STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Burke BO 1447(31)

TOWN HIGHWAY 31, BRIDGE 35 OVER THE WEST BRANCH OF PASSUMPSIC RIVER

March 9, 2018

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I. Site Information

Bridge 35 is a Town owned bridge located on Hayden Crossing Road (Town Highway 31) approximately 0.2 miles east of the junction with US Route 5 in the Town of Burke. The bridge is located in the center of an S-curve on a relatively flat grade at the bottom of a vertical curve over the West Branch of Passumpsic River. The existing bridge has failed and was closed to traffic in 2013. The existing conditions were gathered from a combination of a Site Visit, the Inspection Report, and the existing Survey. See correspondence in the Appendix for more detailed information.

Roadway Classification	Local Road (Class 3 Town Highway)
Bridge Type	Single Span Rolled Thru Beam Bridge
Bridge Length	42 feet
Year Built	1919 (reconstructed in 1951)
Ownership	Town of Burke

Need

Bridge 35 carries Town Highway 31 (Hayden Crossing Road) over the west branch of Passumpsic River. The following is a list of deficiencies of Bridge 35 and Town Highway 31 in this location:

1. Bridge 35 is considered structurally deficient. The superstructure has been rated a 0 "Failed" since 2013 when the floor beams failed. The beams crushed and shear connectors have sheared off.

2. The bridge does not meet the minimum standard width. The existing width is only wide enough for one-way alternating traffic.

3. The bridge does not meet the minimum hydraulic standards.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2018 and 2038.

TRAFFIC DATA	2018	2038
AADT	390	430
DHV	75	80
ADTT	30	45
%T	7.7	9.7
%D	58	58

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 430 and a design speed of 25 mph for a Local Road.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 6.3	10'/2' (24')	9'/2' (22')	
Bridge Lane and Shoulder Widths	VSS Section 6.7	2'-9'-2'(13.2') one-lane bridge	9'/2' (22')	Substandard
Clear Zone Distance	VSS Table 6.5	No Issues Noted	7' fill / 7' cut	
Banking	VSS Section 6.12	e=3.0% @ R=450' e=5.2% @ R=175'	8% (max)	Substandard
Speed		Not Posted	25 mph (design)	
Horizontal Alignment	AASHTO Green Book Table 3-10b	R = 450', 175'	R_{min} = 450' @ e=5.2% R_{min} = 175' @ e=7.6%	Substandard
Vertical Grade	VSS Table 6.6	1.7%	11% for rolling terrain	
K Values for Vertical Curves	VSS Table 6.1	K_{crest} (over bridge) = 46 K_{sag} (western approach) = 22 K_{sag} (eastern approach) = 64	20 crest / 30 sag	Substandard at western approach
Vertical Clearance	VSS Section 6.7	No Issues Noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 6.1	459'	150'	
Bicycle/Pedestrian Criteria	VSS Table 6.7	2' shoulder	2' Shoulder	1 lane bridge – substandard width with no striping
Bridge Railing	Structures Design Manual Section 13	Single Metal Tube Railing	TL-2	Substandard
Hydraulics	VTrans Hydraulics Section	• ClearSpan: 36'-3" • Roadway overtopping at Q_{25} design flow	• Bank Full Width: 30' • Pass Q_{25} design flow with 1' of freeboard	Substandard – does not pass design flow
Structural Capacity	SM, Ch. 3.4.1	Structurally Deficient	Design Live Load: HL-93	Substandard

Inspection Report Summary

Deck Rating	5 Fair
Superstructure Rating	**0 FAILED**
Substructure Rating	6 Satisfactory
Channel Rating	6 Satisfactory

09/17/14 – Structure is closed due to floorbeam failures in 2013. ~MJK/FE

07/11/13 – Structure was closed due to deterioration and overloading. Numerous floorbeams are crushed and connectors sheared off. ~MJK/SP

09/13/12 – Poor condition, numerous floorbeams have heavy rusting with holes along their web ends and crushing is noticed in random locations. Structure needs complete replacement soon as deterioration is progressing at a fast pace. ~MJK/JM

04/19/12 – Courtesy inspection: No significant changes, Full inspection will be done at a later date. ~MJK

Hydraulics
The stream bankfull width indicates the existing bridge does meet state stream equilibrium standards. The existing structure however, does not provide sufficient freeboard at the design flow. Current standards of the VTrans Hydraulic Manual require that this structure provide 1' of freeboard at Q_{25}. Low beam for this structure is 846.6'. The hydraulic analysis performed by the VTrans hydraulic engineer indicates that the existing configuration results in a headwater depth of approximately 847.7', with water overtopping the roadway below Q_{100}.

A new structure should provide a minimum clear span of 30', measured perpendicular to the flow. The minimum clear span mentioned above should be provided within the channel. If stone fill in front of the abutments is desired, the bridge span may need to be significantly longer.

The existing structure provides a waterway opening of approximately 210 square feet. Any new structure should provide additional waterway area, while avoiding raising the grade of the road if possible. This may be achieved by increasing the span and/or decreasing the depth of the superstructure.

There is a flood insurance study for this river. Any alternative is subject to FEMA floodplain and floodway regulations for backwater. Water surface elevations for any proposed alternative must not exceed those of the existing configuration. Please contact the VTrans Hydraulics Section with proposed alternative inlet geometry so headwater depths may be calculated.

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

Municipal Utilities

- The West Burke Fire Department has a dry hydrant at either end of the existing bridge. It may be possible to construct a new bridge at this location without disturbing either of these hydrants. However, the VTrans Utilities section suggests realigning the bridge crossing by moving the westerly end a few feet to the south. If this is done, the bridge will move further away from the existing aerial utilities but closer to the dry hydrant east of the bridge. This might require the relocation of this one dry hydrant. Relocation of this dry hydrant would be a reimbursable expense for the Fire Department.

Public Utilities (Aerial) (Lyndonville Village Electric and FairPoint)

- There is a single phase electric line (owned by Lyndonville Village Electric) line with two attached communication cables (both owned by FairPoint Communications) adjacent to TH # 31 on the northern side. These aerial facilities are closest to the bridge at the east end; these facilities should be far enough away so that they would not interfere with construction. A minor temporary relocation of the electric line on alley arms may be needed.

The electric line is owned by a municipal utility company; any relocation of their facilities on this TH bridge project will be reimbursable to Lyndonville Electric.

Right of Way

There is a 3-rod Right-of-Way centered on the roadway though the project area. It is anticipated that no additional Right-of-Way will be required. The existing Right-of-Way is plotted on the Resource Site Plan Layout Sheet.

Resources
The environmental resources present at this project are shown on the Resource Site Plan Layout Sheet, and are as follows:

Biological:

Wetlands/Watercourses
The East Branch of the Passumpsic River is a cobble-boulder river with clear, but got-brown tannic water. For the most part, it is well-shaded by white cedar which is a significant part of its streamside forest. Along of the East Branch there are signs of mink, raccoon, otter, beaver and weasel. In addition, a variety of waterfowl, woodcock, and large mammals use the adjacent wetlands. Immediately next to Hayden Crossing Road, recent logging within the floodplain has resulted in the conversion of the area from a cedar swamp to a scrub-shrub wetland dominated by alders, willow, red osier dogwood and grasses. These Class II wetlands are still of high quality, are present in all four quadrants of this bridge. Any impacts will require permitting from the Vermont Wetlands Office, as well as from the US Army Corps of Engineers.

The existing bridge is a low lying, single span structure with the abutments that meet the water's edge (without any land bench). Above this crossing, there is a 26.3 mile^2 drainage area and according to macroinvertebrate samples, the East Branch in this area is in excellent health both in terms of water quality and aquatic habitat. In addition, fish sampling shows the presence of both wild and stocked brook trout in this area. Any impacts below OHW will require a Section 404 permit from the U.S. Army Corps of Engineers.

Fish and Wildlife Habitat
This project is located along a rural existing road which crosses a river and its associated floodplain wetlands, and there is nothing to indicate that the bridge or its approaches are causing either stream instability or vehicle/wildlife conflicts.

Rare, Threatened and Endangered Species
This project is within the range of the Northern Long Eared bat, a federally protected species, and is subject to avoidance and minimization measures which protect their habitat and hibernacula. Based on my 2-DEC-2016 site visit, there is only one tree near the bridge which may be considered suitable habitat. This tree is located just south of Hayden Crossing road, as the pavement's edge, about 100' west of the bridge. The areas immediately adjacent to the bridge do not have suitable habitat as it is dominated by shrubs and/or herbaceous vegetation. Since the project is outside of the range of the Indiana Bat, conservation measures will be targeted toward the protection of the northern long-eared bats and their habitat. Any tree cutting in this area is subject to a time of year restriction unless an acoustical survey is conducted, and in this location tree cutting is allowed between September 1st and April 15th.

There are no other species and/or habitats of special concern in the vicinity of this project.

Agricultural Soils / Floodplains
There are no prime agricultural soils within the project area.

Biologist's Recommendation
The repair or replacement of the existing bridge on its existing alignment are both viable options, as neither would result in a significant long-term adverse impact on the environment. If the bridge span is to be lengthened so as to provide a dry shelf under it, ideally the shelf would be on the western side

of the river. If the bridge needs to be widened, the approaches should be designed with 1:3 slopes without guardrail to avoid and minimize impacts to both wetlands and wildlife habitat and movements. Construction staging may occur on the existing road or to the west of the logging road that comes off of Hayden Crossing Road, to the west of the structure.

Hazardous Materials:

According to the Vermont Agency of Natural Resources (VANR) Vermont Hazardous Sites List, there are no hazardous waste sites located in the immediate project area. It is anticipated that no hazardous waste sites will be impacted.

Historic:

Constructed in 1919 and reconstructed in 1951, Bridge No. 35 on Town Highway 31 in Burke is a 42' long steel rolled thru beam bridge with a concrete cast-in-place deck with metal tube bridge railing and w-beam approach railing.

The bridge is not considered historically significant as the substructure and superstructure, including the bridge railing, do not possess the level of historic, engineering or architectural significance required for inclusion in the National Register of Historic Places (NRHP) individually or as a contributing historic resource to an existing or potential historic district under any of the Criteria Considerations.

There are no historic resources adjacent to Bridge No. 35 in Burke.

Archaeological:

The VTrans Archaeology Officer visited the site on April 13, 2017. The bridge is located in a low wetland area and is surrounded by wetland to the west and then slopes up a steep hill to the west containing a residence outside of the project area. The area to the east consists of a low wet terrace. The northeastern quadrant has been filled to create a yard and the southeastern quadrant has been filled in to create a pull-off.

There are no areas of archaeological sensitivity within or adjacent to the project.

Stormwater:

There are no stormwater concerns for this project.

II. Maintenance of Traffic

The Vermont Agency of Transportation reviews each new project to determine suitability for the Accelerated Bridge Program, which focuses on faster delivery of construction plans, permitting, and Right of Way, as well as faster 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 faster construction techniques and incentives to contractors to complete projects sooner. The Agency will consider the closure option on most projects where rapid reconstruction or rehabilitation is feasible. The use of prefabricated elements in new bridges will also expedite construction schedules. This can

apply to decks, superstructures, and substructures. Accelerated 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

Bridge 35 has been closed to traffic since 2013 due to floor beam failure. This option would keep the bridge closed during construction and continue to reroute traffic onto an offsite detour. The detour route most likely being used since the closure is as follows:

- Hayden Crossing Road, to US Route 5, VT Route 5A, and Burke Hollow Road, back to Hayden Crossing Road. (2.6 miles end-to-end)

Advantages: This option would eliminate the need for a temporary bridge, which would significantly decrease cost and time of construction. This option reduces the time and cost of the project both at the development stage and construction.

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

Option 2: Phased Construction

Phased construction is the maintenance of traffic on the existing bridge while building one lane at a time of the proposed structure. This allows the road to be kept open during construction with minimal impacts to adjacent property owners and environmental resources.

Phased construction will not be considered for traffic control since the existing bridge cannot safely support traffic during construction.

Option 3: Temporary Bridge

From a constructability standpoint, a temporary bridge could be placed either downstream or upstream of the existing bridge. Either option would have negative impacts to the high quality Class II wetlands that are located in all four quadrants of the bridge. Significant additional costs would be incurred to use a temporary bridge, including the cost of the bridge itself, installation and removal, restoration of the disturbed area, and the time and money associated with the temporary Right-of - Way.

The bridge has been closed to traffic since 2013 and a viable detour route exists. A temporary bridge would increase the amount of time to deliver the project, resulting in the bridge being closed longer than necessary, and as such is not being considered further.

III. Alternatives Discussion

No Action

This alternative would involve leaving the bridge in its current condition. Bridge 35 has failed and the roadway has been closed. Since the bridge is already closed to traffic it isn't a safety hazard for motor vehicles making the No Action alternative viable when considering motor vehicles. However due to the amount of section loss in the superstructure, the actual load capacity of the bridge is

unknown and the bridge could present a possible safety concern at some time in the future is used for pedestrian access. As such, the No Action alternative is not recommended. A cost estimate has not been provided for this alternative since there are no immediate costs.

Permanent Bridge Closure

This option would close the bridge to traffic permanently. Hayden Crossing Road runs as a shortcut between Burke Hollow Road and US Route 5, so through traffic would not be impacted by keeping this section of road closed indefinitely. The traffic volume utilizing this stretch of road is relatively small and the lengths of the detours are relatively short as well.

The work recommended for a permanent closure would be as follows:

- Work would need to be performed to prevent the existing structure from falling into the river; the existing deck and superstructure would be removed.

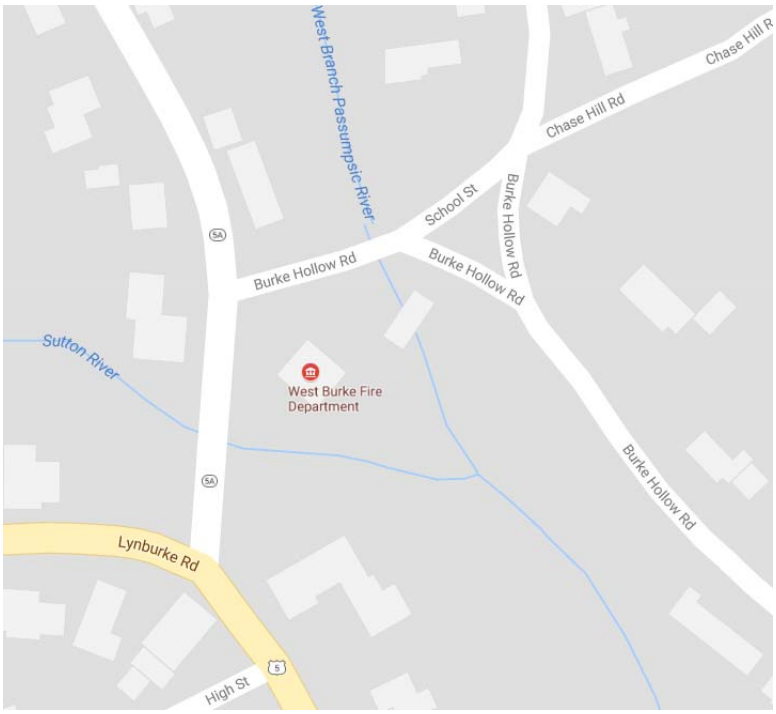
- The paved area on both ends of the bridge would be expanded to allow for a turnaround for maintenance trucks since this would be a dead end on either side. The turnarounds would require permanent right-of-way to be acquired from the adjacent land owners.

- Railing or fencing would be set along the existing abutments to eliminate a fall hazard.

This would provide the lowest cost solution to rectify the issues at this site. In addition, the future maintenance costs would be reduced because there would be no bridge to maintain and the section of Hayden Crossing Road near the existing bridge would see much less traffic if Hayden Crossing Road were to remain closed.

The Town has indicated that walkers and bicyclists are still using the bridge. This option would eliminate access to pedestrians and bikes.

