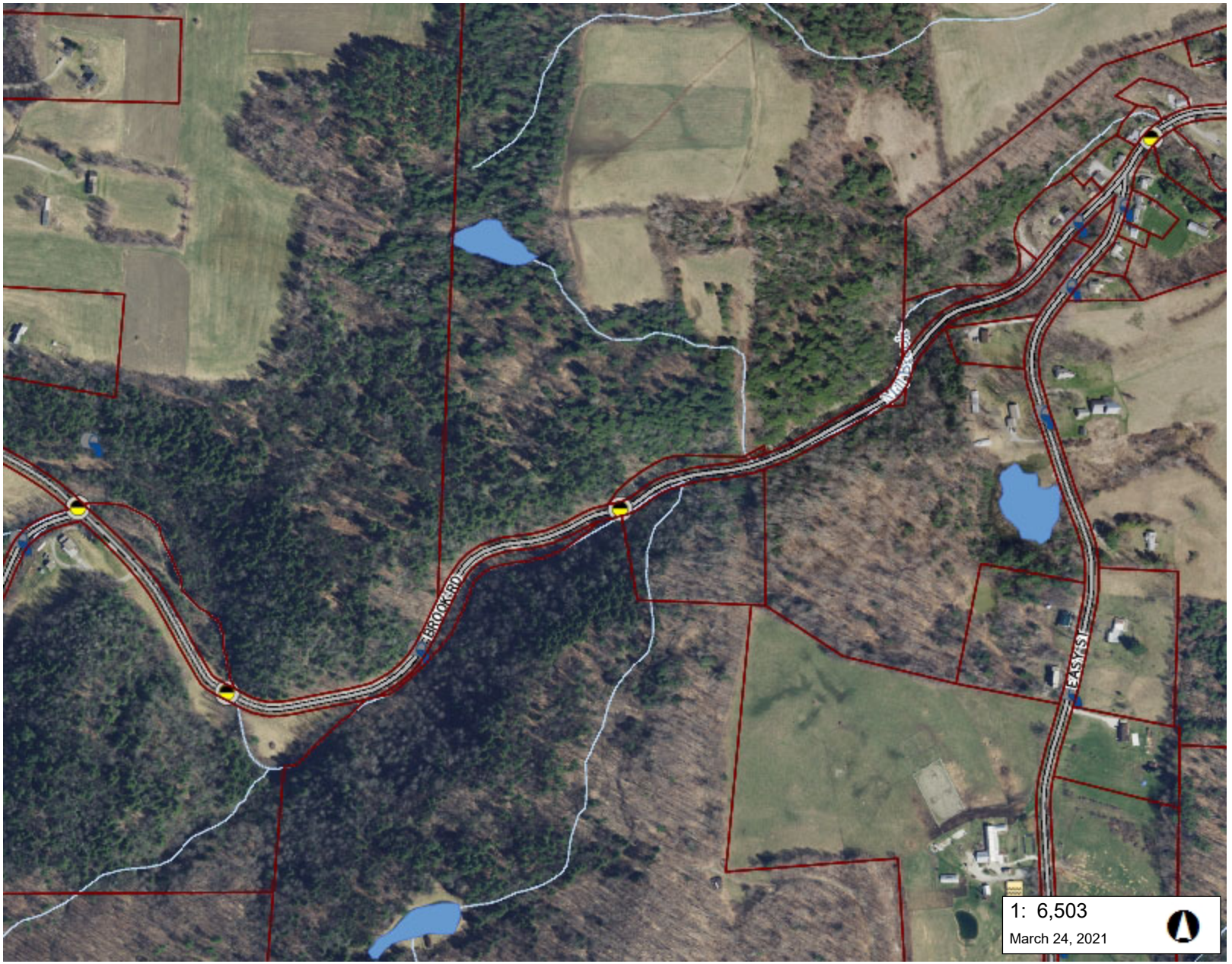
WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 271 Ft. 1cm = 33 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Other Resources Map

Vermont Agency of Natural Resources

vermont.gov



LEGEND

- Parcels (standardized)
- River Area
- Act250 Permits **INCOMPLET
- VTRANS State and Town Long
- VTRANS State Short Structure
- Town Bridge
- Town Culvert
- Roads
  - Interstate
  - US Highway; 1
  - State Highway
  - Town Highway (Class 1)
  - Town Highway (Class 2,3)
  - Town Highway (Class 4)
  - State Forest Trail
  - National Forest Trail
  - Legal Trail
  - Private Road/Driveway
  - Proposed Roads
- Waterbody
- Stream/River
  - Stream
  - Intermittent Stream
- Town Boundary

NOTES

Map created using ANR's Natural Resources Atlas

330.0 0 165.00 330.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 542 Ft. 1cm = 65 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

VERMONT

State of Vermont
Environmental Section
219 North Main Street
Barre, Vermont 05641
Vtrans.vermont.gov

Agency of Transportation

[phone] 802-498-5787

To: Julie Ann Held, VTrans Environmental Specialist Supervisor
From: Heather Voisin, VTrans Green Infrastructure Engineer
Date: July 21, 2021
Subject: Danby BF 0130(4) - Stormwater Resource ID Review

Project Description: I have reviewed the project area for Danby BF 0130(4) for stormwater related regulatory and water quality concerns. My evaluation has included the review of existing mapping (ANR Natural Resource Atlas, VTrans Operational Stormwater Permits) to capture existing stormwater features and existing drainage.

Regulatory Considerations

There do not appear to be any existing stormwater permits near the site area and the following are not noteworthy stormwater regulatory concerns at this time.

This project site is not within a designated public water supply source protection area.

The project site does not include an impaired (303(d) list) or stressed waters.

The need for stormwater treatment and/or permitting will be assessed as the project scope is further defined and will depend on how much earth disturbance and impervious area is involved in the eventual design.

Drainage Considerations

Within the project area, Brook Road is classified as a Hydrologically Connected Road with direct surface drainage and a Road Erosion Risk Ranking of Low Risk. To the extent possible, a drainage design that allows runoff from the roadway to flow overland onto adjacent properties and the streambank in a distributed manner is encouraged. Should collection of water be necessary, adequate outfall protection will be necessary to prevent erosion.

VERMONT

Danby BF 0130(4) Stormwater Resource ID

Vermont Agency of Natural Resources

vermont.gov

LEGEND

Stormwater Permits (Issued)
- Operational
- Construction
- Industrial - NOI
- Industrial - NOX
- Other

Stormwater Permits (Pending)
- Operational
- Construction
- Industrial - NOI
- Industrial - NOX
- Other

Hydrologically Connected Outl

Road Erosion Scoring (MRGP)
- <all other values>
- Fully Meets
- Partially Meets
- Does Not Meet
- Incomplete Data
- Not Connected

Road Segment Priority (MRGP
- Very High
- High
- Moderate
- Low
- Incomplete Data

Hydrologically Connected Roa (MRGP)

NOTES

Map created using ANR's Natural Resources Atlas

201.0 0 100.00 201.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 329 Ft. 1cm = 40 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Appendix H: Archeology Memo

VERMONT

Brennan Gauthier
VTrans Senior Archaeologist
Vermont Agency of Transportation
Project Delivery Bureau
Environmental Section
1 National Life Drive
Montpelier, VT 05633
tel. 802-279-1460
Brennan.Gauthier@Vermont.gov

To: Julie Ann Held, VTrans Environmental Specialist
From: Brennan Gauthier, VTrans Senior Archaeologist
Date: 8/4/2021
Subject: Danby BF 0130(4) - Archaeological Resource Identification

Lee,

I have completed my field inspection and background research for Bridge No. 7 on TH1 in the town of Danby, Rutland County, Vermont. Bridge No. 7 carries TH1 over Mill Brook roughly 1.3 miles west of US Route 7. A generalized area of potential effect was assumed for the purposes of capturing archaeological sensitivity in a broad area around the proposed project location. A visual inspection of site conditions revealed extensive disturbance on both the upstream and downstream side likely related to the original construction of the bridge in 1928 as well as subsequent flood events. Rip rap and rubble are evident in all four quadrants. Additionally, the ravine-like nature of the Mill Brook at this location scores low on the archaeological predictive model given the lack of flat, undisturbed landforms in the area.

In summary, there are no mappable archaeological resources located within a generalized Area of Potential Effect around Bridge No. 7. Please feel free to reach out with any questions or concerns that may arise as part of this process.

Sincerely,

Brennan

Brennan

VTrans Working to Get You There
Vermont Agency of Transportation

Images and Illustrations

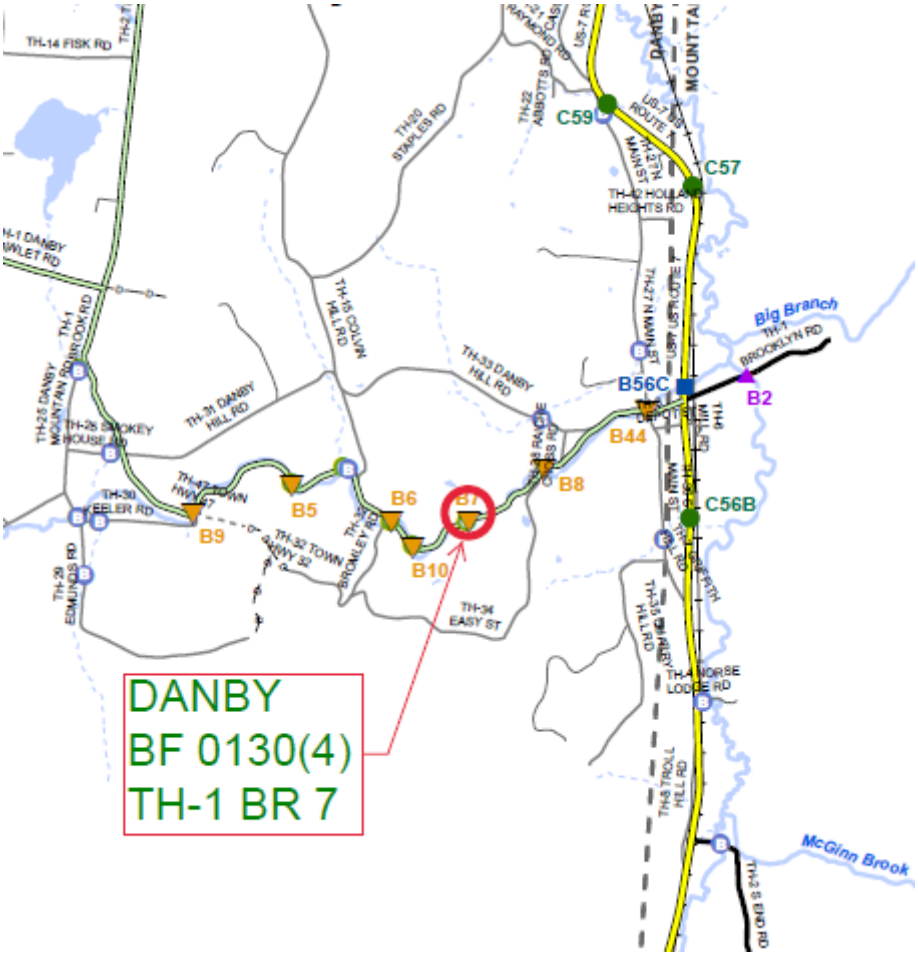


Figure 1: Project Location.

Figure 2: Project Aerial.

