STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Ludlow Village BO 1443(52)

Town Highway 324, Mill St., BRIDGE 57 Over Black River

December 11, 2019

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I. Site Information

Bridge 57 is a Town owned bridge located on TH-324, Mill St. in Ludlow Village over Black River. The south end of the bridge is at the intersection of Mill St. and TH-5, Pleasant St. Bridge 57 is a historic one-lane pony truss that has been closed to traffic since 2007. The existing conditions were gathered from a combination of a site visit, the Bridge Inspection Report, and the existing survey. See correspondence in the Appendix for more detailed information.

Roadway Classification	Local Road, Class 3 – Paved
Bridge Type	Single span, riveted steel Warren Pony Truss
Bridge Length	82 feet
Year Built	1929
County	Windsor
Ownership	Town of Ludlow

Need

Bridge 57 carries TH-324, Mill St. over the Black River. The following is a list of the deficiencies of Bridge 57 and TH-324 at this location.

1. Bridge 57 is considered Structurally Deficient and was closed to vehicular traffic on October 10th, 2007 due to the amount of section loss in the gusset plate connections and floorbeams.

2. The deck is in serious condition with large sections of spalling with exposed reinforcing steel on both the top and underside of the deck.

3. The substructures are in poor condition. The backwalls have many cracks with leaks throughout. The bridge seats are spalling on the ends. Additionally, the abutment stems have cracks with leakage throughout as well as some areas of deep spalling.

4. The existing bridge width is allowable for one-lane or two-lane local bridges that are designated to remain in place. However, it does not meet the minimum standard width for new construction and is too narrow for two-way truck traffic.

5. The horizontal geometry of the bridge and intersection with TH-5, Pleasant St., is such that some emergency vehicles and trucks cannot negotiation the corner. A wider bridge at this location would allow a broader range of trucks and other large vehicles to use it.

6. There is an unshielded utility pole on Mill St. right at the clear zone limit.

7. The existing bridge railing is substandard.

8. The bridge does not meet the minimum hydraulic standards and acts as a dam in flood events and backwater due to this structure, contributes to flooding in Ludlow Village.

Traffic

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

TRAFFIC DATA	2018	2038
AADT	140	160
DHV	30	30
ADTT	10	15
%T	7.3	9.3

Design Criteria

The design standards for this bridge project are the Vermont State Standards (VSS), dated October 22, 1997, AASHTO's A Policy on Geometric Design of Highways and Streets, 6th Edition (AASHTO Green Book) and the 2010 edition of VTrans Structures Design Manual. The minimum standards referenced in the following table are for a Two-Lane Local Road based on an ADT of 0-200 and a design speed of 25 mph.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 6.3	9'/0' (18')	9'/2' (22')	
Bridge Lane and Shoulder Widths	VSS Table 6.4 and Section 6.6	9'/0' (18')	9/2 (22')[1]	
Clear Zone Distance	VSS Table 6.5	There is an unshielded utility pole in the clear zone at station approximately 11+75.	7' fill / 7' cut	Substandard
Banking	VSS Section 4.13	e = +/- 0%	8% (max)	
Speed	VSS Section 4.3	25 mph (by ordinance)	25 mph (Design)	
Horizontal Alignment	AASHTO Green Book Table 3-10b	Bridge is on tangent. Approx. shoulder of Pleasant St. is about 2.5' beyond Begin Bridge.		
Vertical Grade	VSS Table 6.6	0.27% to -3.3%	7% (max) for Level terrain	
K Values for Vertical Curves	VSS Table 6.1	K_{crest}=16 (Bridge) K_{sag}= 61 (northern approach)	20 Crest 30 Sag	Substandard
Vertical Clearance	NA	NA	NA	
Stopping Sight Distance	VSS Table 6.1	378' on bridge 341' north of bridge	150'	
Bicycle/Pedestrian Criteria	VSS Table 6.7	None	2' Shoulder	Substandard
Bridge Railing	Design Manual Sect. 13 & VTrans Bridge Rail Policy	Obsolete built-up single rail.	TL-2	Substandard
Hydraulics	VSS Sect. 6.7, and VTrans 2015 Hydraulics Manual	(-)2.3' of freeboard at the Q_{25} (4% AEP) storm event Clearspan provided: 70'	Pass Q_{25} storm event with 1.0' minimum of freeboard Minimum Bank Full Width: 49'	Substandard Hydraulically
Structural Capacity	Structures Design Manual	Structurally Deficient	Design Live Load: HL-93	Substandard

[1] As the Owner of this bridge, the Town has the right to request that the bridge width remain as is; 18'.

Inspection Report Summary
The ratings provided below are from the most recent inspection performed on September 15, 2017.

Deck Rating:	3 Serious
Superstructure Rating	2 Critical
Substructure Rating	4 Poor
Channel Rating	7 Good

From the Structure Inspection, Inventory, and Appraisal Sheet:

"09/15/2017 – This structure remains closed." JW/SP

Detailed Inspection Notes from 6/15/2006

- Deck: The deck is in poor condition. Full depth holes could occur anytime and anyplace.
- Superstructure: The end post at abutment 1 doesn't have much support at the inside at the gusset plates. The outside truss could buckle. There is not much support for the bearing in the inside eastern abutment. This area should be repaired. Timber blocks were added under the floorbeams to add support fir the ends of the floorbeams. The structure still needs to be replaced or repaired soon. The superstructure is still in poor condition.

Hydraulics
The existing structure does not meet the minimum hydraulic requirements. There is overtopping at all design flows including the Q_{10} design storm. Hydraulic standards require a minimum of 1 foot of freeboard for the Q_{25} discharge for Local Roads. The existing structure provides (-)2.3-feet of freeboard at this design storm. Additionally, the bridge acts as a dam in flood events and backwater due to this structure, contributes to flooding in Ludlow Village. See the preliminary hydraulics report in Appendix D for additional information.

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

<u>Municipal Utilities</u>

- There does not appear to be a sewer line on TH-324 (Mill St.) in the vicinity of the bridge. It is possible that the homes nearer the north end of Mill St. are served by sewers, but there is no information available in that area.
- There is a sewer main on TH-322 (Pleasant St.) as shown on the layout.
- There is also a 6" water line on the east side of the bridge that crosses below the river. The CI pipe is encased in concrete through the river crossing.
- It does not appear that there are any municipal services on the bridge itself.

<u>Public Utilities (Aerial)</u>

- There are overhead utility lines consisting of single-phase electric and communications that run down the east side of Mill St. and cross the river just east of the bridge. Similar overhead facilities run along the north side of Pleasant St. These lines would probably need to be relocated if the bridge is replaced, but depending on the work done, may not

need to be relocated for a rehab project. Relocation of these Town-Owned utilities would be eligible for cost participation with Federal funds.

Public Utilities (Underground)

- There do not appear to be any existing underground utilities in the area of the structure, except for the water/sewer lines mentioned above.

Right-Of-Way

The existing Right-of-Way (ROW) is shown on the Existing Conditions Layout sheet. The ROW width is 2.5 rods, or 41.25' on both Mill Street and Pleasant Street.

Resources

The resources present at this project are shown on the Existing Conditions Layout Sheet and are based on information provided by VTrans, and are as follows:

Biological:

Wetlands/Watercourses

No Wetlands are present within project area. The Black River is listed as an Essential Fish Habitat, which will require a mandatory Army Corps of Engineers Category 2 permit for any work in the water. The ACOE also lists the Black River as a River of Concern. These designations should have limited impact on the ability to permit a project at this location.

Wildlife Habitat

There is limited wildlife habitat within the project area. This is not an area with likely significant wildlife movement. As for fish and aquatic organism habitat, there is a dam directly under Bridge 57. This dam acts as a barrier for most fish and aquatic organisms. Removal of this dam to allow for aquatic organism movement is recommended at this site. A modified approach to removal may also allow for greater aquatic organism passage. Coordination should occur with VT Department of Environmental Conservation. Staff from the Dam Safety Program established that this would be a good site to remove or modify the present dam.

Rare, Threatened and Endangered Species

The only listed species at this site is the federally threatened northern long-eared bat. No impacts are anticipated at this time. Exclusionary measures at the bridge may be required based on the scope and information available regarding bats roosting in bridges.

Agricultural

There are no mapped agricultural soils within the project area.

Floodplains

This location is within a Type AE flood hazard area, depending on the scope of work a FHARC permit may be required.

Archeological:

Only a small portion of the project site, in the Northwest quadrant, is undisturbed, and therefore may have some archaeological sensitivity. The areas adjacent to the nearby mill and the dam in the Black River also may have the potential for archaeological significance. The Archaeological Resource ID can be seen in the Appendix, and the potentially sensitive areas are shown on the plans in the Appendix.

Historic:

This is a historic bridge. It is documented in the 1998 VTrans Historic Bridge Programmatic Agreement as a significant historic bridge whose rehabilitation for limited highway use is both reasonable and prudent. It is also individually listed in the Vermont State Register of Historic places and VTrans historic staff have determined that it appears individually eligible for inclusion in the National Register for Historic Places. For more information, see the Historic ID in the Appendix.

Hazardous Materials:

According to the Vermont Agency of Natural Resources (VANR) Vermont Hazardous Sites List, there has been a hazardous waste site located on the mill property northeast of the project site. The last noted activity on this site in the VANR list is a note that indicated "Mgmnt Activity Complete, Downgrade Wells Have No Contam Above Standards." This was in 2005.

Stormwater:

There are no stormwater concerns or existing stormwater permits for this project based on the Natural Resource ID.

II. Community Needs and Considerations

A community questionnaire was sent to the Town and Regional Planning Commission to fill out. Responses to the questionnaire can be found in Appendix K. The following needs and considerations were gathered from the Town's responses:

- The bridge is used daily by non-motorized traffic. The bridge is located within 1 mile from Ludlow Elementary School, Black River High School, and Black River Middle School. School Children use the bridge to walk or bicycle to and from school on a daily basis during the school year. Additionally, the bridge is located near Dorsey Park and the Ludlow Community Center.

III. Maintenance of Traffic

Typically, the Vermont Agency of Transportation looks at three basic methods of maintaining traffic during bridge projects: Off-Site Detour, Temporary Bridge, and Phased Construction. Since Bridge 57 is currently closed to vehicular traffic, keeping it closed during the work was the only method considered. Consideration for maintaining pedestrian and bike traffic should be given, however.

The shortest detour route available for pedestrians is 0.7 miles end-to-end and is as follows: Mill Street to Meadow Street, Main Street, Elm Street and Pleasant Street, back to Mill Street. This route adds approximately 0.5 miles to the through route.

The Town also has the option to construct a temporary pedestrian bridge during construction. However, if a temporary pedestrian structure is constructed, then the Town share in the project will be increased from 2.5% to 5% for rehabilitation options or from 5% to 10% for new bridge options.

IV. Alternatives Discussion

Bridge 57 is Structurally Deficient and is closed to vehicular traffic. The deck is rated 3-serious, the superstructure 2-critical, and substructure 4-poor. Additionally, Bridge 57 flooded during Tropical Storm Irene in 2011 and based on the Preliminary Hydraulic Study, the bridge does not meet the minimum hydraulic standards. Additionally, the bridge acts as a dam in flood events and backwater due to this structure, contributes to flooding in Ludlow Village.

No Action

The bridge is currently closed to vehicular traffic. It is in use for pedestrians and bicycles only. No action is a viable choice at this time as it leaves the current level of traffic service unchanged. As the bridge continues to deteriorate, eventually closure to all uses will be unavoidable and the bridge will need to be removed in its entirety to avoid becoming a safety and environmental hazard. If the community wishes for this bridge to be returned to vehicular service and maintained in good serviceable order, action will be required.