The West Burke Fire Department is located along the detour route on VT Route 5A (See photo to the right). There two bridge crossings (over the West Branch of Passumpsic River and over Sutton River) in the immediate vicinity of the fire department. If the bridge over Sutton river needed to be closed, Bridge 35 could be used as a viable detour route for fire trucks going south on US Route 5. Similarly, if the bridge over the West Branch of the Passumpsic were closed, Bridge 35 could be used as a viable detour route for fire trucks going south on Burke Hollow Road.



Permanent Bridge Closure including a Pedestrian Bridge

This option would be the same as described above, except a pedestrian bridge would be constructed spanning the West Branch of Passumpsic River along Hayden Crossing Road. This would result in a permanent closure for vehicles but would allow pedestrians and bikes to use the crossing.

A pedestrian bridge could be placed in the middle of the roadway or off to one side or the other. If the pedestrian bridge was put off to one side, then the roadway could host a temporary bridge in the future if a detour was needed for another project. The abutments are in satisfactory condition and could be kept in place and used for a pedestrian bridge, making this a cost-effective solution.

Superstructure Replacement

This alternative involves the rehabilitation of the existing abutments and replacement of the existing superstructure.

This option would remove the failed superstructure and replace it with a new 40-foot span precast concrete superstructure. The existing structure is a one-lane bridge, and if a superstructure replacement is chosen as the preferred alternative, the bridge would remain a one-lane bridge, as widening the existing laid up stone abutments would not be cost effective. This would result in one 10-foot travel lane with 2-foot shoulders.

There is a flood insurance study for this bridge, and decreasing the low beam elevation would not be allowed. Due to hydraulics, the superstructure should be chosen to be the shallowest depth possible for that span. A solid slab superstructure with a 3-inch pavement overlay would likely provide the shallowest section.

The existing abutments are constructed with laid up granite blocks, which are resistant to corrosion and deterioration. Placing a new superstructure on existing substructures can be economical if the substructures are in satisfactory or better condition. While the existing substructures are 99 years old, they are in satisfactory condition and it is reasonable to assume that the existing abutments could last another 40 years. The existing laid up granite stone blocks have a concrete cap, which would need to be partially removed and recast. New bridge seats would likely be poured to a higher elevation to raise the low beam elevation.

The existing laid up stone abutments have moderate size voids between them and have seen settlement in the past. The settlement has ceased however, and they are considered stable.

It is anticipated that Right-of-Way will not need to be obtained for any superstructure replacement option. Additionally, overhead utilities and the dry hydrant would not be disturbed during construction.

Full Bridge Replacement On Existing Alignment

This option would involve constructing a new bridge on the existing alignment that addresses the current structural deficiencies of the existing bridge. Additionally, the new bridge would meet current geometric standards in regard to width and vertical curve requirements. However, the

substandard horizontal geometry of the western approach would remain the same for this alternative.

The various considerations under this option include: the bridge width and length, skew, superstructure type and substructure type.

a. Bridge Width

The current rail to rail width is 13.2 feet. This does not meet the minimum standard of 22 feet. Hayden Crossing road currently has a typical section of 24 feet. Additionally, the Burke Town School is located less than a mile from the bridge, which is used by pedestrians traveling to the recreational fields at the school. Since a new 75+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A 22-foot width bridge will be proposed.

b. Bridge Length and Skew

The existing bridge has a clear span of 36 feet between abutment faces, and the abutments are not skewed, which matches the channel well. Hydraulics has recommended a minimum bank full width of 30 feet between abutment faces. A span of 45', providing a clear span of 42' will be assumed for estimating purposes. The bridge will have parallel abutments and no skew in order to match the natural skew of the channel.

c. Superstructure Type

A superstructure type with a shallow profile should be chosen for this option, to provide for a larger hydraulic capacity. A prefabricated structure will be the preferred choice, due to decreased construction time. The possible bridge types for this span length are steel and composite concrete deck and voided or solid slab concrete beams. The superstructure depth is critical for meeting hydraulic recommendations.

d. Substructure Type

The preferred substructure type is an integral abutment founded on piles, to protect against scour. However, a preliminary geotechnical investigation has found that available information on nearby water wells indicates that bedrock is present approximately 20 feet below the ground surface. Based on this information, abutments supported on piles would likely require additional design considerations and pre-boring into the bedrock. As such reinforced concrete abutments on spread footings are likely the first choice for substructures at this site. Borings should be taken at the abutment locations early in the design process to get a good bedrock profile. If borings show that the subsurface is conducive for an integral abutment at this location, then an integral abutment bridge would be recommended. Any rapid construction alternative should have sufficient subsurface information to verify the in-situ conditions.

e. Maintenance of Traffic

As discussed in the Maintenance of Traffic Section, the bridge would remain closed during construction.

Full Bridge Replacement Off Existing Alignment

This option would involve constructing a new bridge on a new alignment located downstream from the existing bridge.

This option would provide a brand new bridge that addresses the current structural deficiencies of the existing bridge. Additionally, the new bridge would meet current geometric standards in regards to width and vertical curve requirements, as well as the horizontal geometry requirements.

The various considerations under this option include: the bridge width and length, skew, superstructure type and substructure type.

a. Alignment

Placing a new structure on a new alignment provides the opportunity to improve two substandard horizontal curves to meet current standards. This option would extend the project length by several hundred feet, require the purchase of permanent easements and have significant impact to the local vegetation and wetlands.

b. Bridge Width

The current rail to rail width is 13.2 feet. This does not meet the minimum standard of 22 feet. Hayden Crossing road currently has a typical section of 24 feet. Additionally, the Burke Town School is located less than a mile from the bridge, which is used by pedestrians traveling to the recreational fields at the school. Since a new 75+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A 22-foot width bridge will be proposed.

c. Bridge Length and Skew

The existing bridge has a clear span of 36 feet between abutment faces, and the abutments are not skewed, which matches the channel well. Hydraulics has recommended a minimum bank full width of 30 feet between abutment faces.

The horizontal alignment for the off-alignment option would result in the roadway crossing the river at a skew. It would be proposed to match this skew in order to keep the length of the bridge as short as possible and hence the superstructure depth as shallow as possible.

The span of the bridge would need to be 52 feet long in order to provide the required clearspan to meet the bank full width requirements. The new bridge would have a skew of 20 degrees to match the natural skew of the channel to the new roadway alignment.

d. Superstructure Type

A superstructure type with a shallow profile should be chosen for this option, to provide for a larger hydraulic capacity. A prefabricated structure will be the preferred choice, due to decreased construction time. The possible bridge types for this span length are steel and composite concrete deck and voided or solid slab concrete beams. The superstructure depth is critical for meeting hydraulic recommendations.

e. Substructure Type

The preferred substructure type is an integral abutment founded on piles, since this type of substructure provides the best scour protection. However, a preliminary geotechnical investigation has found that available information on nearby water wells indicates that bedrock is present approximately 20 feet below the ground surface. Based on this information, abutments supported on piles would likely require additional design considerations and pre-boring into the bedrock. As such reinforced concrete abutments on spread footings are likely the first choice for substructures at this site. Borings should be taken at the abutment locations early on in the design process to get a good bedrock profile. If borings show that the subsurface is conducive for an integral abutment at this location, than an integral abutment bridge would be recommended. Any rapid construction alternative should have sufficient subsurface information to verify the in-situ conditions.

f. Maintenance of Traffic

As discussed in the Maintenance of Traffic Section, the bridge would remain closed during construction.

IV. Alternatives Summary

Based on the existing site conditions, bridge condition, and recommendations from hydraulics, the following alternatives are being considered:

Alternative 1a: Permanent Bridge Closure
Alternative 1b: Permanent Bridge Closure with new Pedestrian Bridge
Alternative 2: Superstructure Replacement with Traffic Maintained on an Offsite Detour
Alternative 3: Full Bridge Replacement ON alignment with Traffic Maintained on an Offsite Detour
Alternative 4: Full Bridge Replacement OFF alignment with Traffic Maintained on an Offsite Detour

V. Cost Matrix[1]

Burke BO 1447(31)		Do Nothing	Alt 1a	Alt 1b	Alt 2	Alt 3	Alt 4
			Permanent Bridge Closure		Superstructure Replacement	Full Bridge Replacement ON Alignment	Full Bridge Replacement OFF Alignment
			No Pedestrian Bridge	Pedestrian Bridge			
			Offsite Detour				
COST	Bridge Cost	$0	$26,400	$152,700	$201,600	$610,500	$712,000
	Removal of Structure	$0	$23,760	$25,080	$25,080	$55,176	$55,176
	Roadway	$0	$86,000	$100,000	$141,000	$151,000	$317,000
	Maintenance of Traffic	$0	$2,000	$2,400	$2,380	$2,000	$4,000
	Construction Costs	$0	$138,160	$280,180	$370,060	$818,676	$1,088,176
	Construction Engineering + Contingencies	$0	$41,448	$56,036	$74,012	$204,669	$250,280
	Total Construction Costs w CEC	**$0**	**$179,608**	**$336,216**	**$444,072**	**$1,023,345**	**$1,338,456**
	Preliminary Engineering[2]	**$0**	**$41,448**	**$98,063**	**$129,521**	**$122,801**	**$163,226**
	Right of Way	**$0**	**$15,000**	**$15,000**	**$0**	**$0**	**$40,000**
	Total Project Costs	$0	$221,056	$434,279	$573,593	$1,146,146	$1,541,683
	Annualized Costs	$0	0	$0	$14,340	$15,280	$20,560
TOWN SHARE			$5,530 (2.5%)	$21,720 (5%)	$14,340 (2.5%)	$57,310 (5%)	$77,090 (5%)
SCHEDULING	Project Development Duration[3]		2 years	2 years	2 years	2 years	4 years
	Construction Duration		2 months	3 months	4 months	6 months	8 months
	Closure Duration (If Applicable)		N/A				
ENGINEERING	Typical Section - Roadway (feet)	24'	24'	24'	24'	24'	24'
	Typical Section - Bridge (feet)	2.1-9-2.1 (one-lane bridge)	N/A	5' wide pedestrian bridge	2-10-2 (one-lane bridge)	2-9-9-2	2-9-9-2
	Geometric Design Criteria	Substandard horizontal curve	Substandard horizontal curve				Meets all geometric standards
	Traffic Safety	No Change	Improved				
	Alignment Change	No	No				Horizontal Alignment Moved Downstream
	Bicycle Access	No Change	Improved				
	Hydraulics	Substandard	Improved				
	Pedestrian Access	No Change	Improved				
	Utility	No Change	No Change			Possible Relocation	Relocation
OTHER	ROW Acquisition	No	Yes		No		Yes
	Road Closure	No	N/A				
	Design Life[4]	N/A	∞	∞	40 Years	75 Years	75 Years

[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.
[4] A design life of 40 years will be assumed for the superstructure replacement option based on the existing substructure rating of "satisfactory".

VI. Conclusion

We recommend **Alternative 1**; a permanent bridge closure.

This option would close the bridge to traffic permanently. Due to the current condition of the existing bridge, along with redundancies in the surrounding roadway network, a permanent bridge closure is recommended at this site as the most cost-effective solution.

In addition, the future maintenance costs will be reduced since there would be no bridge to maintain and the section of Hayden Crossing Road near the existing bridge will see less traffic, reducing the roadway maintenance needs.

Hayden Crossing Road runs as a shortcut between Burke Hollow Road and US Route 5, so through traffic would not be impacted by keeping this section of road closed indefinitely. The roadway has been closed since 2013, and the routes currently being utilized by traffic will continue to be used after the project.

Structure:
As part of a permanent closure project, the deck and superstructure would be removed from the substructure, and railing or fencing would be installed along the existing abutments to eliminate a fall hazard. There is currently a dry hydrant on both sides of the bridge, and the potential for fire trucks or Town maintenance trucks to use Hayden Crossing Road will exist even with a permanent bridge closure. As such, the Town of Burke may elect to construct a truck turnaround on either or both approaches.

The Town has indicated that there is a desire for pedestrians and bicyclists to have a crossing at the existing bridge location. This alternative would have the option to add a permanent pedestrian bridge, which would increase the Town's share from 2.5% to 5%.

VII. Appendices

Site Pictures
Town Map
Bridge Inspection Report
Preliminary Hydraulics
Preliminary Geotechnical Information
Natural Resources Memo
Natural Resources ID
Archeology Memo
Historic Memo
Utility Field Sketch
District Input
Local Input
Plans

Site Pictures

Looking west over bridge

Looking east over bridge

Looking upstream from structure

Looking downstream from structure

Eastern abutment

Western abutment

Existing failed superstructure

Upstream Fascia

Downstream Fascia

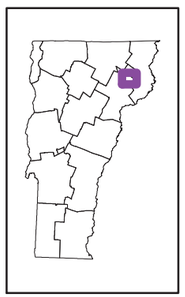
BURKE
TH-31, BR 35

Scale 1:53,174

N

- INTERSTATE
- STATE LONG
- STATE SHORT
- TOWN LONG
- FAS/FAU
- INTERSTATE
- STATE HIGHWAY
- CLASS 1
- CLASS 2
- CLASS 3
- CLASS 4
- LEGAL TRAIL
- PRIVATE
- DISCONTINUED
- DISTRICT
- POLITICAL BOUNDARY
- NAMED RIVERS-STREAMS
- UNNAMED RIVERS-STREAMS
- VOBCIT Bridge Data
- VOBCIT Culvert Data

Produced by:
Mapping Unit
Vermont Agency of Transportation
June 2014



BURKE
CALEDONIA COUNTY
DISTRICT # 7

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for BURKE **bridge no.:** 00035 **District:** 7

Located on: C3031 **ove** WEST BR. PASSUMPSI **approximately** 0.2 MI JCT TH 31 + US 5 **Owner:** 03 TOWN-OWNED

CONDITION

Deck Rating: 5 FAIR

Superstructure Rating: 0 FAILED

Substructure Rating: 6 SATISFACTORY

Channel Rating: 6 SATISFACTORY

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 100302003503021

Federal Sufficiency Rating: 013

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1919 **Year Reconstructed:** 1951

Service On: 1 HIGHWAY

Service Under: 5 WATERWAY

Lanes On the Structure: 01

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 03

ADT: 000400 **% Truck ADT:** 02

Year of ADT: 2008

GEOMETRIC DATA

Length of Maximum Span (ft): 0040

Structure Length (ft): 000042

Lt Curb/Sidewalk Width (ft): 0

Rt Curb/Sidewalk Width (ft): 0

Bridge Rdwy Width Curb-to-Curb (ft): 13.2

Deck Width Out-to-Out (ft): 13.2

Appr. Roadway Width (ft): 024

Skew: 00

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: ROLLED THRU BEAM

Number of Approach Spans 0000 **Number of Main Spans:** 001

Kind of Material and/or Design: 3 STEEL

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 0 NOT APPLICABLE

Type of Membrane 0 NONE

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 0 DOES NOT MEET CURRENT STANDARD

Transitions: 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail Ends: 0 DOES NOT MEET CURRENT STANDARD

Structural Evaluation: 0 BRIDGE CLOSED

Deck Geometry: 0 BRIDGE CLOSED

Underclearances Vertical and Horizontal: 0 BRIDGE CLOSED

Waterway Adequacy: 0 BRIDGE CLOSED

Approach Roadway Alignment: 6 EQUAL TO MINIMUM CRITERIA

Scour Critical Bridges: 2 SCOUR CRITICAL - IMMEDIATE ACTION REQUI

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 2 ALLOWABLE STRESS (AS)

Posting Status: K CLOSED TO TRAFFIC

Bridge Posting: 4 POSTING REQUIRED

Load Posting: 06 BRIDGE CLOSED TO ALL TRAFFIC

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 1 H 10

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 092014 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

09/17/14 Structure is closed due to floorbeam failures in 2013. MJK FE

07/11/13 Structure was closed due to deterioration and overloading. Numerous floorbeams are crushed and connectors sheared off. MJK SP

09/13/12 Poor condition, numerous floorbeams have heavy rusting with holes along their web ends and crushing is noticed in random locations. Structure needs complete replacement soon as deterioration is progressing at a fast pace. ~MJK , JM

04/19/12 Courtesy inspection, No significant changes, Full inspection will done at a later date. MJK

Preliminary Hydraulics

Burke TH-31, Hayden Crossing Road, BO 144-7(31), Pin 12j610
Bridge 35 over the West Branch Passumpsic River, tributary to the Passumpsic River
Site location 0.2 miles east of US-5
GPS coordinates: 44.628746, -71.966744

The existing structure is a one-span rolled steel beam bridge with a concrete deck built in 1919 and reconstructed in 1951. The structure has a 36' - 3" clear span between abutments, and has negligible skew with respect to the channel. This structure was closed to traffic in 2013 due to floor beam failures.