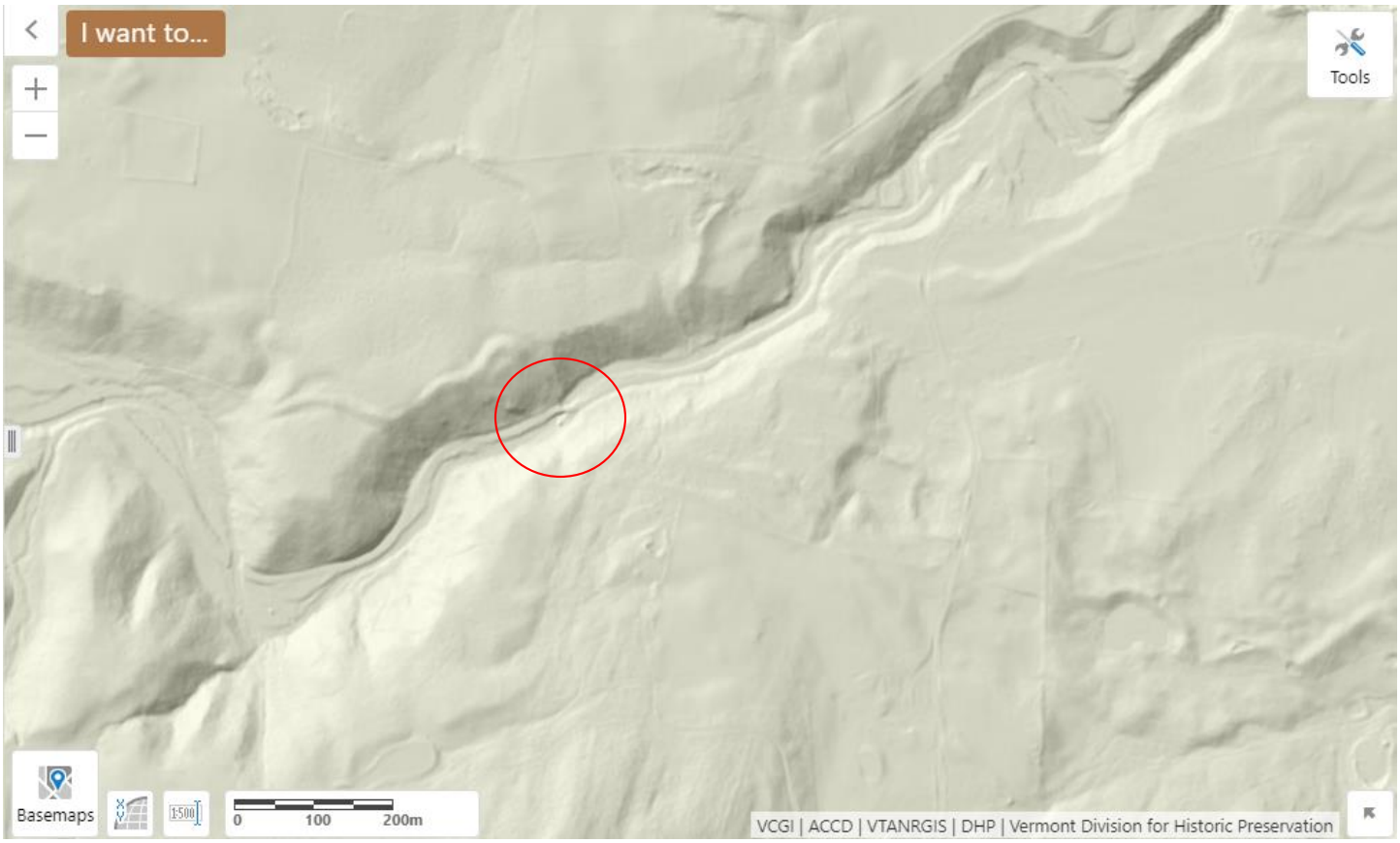


Figure 3: LiDAR View of Project Area.

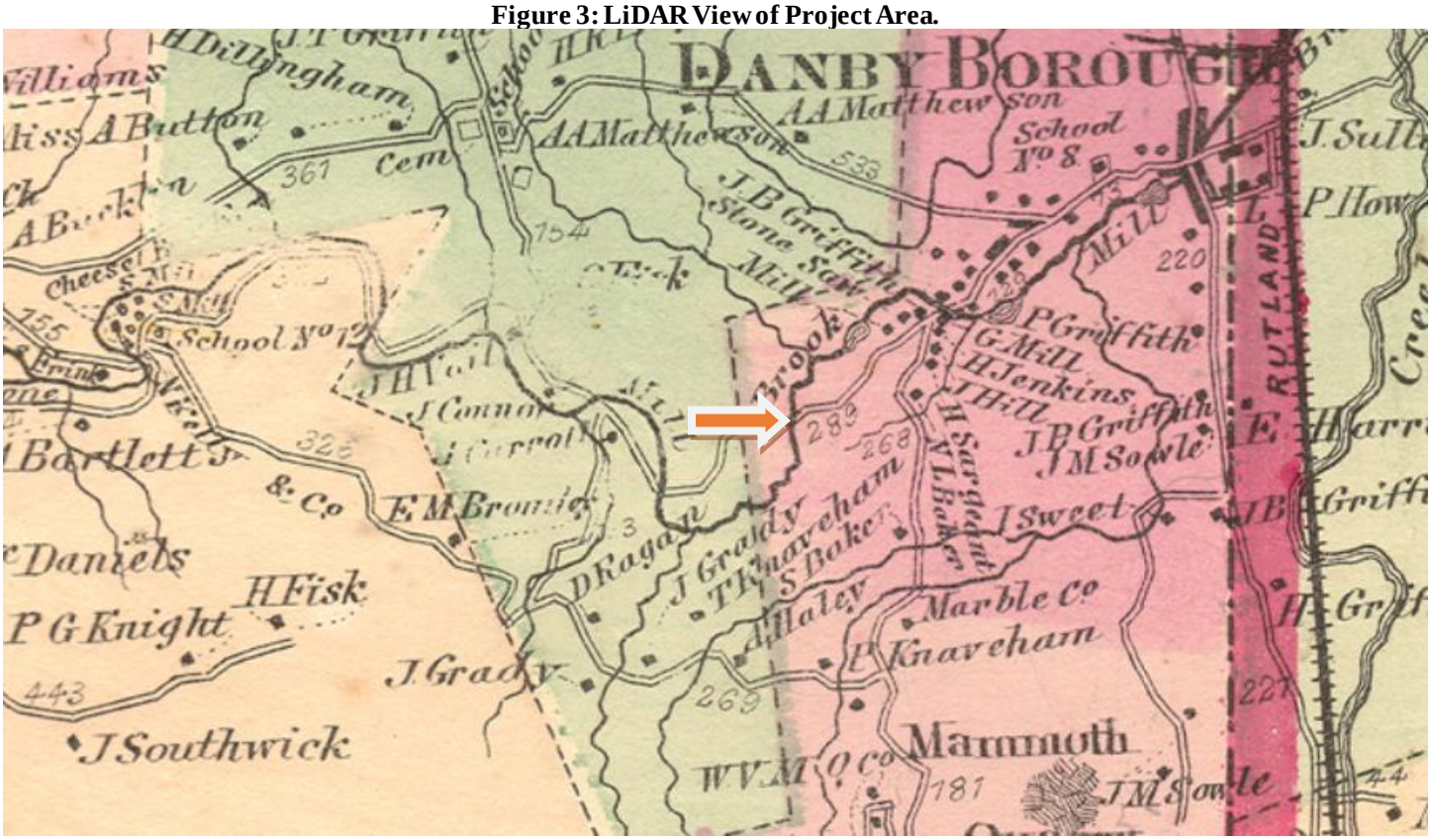


Figure 4: Ca. 1870s View of Project Area.

Figure 5: Downstream View.

Figure 6: View of Bridge Deck.

Appendix I: Historic Memo

Kyle Obenauer
Senior Architectural Historian

Vermont Agency of Transportation

Project Delivery Bureau - Environmental Section
219 N. Main Street
Barre, VT 05641

kyle.obenauer@vermont.gov
(802) 279-7040
www.vtrans.vermont.gov

Historic Preservation Resource Identification Memo

To: Julie Ann Held, VTrans Environmental Specialist
Cc: Brennan Gauthier, VTrans Señor Archaeologist

Date: 05/27/2021

Subject: Danby BF 0134(4)

Julie Ann,

This Resource Identification effort is being undertaken to identify cultural resources within a broad preliminary survey area that could possibly be impacted by a project at Bridge No. 7, which carries TH 1 over Mill Brook 1.3 miles west of its junction with U.S. 7 in Danby, Rutland County, Vermont (*Figure 1*). Once a project has been defined at the conceptual design phase, VTrans Cultural Resources staff will be able to determine a formal Area of Potential Effect (APE) for purposes of Section 106 and 22 VSA § 14.

Constructed in 1928, Bridge No. 7 is over 50 years of age; however, removal of its character-defining ornamental railings has compromised the historic integrity of this reinforced concrete T-beam bridge (*Figures 2-3*). Consequently, Bridge No. 7 is not eligible for inclusion in the National Register of Historic Places. Within the rural, undeveloped survey area of this preliminary resource identification there are no other buildings, structures, or objects.

Please, let me know if there are any questions.

Images and Illustrations

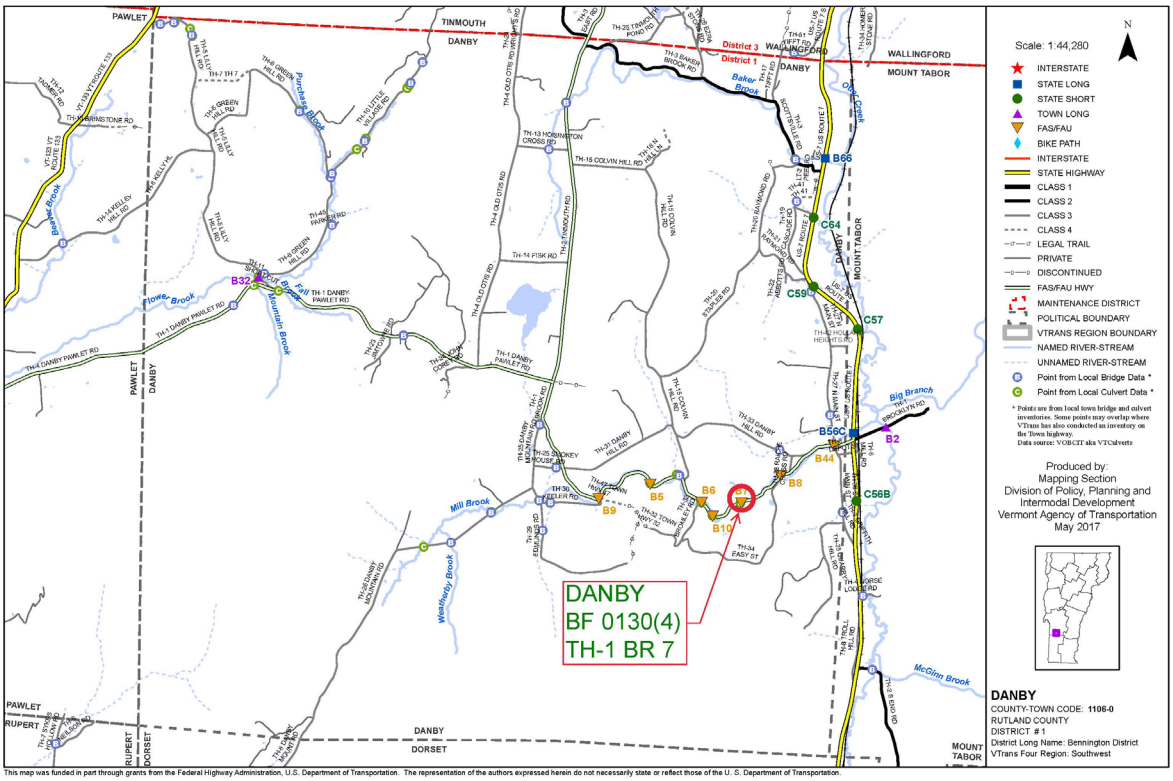


Figure 1. Bridge No. 7 in Danby.

Figure 2. Bridge No. 7

Figure 3. Bridge No.7

Appendix J: Hazardous Sites Map

Hazardous Waste Urban Soils Map

Vermont Agency of Natural Resources

vermont.gov

LEGEND

- Landfills
  - OPERATING
  - CLOSED
- Land Use Restrictions
  - Class IV GW Reclass
  - Class VI GW Reclass
  - Deed Restriction
  - Easement
  - Land Record Notice
  - Other
- Hazardous Site
- Hazardous Waste Generators
- Brownfields
- Salvage Yard
- Aboveground Storage Tank
- Underground Storage Tank (w
- Dry Cleaner
- Urban Soil Background Areas
- Parcels (standardized)
- River Area
- VTRANS State and Town Long
- VTRANS State Short Structure
- Town Bridge
- Town Culvert
- Roads
  - Interstate
  - US Highway; 1

NOTES

Map created using ANR's Natural Resources Atlas

165.0 0 82.00 165.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 271 Ft. 1cm = 33 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Appendix K: Community Input

Project Summary

This project, BF 0130(4), focuses on Bridge 7 on TH 1 in Danby, Vermont. The bridge is deteriorating and is in need of either a major maintenance action or replacement. Potential options being considered for this project include a superstructure and/or deck replacement, or a new bridge to be placed on the existing alignment or an improved alignment. It is possible that VTrans will recommend a road closure and detour traffic away from the project site for the duration of the work. Efforts will be made to limit the detour to State roads.

Community Considerations

1. Are there regularly scheduled public events in the community that will generate increased traffic (e.g. vehicular, bicycles and/or pedestrians), or may be difficult to stage if the bridge is closed during construction? Examples include annual bike races, festivals, parades, cultural events, weekly farmers market, concerts, etc. that could be impacted? If yes, please provide approximate date, location and event organizers' contact info.

   Between May and October is the heart of the construction season. Paving projects in surrounding Towns, housing being built (many private housing development), and so on which generates a lot of truck traffic. School is over in June. Most of the community events will be located closer to Main St.

2. Is there a "slow season" or period of time from May through October where traffic is less or no events are scheduled?

   No.

3. Please describe the location of the Town garage, emergency responders (fire, police, ambulance) and emergency response routes that might be affected by the closure of the bridge, one-way traffic, or lane closures and provide contact information (names, address, email addresses, and phone numbers.

   Town office and garage is 1 mile east, the fire dept is 2 miles east, no police or ambulance. The detour would have to be up over Danby Hill Rd.

4. Are there businesses (including agricultural operations and industrial parks) or delivery services (fuel or goods) that would be adversely impacted either by a detour or due to work zone proximity?