Strategic Disinvestment - Permanent Bridge Closure

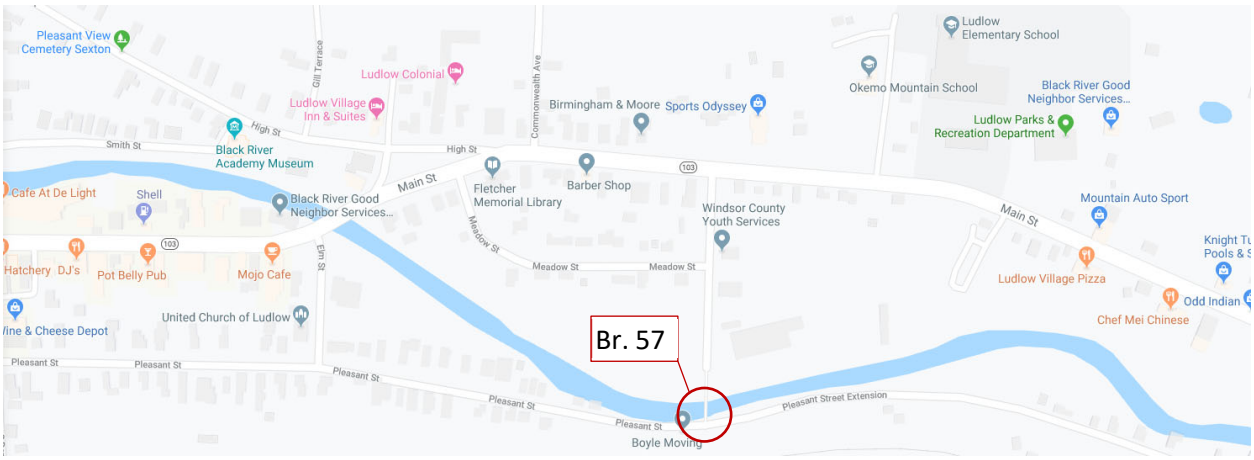
This option would close the bridge to traffic permanently. Mill Street runs as a shortcut between Pleasant Street and Main Street, with several alternative routes. The traffic volume utilizing this stretch of road is relatively small and the lengths of the detours are relatively short as well.

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 the north end of the bridge could be expanded to allow for a turnaround for maintenance trucks since it would be a dead end on the north side. The turnaround would require permanent right-of-way to be acquired from the adjacent landowners.
- Railing or fencing would be set along the existing abutments to eliminate a fall hazard.

The Town has indicated that walkers and bicyclists are still using the bridge. There are several pedestrian generators (as shown in the map below) located in close proximity to the bridge

including the Main Street downtown area, Ludlow Elementary School, Black River High School, and Black River Middle School. This option would eliminate access to pedestrians and bikes.



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 Mill Street near the existing bridge would see much less traffic if it were to remain closed.

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 Black River along Mill Street. 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 substructures built in 1929 are rated as 4 (Poor). While the existing abutments are not suitable for vehicular loading, they should be considered for pedestrian loads. Filling and sealing of cracks as well as concrete repair, with likely Class III concrete repair (Concrete surface repair greater than 6-inches deep) would be included. By rehabilitating and reusing the existing abutments, the Towns share in the project cost would be reduced from 5% to 2.5%.

The superstructure for a pedestrian only bridge would be shallower than that of a vehicular bridge and the pedestrian bridge could be cambered to allow for additional hydraulic capacity.

Truss Rehabilitation

A truss rehabilitation would include repairs to the truss including possible member replacement, deck replacement, cleaning and painting of the steel members, and abutment work. The existing bridge could be rehabilitated for vehicular loads with a reduced capacity or could be rehabilitated for pedestrian loads only.

A rehabilitation alternative needs to be considered as Bridge 57 is historic and is included in the Programmatic Agreement – Alternative A. Alternative A of the Programmatic Agreement includes "a class of significant historic bridges in Vermont whose rehabilitation for limited

highway use was determined to be both feasible and prudent." VTrans historic staff have also determined that the structure appears to be individually eligible for inclusion in the National Register of Historic Places (NRHP). The concrete deck is severely deteriorated and is not salvageable. Reinforcing steel is exposed both on the top and bottom over large areas, and there is severe strength loss in the concrete. Some lower portions of the trusses have been stripped and re-coated in the last 10-15 years. Other areas and members have not been addressed and are in a more deteriorated state. Although not scour critical, the substructures exhibit some cracking, areas of deep spalling, and surface deterioration. They are rated as 4, Poor.

Truss Rehabilitation for Pedestrian Loading Only

A truss rehabilitation for pedestrian loads only would consist of the following:

- The existing bridge deck would be removed and replaced with a new deck.
- The existing truss would be rehabilitated. This would include strengthening or replacement of the floorbeams and gussets plates. Additionally, the existing paint would be removed, and the steel would be cleaned and repainted. Lead remediation would likely be required.
- The bridge and approach railing would be replaced.
- The substructures built in 1929 are rated as 4 (Poor). Filling and sealing of cracks as well as concrete repair, with likely Class III concrete repair (Concrete surface repair greater than 6-inches deep) would be included if the truss is rehabilitated for pedestrian loads only. Bridge seats should be assessed, and new bearings considered while the deck is off.
- This alternative does not meet the minimum hydraulic standards. The current bridge is overtopped at all design flows including the Q_{10} flow. A rehabilitated structure will not improve the hydraulic condition.
- Service Life – A service life of 30 years would be assumed with the repairs listed above. The service life can be extended with good maintenance practices and periodic rehabs or replacements.
- Additional ROW would need to be acquired for a rehabilitation since the existing substructures in the NW quadrant of the project currently extend beyond the Town ROW.

Truss Rehabilitation for Vehicular Loading

A truss rehabilitation for reduced vehicular loads would consist of the following:

- The existing bridge deck would be removed, and a new reinforced concrete deck would be poured.
- The existing truss would be rehabilitated. This would include replacement of the floorbeams and gussets plates as well as member rehabilitation or replacement of steel truss members. Additionally, the existing paint would be removed, and the steel would be cleaned and repainted. Lead remediation would likely be required.

- The bridge and approach railing would be replaced.

- The substructures built in 1929 are rated as 4 (Poor) with cracking and some deep spalling. If the bridge is rehabilitated for vehicular loads, the existing substructures should be removed, and new abutments should be constructed.

- This alternative does not meet the minimum hydraulic standards. The current bridge is overtopped at all design flows including the Q_{10} flow. A rehabilitated structure will not improve the hydraulic condition as the bridge approaches cannot be raised for hydraulic concerns.

- Service Life – A service life of 30 years would be assumed with the repairs listed above. The service life can be extended with good maintenance practices and periodic rehabs or replacements.

- Additional ROW would need to be acquired for a rehabilitation since the existing substructures in the NW quadrant of the project currently extend beyond the Town ROW.

The existing bridge is substandard in width, with two 9-foot travel lanes and no shoulders. The Vermont State Standards specify 9-foot travel lanes with 2-foot shoulders based on the speed and traffic volumes present. Widening the existing structure to meet the minimum standard width as set forth in the Vermont State Standards is not prudent as additional truss members would need replacement. Since the existing trusses would remain in place, lane and shoulder dimensions would not change. Lanes would remain 9' with essentially no shoulders, depending on the configuration of the new curb and bridge rail.

Advantages: This alternative would address the structural and maintenance issues of the existing bridge, with minimum disruption to the historic value of this bridge. This option would have minimal impacts to adjacent properties, and archeological resources.

Disadvantages: This option would not meet the minimum width requirements and would have a reduced loading capacity. Additionally, this option would not meet the minimum hydraulic standard. If this bridge is rehabilitated, it would continue to be an impediment to trucks and most emergency vehicles due to bridge width and the geometry of the intersection.

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

Full Bridge Replacement with a New Truss On-Alignment

This alternative would replace the existing bridge with a new truss replicating the existing as well as new substructures at the existing location. The current alignment meets the minimum standard for a stopped condition, so a new truss should be on the existing alignment to minimize impacts to resources and adjacent properties.

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

a. Historic Requirements

In order to minimize the historic impacts, there are several recommendations for the new structure:

- The new truss should be a Pony Truss in similar proportion to the existing structure.
- Approach railing and bridge railing should be tube type railing.
- Bridge railing should be painted to match bridge elements.
- Paint color will be determined by the Town. Color Galvanizing is OK, as future maintenance costs would be reduced, however, galvanizing is the least preferred from a historic preservation standpoint.

b. Bridge Width

The current rail-to-rail width is 18 feet. This does not meet the minimum standard of 22 feet. Unless the Town determines otherwise, a new bridge should be constructed to meet the full width standards for two-way traffic. Since a new 75+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A 22-foot width (traveled way) bridge will be proposed with two 9-foot travel lanes with 2-foot shoulders. This satisfies standards for vehicular traffic and for shared shoulder use for bicycles and pedestrians. A wider bridge would be able to accommodate some truck traffic and would make it possible for emergency vehicles to use the bridge. The approaches are slightly narrow and would be widened in the vicinity of the bridge to make a safe transition.

c. Span and Skew

The existing bridge has a single span of 82 feet and a skew of approximately 10 degrees. If a new truss were constructed, an approximate 82-foot span bridge would be proposed in order to match the characteristics of the existing historic bridge, to uphold the historic character. The abutments are slightly outside the riverbanks, and could potentially be placed closer to the river, although the river should not be filled here.

The existing skew is approximately 15 degrees. The skew would remain the same under a new bridge.

d. Superstructure Type

This option would provide a new Pony Truss, similar to the existing truss. The truss should be constructed with galvanized or painted steel for long term durability, and follow the stipulations set forth above. The truss would require periodic maintenance for the cleaning and painting of steel members.

e. Substructure Type

The existing abutment at the north end is on a spread footing. At the south end, when the current bridge was constructed, the south abutment built for the previous bridge was modified and kept in place to support the current bridge. The modifications included underpinning a short portion of the previous abutment and cutting the top down so a new top section with seats at the proper elevation could be placed. A new substructure should consist of spread footings, either with or

without piles. Subsurface investigations are needed to determine the necessity of piles. Borings should be requested early on in the design phase to determine a more accurate bedrock profile.

The new abutments could be placed to better match the upstream and downstream channel widths as recommended in the Preliminary Hydraulic Report. For a new structure, an integral abutment bridge was not considered because of the very close proximity of TH-332 (Pleasant St.).

f. Hydraulic Requirements

Based on the Preliminary Hydraulic Study, the existing bridge does not meet the minimum hydraulic standards. Additionally, the bridge acts as a dam in flood events and backwater due to this structure, contributes to flooding in Ludlow Village. The new superstructure depth may not be deeper than the existing. Additionally, a camber should be put into the structure to improve the hydraulic capacity.

g. Maintenance of Traffic

Since the bridge is currently closed to vehicular traffic, the closure should be maintained during the work.

Maintenance of Traffic: Either a temporary bridge or an offsite detour could be utilized for traffic control.