The stream bankfull width indicates the existing bridge does meet state stream equilibrium standards. The existing structure however, does not provide sufficient freeboard at the design flow. Current standards of the VTrans Hydraulic Manual require that this structure provide 1' of freeboard at the 4% AEP. Low beam for this structure is 846.6'. Our analysis indicates that the existing configuration results in a headwater depth of approximately 847.7' at the 4% AEP, with water overtopping the roadway below the 2% AEP.

As approved by Pat Ross, ANR River Management Engineer, a new structure at this location should provide a minimum clear span of 30', measured perpendicular to the flow. The minimum clear span mentioned above should be provided within the channel. If stone fill in front of the abutments is desired, the bridge span may need to be significantly longer.

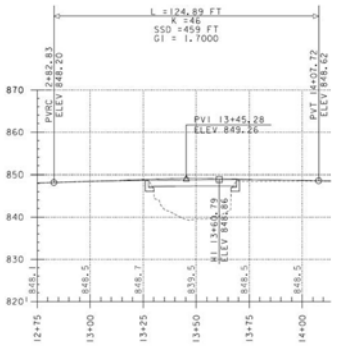
The existing structure provides a waterway opening of approximately 220 square feet. Any new structure should provide additional waterway area, while avoiding raising the grade of the road if possible. This may be achieved by increasing the span and/or decreasing the depth of the superstructure.

There is a flood insurance study for this river. Any alternative is subject to FEMA floodplain and floodway regulations for backwater. Water surface elevations for any proposed alternative must not exceed those of the existing configuration.

The VTrans scoping section has provided the following proposed inlet geometry:

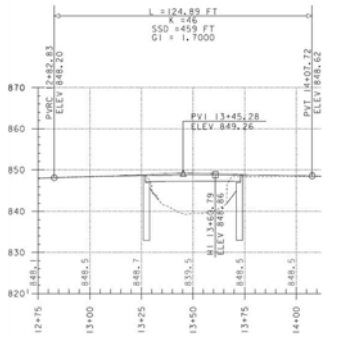
Superstructure Replacement

- Assumptions: 15” prestressed solid slabs with 3”overlay (it may be possible to get this down to a 12” solid slab), 2% normal crown over bridge, 14’ bridge width
- Clear Span between Abutments: 36.25’
- Low Beam (begin Bridge): 847.12’
- Low Beam (end bridge): 847.22’
- Waterway Area: 243.84 sf



Full Bridge Replacement

- Assumptions: 15” prestressed solid slabs with 3”overlay, 2% normal crown over bridge, 24’ bridge width
- Clear Span between Abutments: 42’
- Low Beam (begin bridge): 847.01’
- Low Beam (end bridge): 847.11’
- Waterway Area: 264.18 sf



Based on the proposed configurations detailed above, we provide the following in response:

The provided configurations do not provide sufficient freeboard at the design flow to meet the hydraulic standard. Current standards of the VTrans Hydraulic Manual specify that this structure provide 1' of freeboard at the 4% AEP. The existing structure provides a water surface elevation that exceeds this standard by over 2'. As a result, it is anticipated that a replacement or rehabilitation structure will not meet the hydraulic standard unless the road is substantially elevated, and/or the span significantly increased. It is understood that these options may not be cost-effective or feasible at this location. It is our recommendation that a cost-effective solution be selected that provides the as much hydraulic improvement as possible.

Our analysis indicates that FEMA floodplain and floodway regulations for backwater are met by both proposed alternatives. Water surface elevations do not exceed those of the existing configuration.

Superstructure Replacement
Low beam for this structure is 847.1'. Our analysis indicates that the existing configuration results in a headwater depth of approximately 847.7', with water overtopping the roadway below the 2% AEP.

Full Bridge Replacement
Low beam for this structure is 847.0'. Our analysis indicates that the existing configuration results in a headwater depth of approximately 847.7', with water overtopping the roadway below the 2% AEP.

If a new bridge is installed, the bottom of abutment footings should be at least six feet below the channel bottom, or to ledge, to prevent undermining. Abutments on piles should be designed to be free standing for a scour depth at least six feet below channel bottom. A detailed scour analysis will be completed at final hydraulics.

Please reach out if you have any questions or if we may be of further assistance.

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Jennifer Fitch, P.E., Structures Project Manager

JAC CEE

From: Jace Curtis, Geotechnical Engineer, via Callie Ewald, P.E., Geotechnical Engineering Manager

Date: January 6, 2017

Subject: Burke BO 1447(31) Preliminary Geotechnical Information

1.0 INTRODUCTION

We have completed our preliminary geotechnical investigation for the replacement of Bridge No. 35 on Town Highway 31 (Hayden Crossing) over the West Branch of the Passumpsic River in the Town of Burke, VT. Bridge No. 35 is located approximately 0.2 miles East of the junction of Town Highway 31 and US Route 5. The existing structure is a single span, rolled through beam, cast in place concrete deck bridge on stone abutments. The project is currently in the scoping phase. This review included the examination of as-built record plans, historical in-house bridge boring files, water well logs and hazardous site information on-file at the Agency of Natural Resources, USDA Natural Resources Conservation soil survey records, published surficial and bedrock geologic maps, and observations made during a site visit.

2.0 SUBSURFACE INFORMATION

2.1 Previous Projects

Record plans were not available for the existing structure that was built in 1919 and reconstructed in 1951.

The Geotechnical Engineering Section maintains a GIS based historical record of subsurface investigation, which contains electronic records for the majority of borings completed in the past 10 years. An exploration of this database revealed 1 nearby project within a 3.5-mile radius. Burke BRZ 1447(15) was approximately 3.2 miles away. Boring logs indicated a mixture of relatively dense sands and gravel with boulders, but did not encounter bedrock within a depth of 41 feet.

2.2 Water Well Logs

The Agency of Natural Resources (ANR) documents and publishes all water wells that are drilled for residential or commercial purposes. Published online, these logs can be used to determine general characteristics of the soil strata in the area. The soil description given on the logs is done in the field, by unknown personnel, and as such should only be used as an approximation. Figure 1 contains the subject project as well as surrounding well locations found using the ANR Natural Resources Atlas. Four water wells within an approximate

700-foot radius of the project were used to get an estimate of the depth to bedrock likely to be encountered for Bridge No. 35 and are marked on the figure below.

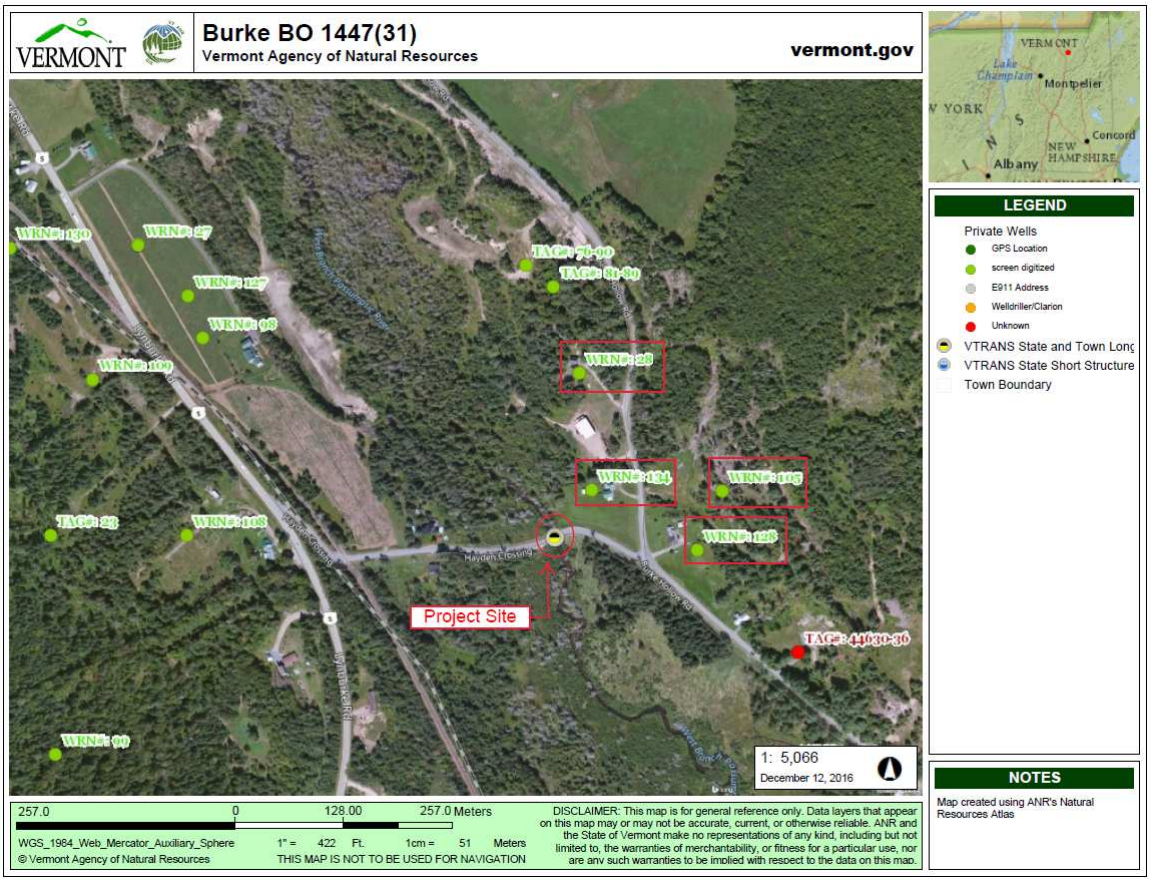


Figure 1. Highlighted well locations near subject project

Table 1 lists the well sites used in gathering the surrounding information. Wells are listed with the distance from the bridge project, depth to bedrock, and overburden material encountered.

Table 1. Summarized characteristics of nearby water wells

Well ID	Approx. Distance From Project (feet)	Approx. Depth To Bedrock (feet)	Overburden Material
134	232	Not Encountered	Gravel
128	572	25	Gravel & Sand
28	657	8	Dirt, Soil, Topsoil, Loam
105	681	21	Gravel & Sand

2.3 Hazardous Materials and Underground Storage Tanks

The ANR Natural Resource Atlas also maps the location and information of known hazardous waste sites and underground storage tanks. The location of this project is not on

the Hazardous Site List but there is a hazardous site located approximately half a mile to the Northwest. Additionally, one underground storage tank is indicated at a location approximately three quarters of a mile to the Northwest but is not anticipated to impact the project. See Figure 2 below for hazard sites in the area.

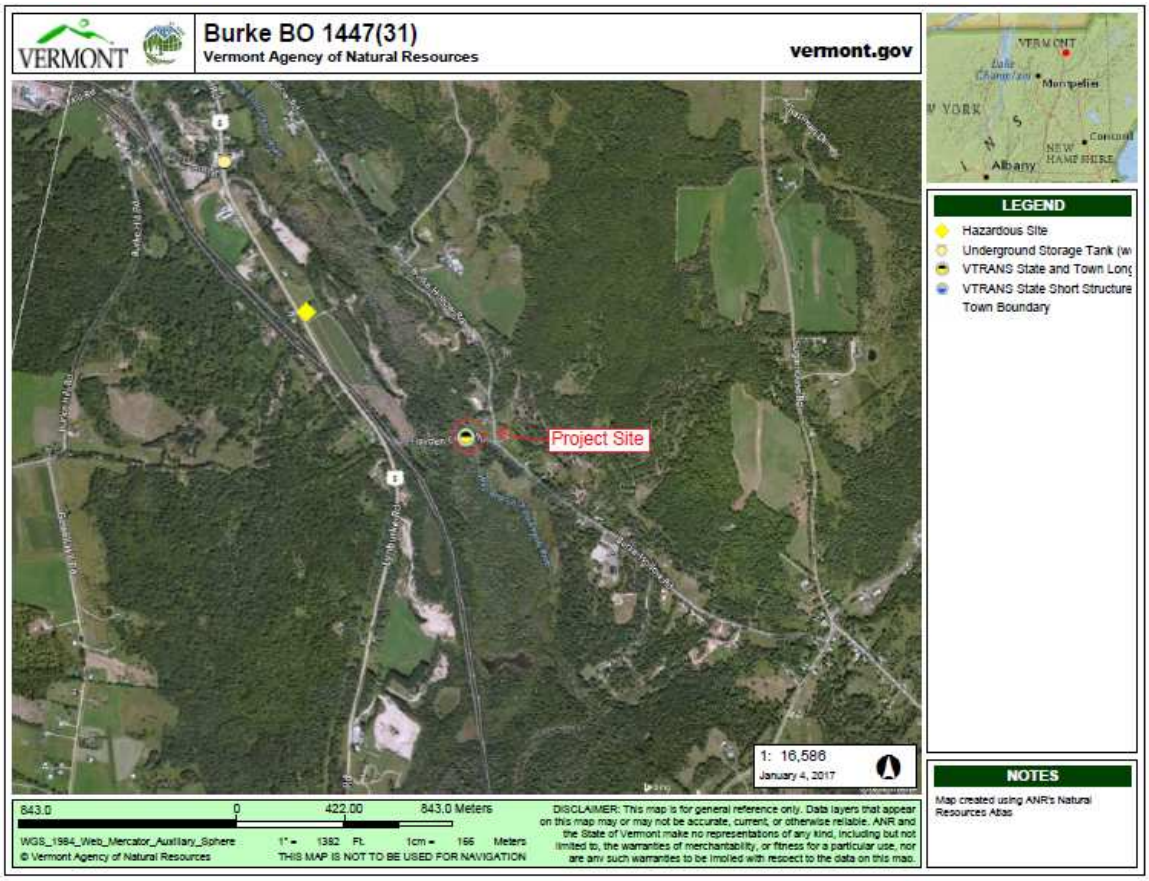


Figure 2: Locations of hazardous sites within a one-mile radius of the project site

2.4 USDA Soil Survey

The United States Department of Agriculture Natural Resources Conservation Service maintains an online surficial geology map of the United States. According to the Web Soil Survey, the stratum directly underlying the project site consists of very poorly drained Wonsqueak & Pondicherry mucks with 0 to 2 percent slopes. The depth to groundwater is approximately 0-6 inches with a depth to bedrock of greater than 80 inches.

2.5 Geologic Maps of Vermont

Mapping conducted in the 1970's for the Surficial Geologic map of Vermont shows that the project area consists of postglacial fluvial alluvium.

According to the 2011 Bedrock Map of Vermont, published by the USGS and State of Vermont, the project is underlain with phyllite and metalimestone.

3.0 BRIDGE INSPECTIONS

An inspection team visited the bridge in September of 2014 and September of 2016 but no inspections were performed as the structure was closed to all traffic. The bridge was closed to all traffic following an inspection in July of 2013 due to crushed floor beams and sheared connectors, as seen in Figures 3-5 below. It was noted in the inspection from September of 2012 that the structure was in need of full replacement due to rapidly progressing deterioration.

Figure 3. Floor beams noted as crushed in the July 2013 inspection report

4.0 FIELD OBSERVATIONS

Pertinent information was gathered during a site visit in December of 2016 to determine any potential issues with boring operations or design considerations. Overhead utilities are located on the north side of the bridge as shown in Figure 6 and should not cause issue for subsurface investigation on the current alignment but could possibly interfere with construction activities. It was also noted that there are fire department stand pipes located off both the NW and SE corners of the bridge. The location at which these pull from the river was not discernable in the field.