   There is an active dairy farm (Bromley Rd) just west of the project. There are dairy hauler trucks involved in the farm operations.

5. Are there important public buildings (town hall, community center, senior center, library) or community facilities (recreational fields, town green, etc.) close to the project?

   See question 3.

6. What other municipal operations could be adversely affected by a road/bridge closure or detour?

   Fire Department, Paving (roads have not been identified), Equipment coming to and from Town Garage.

7. Are there any town highways that might be adversely impacted by traffic bypassing the construction on other local roads? Please indicate which roads may be affected and their condition (paved/unpaved, narrow, weight-limited bridges, etc), including those that may be or go into other towns.

   Danby Hill Rd (near intersection with Brook) is very narrow. This could be dangerous for large truck traffic for two-way traffic. The Town would request extra traffic control to assist with traffic flow and avoid any crashes.

8. Is there a local business association, chamber of commerce, regional development corporation, or other downtown group that we should be working with? If known, please provide name, organization, email, and phone number.

   Just through the Town.

9. Are there any public transit services or stops that use the bridge or transit routes in the vicinity that may be affected if they become the detour route?

   No public transit.

Schools

1. Where are the schools in your community and what are their yearly schedules (example: first week in September to third week in June)?

   The school is on North Main Street. Schedule is last week of August through middle of June.

2. Is this project on specific routes that school buses or students use to walk to and from school?

   Yes.

3. Are there recreational facilities associated with the schools nearby (other than at the school)?

No.

Pedestrians and Bicyclists

1. What is the current level of bicycle and pedestrian use on the bridge?

   Low. Some daily bicyclists but minimal.

2. Are the current lane and shoulder widths adequate for pedestrian and bicycle use?

   No. Needs widening.

3. Does the community feel there is a need for a sidewalk or bike lane over the bridge?

   No. Just widened shoulders.

4. Is pedestrian and bicycle traffic heavy enough that it should be accommodated during construction?

   No.

5. Does the Town have plans to construct either pedestrian or bicycle facilities leading up to the bridge? Please provide any planning documents demonstrating this (scoping study, master plan, corridor study, town or regional plan).

   No.

6. In the vicinity of the bridge, is there a land use pattern, existing generators of pedestrian and/or bicycle traffic, or zoning that will support development that is likely to lead to significant levels of walking and bicycling?

   No.

Design Considerations

1. Are there any concerns with the alignment of the existing bridge? For example, if the bridge is located on a curve, has this created any problems that we should be aware of?

   No.

2. Are there any concerns with the width of the existing bridge?

Road should be widened to include more shoulder.

3. Are there any special aesthetic considerations we should be aware of?

   It is a scenic area. But overall fine with how it looks now.

4. Does the location have a history of flooding? If yes, please explain.

   Yes. The banks came down during Irene. Overall low impacts to bridge.

5. Are there any known Hazardous Material Sites near the project site?

   No.

6. Are there any known historic, archeological and/or other environmental resource issues near the project site?

   No.

7. Are there any existing, pending, or planned municipal utility projects (communications, lighting, drainage, water, wastewater, etc.) near the project that should be considered?

   No.

8. Are there any other issues that are important for us to understand and consider?

   No.

Land Use & Zoning

1. Please provide a copy of your existing and future land use map or zoning map, if applicable.

   See attached.

2. Are there any existing, pending or planned development proposal that would impact future transportation patterns near the bridge? If so, please explain.

   No.

3. Is there any planned expansion of public transit or intercity transit service in the project area? Please provide the name and contact information for the relevant public transit provider.

   No.

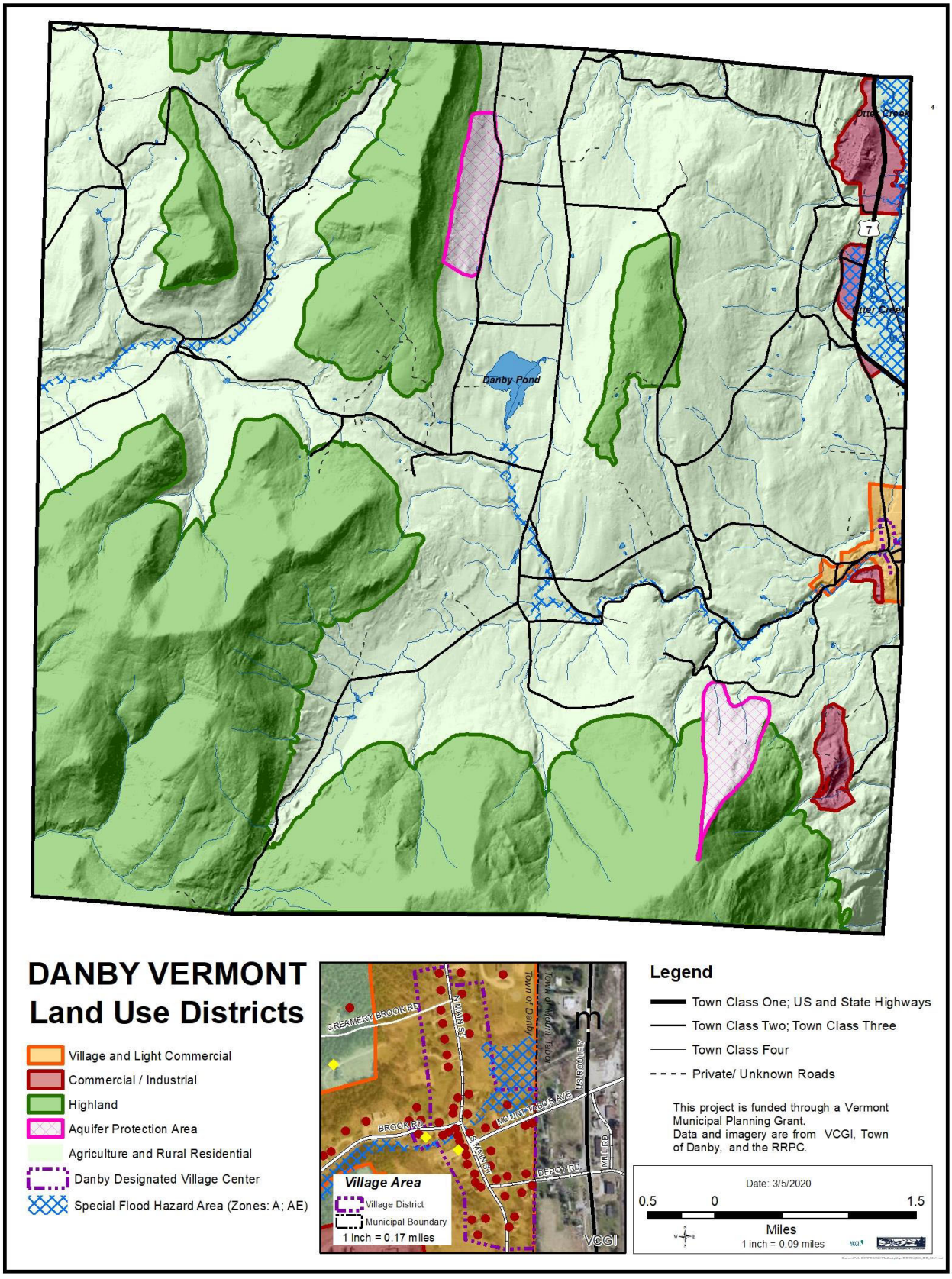
Communications

1. Please identify any local communication outlets that are available for us to use in communicating with the local population. Include weekly or daily newspapers, blogs, radio, public access TV, Facebook, Front Page Forum, etc. Also include any unconventional means such as local low-power FM.

   Town website. Facebook. Front Porch Forum. Rutland Herald. Vermont News Guide.

2. Other than people/organizations already referenced in this questionnaire, are there any others who should be kept in the loop as the project moves forward?

   Danby/Mt. Tabor Volunteer Fire Department
   Manchester Rescue Squad (Northshire)
   Vermont State Police
   Currier Memorial School
   Town Crew


Danby Pond
Otter Creek
7
DANBY VERMONT
Land Use Districts
Village and Light Commercial
Commercial / Industrial
Highland
Aquifer Protection Area
Agriculture and Rural Residential
Danby Designated Village Center
Special Flood Hazard Area (Zones: A; AE)
CREAMERY BROOK RD
N MAIN ST
Town of Danby
Town of Mount Tabor
MOUNTAIN VIEW AVE
BROOK RD
S MAIN ST
DEPOT RD
MILL RD
Village Area
Village District
Municipal Boundary
1 inch = 0.17 miles
VCGI
Legend
Town Class One; US and State Highways
Town Class Two; Town Class Three
Town Class Four
Private/ Unknown Roads
This project is funded through a Vermont Municipal Planning Grant.
Data and imagery are from VCGI, Town of Danby, and the RRPC.
Date: 3/5/2020
0.5
0
1.5
Miles
1 inch = 0.09 miles

Appendix L: Crash Data

General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

*	Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
	VTVSP0400/14D102941	Rockingham	3.04	09/20/2014	16:20	Clear	Fatigued, asleep	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VTVSP0400/14D100176	Rockingham	3.11	01/14/2014	00:22	Cloudy	No improper driving	Single Vehicle Crash	0	0	0	S	MC (FAS)
	VTVSP0400/15D103561	Rockingham	3.74	11/26/2015	03:12	Clear	No improper driving	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VTVSP1600/16D000803	Rockingham	3.74	08/03/2016	14:35	Clear	No improper driving, Inattention	Rear End	0	0	0	N	MC (FAS)
	VTVSP0400/15D103385	Rockingham	4.28	11/05/2015	23:54	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
	VTVSP0400/16D101060	Rockingham	5.10	05/07/2016	06:08	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
	VTVSP1600/18B106697	Rockingham	5.44	11/07/2018	09:10	Clear	Under the influence of medication/drugs/alcohol, Failure to keep in proper lane	Single Vehicle Crash	0	0	0	N	MC (FAS)
Route: FAS 0130													
	VTVSP0300/17B400007	Pawlet	0.99	01/01/2017	03:45	Snow	Under the influence of medication/drugs/alcohol, Driving too fast for conditions	Single Vehicle Crash	1	0	0	W	MC (FAS)
	VTVSP1100/15C101907	Pawlet	1.47	04/06/2015	12:43	Cloudy	Failure to keep in proper lane	Single Vehicle Crash	0	0	0	S	MC (FAS)
	VTVSP0300/15C104863	Danby	0.03	08/29/2015	19:58	Clear	Made an improper turn, Fatigued, asleep	Single Vehicle Crash	1	0	0	E	MC (FAS)
	VTVSP0300/14C101171	Danby	1.23	02/24/2014	22:38	Clear	Under the influence of medication/drugs/alcohol, Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner	Single Vehicle Crash	1	0	0	E	MC (FAS)
	VTVSP0300/16C104234	Danby	3.04	08/04/2016	17:18	Clear		No Turns, Thru moves only, Broadside ^<	3	0	0	N, E	MC (FAS)
	VTVSP0300/16C100795	Danby	3.25	02/15/2016	19:57	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
	VTVSP0300/14C101424	Danby	3.45	03/11/2014	08:10	Clear	Failure to keep in proper lane, Under the influence of medication/drugs/alcohol	Single Vehicle Crash	3	0	0	W	MC (FAS)
	VTVSP0300/14C103811	Danby	3.52	07/13/2014	21:30	Rain	Driving too fast for conditions	Single Vehicle Crash	3	0	0	W	MC (FAS)
	VTVSP0300/18B405328	Danby	3.64	10/27/2018	11:54	Snow	Failure to keep in proper lane, Driving too fast for conditions	Single Vehicle Crash	0	0	0	W	MC (FAS)
	VTVSP0300/18B402283	Danby	4.22	05/11/2018	23:30	Not Reported	Failure to keep in proper lane, Fatigued, asleep	Single Vehicle Crash	0	0	0	S	MC (FAS)
	VTVSP0300/VTVSP05397	Danby	4.54	09/27/2015	11:38	Clear	Followed too closely	Single Vehicle Crash	2	0	0	S	MC (FAS)
	VTVSP0300/17B403173	Danby	5.16	06/15/2017	18:57	Cloudy	Disregarded traffic signs, signals, markings, Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner, No improper driving	No Turns, Thru moves only, Broadside ^<	2	1	0	W, S	MC (FAS)
	VTVSP0300/14C103505	Danby	6.84	06/30/2014	12:54	Clear	Failure to keep in proper lane, No improper driving	Single Vehicle Crash	1	0	0	E, W	MC (FAS)
	VTVSP0300/18B400983	Danby	6.84	02/24/2018	08:26	Clear	Failure to keep in proper lane	Same Direction Sideswipe	0	0	0	W	MC (FAS)

**Crash occurred prior to the last Highway Improvement Project. This data should not be used in a crash analysis. UNK indicates Mile Marker is Unknown.*