V. Alternatives Summary

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

- Alternative 1a: Strategic Disinvestment
- Alternative 1b: Strategic Disinvestment with a Pedestrian Bridge
- Alternative 2a: Deck Replacement with Superstructure and Substructure Rehabilitation, for Limited Use (Pedestrians Only)
- Alternative 2b: Deck Replacement with Superstructure Rehabilitation and Substructure Replacement, for Vehicular Loading (Reduced Loading)
- Alternative 3: Full Bridge Replacement with a New Pony Truss

VI. Cost Matrix[2]

Ludlow Village BO 1443(52)		Do Nothing	Alternative 1: Strategic Disinvestment (Removal of Bridge 57)		Alternative 2: Truss Rehabilitation with Deck Replacement		Alternative 3: Full Bridge Replacement with a New Pony Truss
			a. No Pedestrian Bridge	b. Pedestrian Bridge	a. Rehabilitated for Pedestrian Use Only	b. Rehabilitated for Vehicular Loads	
COST	Bridge Cost	$0	$0	$108,500	$1,012,200	$1,557,700	$1,165,400
	Removal of Structure	$0	$110,700	$110,700	$0	$0	$110,700
	Roadway	$0	$113,000	$148,000	$19,000	$132,000	$221,000
	Maintenance of Traffic	$0	$26,540	$26,540	$26,540	$26,540	$14,040
	Construction Costs	$0	$250,240	$393,740	$1,057,740	$1,716,240	$1,511,140
	Construction Engineering & Contingencies	$0	$75,072	$118,122	$264,435	$429,060	$377,785
	Accelerated Premium	$0	$0	$0	$0	$0	$0
	Total Construction Costs w CEC	$0	$325,312	$511,862	$1,322,175	$2,145,300	$1,888,925
	Preliminary Engineering[3]	$0	$75,072	$98,435	$150,000	$175,000	$250,000
	Right of Way	$0	$10,000	$10,000	$10,000	$10,000	$10,000
	Total Project Costs	$0	$410,384	$620,297	$1,596,610	$2,584,360	$2,201,153
	Annualized Costs	$0	NA	$8,270	$39,915	$64,609	$29,349
TOWN SHARE			$10,260	$15,510	$39,915	$64,609	$110,058
TOWN %			2.5%	2.5%	2.5%	2.5%	5%
SCHEDULEING	Project Development Duration[4]	N/A	2 Years	2 Years	2 Years	4 Years	4 Years
	Construction Duration	N/A	2 Months	4 Months	4 Months	4 Months	6 Months
	Closure Duration (If Applicable)	N/A	N/A	N/A	N/A	N/A	N/A
ENGINEERING	Typical Section - Roadway (feet)	18'	18'	18'	18'	18'	22'
	Typical Section - Bridge (feet)	18'	N/A	6’	18'	18'	22' with sidewalk
	Geometric Design Criteria	Substandard Width	N/A	N/A	N/A	Substandard Width	Meets Minimum Standards
	Traffic Safety	Structurally Deficient	N/A	N/A	N/A	Improved	Improved
	Alignment Change	No	N/A	N/A	No	No	No
	Bicycle Access	Substandard Shoulders for Shared-Use	Access Removed	Improved	Improved	No Change	Improved
	Pedestrian Access	Substandard Shoulders for Shared-Use	Access Removed	Improved	Improved	No Change	Improved
	Hydraulics	Substandard	N/A	Substandard – Improved	Substandard	Substandard	Substandard
	Utilities	No Change	No Change	No Change	No Change	No Change	Minor Aerial Relocation
OTHER	ROW Acquisition	No	No	No	No	Yes	Yes
	Road Closure	No	Indefinitely	Indefinitely	Indefinitely	Yes	Yes
	Design Life	<10 years	N/A	75	30	30	75

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

VII. Conclusion

We recommend **Alternative 1b**; a permanent bridge closure along with the construction of a new pedestrian bridge.

This option would close the bridge to traffic permanently. Due to the current structural condition of the existing bridge and the substandard hydraulic condition, 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 of the bridge will be reduced and the section of Mill Street near the existing bridge will see less traffic, reducing the roadway maintenance needs.

The roadway has been closed since 2007, 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 truss superstructure would be removed, and railing or fencing would be installed to eliminate a fall hazard. The Town has indicated that there is a desire for pedestrians and bicyclists to have a crossing at the existing bridge location. A permanent pedestrian bridge would also be constructed as part of this alternative. While the existing abutments are not suitable for vehicular loading, they should be considered for pedestrian loads. Filling and sealing of cracks as well as concrete repair, with likely Class III concrete repair (Concrete surface repair greater than 6-inches deep) would be included. By rehabilitating and reusing the existing abutments, the Towns share in the project cost would be reduced from 5% to 2.5%.

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. Additionally, the new superstructure would be shallower than that of a vehicular bridge and the pedestrian bridge could be cambered to allow for additional hydraulic capacity.

VIII. Appendices

A: Site Pictures
B: Town Map
C: Bridge Inspection Report
D: Preliminary Hydraulics
E: Preliminary Geotechnical Information
F: Natural Resources Memo
G: Natural Resources ID
H: Archeology Memo
I: Historic Memo
J: Hazardous Sites Map
K: Local Input
L: Detour Maps
M: Plans

Appendix A: Site Pictures

Picture 1: Looking South over Bridge 57


Picture 2 Looking North over Bridge 57

Picture 3: Looking West on Pleasant Street

Picture 4: Looking East on Pleasant Street

Picture 5: Exposed Reinforcing Steel on Deck

Picture 6: Deteriorated Floorbeam

Picture 7: Southern Abutment

Picture 8: Northern Abutment

Picture 9: Downstream Bridge Fascia


Picture 10: Upstream Bridge Fascia

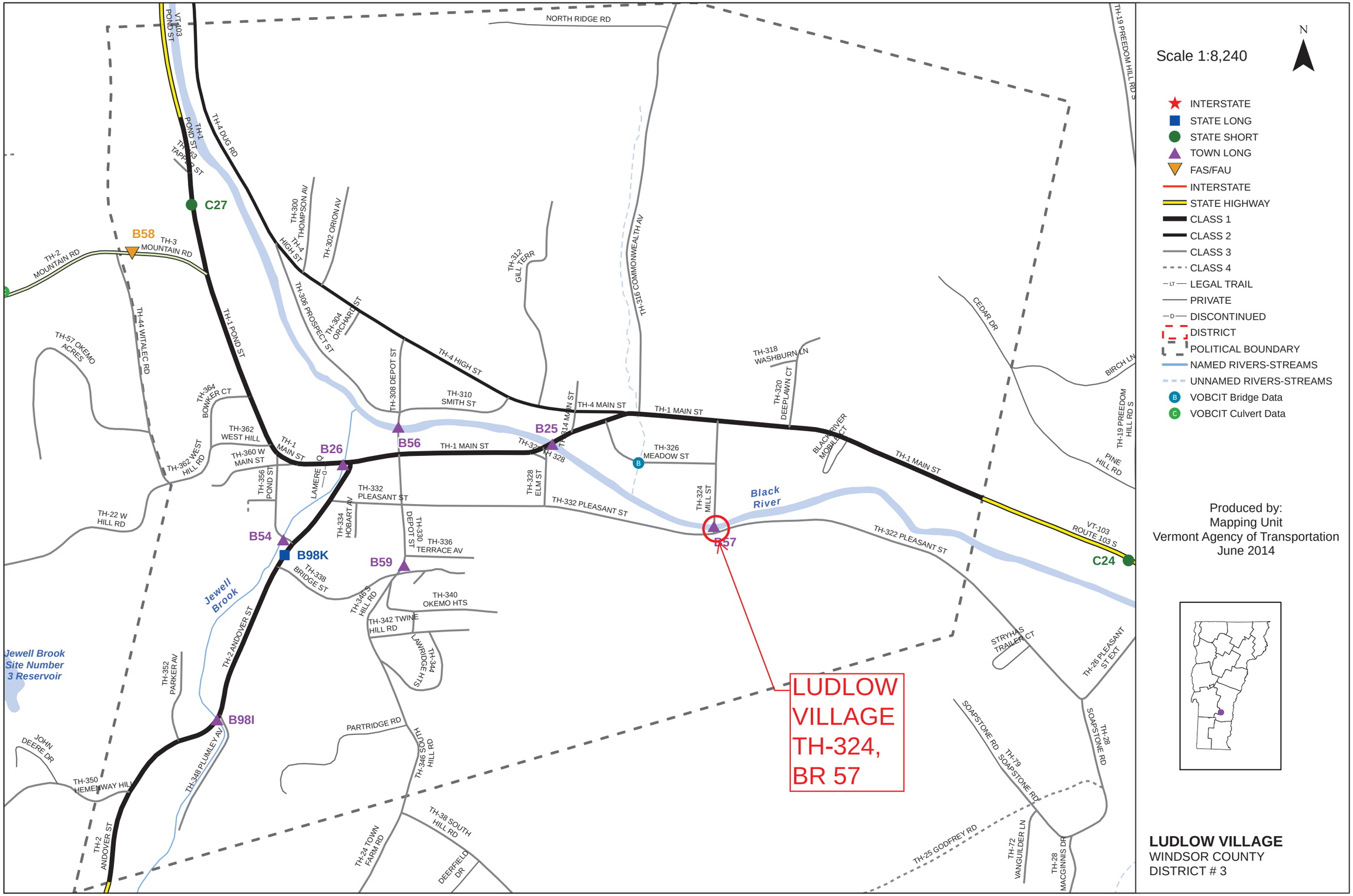
Picture 11: Deteriorated Floorbeam

Picture 12: Section Loss at Gusset Plate

Picture 13: Looking Downstream

Picture 14: Looking Upstream

Appendix B: Town Map


NORTH RIDGE RD
VT-103 POND ST
TH-1 POND ST
TH-4 DUG RD
TH-3 TARPLIN ST
C27
B58
TH-3 MOUNTAIN RD
TH-2 MOUNTAIN RD
TH-44 WITALEC RD
TH-57 OKEMO ACRES
TH-1 POND ST
TH-300 THOMPSON AV
TH-4 HIGH ST
TH-302 ORION AV
TH-306 PROSPECT ST
TH-304 ORCHARD ST
TH-312 GILL TERR
TH-319 COMMONWEALTH AV
TH-4 HIGH ST
TH-308 DEPOT ST
TH-310 SMITH ST
TH-4 MAIN ST
TH-1 MAIN ST
TH-314 MAIN ST
B25
B56
B26
TH-328
TH-326 MEADOW ST
TH-318 WASHBURN LN
TH-320 DEEPLAWN CT
BLACK RIVER MOBILE CT
CEDAR DR
BIRCH LN
TH-19 PREEDOM HILL RD S
PINE HILL RD
TH-19 PREEDOM HILL RD S
TH-364 BOWKER CT
TH-362 WEST HILL
TH-362 WEST HILL RD
TH-360 W MAIN ST
TH-356 POND ST
LAMERE QUARRY
TH-332 PLEASANT ST
TH-328 ELM ST
TH-324 MILL ST
Black River
TH-322 PLEASANT ST
VT-103 ROUTE 103 S
C24
TH-22 W HILL RD
B54
B98K
TH-334 HOBART AV
TH-330 DEPOT ST
TH-336 TERRACE AV
B59
TH-338 BRIDGE ST
TH-340 OKEMO HTS
TH-346 S HILL RD
TH-342 TWINE HILL RD
LAWRIDGE HTS
TH-344
Jewell Brook
Jewell Brook Site Number 3 Reservoir
TH-2 ANDOVER ST
TH-352 PARKER AV
B98I
PARTRIDGE RD
TH-346 SOUTH HILL RD
JOHN DEERE DR
TH-350 HEMENWAY HILL
TH-348 PLUMLEY AV
TH-2 ANDOVER ST
TH-24 TOWN FARM RD
TH-38 SOUTH HILL RD
DEERFIELD DR
B57
LUDLOW VILLAGE TH-324, BR 57
STRYHAS TRAILER CT
TH-26 PLEASANT ST EXT
SOAPSTONE RD
TH-79 SOAPSTONE RD
TH-28 SOAPSTONE RD
TH-25 GODFREY RD
TH-72 VANGUILDER LN
TH-28 MACGINNIS DR
N
Scale 1:8,240
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
LUDLOW VILLAGE
WINDSOR COUNTY
DISTRICT # 3