Figure 6. View of the existing bridge facing East

Figure 7. View of the existing bridge facing West

5.0 RECOMMENDATIONS

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

- Reinforced concrete abutments on spread footings
- Pile caps on a single row of H-Piles

We recommend a minimum of two borings be taken at opposite corners of the abutments in order to more fully assess the subsurface conditions 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.

When an alternative as well as preliminary alignment has been chosen, the Geotechnical Engineering Section should be contacted to help determine a subsurface investigation that efficiently gathers adequate information for the alternative chosen.

If you have any questions or would like to discuss this report, please contact us by phone at (802) 828-2561, or via email at Jace.Curtis@vermont.gov.

cc: Electronic Read File/DJH
Project File/CEE
JAC

OFFICE MEMORANDUM

AOT - PDB - ENVIRONMENTAL SECTION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Nick Wark, Project Manager
FROM: Jeff Ramsey, Environmental Specialist Supervisor
DATE: May 31, 2017
Project: Burke BO 1447(31)

ENVIRONMENTAL RESOURCES:

Archaeological Site:	___ Yes	_X_ No	See Archaeological Resource ID Memo Issued:
Historic/Historic District:	___ Yes	_X_ No	See Historic Resource ID Memo Issued:
4(f) Property:	___ Yes	_X_ No	
Wetlands:	_X_ Yes	___ No	See Natural Resource ID Memo Issued: 12/05/2016. Class II wetlands exist in all four quadrants of Bridge No.35. Any impacts will require permitting from the Vermont Wetlands office, as well as from the US Army Corps of Engineers
Agricultural Land:	___ Yes	_X_ No	
Fish & Wildlife Habitat:	_X_ Yes	___ No	Both wild and stocked brook trout are located in this area, and impacts below OHE will require a Section 404 Permit.
Wildlife Habitat Connectivity:	___ Yes	_X_ No	
Endangered Species:	_X_ Yes	___ No	The project is within the range of the Northern Long Eared bat, and will require time of year cutting restrictions unless an acoustical survey is conducted.
Invasive Species:	___ Yes	_X_ No	
Stormwater:	___ Yes	_X_ No	
Landscaping:	___ Yes	_X_ No	
6(f) Property:	___ Yes	_X_ No	
Hazardous Waste:	___ Yes	_X_ No	
Contaminated Soils:	___ Yes	_X_ No	
USDA-Forest Service Lands:	___ Yes	_X_ No	
Scenic Highway/Byway:	___ Yes	_X_ No	
Act 250 Permits:	___ Yes	_X_ No	
FEMA Floodplains:	_X_ Yes	___ No	Special Food Hazard Area A2, may require state floodplain permit
Flood Hazard Area/ River Corridor:	_X_ Yes	___ No	This project is located over the West Branch of the Passumpsic River, and will require Title 19 coordination.
US Coast Guard:	___ Yes	_X_ No	
Lakes and Ponds:	___ Yes	_X_ No	
Environmental Justice:	___ Yes	_X_ No	
303D List/ Class A Water/ Outstanding Resource Water	___ Yes	_X_ No	
Source Protection Area:	___ Yes	_X_ No	
Public Water Sources/ Private Wells:	___ Yes	_X_ No	
Other:	___ Yes	_X_ No	

cc: Project File

VERMONT

State of Vermont
Program Development Division
One National Life Drive
Montpelier, VT 05633-5001
www.aot.state.vt.us

Agency of Transportation

[phone] 802-828-2672
[fax] 802-828-2334
[ttd] 800-253-0191

Memorandum

To: Jeff Ramsey, VTrans Environmental Specialist Supervisor

From: John Lepore, VTrans Senior Biologist

Date: December 5, 2016

Subject: BURKE BO 1447 (31)
Natural Resource Identification

Project Description:
This project involves Bridge #35 on Town Highway #31 (Hayden Crossing Road) over the East Branch of the Passumpsic River.

Wetlands/Watercourses:
The East Branch of the Passumpsic River is a cobble-boulder river with clear, but got-brown tannic water. For the most part, it is well-shaded by white cedar which is a significant part of its streamside forest. Along of the East Branch there are signs of mink, raccoon, otter, beaver and weasel. In addition, a variety of waterfowl, woodcock, and large mammals use the adjacent wetlands. Immediately next to Hayden Crossing Road, recent logging within the floodplain has resulted in the conversion of the area from a cedar swamp to a scrub-shrub wetland dominated by a alders, willow, red osier dogwood and grasses. These Class II wetlands wetlands are still of high quality, are present in all four quadrants of this bridge. Any impacts will require permitting from the Vermont Wetlands Office, as well as from the US Army Corps of Engineers.

The existing bridge is a low lying, single span structure with the abutments that meet the water's edge (without any land bench). Above this crossing, there is a 26.3 mile^2 drainage area and according to macroinvertebrate samples, the East Branch in this area is in excellent health both in terms of water quality and aquatic habitat. In addition, fish sampling shows the presence of both wild and stocked brook trout in this area. Any impacts below OHW will require a Section 404 permit from the U.S. Army Corps of Engineers.

Rare, Threatened and Endangered (R/T/E) Species:
This project is within the range of the Northern Long Eared bat, a federally protected species, and is subject to avoidance and minimization measures which protect their habitat and hibernacula. Based on my 2-DEC-2016 site visit, there is only one tree near the bridge which may be considered suitable habitat. This tree is located just south of Hayden Crossing road, as the pavement's edge, about 100' west of the bridge. The areas immediately adjacent to the bridge do not have suitable habitat as it is dominated by shrubs and/or herbaceous vegetation. Since the project is outside of the range of the Indiana Bat, conservation measures will be targeted toward the protection of the northern long-eared bats and their habitat. Any tree cutting in this area is subject to a time of year restriction unless an acoustical survey is conducted, and in this location tree cutting is allowed between September 1st and April 15th.

There are no other species and/or habitats of special concern in the vicinity of this project.

Agricultural Soils:
Prime agricultural are not present in the project area.

Fish and Wildlife Habitat:
This project is located along a rural existing road which crosses a river and its associated floodplain wetlands, and there is nothing to indicate that the bridge or it's approaches are causing either stream instability or vehicle/wildlife conflicts.

Recommendations
The repair or replacement of the existing bridge on its existing alignment are both viable options, as neither would result in a significant long-term adverse impact on the environment. If the bridge span is to be lengthened so as to provide a dry shelf under it, ideally the shelf would be on the western side of the river. If the bridge needs to be widened, the approaches should be designed with 1:3 slopes without guardrail to avoid and minimize impacts to both wetlands and wildlife habitat and movements. Construction staging may occur on the existing road or to the west of the logging road that comes off of Hayden Crossing Road, to the west of the structure.

VERMONT

Jeannine Russell
VTrans Archaeology Officer
State of Vermont
Environmental Section
One National Life Drive
Montpelier, VT 05633-5001
www.aot.state.vt.us

[phone] 802-828-3981
[fax] 802-828-2334
[ttd] 800-253-0191

Agency of Transportation

To: Jeff Ramsey, Environmental Specialist Supervisor

From: Jeannine Russell, VTrans Archaeology Officer

Date: April 17, 2017

Subject: Burke BO 1447(31) – Archaeological Resource ID

The scope for this project has not been fully defined. We have been asked to survey an area surrounding Bridge 35 on Town Highway 31 in Burke.

The VTrans Archaeology Officer visited the site on April 13, 2017. The bridge is located in a low wetland area and is surrounded by wetland to the west and then slopes up a steep hill to the west containing a residence outside of the project area. The area to the east consists of a low wet terrace. The northeastern quad has been filled to create a yard and the southeastern quad has been filled in to create a pull-off.

There are no areas of archaeological sensitivity within or adjacent to the project. A formal clearance will be provided when plans are available for review.

Please let me know if you have any questions.

Thank you,
Jen Russell
VTrans Archaeology Officer

VTrans Working to Get You There
Vermont Agency of Transportation

Figure 1: Project location

Figure 2: Google image of the immediate project area

VERMONT

Vermont Agency of Transportation
Project Delivery Bureau - Environmental Section
One National Life Drive
Montpelier, VT 05633-5001
Tel: 802.828.1708

To: Jeff Ramsey, Environmental Specialist Supervisor

From: Judith Williams Ehrlich, VTrans Historic Preservation Officer

Date: May 30, 2017

Subject: Historic Resource Identification for Burke BO 1447(31)

I have completed a resource identification (ID) for Burke BO 1447(31).

Constructed in 1919 and reconstructed in 1951, Bridge No. 35 on Town Highway 31 in Burke is a 42' long steel rolled thru beam bridge with a concrete cast-in-place deck with metal tube bridge railing and w-beam approach railing located approximately 0.2 miles east of the junction of TH 31 and US 5. Bridge No. 35 carries TH 31 over the West Branch of the Passumpsic River.

Bridge No. 35 has been closed to traffic since 2013 due to extensive deterioration and overloading. Numerous floor beams are crushed and connectors are sheared off.

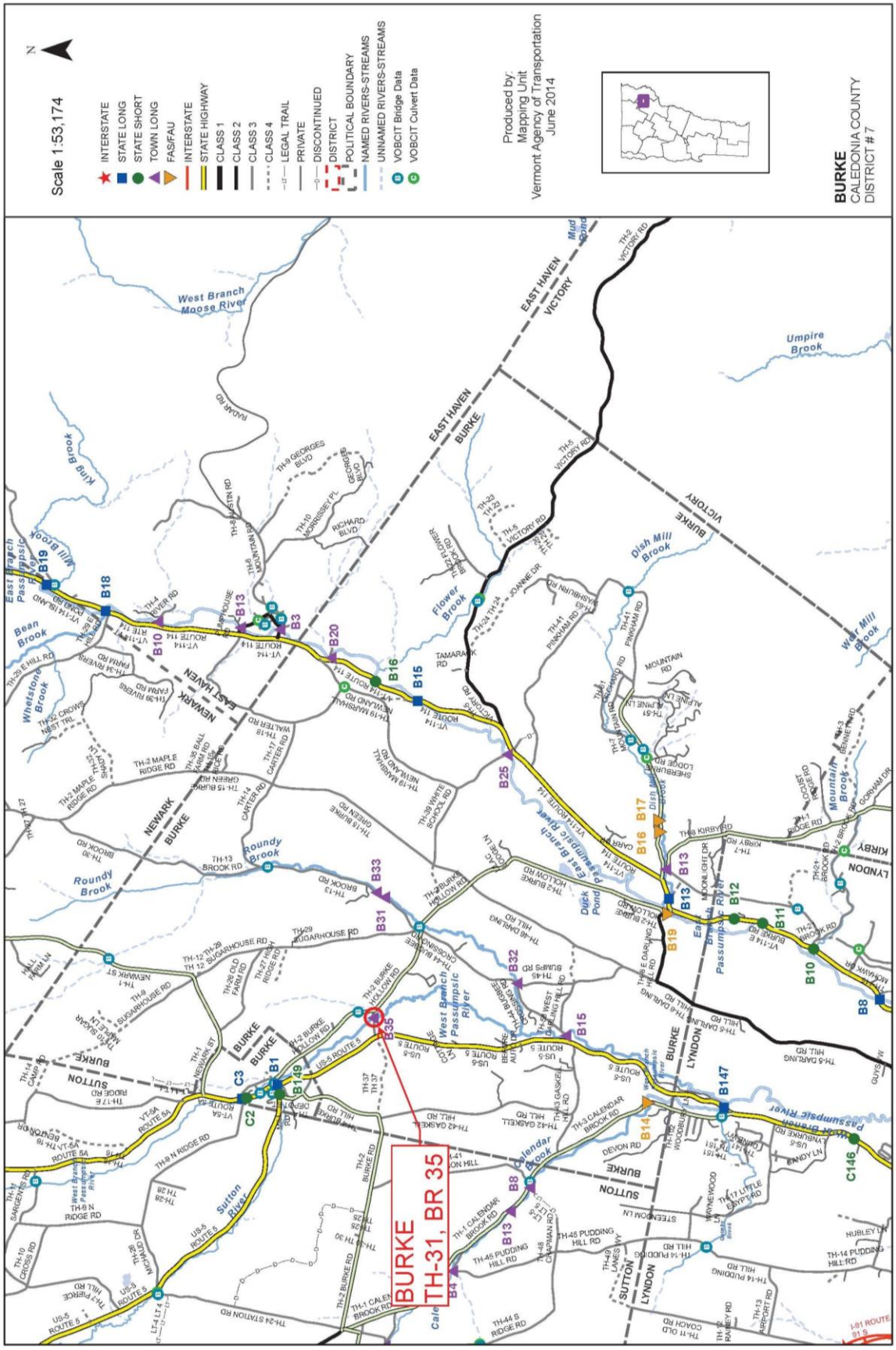
The bridge is not considered historically significant as the sub- and superstructure, including the bridge railing, do not possess the level of historic, engineering or architectural significance required for inclusion in the National Register of Historic Places (NRHP) individually or as a contributing historic resource to an existing or potential historic district under any of the Criteria Considerations.

There are no historic resources adjacent to Bridge No. 35 in Burke.

Please do not hesitate to contact me should you require additional information.

Attachments

- Map
- Photos

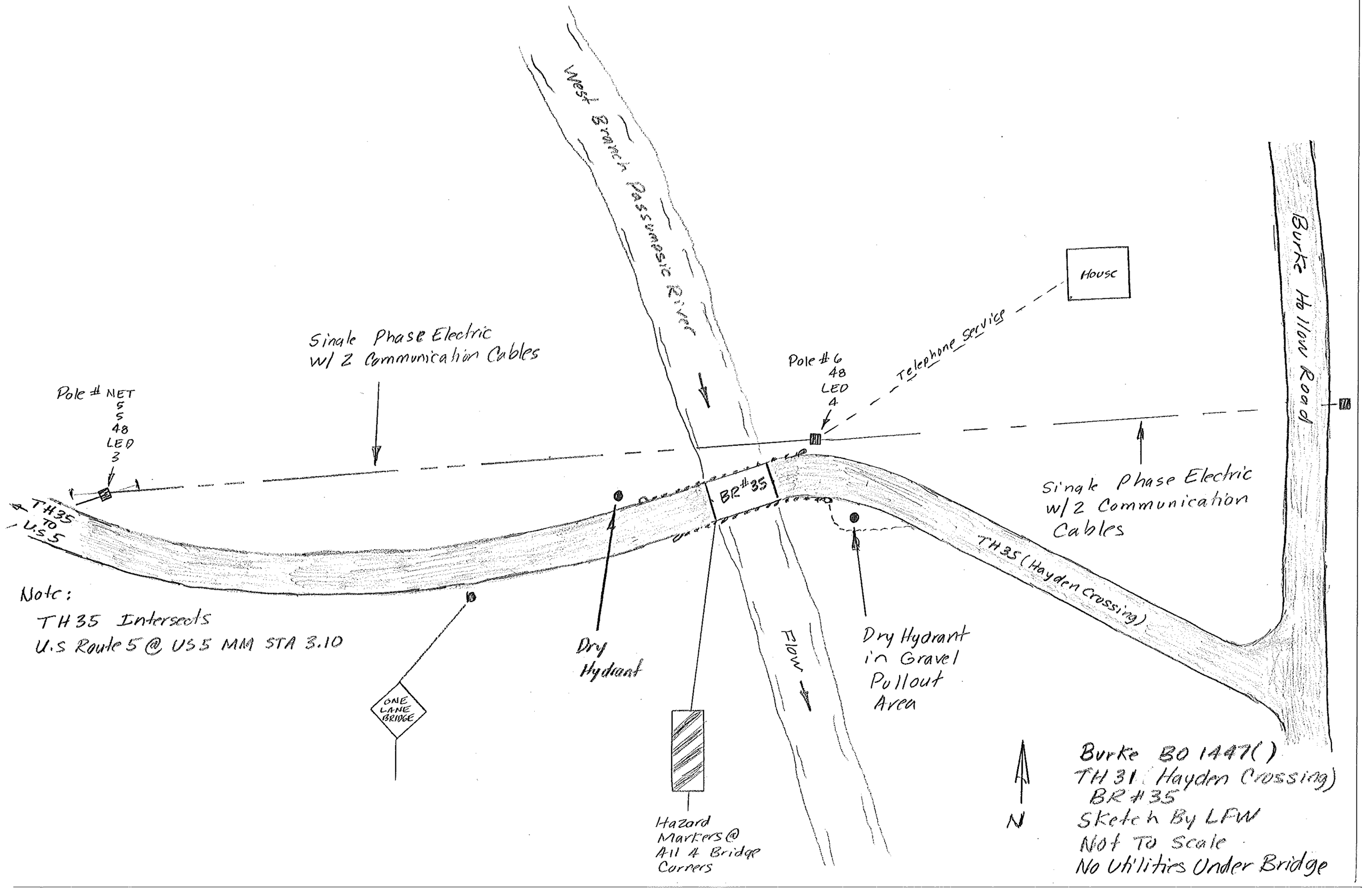


Location of Bridge No. 35, TH 31, Burke.