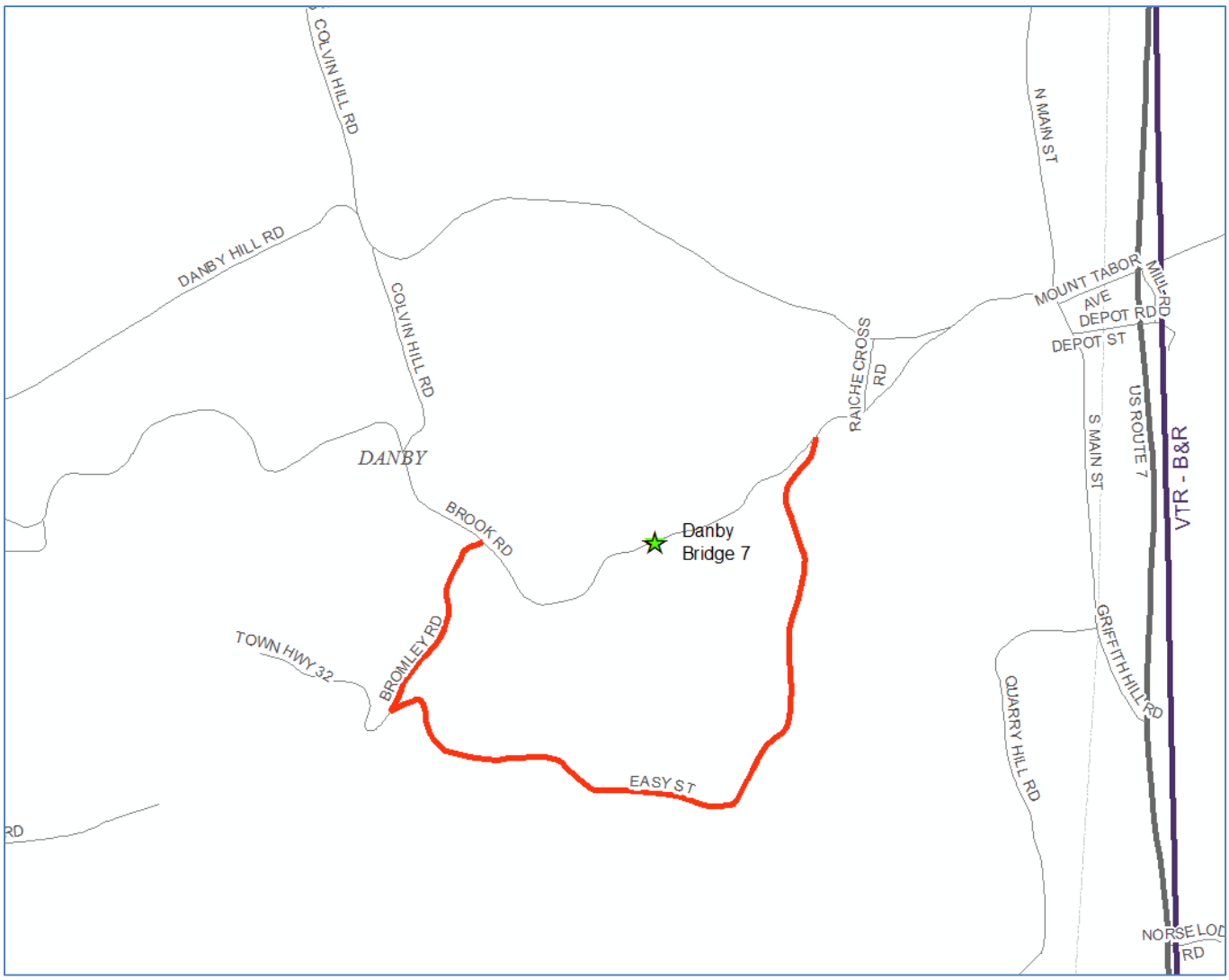
General Yearly Summaries - Crash Listing: State Highways and All Federal Aid Highway Systems

WHERE Year of Crash >= 2014 AND Year of Crash <= 2018

*	Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
	VTVSP0300/16C100223	Danby	8.26	01/14/2016	08:25	Snow	Driving too fast for conditions	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VTVSP0300/17B400856	Danby	8.31	02/11/2017	06:26	Cloudy	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	1	0	0	E	MC (FAS)
	VTVSP0300/16C102918	Danby	8.33	06/09/2016	14:42	Clear	Failure to keep in proper lane, Fatigued, asleep	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VTVSP0300/16C105091	Danby	UNK	09/14/2016	15:48	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
Route: FAS 0131 (VT 153 TH)													
	VTVSP0900/15C300283	Rupert	0.82	01/29/2015	09:20	Clear	Driving too fast for conditions	Single Vehicle Crash	1	0	0	N	MC (FAS)
	VTVSP0900/15C302696	Rupert	1.75	08/27/2015	15:15	Clear	Failure to keep in proper lane, Operating defective equipment	Single Vehicle Crash	1	0	0	S	MC (FAS)
	VTVSP0900/18B302241	Rupert	1.91	07/08/2018	17:20	Clear	Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner, Failure to keep in proper lane	Single Vehicle Crash	1	0	0	N	MC (FAS)
	VTVSP0900/16C301404	Rupert	2.91	05/04/2016	18:39	Cloudy	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	1	0	0	S	MC (FAS)
	VTVSP0900/15C300849	Rupert	3.10	03/21/2015	12:53	Cloudy	Driving too fast for conditions, Failure to keep in proper lane	Single Vehicle Crash	2	0	0	N	MC (FAS)
	VTVSP0900/15C302938	Rupert	3.83	09/16/2015	12:42	Clear	Failure to keep in proper lane	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VTVSP0900/15C300178	Rupert	4.13	01/18/2015	17:16	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
	VTVSP0300/15C104676	Pawlet	0.91	08/20/2015	12:08	Clear	Failure to keep in proper lane	Opp Direction Sideswipe	2	0	0	N	MC (FAS)
	VTVSP0300/15C101280	Pawlet	1.81	03/02/2015	18:45	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
	VTVSP0300/17B400649	Pawlet	2.85	02/01/2017	16:28	Cloudy	Failed to yield right of way, No improper driving	Left Turn and Thru, Broadside v<--	0	0	0	S	MC (FAS)
	VTVSP0300/14C100858	Pawlet	UNK	02/11/2014	08:34	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
Route: FAS 0132													
	VTVSP1600/16D002109	Weston	0.40	09/25/2016	14:50	Clear	Failure to keep in proper lane, Inattention	Single Vehicle Crash	0	0	0	E	MC (FAS)
	VTVSP0400/15D103656	Weston	0.50	12/06/2015	17:14	Clear	Driving too fast for conditions	Single Vehicle Crash	1	0	0	E	MC (FAS)
	VTVSP1600/17B104588	Andover	1.48	07/19/2017	22:40	Clear	Failure to keep in proper lane	Single Vehicle Crash	1	0	0	E	MC (FAS)
	VTVSP0400/15D101905	Andover	1.53	06/16/2015	10:10	Rain	Failure to keep in proper lane, Fatigued, asleep	Single Vehicle Crash	0	0	0	W	MC (FAS)
	VTVSP0400/14D102066	Andover	1.75	07/08/2014	15:28	Cloudy	Failure to keep in proper lane	Single Vehicle Crash	0	0	0	N	MC (FAS)
	VTVSP0400/14D102783	Andover	2.22	09/04/2014	23:08	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)
	VTVSP0400/15D103778	Andover	2.22	12/18/2015	17:26	[No Weather]		[No Direction of Collision]	0	0	0		MC (FAS)

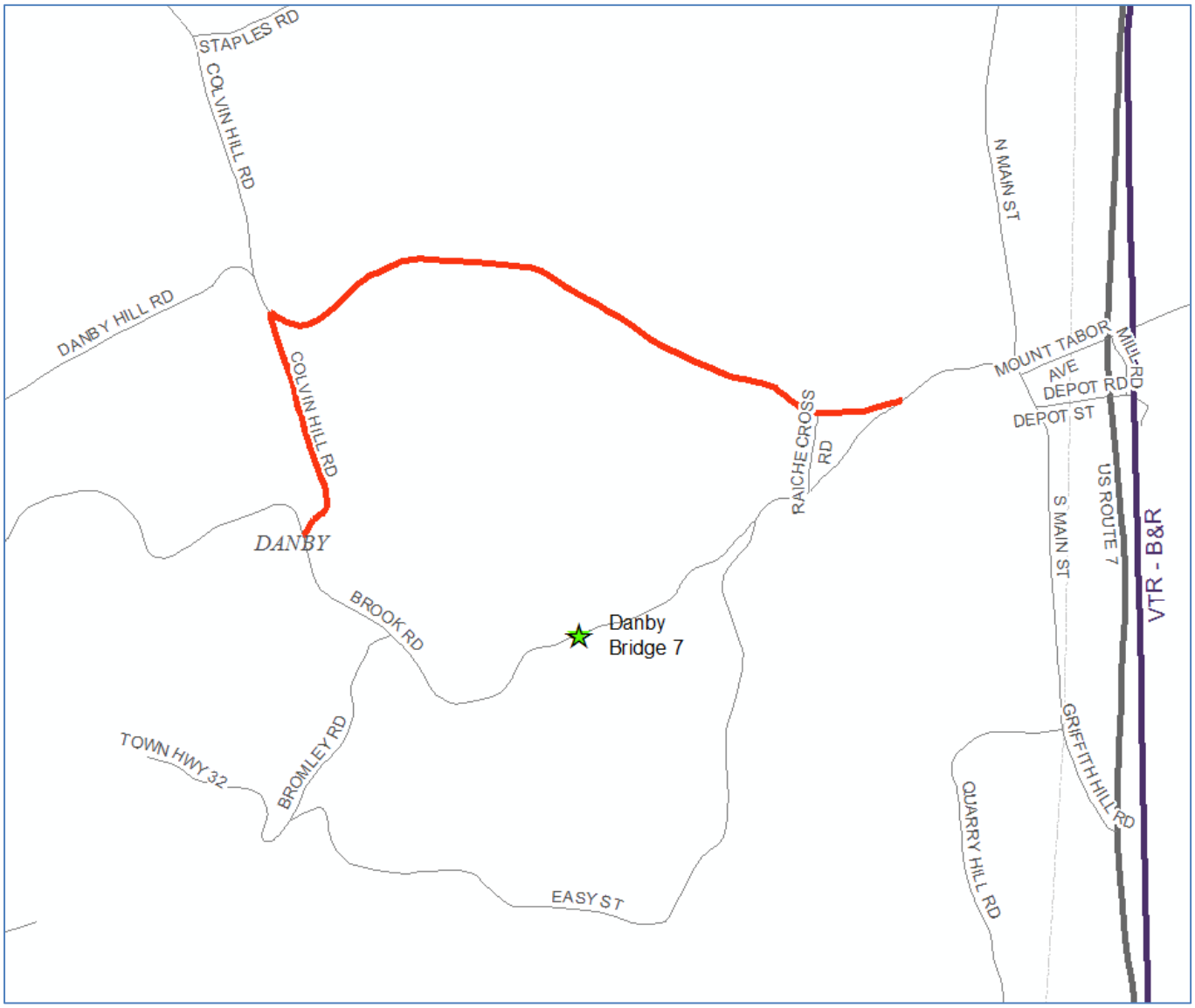
**Crash occurred prior to the last Highway Improvement Project. This data should not be used in a crash analysis. UNK indicates Mile Marker is Unknown.*

Appendix M: Detour Routes



Detour Route 1: Brook Road (FAS 130/TH 1), to Bromley Road and Easy Street, back to Brook Road (3.0 mi end-to-end)

Detour Distance: 2.1 miles
Thru Route: 0.9 miles
End-to-End Distance: 3.0 miles
Added Distance: 1.2 miles



Detour Route 2: Brook Road (FAS 130/TH 1), to Colvin Hill Road and Danby Hill Road, back to Brook Road (3.4 mi end-to-end)

Detour Distance: 1.8 miles
Thru Route: 1.6 miles
End-to-End Distance: 3.4 miles
Added Distance: 0.2 miles

Appendix N: Plans

CURVE (x)
DELTA = 13°41'44"
D = 15°26'40"
R = 370.99'
T = 44.55'
L = 88.68'
e = 2.67'

CURVE (x)
DELTA = 14°01'27"
D = 10°02'36"
R = 570.49'
T = 70.17'
L = 139.64'
e = 4.30'

MACHESKI, MARGARET & DONALD N/F

SMITH, ROY ALLEN N/F

MILL BROOK FLOW

TOWN R.O.W.

APPROX. EXISTING TOWN R.O.W.