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 LUDLOW VILLAGE **bridge no.:** 00057 **District:** 3

Located on: C3324 **over** BLACK RIVER **approximately** @ JCT W CL3 TH324 **Owner:** 03 TOWN-OWNED

CONDITION

Deck Rating: 3 SERIOUS

Superstructure Rating: 2 CRITICAL

Substructure Rating: 4 POOR

Channel Rating: 7 GOOD

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 101410005714101

Federal Sufficiency Rating: 016.4

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1929 **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): 01

ADT: 000150 **% Truck ADT:** 02

Year of ADT: 2007

GEOMETRIC DATA

Length of Maximum Span (ft): 0078

Structure Length (ft): 000082

Lt Curb/Sidewalk Width (ft): 0.5

Rt Curb/Sidewalk Width (ft): 0.5

Bridge Rdwy Width Curb-to-Curb (ft): 19.1

Deck Width Out-to-Out (ft): 19.1

Appr. Roadway Width (ft): 018

Skew: 15

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: STEEL PONY TRUSS

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: 6 BITUMINOUS

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: 3 INTOLERABLE, CORRECTIVE ACTION NEEDED

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

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

Posting Status: K CLOSED TO TRAFFIC

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 06 BRIDGE CLOSED TO ALL TRAFFIC

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 2 H 15

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 062006 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

9/15/2017 This structure remains closed. JW/SP

9/28/2015 Structure remains closed and no inspection is performed. JWW/JDM

11/19/2013 - Bridge is still closed to all but pedestrians only and has been for a number of years. No inspection. See photos on Inventory. Removed from 12 month frequency. ~ MJ/JS

05/02/2011 - Bridge is closed to all traffic but pedestrian with Jersey barrier and was not inspected. ~ MJ/DK

Appendix D: Preliminary Hydraulics

VERMONT

State of Vermont
Structures and Hydraulics Section
One National Life Drive
Montpelier, Vermont 05633-5001
vtrans.vermont.gov

Agency of Transportation

[phone] 802-917-8487
[fax] 802-828-3566
[ttd] 800-253-0191

TO: Laura Stone, Scoping Engineer

FROM: Cassidy Cote, Hydraulics Engineer

DATE: July 16, 2019

SUBJECT: Ludlow Village TH-324 (C-3324), Mill Street
Bridge 57 over Black River, tributary to Connecticut River
Site located at intersection with TH-332, Pleasant Street
GPS coordinates: N 43.394547°, W 72.691870°

The existing bridge has a 70-foot hydraulic clear span, measured perpendicular to flow. This structure provides approximately 600 feet of waterway area. Our model indicates that the existing structure does not meet current standards of the VTrans Hydraulic Manual.

Results: Existing Bridge	
Low beam elevation (outlet)	984.8 ft.
10% AEP WSE	986.3 ft.
10% AEP Freeboard	-1.5 ft.
4% AEP WSE	987.1 ft.
4% AEP Freeboard	-2.3 ft.
1% AEP WSE	987.8 ft.
1% AEP Freeboard	-3.0 ft.

The stream bankfull width, as determined from field measurements, indicates that the structure does meet state stream equilibrium standards. Scott Jensen, ANR River Management Engineer, has indicated that a BR-57 replacement structure is required to provide a hydraulic clear span of no less than 49 feet, measured perpendicular to flow at a depth of 6 feet above the channel thalweg. If there is the opportunity to do so, VTrans recommends that a replacement structure provide a hydraulic clear span of 58.5 feet, matching the bankfull width detailed in the geomorphic assessment for this reach.

The existing channel banks are heavily armored along this reach. It is anticipated that Stone Fill, Type III should be used to protect any disturbed channel banks or roadway slopes at the structure's inlet and outlet, up to a height of at least one foot above the top of the opening.

There is a FEMA Flood Insurance Study for the Black River through this project area. To meet the National Flood Insurance Program (NFIP) no rise criteria, any alternative will need to maintain or reduce base flood elevations (1% AEP).

Based on the above considerations, we have evaluated the following alternatives for this crossing:

A. Rehabilitate the existing structure for vehicular traffic

A hydraulically adequate bridge on a local town road must provide at least 1.0 feet of freeboard at the 4% AEP. The model indicates that there is -2.3 feet of freeboard at this design flow. This alternative is not hydraulically adequate.

B. Rehabilitate the existing structure for pedestrian traffic

It is at the discretion of the town a select the design AEP for a pedestrian structure. We propose evaluating this alternative using the 10% AEP. At this design flow, there is -1.5 feet of freeboard. The structure is not hydraulically adequate at the 10% AEP.

C. Remove the structure completely

Ludlow Village resides in the Black River floodplain. Photographs taken during Tropical Storm Irene show that the existing Bridge 57 causes backwater, raising water surface elevations (WSE) in the adjacent floodplain. Complete removal of the structure would decrease flooding risk in the adjacent floodplain. This is the Hydraulics Unit's preferred alternative.

D. Construct a new structure

It was indicated that replacement of this structure would involve leaving the abutments in the same location. A hydraulically adequate bridge on a local town road must provide at least 1.0 feet of freeboard at the 4% AEP. The existing structure, however, provides -2.3 feet of freeboard at the 4% AEP. We have developed two models for a new structure, using an elevated low beam at the existing span and location. These alternatives may not be feasible because they could also result in major grade and alignment changes on TH-332.

A model was developed in which the bottom chord of the structure was raised 1-foot and a 1:12 V:H slope was used to tie into TH-324. This alternative results in a 1% AEP WSE of 987.8 feet. This alternative does meet the NFIP no rise criteria but is still hydraulically inadequate, providing -1.7 feet of freeboard at the 4% AEP.

Another model was developed in which the bottom chord of the structure was raised 3.3 feet and a 1:12 V:H slope was used to tie into TH-324. This alternative results in a 1% AEP WSE of 987.7 feet. This alternative does meet the NFIP no rise criteria and is also hydraulically adequate, providing 1.1 feet of freeboard at the 4% AEP design event.

If there are alternate configurations that you would like analyzed, please reach out to the hydraulics unit with proposed inlet geometry so that we can build a model to determine water surface elevations.

Appendix E: Preliminary Geotechnical Information

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

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

From: Stephen Madden, Geotechnical Engineer, via Callie Ewald, P.E., Geotechnical Engineering Manager
CEE

Date: December 27, 2016

Subject: Ludlow Village BO 1443(52) Preliminary Geotechnical Information

1.0 INTRODUCTION

We have completed our preliminary geotechnical investigation for the replacement of Bridge No. 57 on Town Highway 324 (Mill St.) over the Black River in the town of Ludlow, VT. Bridge No. 57 is located at the junction of Town Highway 324 and Town Highway 332 (Pleasant St.). The subject project consists of replacing or rehabilitating the existing single span bridge. 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 available for this project from the construction in 1929. The plans included details of the existing bridge abutments and wingwalls and indicated that the bottom of footing at the northern and southern abutments are approximately 18.0 feet and 10.0 feet below ground surface elevation, respectively, however the plans did not confirm whether the footings are bearing on soil or bedrock.

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. An exploration of this database revealed one nearby project within a 1-mile radius. Ludlow BRF 025-1(42) was approximately 1,425 feet away and boring logs indicated a mixture of sand, silt, gravel, and cobbles with depths to bedrock where encountered ranging from 55 to 64 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. Six water wells within an approximate 0.5-

mile radius of the project were used to get an estimate of the depth to bedrock likely to be encountered for Bridge No. 57 and are highlighted within Figure 1 in red.

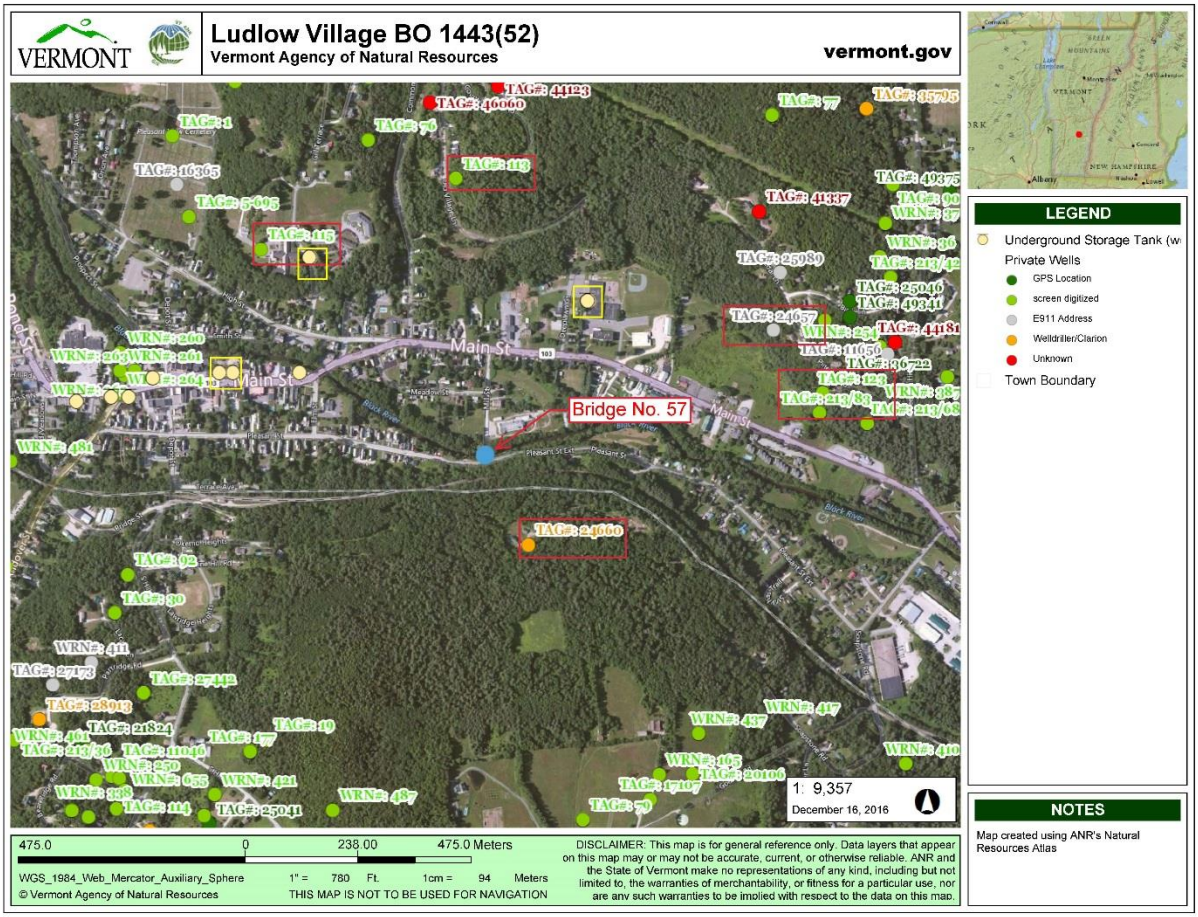


Figure 1: *Highlighted well and underground storage tank locations near subject project.*

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

Table 1: Depth to Bedrock of Surrounding Wells

Well ID	Approx. Distance From Project (feet)	Approx. Depth To Bedrock (feet)	Overburden Material
24660	750	21	Sand, Boulders, and Clay
113	2,140	Not Reported	Clay and Sand
115	2,330	Not Reported	Hardpan, Gravel, and Mud
24657	2,400	56	Sand and Boulders
213/83	2,575	6	Dirt, soil, topsoil, loam
123	2,625	18	Dirt, soil, topsoil, loam

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. The project is located within 0.5 miles of several underground storage tanks, highlighted within Figure 1 in yellow, and listed in Table 2 with the address, approximate distance in feet from the subject bridge, and the stored substance.