Bridge No. 35; View to the west.

Bridge No. 32; View north. Note metal tube guardrail.

Bridge No. 35; Note extensive rust.


West Branch Des Moines River
Burke Hollow Road
House
Telephone Service
Single Phase Electric
w/ 2 Communication Cables
Pole # 6
48
LED
4
Pole # NET
S
S
48
LED
3
TH35
TO
U.S 5
BR#35
TH 35 (Hayden Crossing)
Single Phase Electric
w/ 2 Communication
Cables
Note:
TH 35 Intersects
U.S Route 5 @ US 5 MM STA 3.10
ONE
LANE
BRIDGE
Dry
Hydrant
Hazard
Markers @
All 4 Bridge
Corners
Flow
Dry Hydrant
in Gravel
Pullout
Area
N
Burke BO 1447( )
TH 31 (Hayden Crossing)
BR#35
Sketch By LFW
Not To Scale
No Utilities Under Bridge

Bridge Scoping Project Burke BO 1447(31)
Operations Input Questionnaire

The Structures Section has begun the scoping process for Burke BO 1447(31), Town Highway 31, Bridge 35, over the Passumpsic River. This is a rolled beam with concrete deck bridge constructed in 1919, and closed in 2013. The Structure Inspection, Inventory, and Appraisal Sheet (attached) rates the deck as 5 (fair), the superstructure as 0 (failed), and the substructure as 6 (satisfactory). We are interested in hearing your thoughts regarding the items listed below. Leave it blank if you don't wish to comment on a particular item.

1. Any comments on the geometry of the bridge (curve, sag, banking, sight distance)?

2. Do you feel the posted speed limit is appropriate?
   Not sure what it is but there is an intersection right off the end of the bridge which has traffic coming to a stop (when the bridge was open).

3. Is the width adequate for snow plowing?
   It is a one lane bridge – town was able to plow it with a smaller truck. Town also felt that it being narrow kept the speed down.

4. Are the railings constantly in need of repair or replacement? What type of railing works best for your district?
   The railings on this bridge are completely obsolete. Other bridges that the town has rehabbed lately have had the rail replaced with fascia mounted steel beam guard rail.

5. Are you aware of any unpermitted driveways within the likely project limits? We frequently encounter driveways that prevent us from meeting railing standards and then discover them to be illegal.
   Contact town.

6. Are you aware of abutting property owners that are likely to need special attention during the planning and construction phases? These could be people with disabilities, elderly, or simply folks who feel they have been unfairly treated in the past.
   Contact town.

7. Do you find that extra effort is required to keep the slopes and river banks around the bridge in a stable condition? Is there frequent flood damage that demands repair?

I am not aware of slope or river bank issues but I do know that the abutments have had undermining. The soils are very poor in this area and the abutment foundations unknown. Settlement and scour have been issues.

8. Does this bridge seem to pick up an unusual amount of debris from the waterway?
   There is a great deal of debris on this river corridor but not too much seem to get hung up in the bridge.

9. If there is a sidewalk on this bridge, how effective are the Town's efforts to keep it snow and ice free?
   No sidewalk exists.

10. Are there any drainage issues that we should address on this project?
    Contact town.

11. Are you aware of any complaints that the public has about issues that we can address on this project?
    Only that some town folks have complained that it is closed.

12. Anything else?
    Prior to this becoming a project through Vtrans, I tried to convince the town to not replace it; to just remove the bridge and throw up that section of the road. Two out of the three selectboard members were in agreement on that. The bridge was closed (due to condition) and nothing more really came of it. The initial closure caused some conversation with the traveling public because it was used as a shortcut from US 5 to the Burke Town School, but really it is only roughly 1 mile around. I have not heard any discussion since.

Local & Regional Input Questionnaire

This project, BO 1447(31), focuses on bridge 35 on town highway 31 in Burke, Vermont. The bridge is closed and is in need of either a major maintenance action or replacement. Potential options being considered for this project include replacement with a new bridge placed in the same location, removal of the existing bridge and replacement in a new location, or abandonment of the existing bridge and removal of the structure before it falls into the river. With the fact that the bridge is currently closed, it is probable that VTrans will recommend a road closure and detour traffic away from the project site for the duration of the work.

Community Considerations

1. Are there regularly scheduled public events in the community that will generate increased traffic (e.g. vehicular, bicycles and/or pedestrians)? 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.

   No.

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

   There was less traffic during the summer when school was not in session

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.

   The Town garage is approx. 2 miles North & not affected by the closure. We have 2 fire depts one on either side of Hayden Crossing. There are dry hydrants on each side of closed bridge.

   (~2 miles) West Burke: Chief Tom Villeneuve 467-3350 East Burke Chief Brian Greer 626-4685 (~4 miles)

   Lyndon Rescue is out of Lyndonville

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

   Burke Town School is ~½ mile from the bridge. Community uses their softball field.

5. 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.

   → Burke Area Chamber of Commerce 347 E. Burke Rd E. Burke, VT 05832
   burkechamber@burkevermont.com 626-4124

   → NVDA Doug Morton 748-1221
   dmorton@nvda.net

Schools

1. Where are the schools in your community and what are their schedules?
   Burke Town School is ~½ mile from the bridge @ 3293 Burke Hollow Rd West Burke, VT 05871. Sept. 1 - mid June, 7:50am – 2:50 pm
   Also private schools: East Burke School 611 VT 114 East Burke
   Burke Mountain Academy 60 Alpine Ln E. Burke
2. Is this project on specific routes that school buses or students use to walk to and from school?
   No.
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?
   Currently closed to both.
2. Are the current lane and shoulder widths adequate for pedestrian and bicycle use?
   No - narrow, one lane bridge with no shoulders.
3. Does the community feel there is a need for a sidewalk or bike lane on the bridge?
   There is some community desire for bike and ped. passage here
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?

   Kingdom Trails (bike trails) are not close by but bikers have used this crossing to get there.

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?

   It is on a bit of a skew.

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

   Narrow, one lane. Was inadequate when in use.

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

   No.

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

   Yes. This is a low-lying marsh area crossing.

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? Wetlands.

7. Are there any utilities (water, sewer, communications, power) attached to the existing bridge? Please provide any available documentation.
   No.

8. Are there any existing, pending, or planned municipal utility projects (communications, lighting, drainage, water, wastewater, etc. near the project that should be considered?
   No.

9. With the fact that the bridge is already closed, and has been for a while, does the town want a new bridge for vehicles at this location? If not, will a pedestrian bridge be wanted at this location? Town officials feel that it is not practical or cost effective to replace the vehicular bridge given the relatively short detour options and anticipated environmental issues involved. The Town would be interested in a bike/ped. option if the cost was reasonable. *However there is interest from the community to explore replacing the bridge for vehicular traffic. Given that, we would like to continue with the scoping phase for replacement. We will re-evaluate once that is complete and costs are known.

* Revision

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

Land Use & Zoning

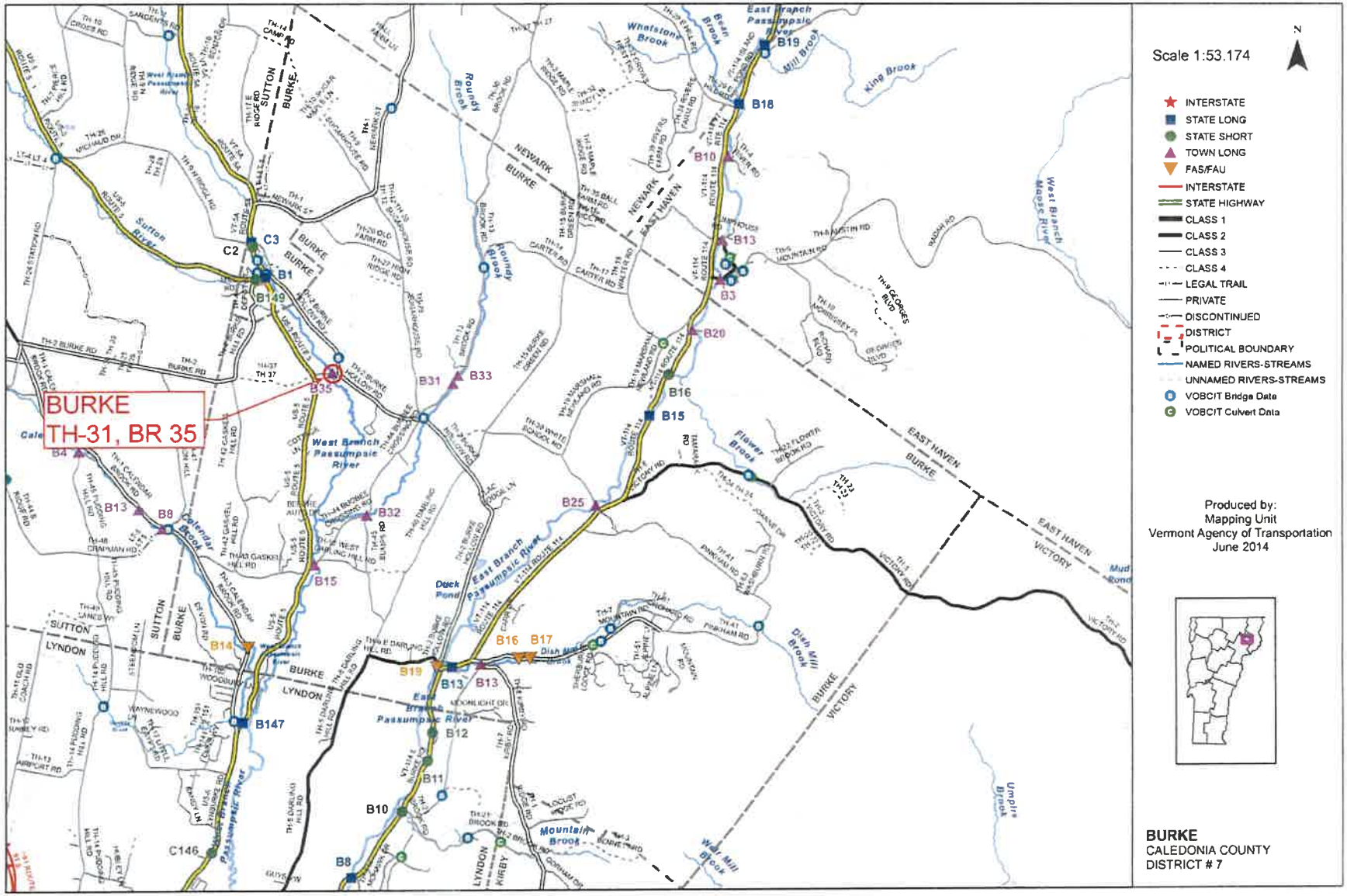
1. Please provide a copy of your existing and future land use map or zoning map, if applicable.
   n/a

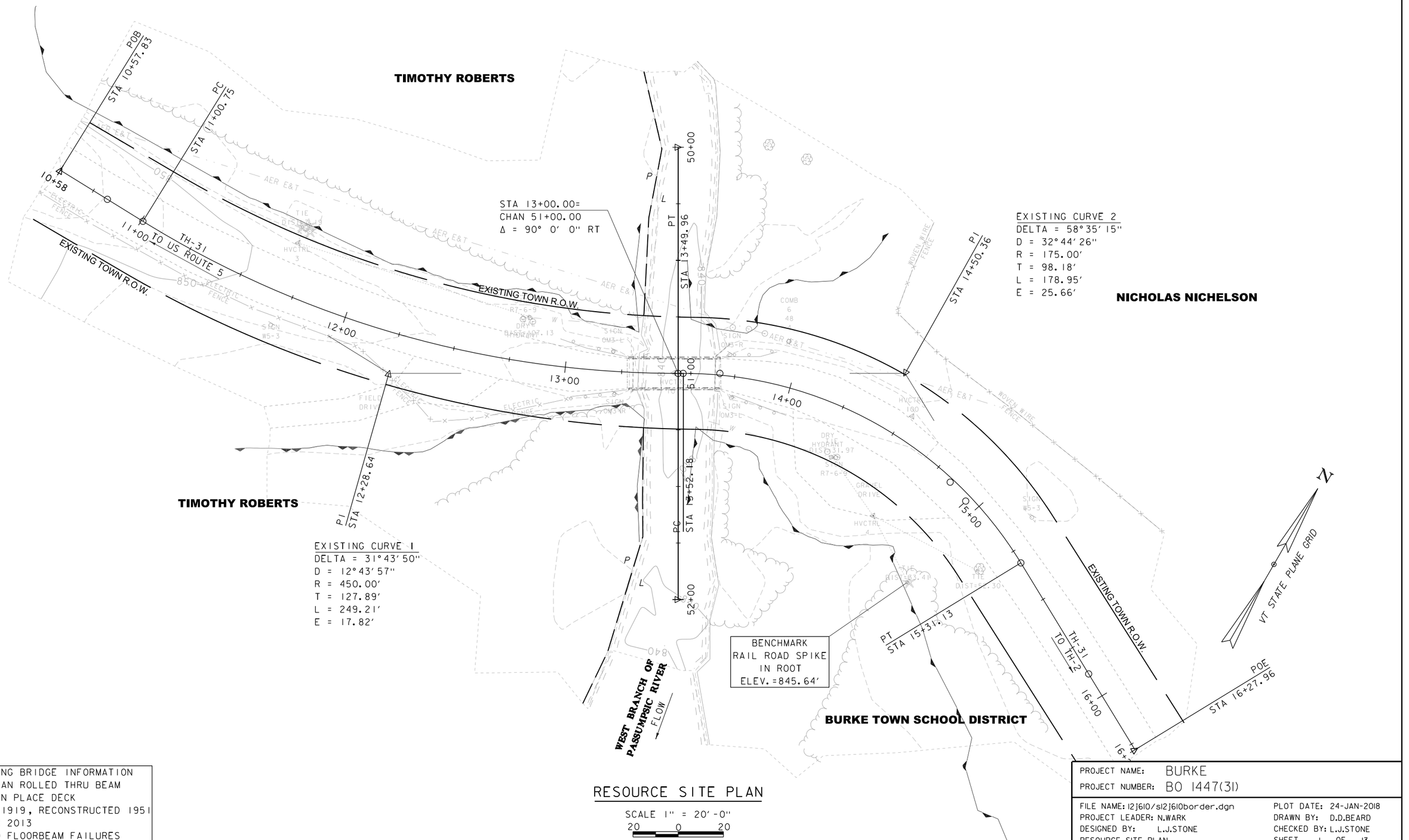
2. Are there any existing, pending or planned development proposal that would impact future transportation patterns near the bridge? If so, please explain.
   Potential growth of Kingdom Trails (possibly).

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.
   Caledonian Record
   Burke Town website / chamber of Commerce website / FB pages
   Magic 97.7 - Lyndon KIXX 105.5 St. Johnsbury
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?