TH-1/FAS 130 (BROOK ROAD)

POB 83+32.75

PI 85+87.39

PC 86+62.50

PI 87+65.33

PI 89+10.65

PC 85+42.84

PT 86+52.21

PI 87+14.17

PC 88+40.48

PI 84+02.37

STA 86+50.00=
CHAN 51+50.00
Δ=44° 30' 00" LT

CURVE (x)
DELTA = 13°46'02"
D = 13°23'22"
R = 427.92'
T = 51.66'
L = 102.82'
e = 3.11'

BENCHMARK
SPIKE IN TREE
ELEV. =925.75

MERROW, GLORIA JEAN AND HELEBA, DANA & MICHELLE N/F

CURVE (x)
DELTA = 15°19'43"
D = 11°04'31"
R = 517.33'
T = 69.62'
L = 138.41'
e = 4.66'

BENCHMARK
SPIKE IN TREE
ELEV. =931.30

N63°46'17"E

N77°28'01"E

N63°41'59"E

GRAVEL DRIVE

HVCTRL

N

VT STATE PLANE GRID

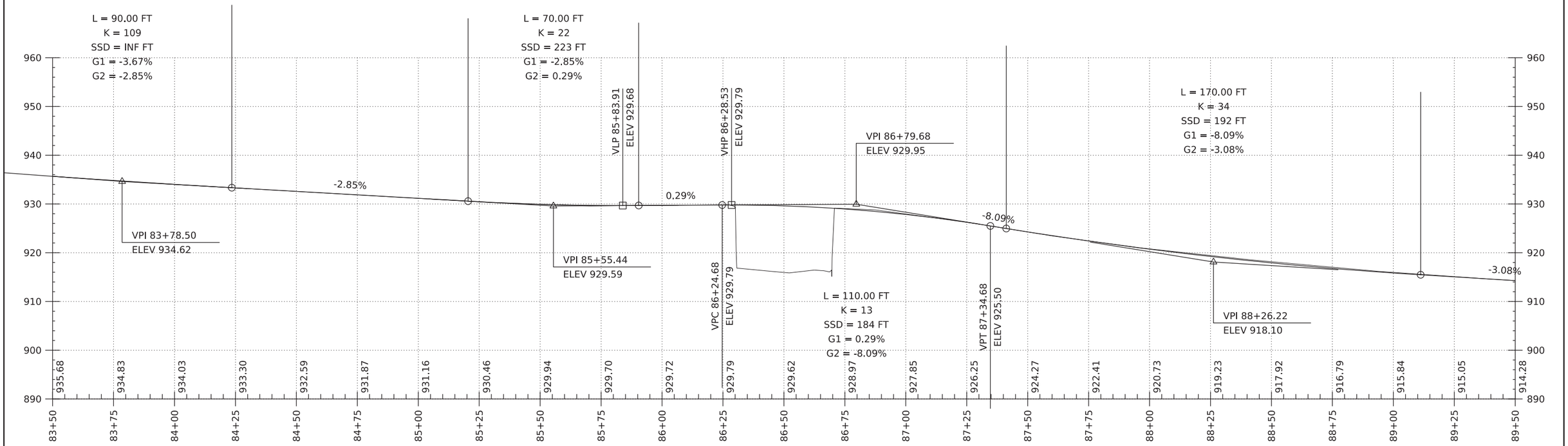
SCALE 1" = 20'-0"
20 0 20

EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1928
40' MAX SPAN

PROJECT NAME: DANBY
PROJECT NUMBER: BF 0130(4)

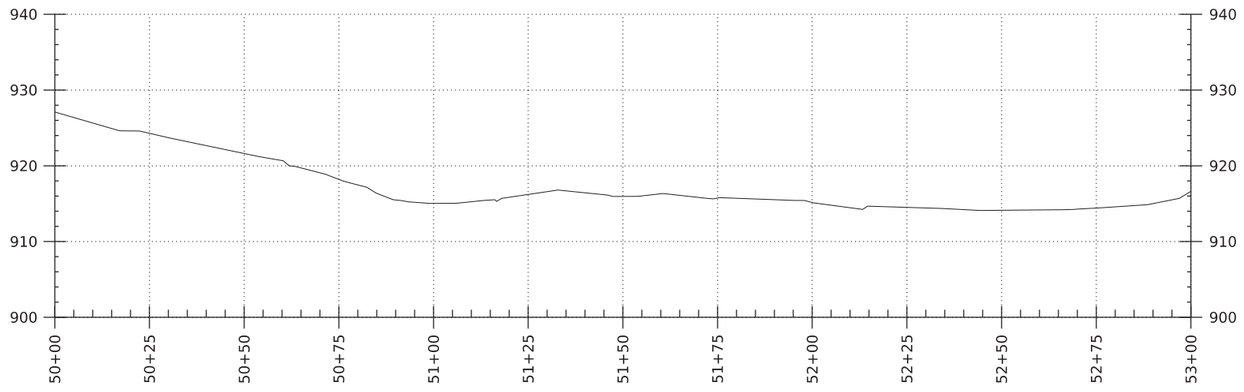
FILE NAME: s12j618BDR_Existing.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ------
EXISTING CONDITIONS LAYCUT

PLOT DATE: 17-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 1 OF 15



FAS ROUTE 130 PROFILE

SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"



CHANNEL PROFILE

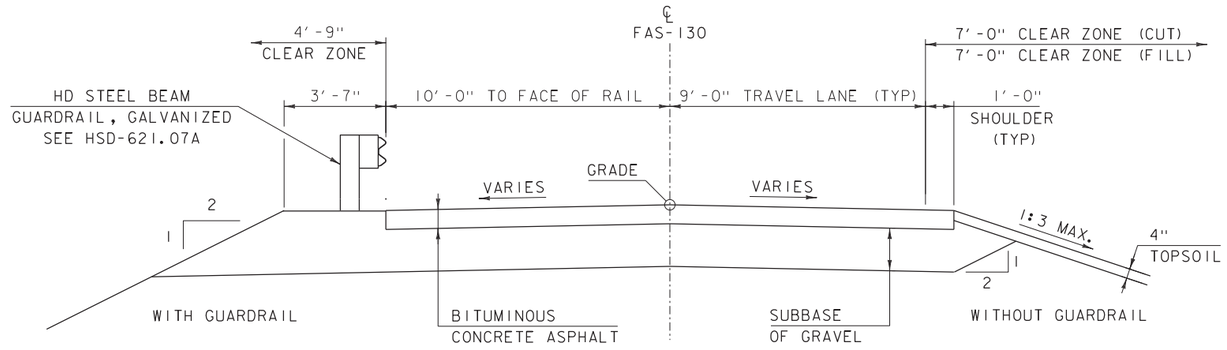
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: DANBY
PROJECT NUMBER: BF 0130(4)

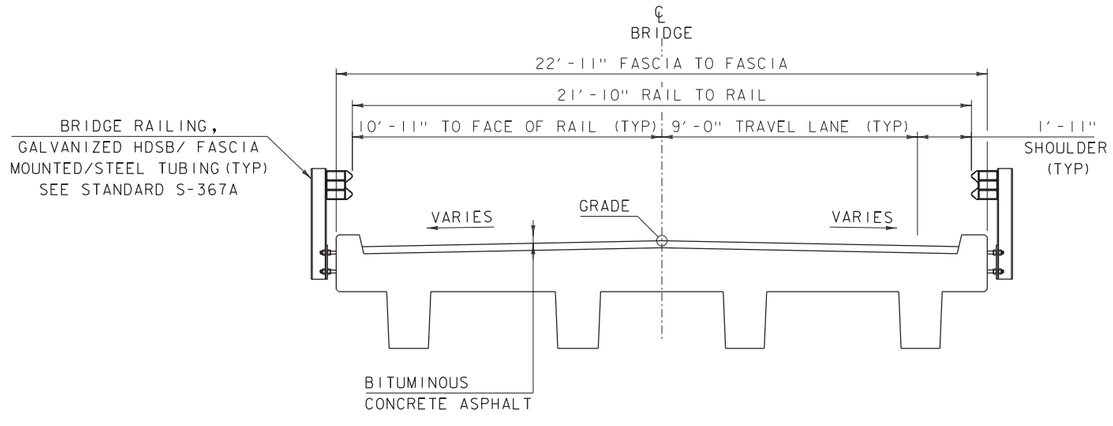
FILE NAME: sl2j618profile.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ------
EXISTING PROFILE

PLOT DATE: 17-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 2 OF 15



EXISTING FAS-130 TYPICAL SECTION

SCALE 3/8" = 1'-0"



EXISTING BRIDGE TYPICAL SECTION

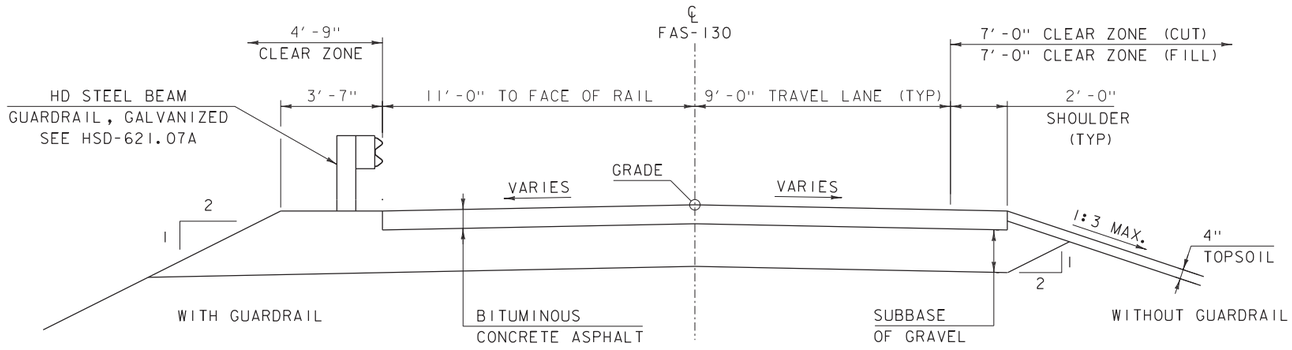
SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES (IF USED ON PROJECT)	
SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- 1/4"
- AGGREGATE SURFACE COURSE	+/- 1/2"
SUBBASE	+/- 1"
SAND BORROW	+/- 1"

PROJECT NAME: DANBY
PROJECT NUMBER: BF 0130(4)

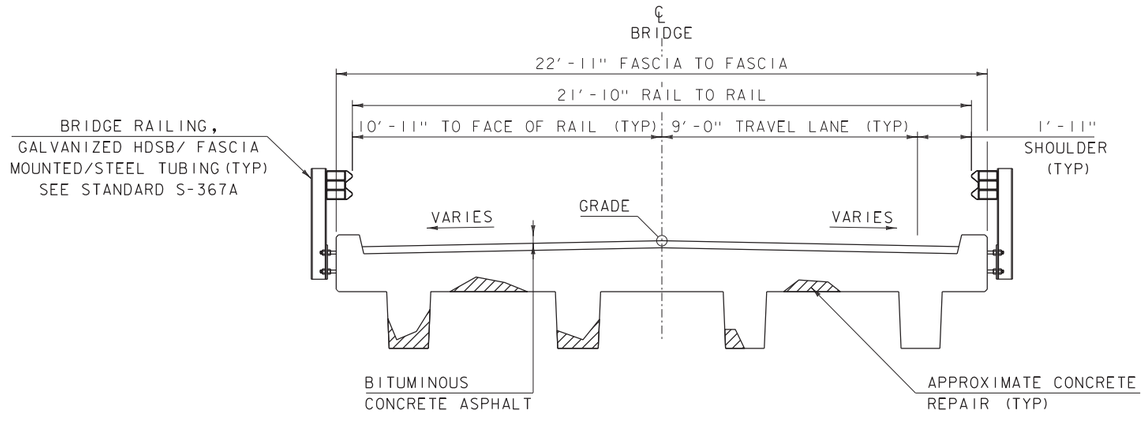
FILE NAME: 12J618\sl2J618typ.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ----------
EXISTING TYPICAL SECTIONS

PLOT DATE: 17-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------



PROPOSED FAS-130 TYPICAL SECTION

SCALE 3/8" = 1'-0"



PROPOSED BRIDGE REHABILITATION TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

(IF USED ON PROJECT)

SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- 1/4"
- AGGREGATE SURFACE COURSE	+/- 1/2"
SUBBASE	+/- 1"
SAND BORROW	+/- 1"

PROJECT NAME: DANBY
PROJECT NUMBER: BF 0130(4)

FILE NAME: 12J618\sl2J618typ.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ----------
REHABILITATION TYPICAL SECTIONS

PLOT DATE: 17-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------

CURVE (x)
DELTA = 14°01'27"
D = 10°02'36"
R = 570.49'
T = 70.17'
L = 139.64'
e = 4.30'

CURVE (x)
DELTA = 13°41'44"
D = 15°26'40"
R = 370.98'
T = 44.55'
L = 88.68'
e = 2.67'

MILL BROOK
FLOW

PI 89+10.65

PI 87+65.33

PC 86+62.50

PI 85+87.39

PI 84+71.16

POB 83+32.75

55+00

52+00

89+00

88+00

87+00

86+00

85+00

84+00

50+00

N63°41'59"E

N77°28'01"E

N31°59'59"W

TH-1/FAS 130
(BROOK ROAD)

TOWN R.O.W.

APPROX. EXISTING TOWN R.O.W.