Table 2: Information for nearby Underground Storage Tanks

Tank Location	Approx. Distance From Project (feet)	Compartment Substance
45 Main Street (Ludlow Elementary School)	1,320	Fuel Oil #2 or #4
8 Gill Terrace (Gill Odd Fellows Home)	2,000	Fuel Oil #2 or #4
129 Main Street (Ludlow Shell) [3 USTs at this location]	2,060	Gasoline/Diesel
143 Main Street (Cumberland Farms #4015) [3 USTs at this location]	2,165	Gasoline

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 well drained Marlow fine sandy loam with 35 to 65 percent slopes and depth to groundwater of more than 80 inches, and well drained Urban land-Colton-Croghan complex with slopes of 0 to 8 percent, depth to groundwater of more than 80 inches, and depth to bedrock of more than 80 inches.

2.5 Geologic Maps of Vermont

Mapping conducted in 1970 for the Surficial Geologic Map of Vermont shows that the project area consists of glaciofluvial outwash.

According to the 2011 Bedrock Map of Vermont, published by the USGS and State of Vermont, the project site is underlain with carbonaceous to highly graphitic Phyllite.

3.0 BRIDGE INSPECTION

The latest inspection summary update from September of 2015 by the Bridge Management and Inspection unit noted that the bridge remained closed to all traffic but pedestrian, and had been for a number of years, and that the bridge has not been fully inspected since at least February 2011. The 2015 document shows that the substructure rating was given as being in poor condition, and the structure was rated as being stable for scour.

4.0 FIELD OBSERVATIONS

A preliminary site visit was conducted on December 2, 2016 to determine possible obstructions inhibiting boring operations and to make any other pertinent observations about the project. Overhead wires run along Pleasant Street and cross above the bridge on the southern side. Overhead wires also run in a north-south direction east of the eastern edge of the bridge deck. The utility lines can be seen in Figure 2. There was no visible bedrock in the river, but there were cobbles and small to medium sized boulders visible within the river and along the river banks, as seen in Figures 3 and 4. Also shown in Figure 3 is a possible weir located within the river just downstream of the bridge, however record plans did not contain information on this weir.

Figure 2: *Looking south across bridge; visible are overhead wires running parallel to bridge and crossing over southern end of bridge.*

Figure 3: *Cobbles and boulders within river and on river banks on downstream side. Also visible is possible weir within river.*

Figure 4: *Cobbles and boulders visible on river banks on upstream side of bridge.*

As shown in Section 3.0 of this report, the bridge abutments were rated as being in poor condition. During the site visit spalling and cracking of the concrete abutments was visible, as seen in Figures 5 and 6, however there was no apparent scour at either abutment.

Figure 5: *Northern abutment; note visible cracking and spalling of concrete.*

Figure 6: *Southern abutment; note visible cracking and spalling of concrete.*

5.0 RECOMMENDATIONS

If a full bridge replacement option is chosen as the preferred alternative, we recommend the following foundations options:

- Reinforced concrete abutments on spread footings supported on soil or bedrock
- Integral abutments on a single row of H-Piles

We recommend a minimum of two borings be taken with one located at each abutment at opposite corners in order to more fully assess the subsurface conditions at the site including, but 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.

6.0 CONCLUSION

When a design alternative has been chosen, the Geotechnical Engineering Section can assist in determining 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.

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

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Appendix F: Natural Resources Memo

OFFICE MEMORANDUM

AOT - PDB - ENVIRONMENTAL SECTION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Jonathan Griffin, Project Manager
FROM: Julie Ann Held, Environmental Specialist, SW Region (802)828-3963
DATE: April 3, 2017
Project: **Ludlow Village BO 1443(52)**

ENVIRONMENTAL RESOURCES:

Archaeological Site: _X_ Yes ____ No See Archaeological Resource ID Memo Issued: 11/23/2016. Precontact Native American site presence in the area is possible, and the area adjacent to the dam and mill are sensitive with the potential to yield information related to the unique industry. Avoidance is recommended.

Historic/Historic District: _X_ Yes ____ No See Historic Resource ID Memo Issued: 01/11/2017. Bridge No. 57 is NHRP eligible, and if replacement is the proposed alternative a project-specific Memorandum of Agreement, Section 106 review, and a Section 4(f) will be required.

4(f) Property: _X_ Yes ____ No Historic Bridge No. 57 is a 4(f) property, and will most likely require a bridge programmatic.

Wetlands: ___ Yes _X_ No See Natural Resource ID Memo Issued: 03/30/2017

Agricultural Land: ___ Yes _X_ No

Fish & Wildlife Habitat: _X_ Yes ____ No See Natural Resource ID Memo Issued: 03/30/2017 The Black River is listed as Essential Fish Habitat EFH, which will require a mandatory Army Corps of Engineers Category 2 permit for any work in the water, The ACOE also lists the Black River as a River of Concern. These designation should have limited impact on the ability to permit a project at this location. Also, removal of the dam directly under Bridge No. 57 is recommended to allow for aquatic organism movement, and coordination with VT Department of Environmental Conservation is recommended.

Wildlife Habitat Connectivity: ___ Yes _X_ No

Endangered Species: _X_ Yes ____ No The only listed species at this site is the federally threatened northern long-eared bat. Exclusionary measures at the bridge may be required based on the scope and information available regarding bats roosting in bridges.

Invasive Species: ___ Yes _X_ No

Stormwater: ___ Yes _X_ No

Landscaping: ___ Yes _X_ No

6(f) Property: ___ Yes _X_ No

Hazardous Waste: _X_ Yes ____ No The ANR Atlas shows a hazardous waste site located on the property in the NE quadrant of the project area. Avoidance of this area is recommended.

Contaminated Soils: ___ Yes _X_ No Contaminated Soils were not mapped on ANR Atlas 11/22/2016.

USDA-Forest Service Lands: ___ Yes _X_ No ANR Atlas mapped on 11/22/2016.

Scenic Highway/Byway: ___ Yes _X_ No

Act 250 Permits: _X_ Yes ____ No An Act 250 permit, number 2S0980, is located in the NE quadrant of the project area. Avoidance of ROW acquisition of this property is recommended. If ROW acquisition in this area is required, an amendment to the existing Act 250 permit may be required.

FEMA Floodplains: _X_ Yes ____ No

Flood Hazard Area/
River Corridor: _X_ Yes ____ No This location is within a Type AE flood hazard area, depending on the scope of work a FHARC permit may be required. This project is located on Bridge No. 57 over the Black River.

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	ANR Atlas mapped on 11/22/2016
Source Protection Area:	___ Yes _X_ No	
Public Water Sources/ Private Wells:	___ Yes _X_ No	ANR Atlas mapped on 11/22/2016
Other:	___ Yes _X_ No	

cc:
Project File

Appendix G: Natural Resources ID

State of Vermont *Agency of Transportation*
Program Development Division
One National Life Drive [phone] 802-279-2562
Montpelier, VT 05633-5001 [fax] 802-828-2334
vtrans.vermont.gov [ttd] 800-253-0191

To: Lee Goldstein, VTrans Environmental Specialist

From: James Brady, VTrans Environmental Biologist

Date: March 30, 2017

Subject: Ludlow Village BO 1443 (52) - Natural Resource ID

I have completed my natural resource report for the above referenced project. My evaluation has included wetlands, wildlife habitat, agricultural soils and rare, threatened and endangered species.

Project Ludlow Village BO 1443 (52) is located on Mill Street in Ludlow at bridge 57. This bridge spans the Black River.

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

The Black River is listed as Essential Fish Habitat EFH, which will require a mandatory Army Corps of Engineers Category 2 permit for any work in the water. The ACOE also lists the Black River as a River of Concern. These designations should have limited impact on the ability to permit a project at this location.

Wildlife Habitat
There is limited wildlife habitat in the project area. This is not an area with likely significant wildlife movement.

As for fish and aquatic organism habitat, there is a dam directly under the bridge 57. This dam acts as a barrier for most fish and aquatic organisms. Removal of this dam to allow for aquatic organism movement is recommended at this site. A modified approach to removal may also allow for greater aquatic organism passage. Coordination should occur with VT Department of Environmental Conservation. Staff from the Dam Safety Program established that this would be a good site to remove or modify the present dam.

Rare, Threatened and Endangered Species
The only listed species at this site is the federally threatened northern long-eared bat. No impacts are anticipated at this time. Exclusionary measures at the bridge may be required based on the scope and information available regarding bats roosting in bridges.

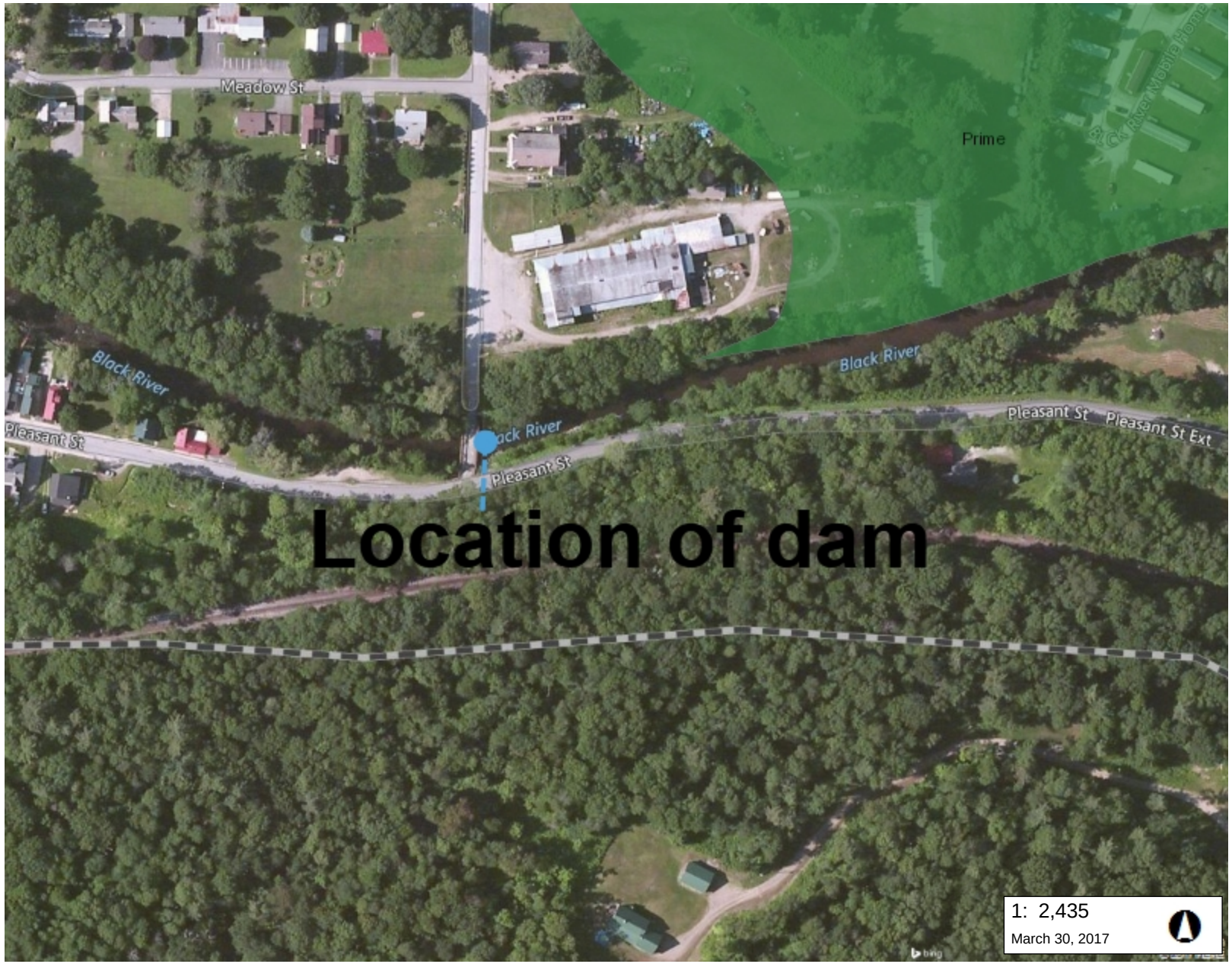
Agricultural Soils:
There are no mapped agricultural soils within the project area.