BURKE
TH-31, BR 35
Scale 1:53.174
N
INTERSTATE
STATE LONG
STATE SHORT
TOWN LONG
FAS/FAU
INTERSTATE
STATE HIGHWAY
CLASS 1
CLASS 2
CLASS 3
CLASS 4
LEGAL TRAIL
PRIVATE
DISCONTINUED
DISTRICT
POLITICAL BOUNDARY
NAMED RIVERS-STREAMS
UNNAMED RIVERS-STREAMS
VOBCIT Bridge Data
VOBCIT Culvert Data
Produced by:
Mapping Unit
Vermont Agency of Transportation
June 2014
BURKE
CALEDONIA COUNTY
DISTRICT # 7



RESOURCE SITE PLAN

SCALE 1" = 20'-0"

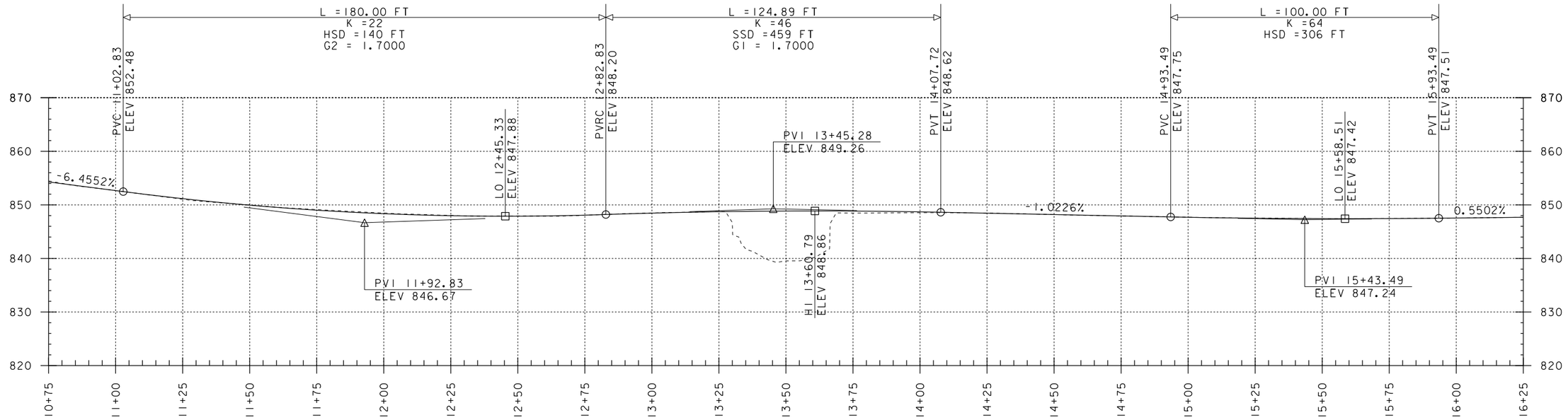
20 0 20

EXISTING BRIDGE INFORMATION
42' SPAN ROLLED THRU BEAM
CAST IN PLACE DECK
BUILT 1919, RECONSTRUCTED 1951
CLOSED 2013
DUE TO FLOORBEAM FAILURES

PROJECT NAME: BURKE
PROJECT NUMBER: BO 1447(31)

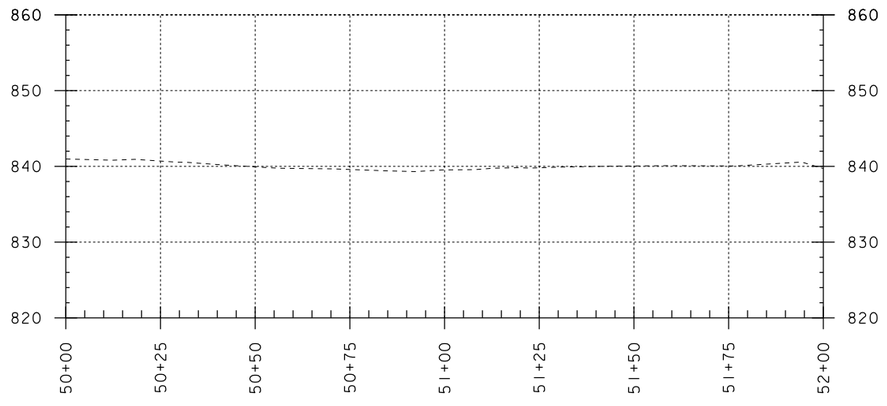
FILE NAME: 12j610/sl2j610border.dgn
PROJECT LEADER: N.WARK
DESIGNED BY: L.J.STONE
RESOURCE SITE PLAN

PLOT DATE: 24-JAN-2018
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 1 OF 13



BURKE TH-31 EXISTING PROFILE

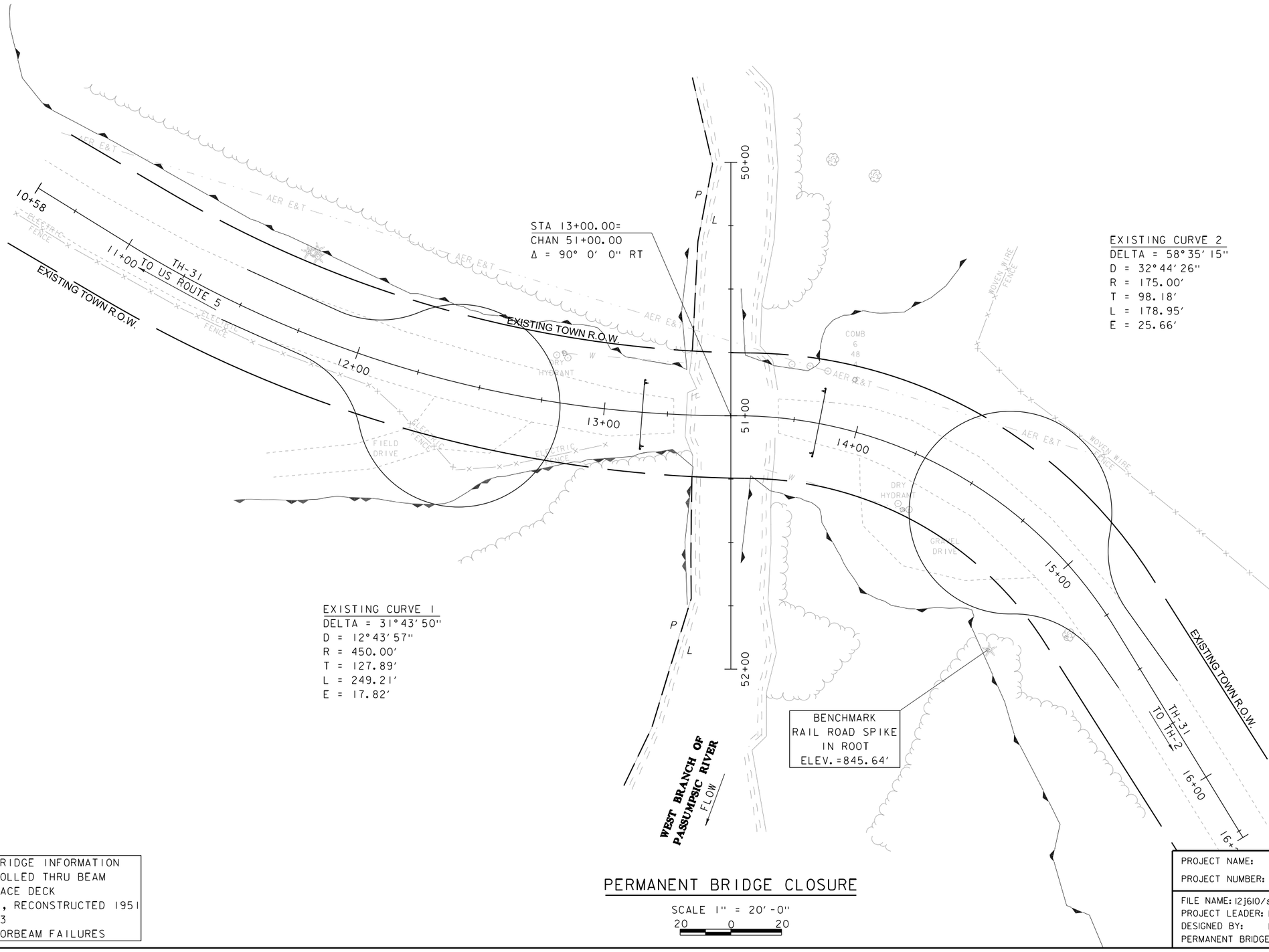
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"



CHANNEL PROFILE

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

PROJECT NAME:	BURKE
PROJECT NUMBER:	BO 1447(31)
FILE NAME: 12j610/sl2j610profile.dgn	PLOT DATE: 24-JAN-2018
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
EXISTING PROFILE SHEET	SHEET 2 OF 13



EXISTING CURVE 2
DELTA = 58°35'15"
D = 32°44'26"
R = 175.00'
T = 98.18'
L = 178.95'
E = 25.66'

EXISTING CURVE 1
DELTA = 31°43'50"
D = 12°43'57"
R = 450.00'
T = 127.89'
L = 249.21'
E = 17.82'

EXISTING BRIDGE INFORMATION
42' SPAN ROLLED THRU BEAM
CAST IN PLACE DECK
BUILT 1919, RECONSTRUCTED 1951
CLOSED 2013
DUE TO FLOORBEAM FAILURES

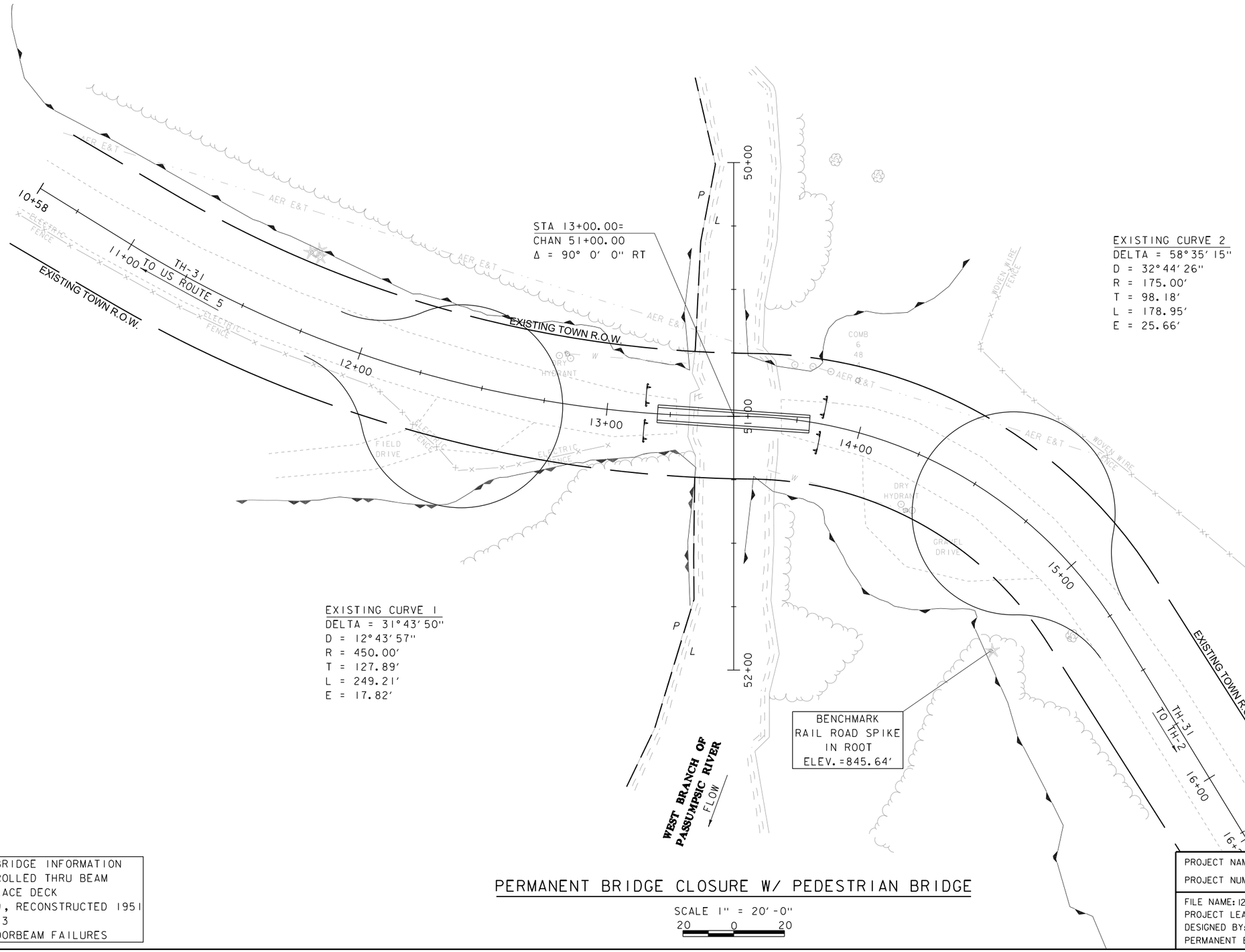
PERMANENT BRIDGE CLOSURE

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

PROJECT NAME: BURKE
PROJECT NUMBER: BO 1447(31)

FILE NAME: 12j610/s12j610border.dgn
PROJECT LEADER: N.WARK
DESIGNED BY: L.J.STONE
PERMANENT BRIDGE CLOSURE

PLOT DATE: 24-JAN-2018
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 3 OF 13



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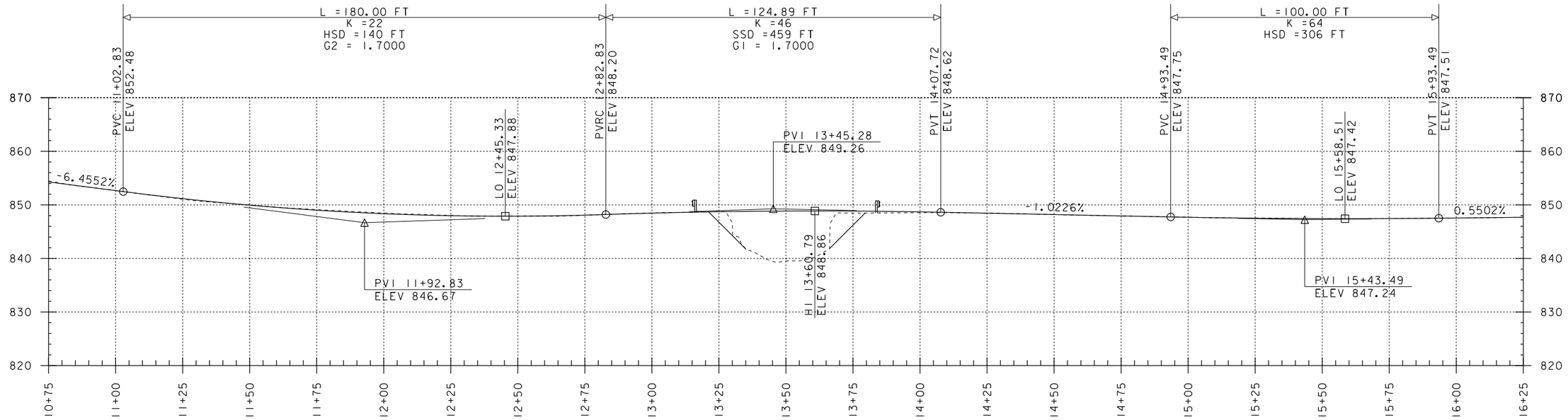
EXISTING BRIDGE INFORMATION
42' SPAN ROLLED THRU BEAM
CAST IN PLACE DECK
BUILT 1919, RECONSTRUCTED 1951
CLOSED 2013
DUE TO FLOORBEAM FAILURES