GRAVEL
DRIVE

HVCTRL
1
2
3
4

T/E

STA 86+50.00=
CHAN 51+50.00
Δ=44°30'00" LT

PC 88+40.48

PI 87+14.17

PT 86+81.52

PC 85+42.84

PI 84+02.37

CURVE (x)
DELTA = 13°46'02"
D = 13°23'22"
R = 427.92'
T = 51.66'
L = 102.82'
e = 3.11'

BENCHMARK
SPIKE IN TREE
ELEV. = 925.75

CURVE (x)
DELTA = 15°19'43"
D = 11°04'31"
R = 517.33'
T = 69.62'
L = 138.41'
e = 4.66'

BENCHMARK
SPIKE IN TREE
ELEV. = 931.30

N

VT STATE PLANE GRID

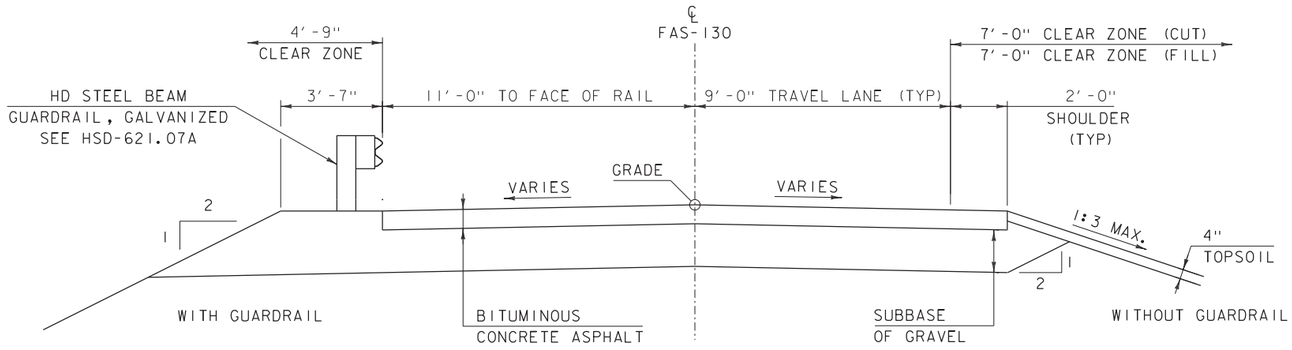
SCALE 1" = 20'-0"
20 0 20

EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1928
40' MAX SPAN

PROJECT NAME: DANBY
PROJECT NUMBER: BF 0130(4)

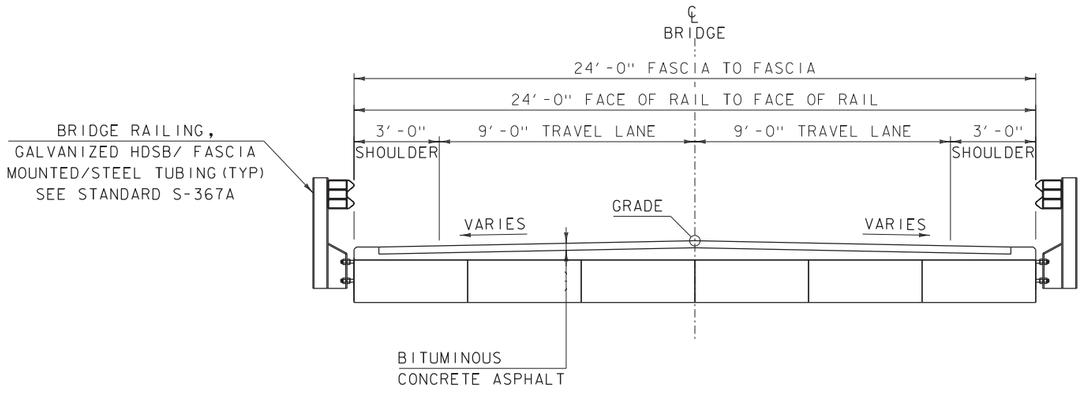
FILE NAME: s12j618BDR_Rehab.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ------
STRUCTURE REHABILITATION LAYOUT

PLOT DATE: 17-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 5 OF 15



PROPOSED FAS-130 TYPICAL SECTION

SCALE 3/8" = 1'-0"



FLOW

PROPOSED SUPERSTRUCTURE REPLACEMENT TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

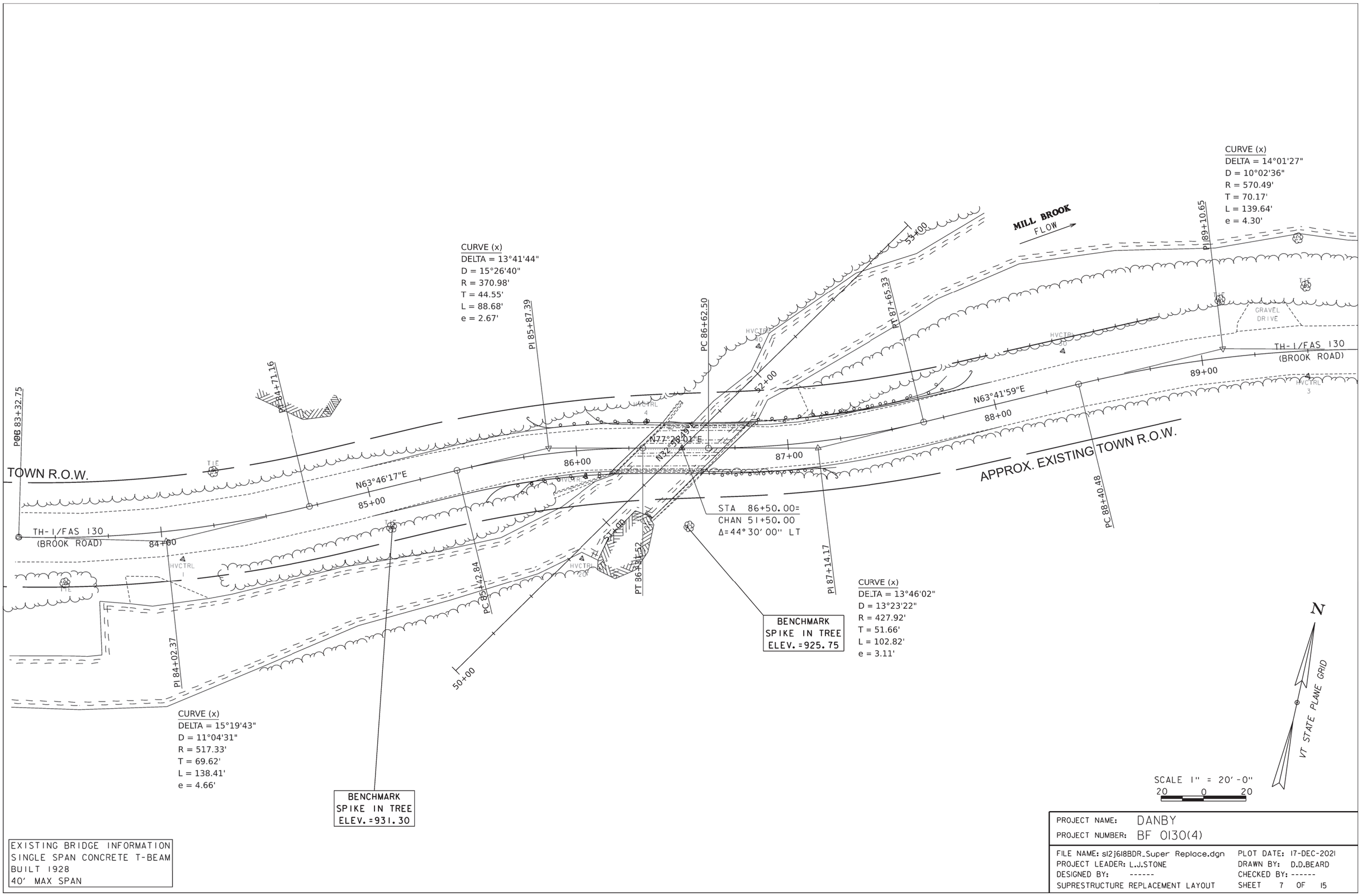
(IF USED ON PROJECT)

SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- 1/4"
- AGGREGATE SURFACE COURSE	+/- 1/2"
SUBBASE	+/- 1"
SAND BORROW	+/- 1"

PROJECT NAME: DANBY
PROJECT NUMBER: BF 0130(4)

FILE NAME: 12J618\sl2J618typ.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ----------
SUPER REPLACEMENT TYPICAL SECTIONS

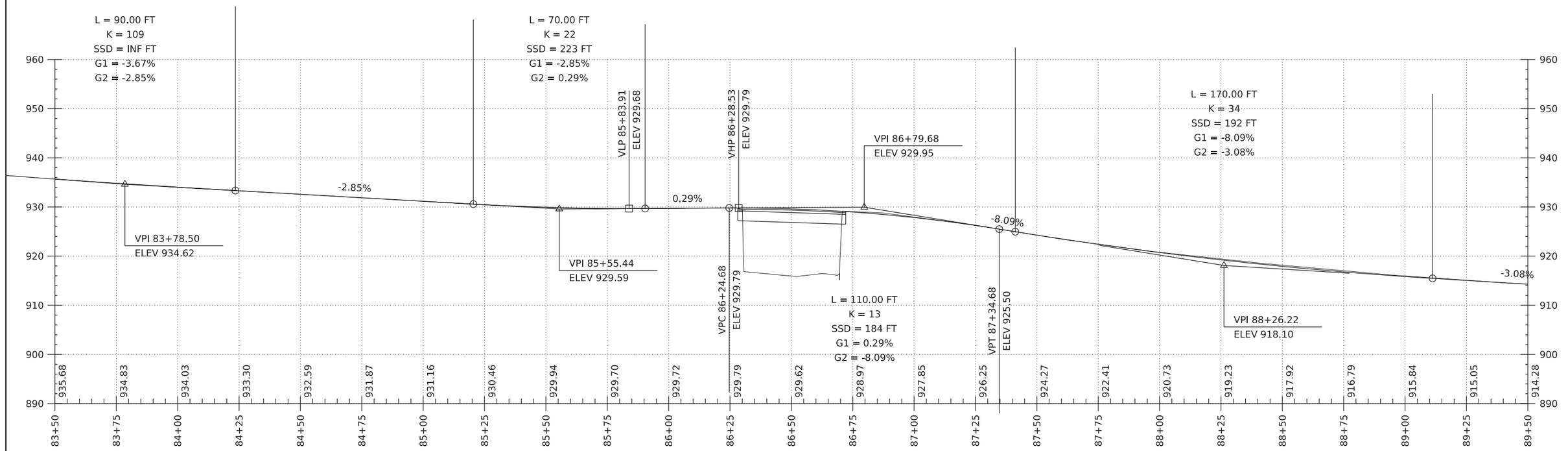
PLOT DATE: 17-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------



EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1928
40' MAX SPAN

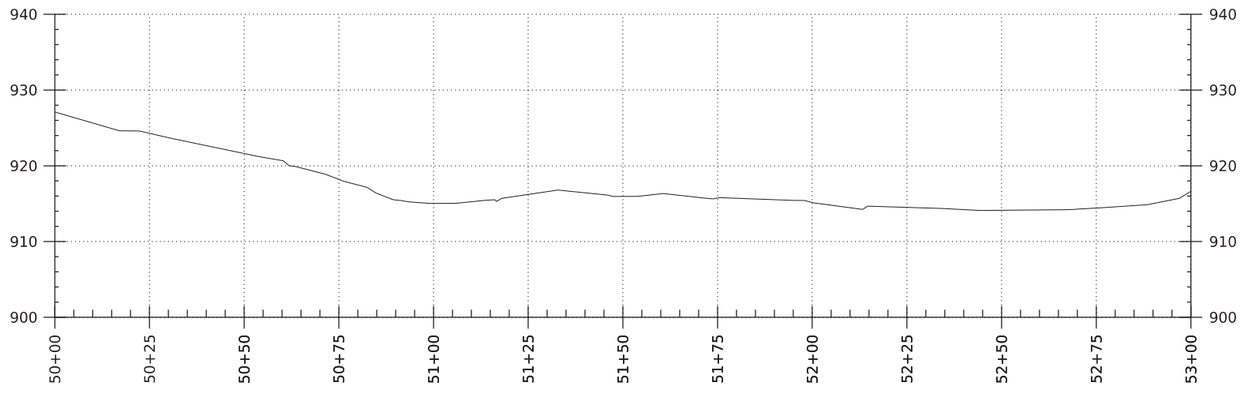
PROJECT NAME:	DANBY
PROJECT NUMBER:	BF 0130(4)

FILE NAME: s12j618BDR_Super Replace.dgn	PLOT DATE: 17-DEC-2021
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
SUPRESTRUCTURE REPLACEMENT LAYOUT	SHEET 7 OF 15



FAS ROUTE 130 SUPERSTRUCTURE REPLACEMENT PROFILE

SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"