VERMONT

Ludlow Village BO 1443 (52)

Vermont Agency of Natural Resources

vermont.gov



LEGEND

- Hazard Class
  - High Hazard Potential
  - Significant Hazard Potential
  - Low Hazard Potential
  - Undetermined Hazard Potential
- Historical Dam Location
- Designated ORW
- stream/river
- lake/pond
- Class A(1) Ecological Waters
- Class A(2) Public Water Suppli
- Mixed Classifications for Uses
- 303(d) List of Impaired Lakes a
- 303(d) List of Impaired Stream
- 303(d) List of Impaired Waters
- Priority Waters List (Lakes and
  - Part B (impaired TMDL not required
  - Part D (impaired with approved TM
  - Part E (altered exotic species)
  - Part F (altered flow regulation)
- Priority Waters List (Streams a
  - Part B (impaired TMDL not required
  - Part D (impaired with approved TM
  - Part E (altered exotic species)
  - Part F (altered flow regulation)
- Stressed Waters List (Lakes ar
- Stressed Waters List (Streams

NOTES

Map created using ANR's Natural Resources Atlas

124.0 0 62.00 124.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 203 Ft. 1cm = 24 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Appendix H: Archeology Memo

VERMONT

Brennan Gauthier
VTrans 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 Archaeologist
Date: 11/23/2016
Subject: Ludlow Village BO 1443(52) Resource ID

Julie Ann,

I have completed my field visit and background research for the proposed bridge replacement/rehabilitation of Bridge 57 over the Black River in Ludlow, Windsor County, Vermont. Located at the junction of Mill Street and Pleasant Street, this iron Pratt pony truss was built by the Penn Bridge Company of Beaver Falls, PA in 1929 following the devastating flood of 1927. This structure was blocked off to vehicular traffic in May of 2011; concrete jersey barriers and protective fencing were erected in the following years to divert pedestrians from failing sections of the deck. Maintenance on the bridge appears to have been deferred over the past few decades, and the original factory-applied red lead primer is visible below a series of flaked green paint layers.

The structure is located on a flood plain of the Black River at the northern base of South Hill and connects two major east-west travel corridors via the 0.2 mile Mill Street. Originally built in 1873, the namesake of Mill Street is located directly to the northeast of the project Area of Potential Effect(AEP) and consists of a series of structures spanning 400x150 feet along the Black River. Given the importance of the mill to the area, I've taken some time to research the history and remaining legacy of the industry in the area:

History of the Mill

The first mill to begin industrial manufacturing on Mill Street dates back to the 1872 organization of the Green Mountain Toy Co. by R.N. Parker, Albert B. Riggs and Wallace N. Graves and was situated directly on Main Street before moving to the present footprint adjacent in the NE corner of Bridge 57. The 1873 move to this location was inspired by the purchase of the company by a private investment stock company headed up by a Mr. William Walker. With the addition of a dam on the Black River and a change in name to the Ludlow Toy Manufacturing Co., the business began turning out doll carriages, toy carts and wheelbarrows. Future President Calvin Coolidge worked here making doll carriages on the weekends while attending Black River Academy in his early years. Employing over thirty employees by the mid-1880s, the company grew exponentially until being eventually sold in 1887 to Surray W. Stimson, local sheriff, farmer and timber mogul. With yet another name change, the Ludlow Toy Manufacturing Company dropped TOY from the title and became the Ludlow Manufacturing Company, a local producer of raw lumber and chair stock.

This apparently versatile mill yet again changed hands and names in 1893, upon the purchase of the building and contents by George H. Levey and partners, who established the Black River Woolen Co. This business quickly expanded with the erection of a series of new structures and instruments to convert the one-time lumber/toy mill to wool production. The two-story wool factory measured 116x52 feet, the annex was 100x30, the dye house was 48x35 and the boiler structure measured 35x40. The total cost of the new infrastructure weighed in at $45,000, a costly sum in the post-economic depression of the 1890s. With over 100 employees who lived in the immediate area of Mill Street, in worker housing owned by the company, the Black River Woolen Co. was a major source of employment during the early 1900s.

The Black River Woolen Co. was purchased in 1923 by the Vermont-based American Woolen Co. and continued production, to a lesser degree, until the ultimate shuttering of the mill after the great depression hit in 1929. Since this time, the mill has changed hands dozens of times operating as various industrial entities until the present day. Below ground infrastructure such as head and tail races are not currently visible, but are likely present. As of 2016, the current industrial presence, Tucker Mills, is the only remaining vestige of a once-vibrant textile industry in Ludlow.

Precontact Native American site presence in the area is possible given the proximity to the Black River and the flat nature of the floodplain. However, the project APE encompasses only a small portion of undisturbed ground surface in the northwest quadrant. This area will be marked in the archaeology geodatabase for inclusion in plan sets. Additionally, the area adjacent to the dam and mill will similarly be marked with the potential to yield information related to this unique industry.

As always, feel free to reach out with any questions or concerns that may arise as part of this project. I've included a series of images, illustrations and maps to help explain the history and condition of the bridge and site. Additional plans or maps can be provided upon request.

Sincerely,

Brennan

Brennan

Images and Illustrations

Figure 1: Bridge 57 View West

Figure 2: Mill Dam View North

Figure 3: View from Northern Abutment East Towards Mill

Figure 4: View East from Northern Abutment (Note Lower Flood Plain)

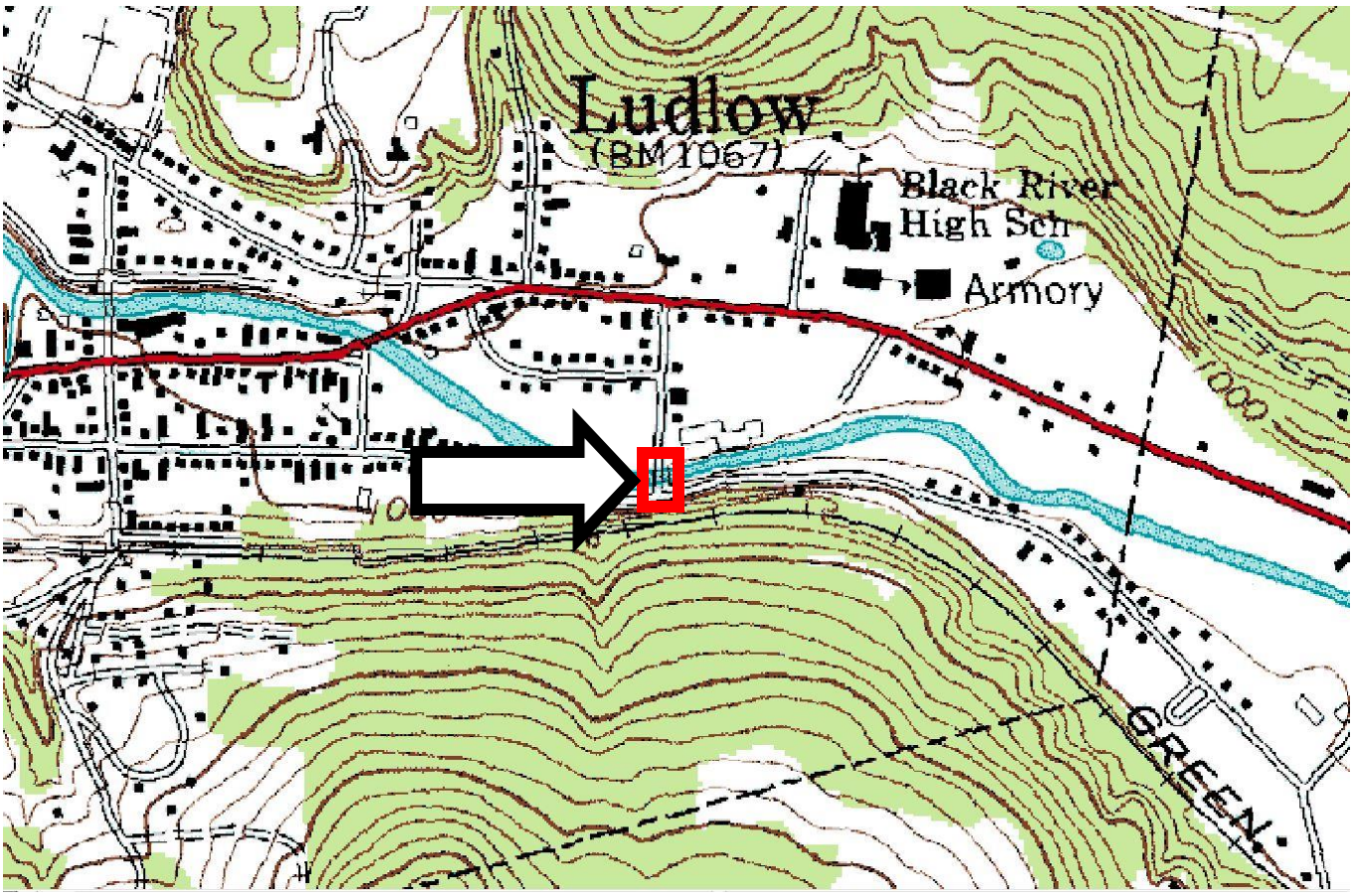


Figure 5: Project Location and APE (24k Topo)