PERMANENT BRIDGE CLOSURE W/ PEDESTRIAN BRIDGE

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

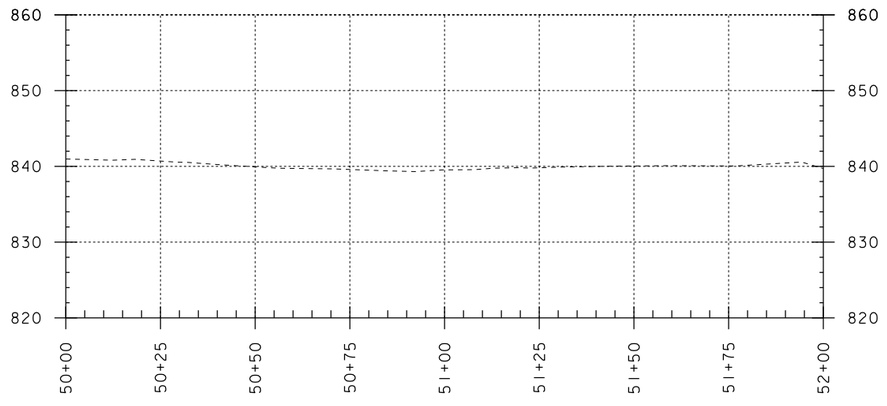
PROJECT NAME: BURKE
PROJECT NUMBER: BO 1447(31)

FILE NAME: 12j610/sl2j610border.dgn
PROJECT LEADER: N.WARK
DESIGNED BY: L.J.STONE
PERMANENT BRIDGE CLOSURE W/ PED BRIDGE
PLOT DATE: 24-JAN-2018
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE



BURKE TH-31 ALTERNATIVE 1 PROFILE

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



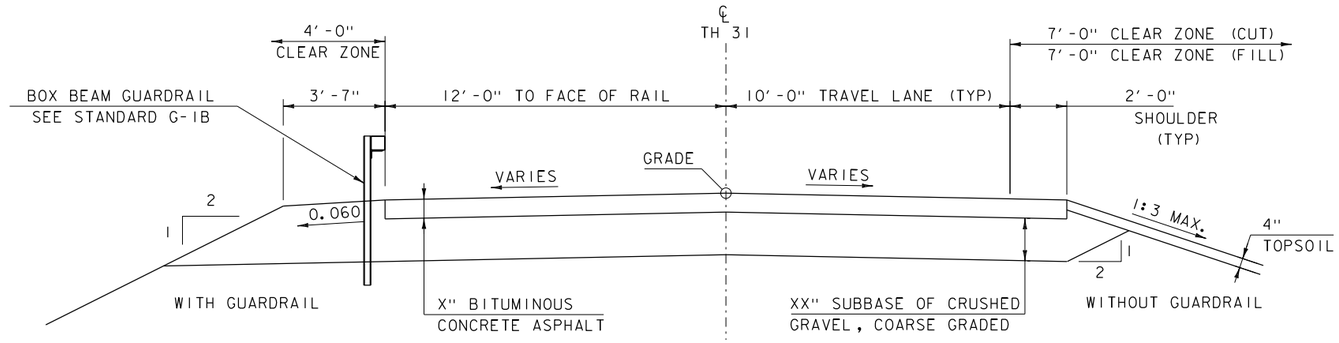
CHANNEL PROFILE

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

PROJECT NAME: BURKE
PROJECT NUMBER: BO 1447(31)

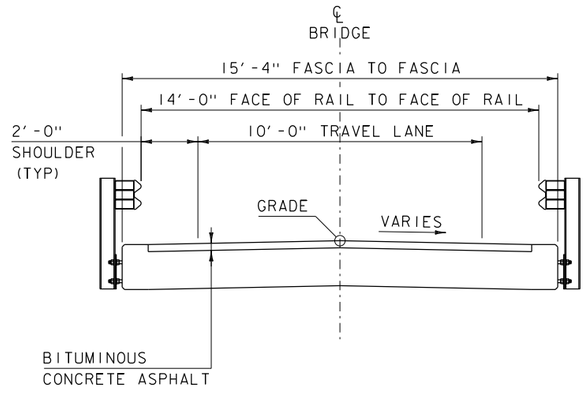
FILE NAME: 12j610/sl2j610profile.dgn
PROJECT LEADER: N.WARK
DESIGNED BY: L.J.STONE
ALTERNATIVE 1 PROFILE SHEET

PLOT DATE: 24-JAN-2018
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 5 OF 13



PROPOSED TH 31 TYPICAL SECTION

SCALE 3/8" = 1'-0"



FLOW

SUPERSTRUCTURE REPLACEMENT TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

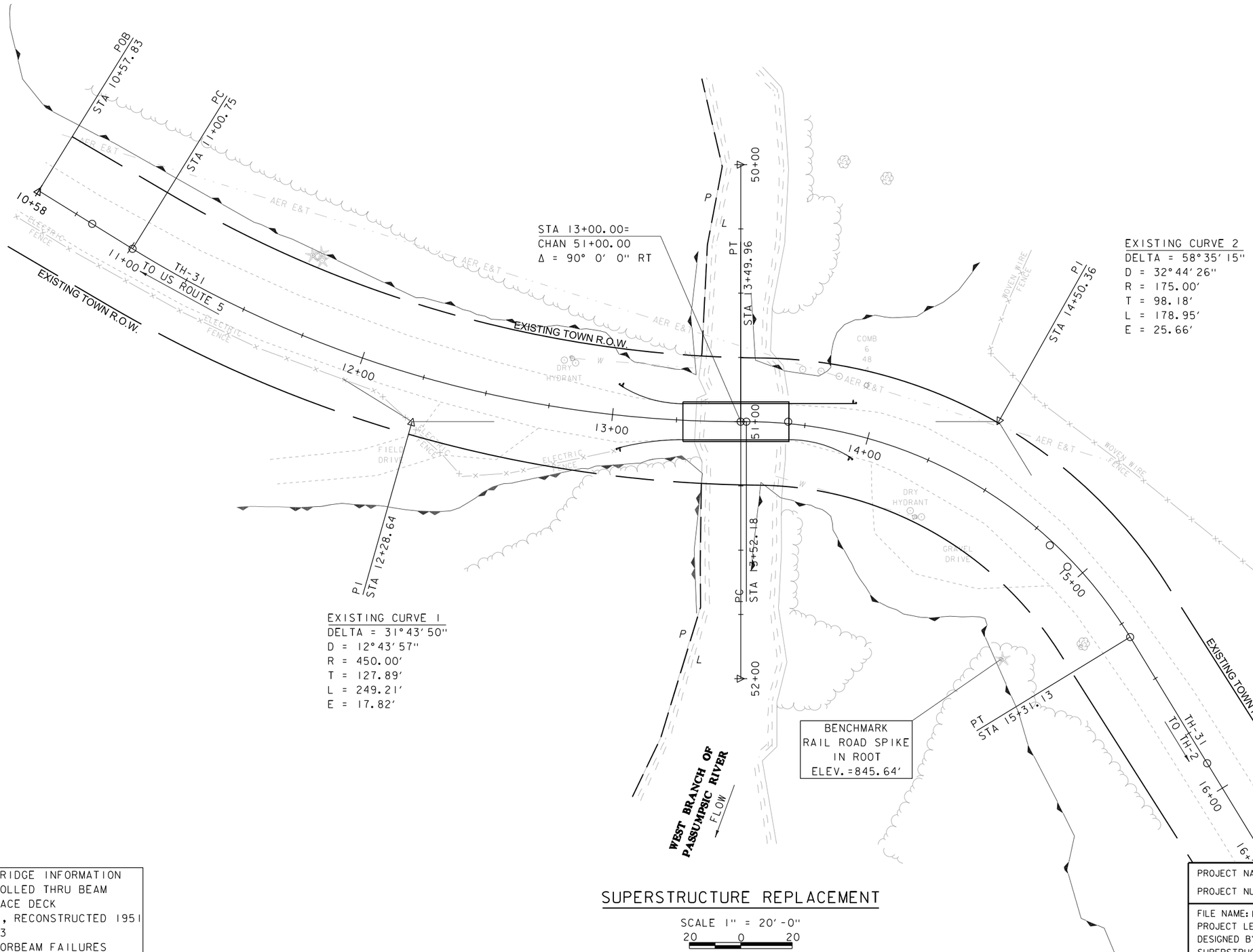
(IF USED ON PROJECT)

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

PROJECT NAME: BURKE
PROJECT NUMBER: BO 1447(31)

FILE NAME: 12j610\s12j610typ.dgn
PROJECT LEADER: N.WARK
DESIGNED BY: L.J.STONE
TYPICAL SECTIONS

PLOT DATE: 24-JAN-2018
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 6 OF 13



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EXISTING CURVE 2
DELTA = 58°35'15"
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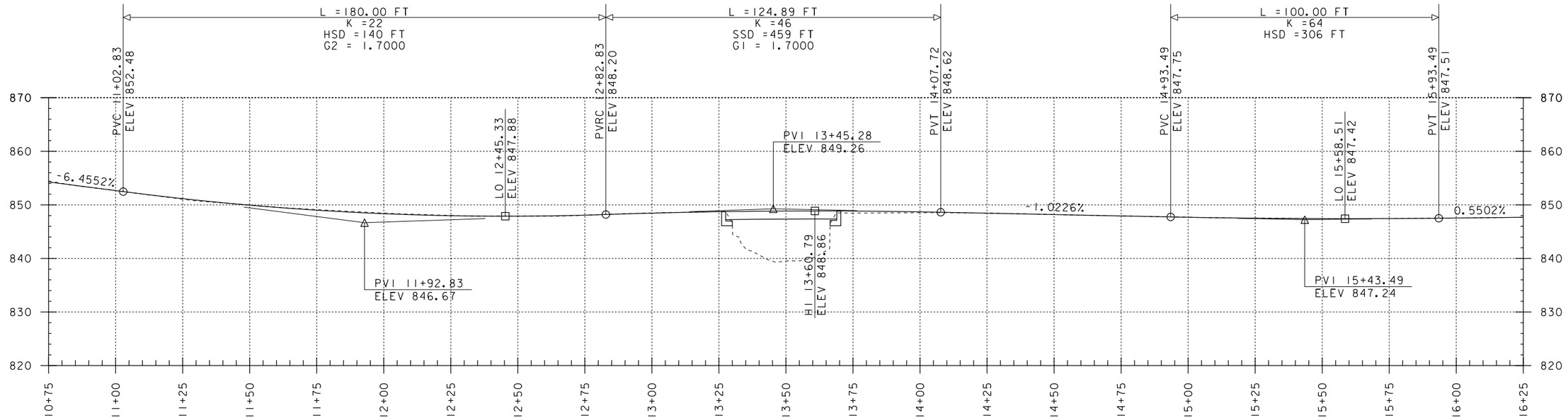
EXISTING BRIDGE INFORMATION
42' SPAN ROLLED THRU BEAM
CAST IN PLACE DECK
BUILT 1919, RECONSTRUCTED 1951
CLOSED 2013
DUE TO FLOORBEAM FAILURES

SUPERSTRUCTURE REPLACEMENT

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

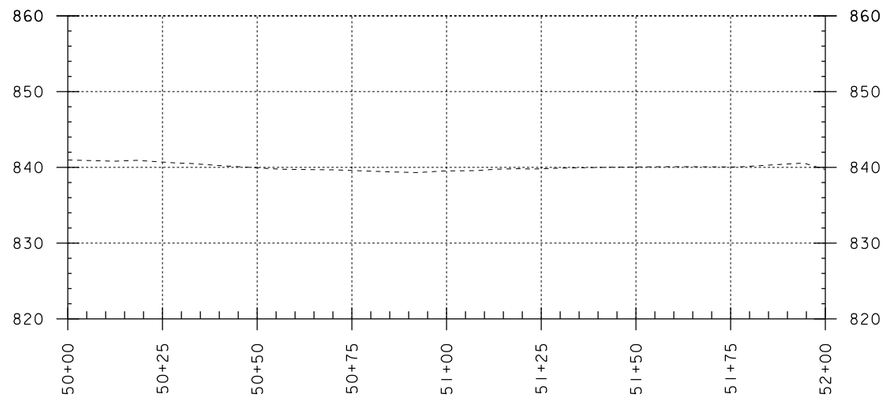
PROJECT NAME: BURKE
PROJECT NUMBER: BO 1447(31)

FILE NAME: 12j610/sl2j610border.dgn
PROJECT LEADER: N.WARK
DESIGNED BY: L.J.STONE
SUPERSTRUCTURE REPLACEMENT
PLOT DATE: 24-JAN-2018
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 7 OF 13



BURKE TH-31 ALTERNATIVE 2 PROFILE

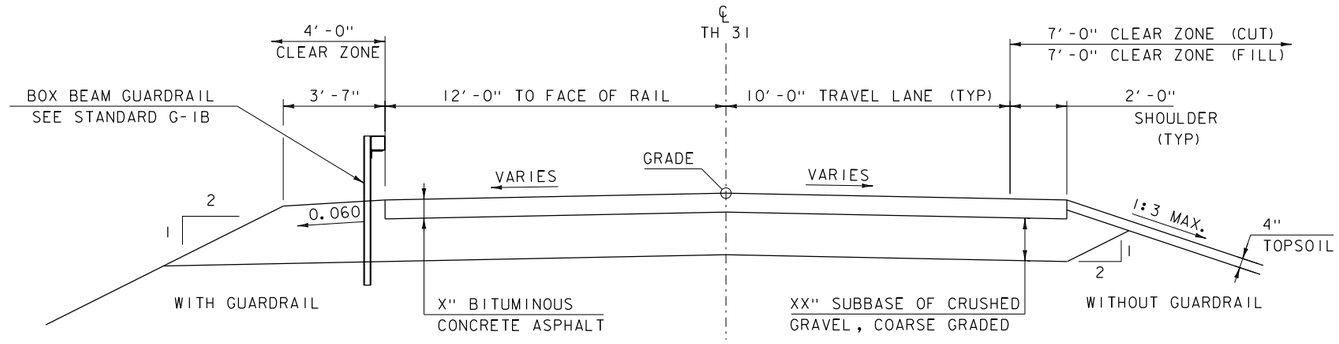
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"



CHANNEL PROFILE

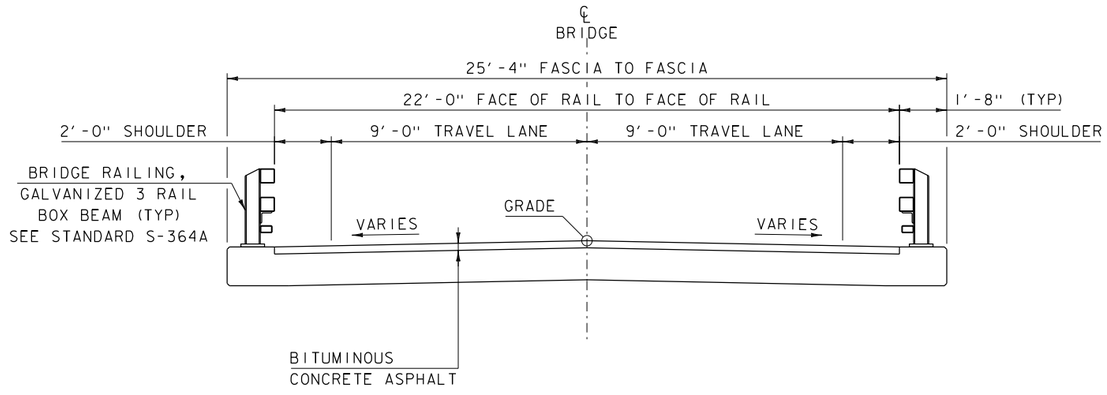
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

PROJECT NAME:	BURKE
PROJECT NUMBER:	BO 1447(31)
FILE NAME: 12j610/sl2j610profile.dgn	PLOT DATE: 24-JAN-2018
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
ALTERNATIVE 2 PROFILE SHEET	SHEET 8 OF 13



PROPOSED TH 31 TYPICAL SECTION

SCALE 3/8" = 1'-0"