CHANNEL PROFILE

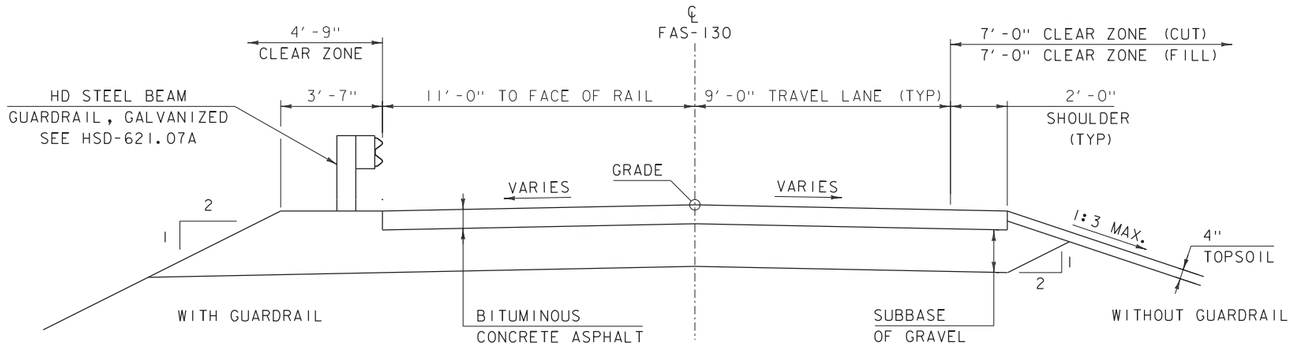
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: DANBY
PROJECT NUMBER: BF 0130(4)

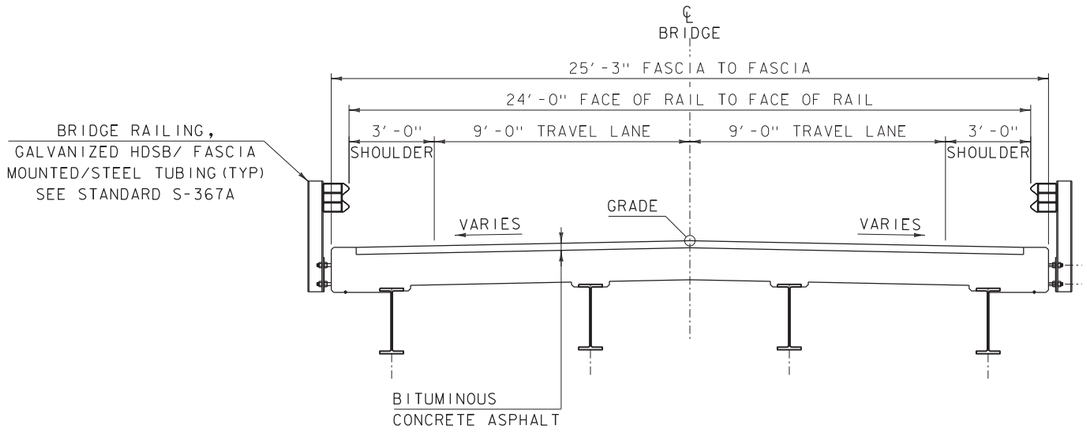
FILE NAME: sl2j618profile.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ------
SUPERSTRUCTURE REPLACEMENT PROFILE

PLOT DATE: 17-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 8 OF 15



PROPOSED FAS-130 TYPICAL SECTION

SCALE 3/8" = 1'-0"



PROPOSED BRIDGE TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

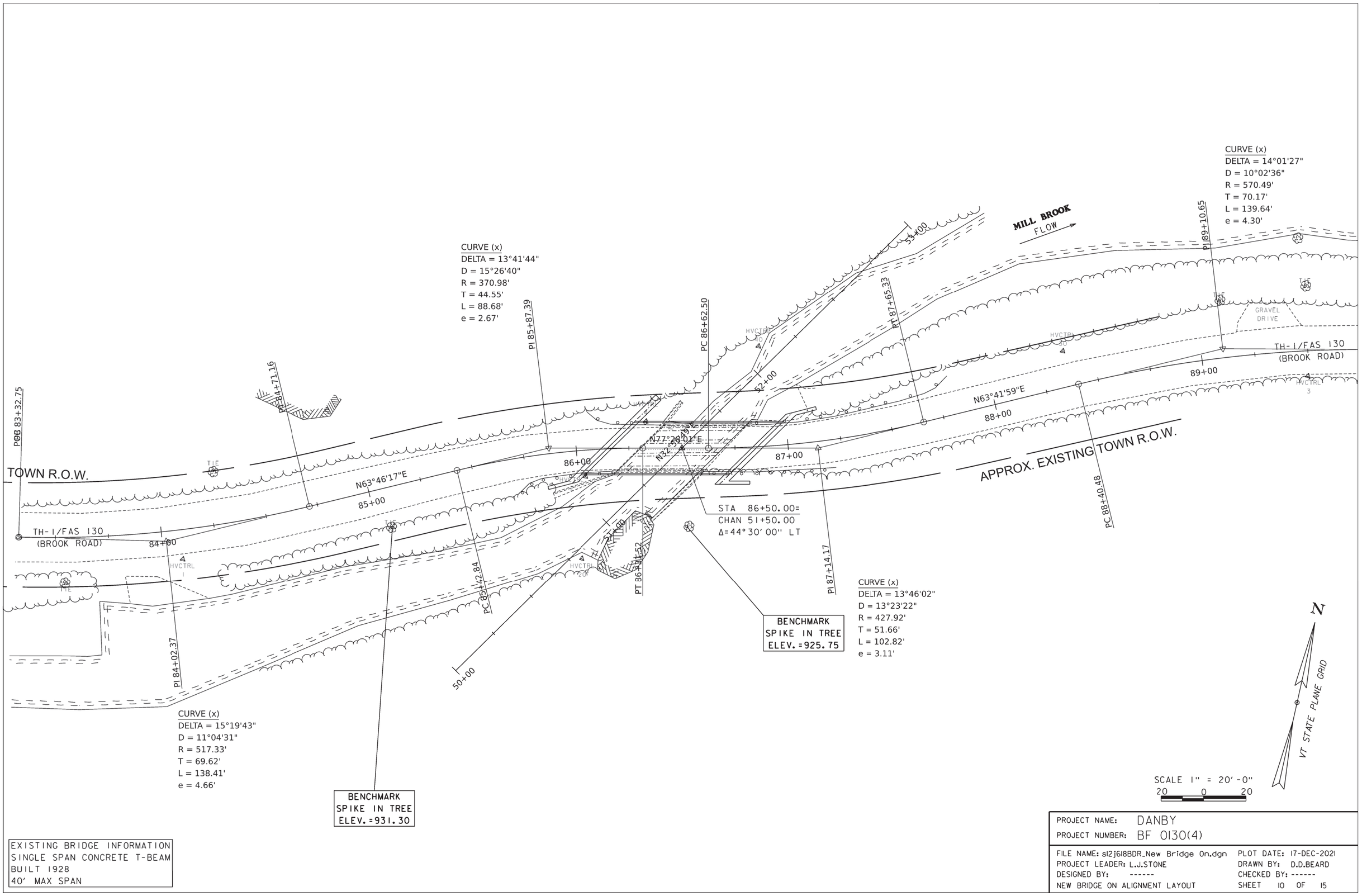
(IF USED ON PROJECT)

SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- 1/4"
- AGGREGATE SURFACE COURSE	+/- 1/2"
SUBBASE	+/- 1"
SAND BORROW	+/- 1"

PROJECT NAME: DANBY
PROJECT NUMBER: BF 0130(4)

FILE NAME: 12J618\s12J618typ.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ----------
BRIDGE REPLACEMENT TYPICAL SECTIONS

PLOT DATE: 17-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------

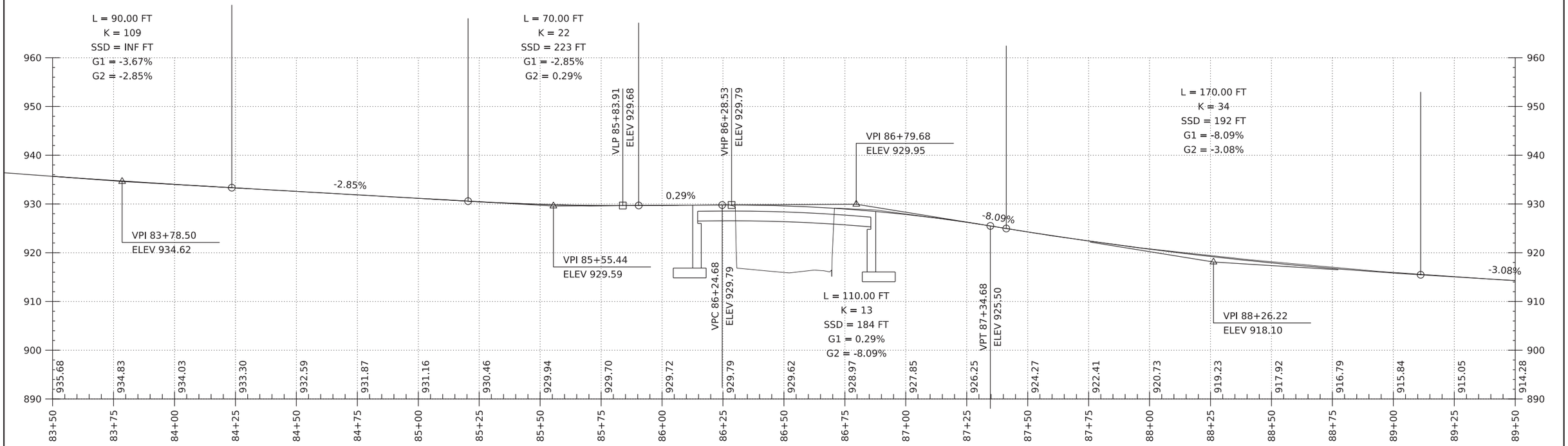


EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1928
40' MAX SPAN

PROJECT NAME: DANBY
PROJECT NUMBER: BF 0130(4)

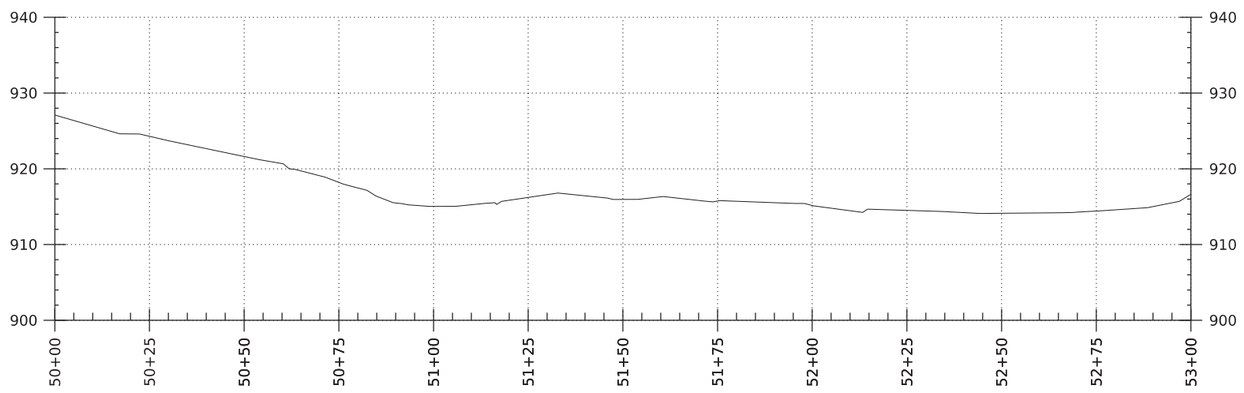
FILE NAME: s12j618BDR_New Bridge On.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ------
NEW BRIDGE ON ALIGNMENT LAYOUT

PLOT DATE: 17-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 10 OF 15



FAS ROUTE 130 NEW BRIDGE PROFILE

SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"