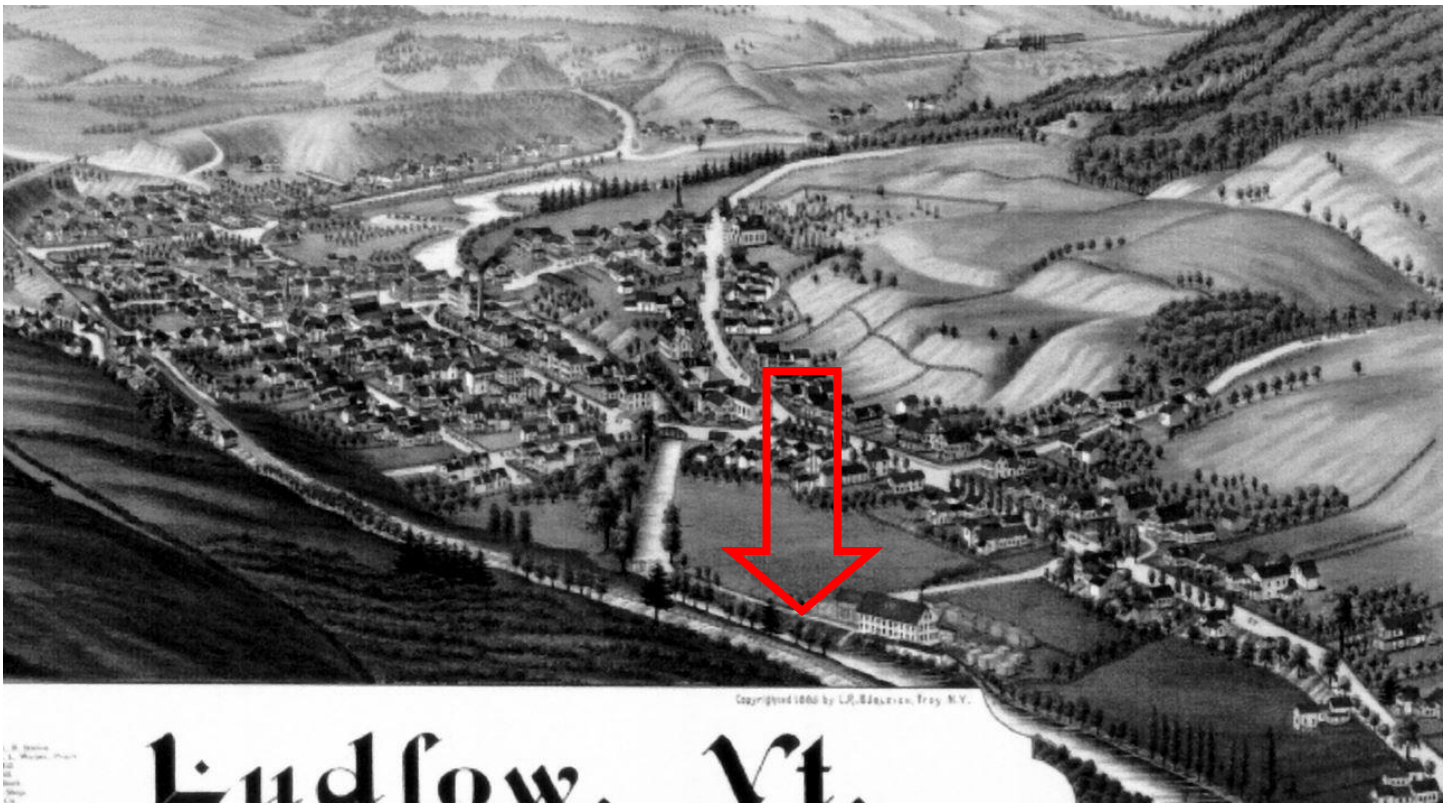


Figure 6: 1877 Birdseye View of Bridge Location

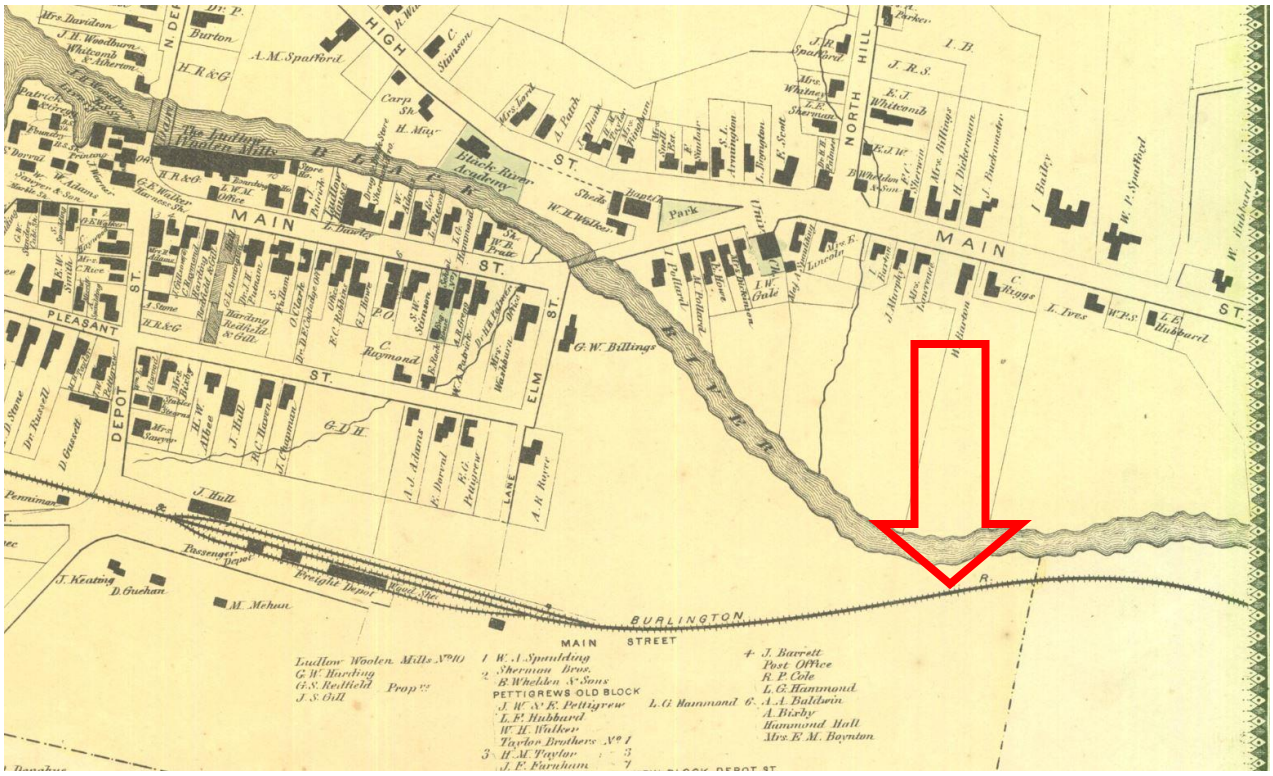


Figure 7: Ca. 1869 Map of Project Location (pre-mill)

Figure 8: Ludlow Toy and Manufacturing Company Doll Carriage

Appendix I: Historic Memo

VERMONT

Kyle Obenauer
Historic Preservation Specialist

Vermont Agency of Transportation

Project Delivery Bureau - Environmental Section
One National Life Drive
Montpelier, VT 05633-5001

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

Historic Preservation Resource Identification Memo

To: Julie Ann Held, Environmental Specialist
Via: Judith Ehrlich, VTrans Historic Preservation Officer
Cc: Brennan Gauthier, VTrans Archaeologist
Karen Spooner, Administrative Assistant
Date: January 11, 2017

Subject: Ludlow Village BO 1443(52)

Julie Ann,

I have completed the resource identification (ID), above. A future project may include work to Bridge No. 57, which carries the southern end of Mill Street approximately, 82 feet over the Black River in Ludlow Village, Windsor County, Vermont (Figures 1-4). Constructed in 1929, Bridge No. 57 is a historic, single-span, riveted steel Warren Pony Truss with reinforced concrete abutments. Manufactured by the Pennsylvania-based Pennsylvania Bridge Co. of America, Bridge No. 57 is the only historic resource within a conceivable area of potential effect (APE) for work to this structure. Closed to vehicular traffic in 2011, Bridge No. 57 has been mapped in ArcGIS.

Bridge No. 57 is individually listed in the Vermont State Register of Historic Places (1977; Survey 1410-27). VTrans has determined that this structure also appears individually eligible for inclusion in the National Register of Historic Places (NRHP), within the significance and registration requirements of the NRHP-listed *Metal Truss, Masonry, and Concrete Arch Bridges of Vermont Multiple Property Documentation Form* (1990), under Criteria A and C for its significant contributions to the broad patterns of our transportation, engineering, and tourism histories and for its distinctive characteristics and method of construction, as a standardized, riveted post-1927, steel Warren pony truss. Bridge No. 57 is one of only a few post-1927, automobile trusses manufactured by the Pennsylvania Bridge Company that remain in Vermont.

Additionally, Bridge No. 57 has been previously-documented as part of the 1998 VTrans Historic Bridge Programmatic Agreement's corresponding Historic Metal Truss Preservation Plan (VHBPA) within Category A, a class of significant historic bridges in Vermont whose rehabilitation for limited highway use was determined to be both feasible and prudent.[1] A different use for this bridge would require a project-specific Memorandum of Agreement (MOA), in addition to review under Section 106, Section 4(f), and/or any other applicable laws.

A former concrete mill dam below Bridge No. 57 also stands within a possible project APE (Figure 4). This feature is associated with the ruins of a former mill complex on Mill Street, at the northeastern corner of Bridge No. 57.

[1] Known as the Vermont Historic Bridge Programmatic Agreement (VHBPA): July 7, 1998; PROGRAMMATIC AGREEMENT AMONG THE FEDERAL HIGHWAY ADMINISTRATION, THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, THE VERMONT AGENCY OF TRANSPORTATION, THE VERMONT STATE HISTORIC PRESERVATION OFFICER, THE VERMONT AGENCY OF NATURAL RESOURCES, AND THE VERMONT AGENCY OF COMMERCE AND COMMUNITY DEVELOPMENT REGARDING IMPLEMENTATION OF A PROGRAM FOR PROJECTS INVOLVING HISTORIC BRIDGES.

This extant dam and former mill complex do not retain sufficient historic integrity for inclusion in the NRHP. Around 1872, harnessing the power of the Black River, the first mill operating at this location was the Green Mountain Toy Co., followed shortly thereafter by the Ludlow Toy Co. In 1887, new owners renamed and re-tooled the mill, creating the Ludlow Manufacturing Company. By the 1890s, the Black River Woolen Co. was established at this location. Employing around 100 people, this mill complex also converted the former Congregational Church at 10 Mill Street into worker housing. A detailed history of manufacturing on Ludlow's Mill Street can be found in the 11/23/2016, resource ID for this project, completed by Brennan Gauthier, VTrans Archaeologist.

Please, let me know if there are any questions. Additional information is available upon request.