FLOW

FULL BRIDGE REPLACEMENT TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

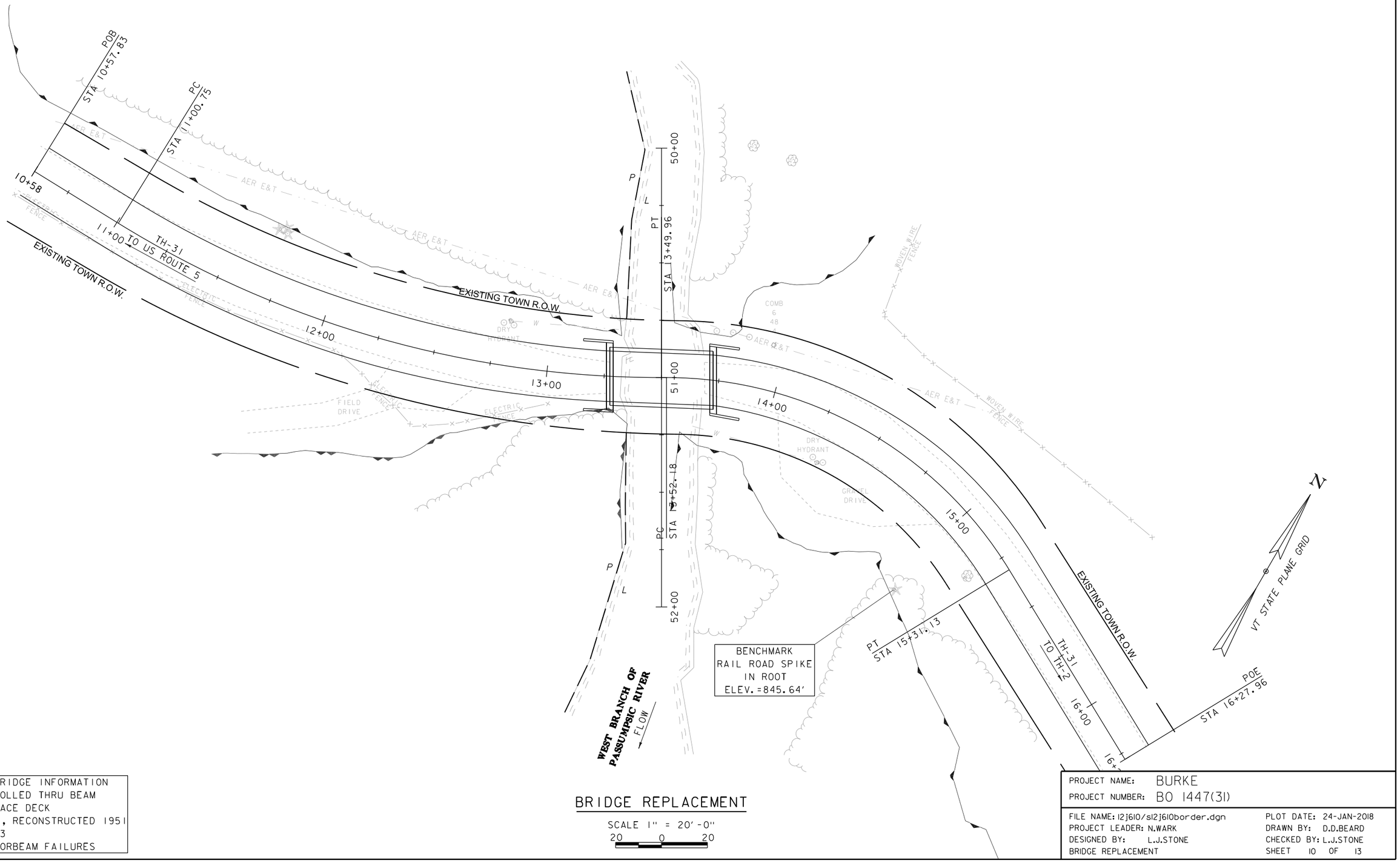
(IF USED ON PROJECT)

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

PROJECT NAME: BURKE
PROJECT NUMBER: BO 1447(31)

FILE NAME: 12j610\s12j610typ.dgn
PROJECT LEADER: N.WARK
DESIGNED BY: L.J.STONE
TYPICAL SECTIONS

PLOT DATE: 24-JAN-2018
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 9 OF 13



EXISTING BRIDGE INFORMATION
42' SPAN ROLLED THRU BEAM
CAST IN PLACE DECK
BUILT 1919, RECONSTRUCTED 1951
CLOSED 2013
DUE TO FLOORBEAM FAILURES

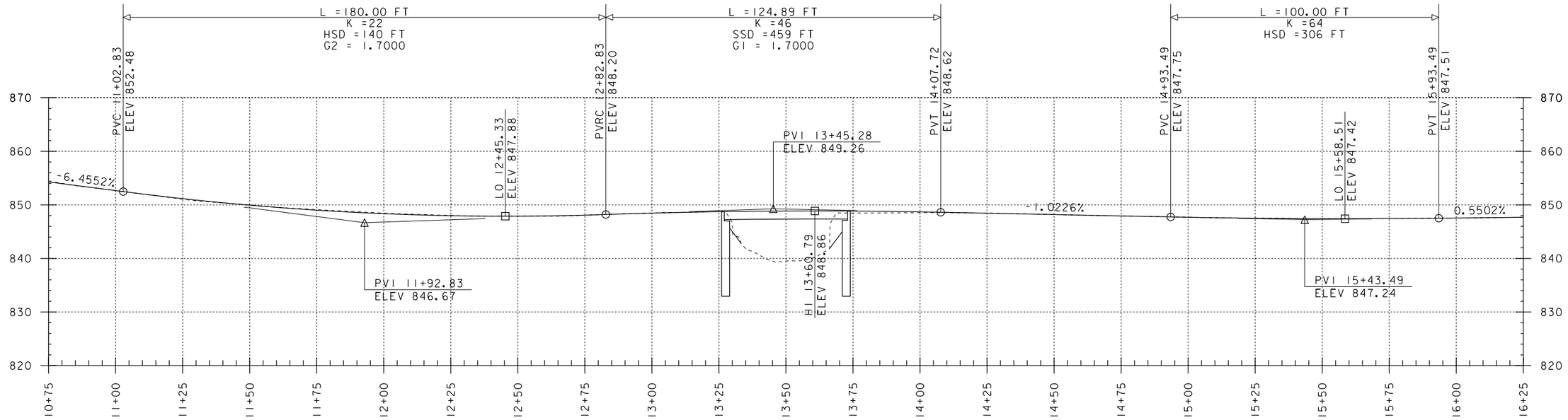
BRIDGE REPLACEMENT

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

PROJECT NAME: BURKE
PROJECT NUMBER: BO 1447(31)

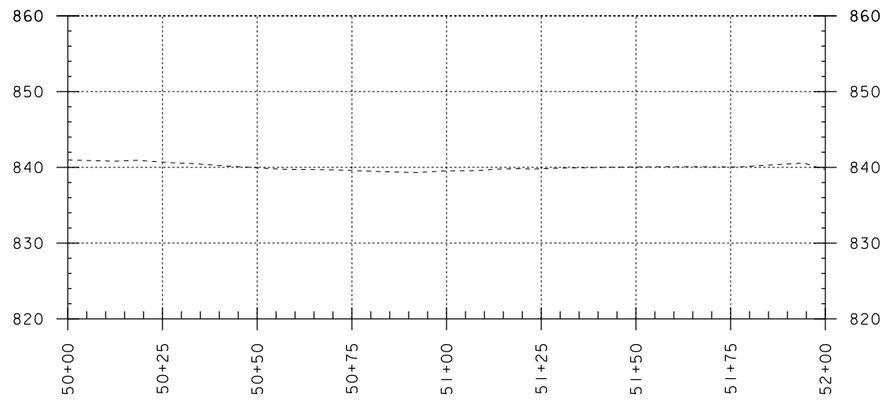
FILE NAME: 12j610/s12j610border.dgn
PROJECT LEADER: N.WARK
DESIGNED BY: L.J.STONE
BRIDGE REPLACEMENT

PLOT DATE: 24-JAN-2018
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 10 OF 13



BURKE TH-31 ALTERNATIVE 3 PROFILE

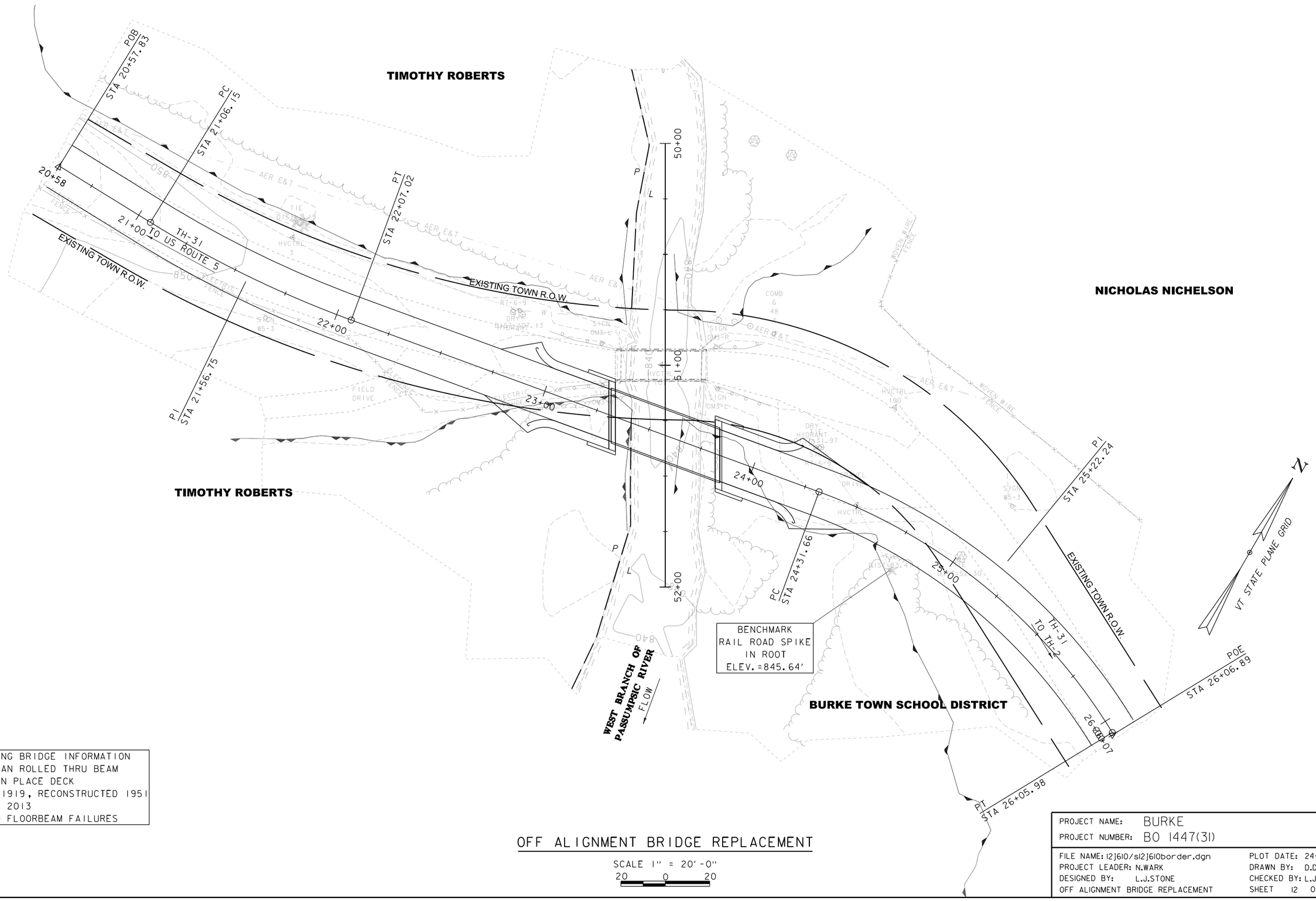
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"



CHANNEL PROFILE

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

PROJECT NAME:	BURKE
PROJECT NUMBER:	BO 1447(31)
FILE NAME: 12j610/sl2j610profile.dgn	PLOT DATE: 24-JAN-2018
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
ALTERNATIVE 3 PROFILE SHEET	SHEET 11 OF 13



EXISTING BRIDGE INFORMATION
42' SPAN ROLLED THRU BEAM
CAST IN PLACE DECK
BUILT 1919, RECONSTRUCTED 1951
CLOSED 2013
DUE TO FLOORBEAM FAILURES

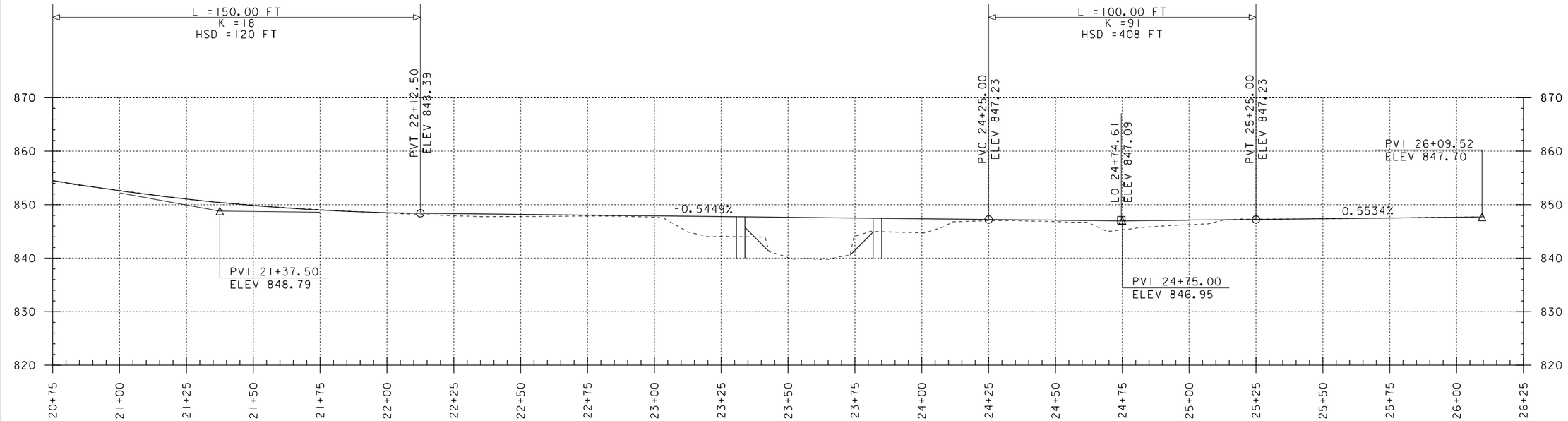
OFF ALIGNMENT BRIDGE REPLACEMENT

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

PROJECT NAME: BURKE
PROJECT NUMBER: BO 1447(31)

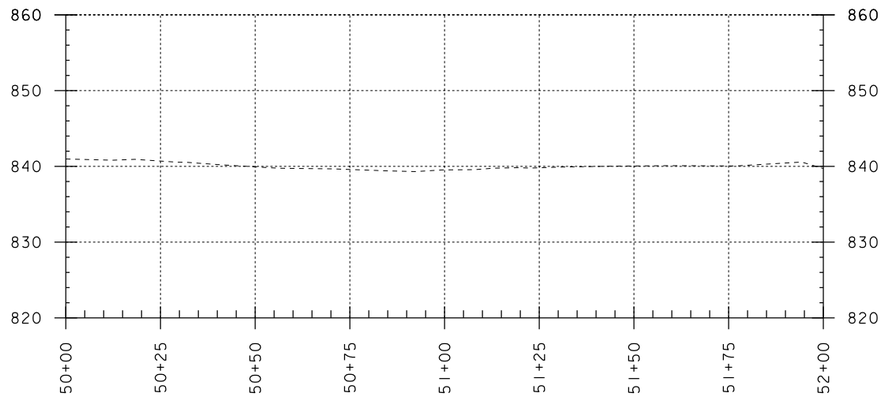
FILE NAME: 12j610/s12j610border.dgn
PROJECT LEADER: N.WARK
DESIGNED BY: L.J.STONE
OFF ALIGNMENT BRIDGE REPLACEMENT

PLOT DATE: 24-JAN-2018
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 12 OF 13



BURKE TH-31 ALTERNATIVE 4 PROFILE

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



CHANNEL PROFILE

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

PROJECT NAME:	BURKE
PROJECT NUMBER:	BO 1447(31)
FILE NAME: 12j610/sl2j610profile.dgn	PLOT DATE: 24-JAN-2018
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
ALTERNATIVE 4 PROFILE SHEET	SHEET 13 OF 13