CHANNEL PROFILE

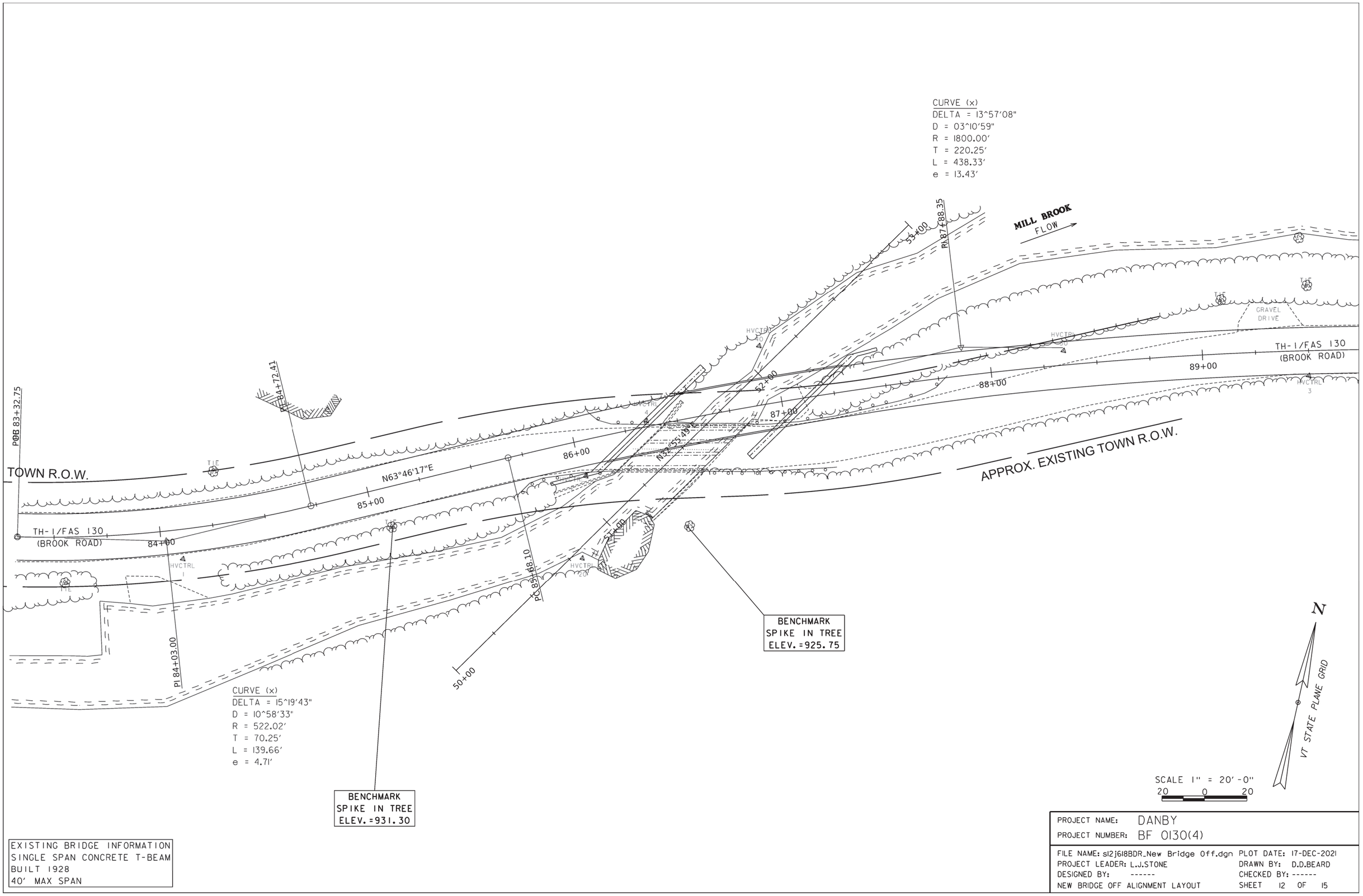
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: DANBY
PROJECT NUMBER: BF 0130(4)

FILE NAME: sl2j618profile.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ------
NEW BRIDGE ON ALIGNMETN PROFILE

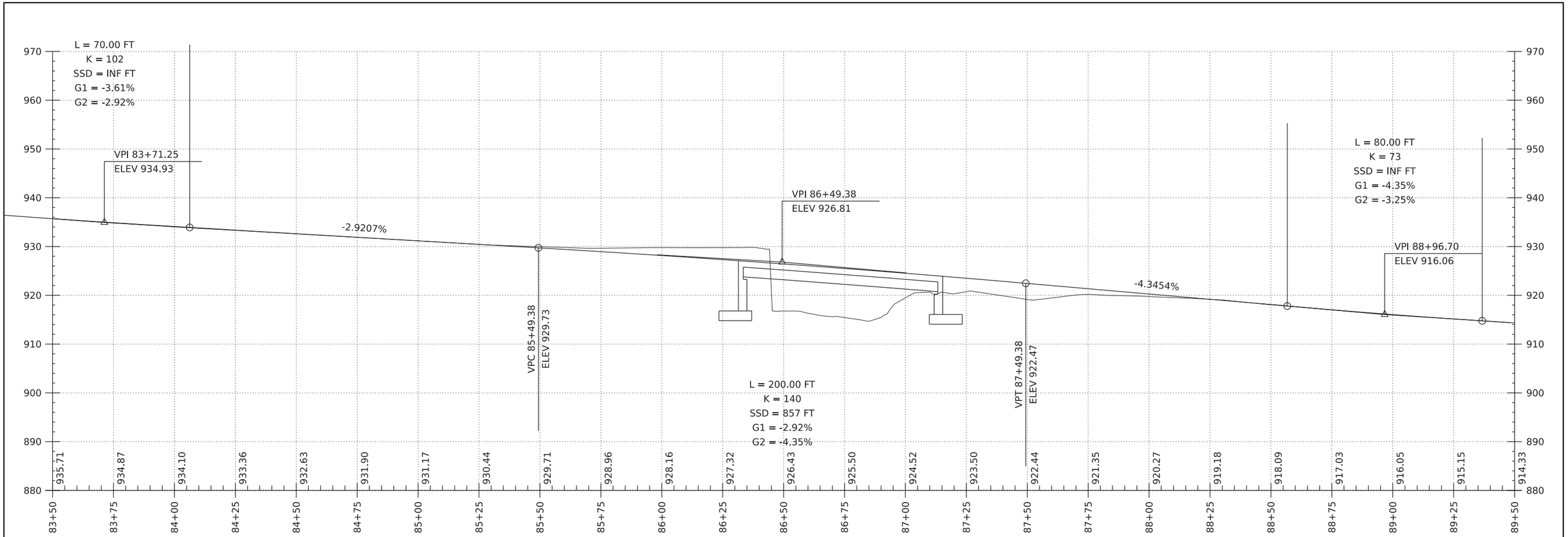
PLOT DATE: 17-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 11 OF 15



EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1928
40' MAX SPAN

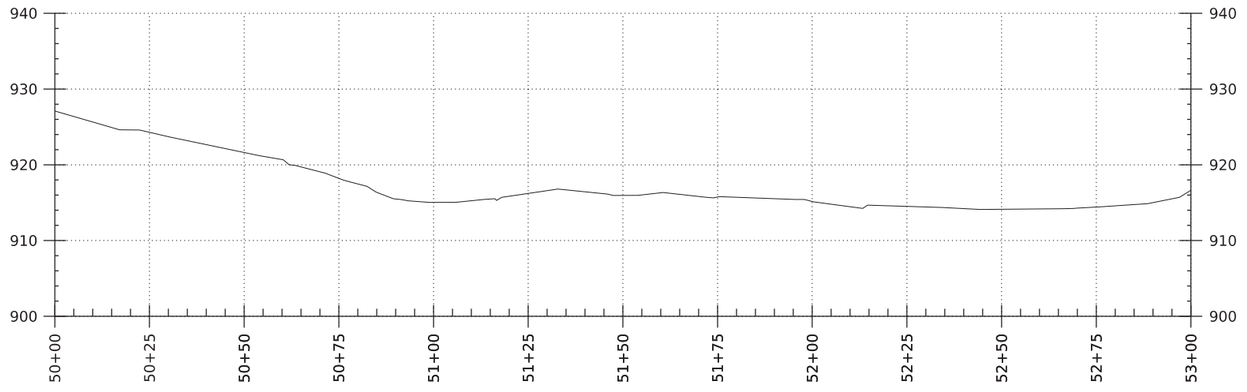
PROJECT NAME:	DANBY
PROJECT NUMBER:	BF 0130(4)

FILE NAME: s12j618BDR_New Bridge Off.dgn	PLOT DATE: 17-DEC-2021
PROJECT LEADER: L.J.STONE	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
NEW BRIDGE OFF ALIGNMENT LAYOUT	SHEET 12 OF 15



FAS ROUTE 130 NEW BRIDGE NEW ALIGNMENT PROFILE

SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"



CHANNEL PROFILE

SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: DANBY
PROJECT NUMBER: BF 0130(4)

FILE NAME: s12j618profile.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ------
NEW BRIDGE OFF ALIGNMENT LAYOUT

PLOT DATE: 17-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 13 OF 15

MILL BROOK
FLOW

TOWN R.O.W.

APPROX. EXISTING TOWN R.O.W.

TH-1/FAS 130
(BROOK ROAD)

84+00
85+00
86+00
87+00
88+00
89+00
50+00
52+00
54+00

N63°46'17"E
N77°28'01"E
N63°41'59"E

950'
940'
930'
920'

HVCTRL
GRAVEL DRIVE

N

VT STATE PLANE GRID

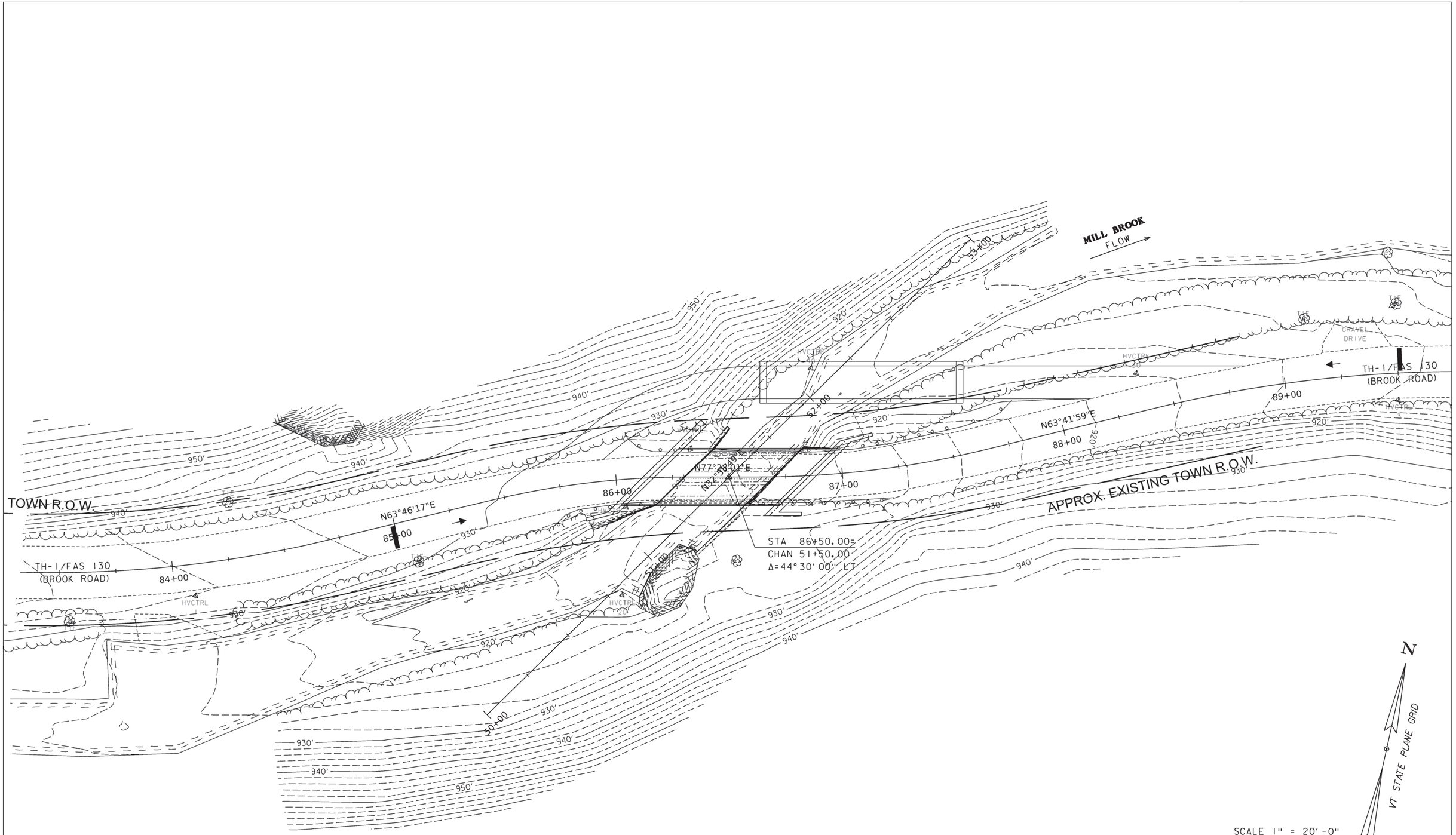
SCALE 1" = 20'-0"
20 0 20

EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1928
40' MAX SPAN

PROJECT NAME: DANBY
PROJECT NUMBER: BF 0130(4)

FILE NAME: s12j618BDR_Temp Bridge Up.dgn
PROJECT LEADER: L.J.STONE
DESIGNED BY: ------
UPSTREAM TEMPORARY BRIDGE LAYOUT

PLOT DATE: 17-DEC-2021
DRAWN BY: D.D.BEARD
CHECKED BY: ------
SHEET 14 OF 15



EXISTING BRIDGE INFORMATION
SINGLE SPAN CONCRETE T-BEAM
BUILT 1928
40' MAX SPAN

PROJECT NAME: DANBY
PROJECT NUMBER: BF 0130(4)

FILE NAME: s12j618BDR_Temp Bridge Down.dgn PLOT DATE: 17-DEC-2021
PROJECT LEADER: L.J.STONE DRAWN BY: D.D.BEARD
DESIGNED BY: ------ CHECKED BY: ------
DOWNSTREAM TEMPORARY BRIDGE LAYOUT SHEET 15 OF 15