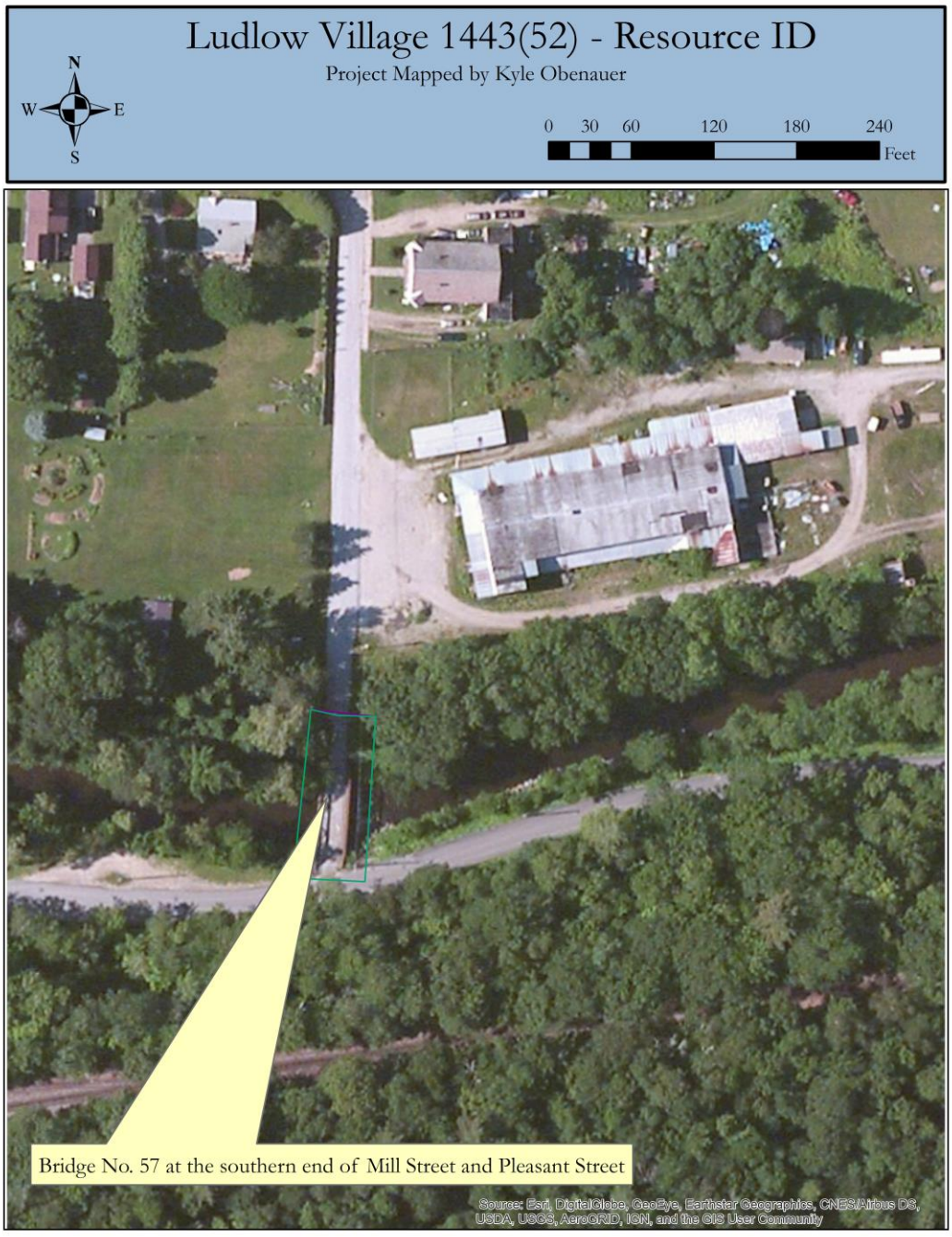


Figure 1. Location of NRHP-eligible Bridge No. 57.

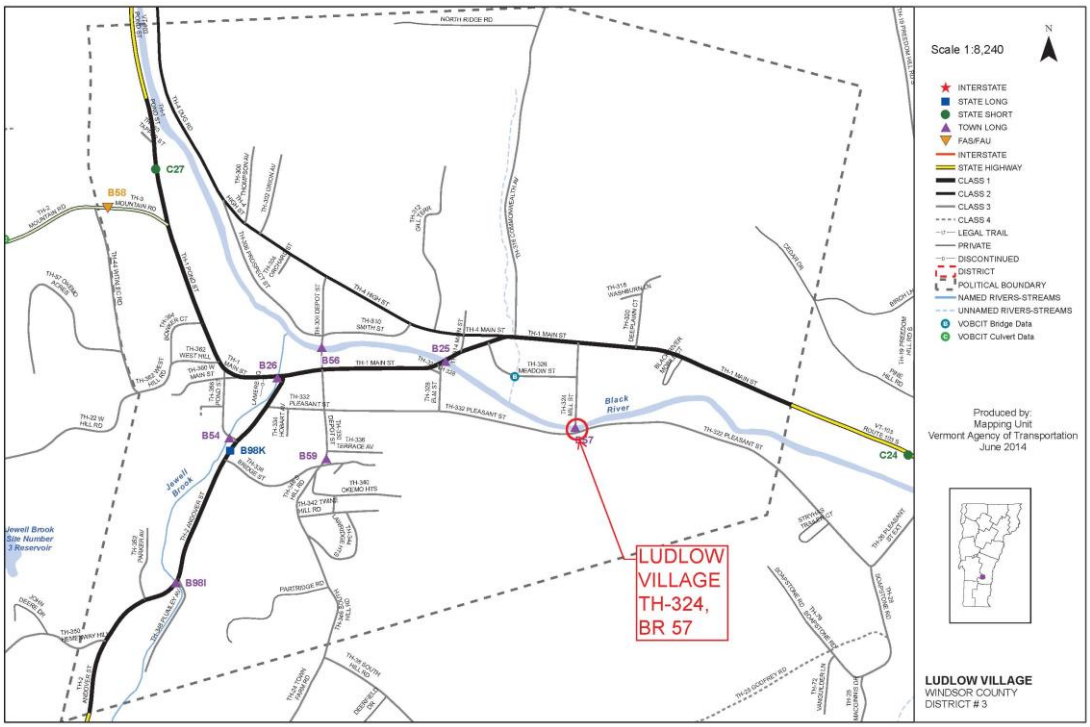


Figure 2. Location of Bridge No. 57 in Ludlow Village.

Figure 3. Bridge No. 57, looking east at the Black River from Pleasant Street.

Figure 4. Bridge No. 57 with extant mill dam in foreground, looking west from Pleasant Street.

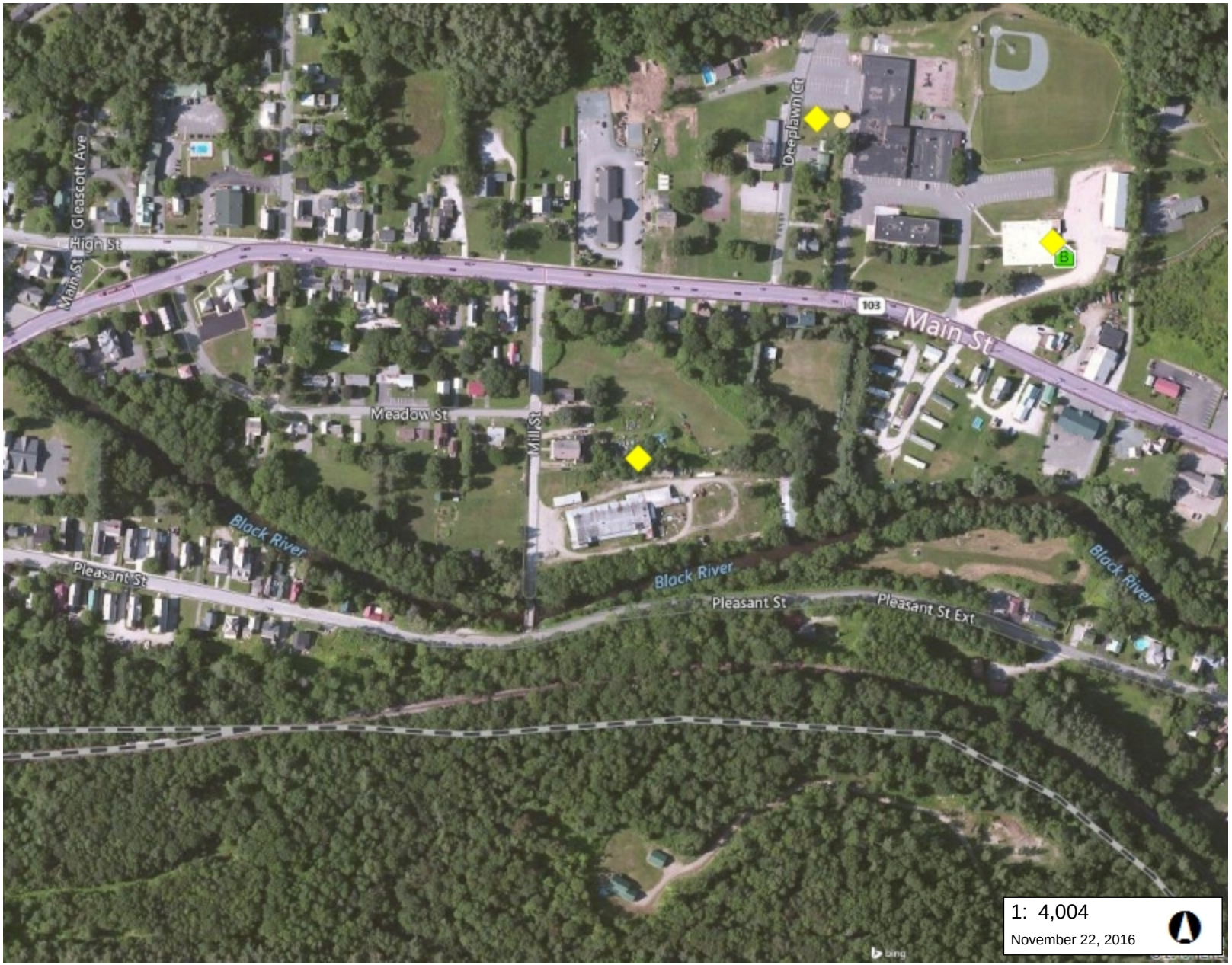
Appendix J: Hazardous Sites Map

VERMONT

Hazardous Waste Site

Vermont Agency of Natural Resources

vermont.gov



LEGEND

- Landfills
  - OPERATING
  - CLOSED
- Hazardous Site
- Brownfields
- Underground Storage Tank (w
- State Natural Areas
- Fragile Areas Registry
  - Physical Feature
  - Biological Feature
  - Physical and Biological Features
- Managed Lands
  - State Forest, Fee ownership
  - State Park, Fee ownership
  - Non-fee interest
- Congressional Areas (GMNF)
  - National Recreation Area
  - Wilderness
- Green Mountain National Fore
- Conserved Lands
  - Housing and Conservation Board
  - Local Government
  - Private Organization
  - US Dept. of Defense
  - US Fish and Wildlife Service
  - US National Park Service
  - UVM and State Colleges
  - VT Dept. Buildings and General Se

NOTES

Map created using ANR's Natural Resources Atlas

203.0 0 102.00 203.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 334 Ft. 1cm = 40 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Appendix K: Local Input

This project, Ludlow Village BO 1443(52), focuses on bridge 57 on town highway 324 in Ludlow Village, Vermont. The bridge is closed and is in need of either replacement or demolition and abandonment. Potential options being considered for this project include a new bridge placed in the same location, a smaller pedestrian structure placed in the same location, or removal of the existing structure without replacement.

Community Considerations

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

   During the spring or summer months

2. 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 bridge is already closed to vehicle traffic (see attached emergency contact listing). Fire, Police, Ambulance are all within 1-2 miles of the bridge.

3. 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?

   No

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?

   No

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.

   Okemo Valley Regional Chamber of Commerce – 228-5830
   SWCRPC – 674-9201

6. 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?

   The bridge is closed to vehicle traffic.

Schools

1. Where are the schools in your community and what are their schedules?

   Ludlow Elementary, Black River High and Black River Middle School are located at 43 Main Street (1-mile from the bridge). School is in session from 7:30 am until 2:30 pm.

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

   Children use the bridge to walk or bicycle to/from school. Local residents use the bridge when they take their walks. The Mill Street, Main Street, Pleasant Street routes are popular walking routes.

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

   Dorsey Park and the Ludlow Community Center are located 1-mile from the Mill Street Bridge.

Pedestrians and Bicyclists

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

   Children use the bridge while walking to/from school. Local residents use the bridge during their daily walks. The Mill Street Bridge is centrally located and provides easy access to the Main Street.

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

   Original Bridge – No
   Current Use - Yes

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

   No

4. 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

5. 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?

   The Village streets have concrete sidewalks with granite curbing, which helps to promote a healthy lifestyle and a safe venue for children walking to/from school.

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?

   No

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

   The bridge is a Pony Truss style that was built in 1929.

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

   Infrastructure was damaged in 1927 and again in 2011.

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 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?

   The preference would behave a new bridge that would be open to vehicle and pedestrian traffic and open another access onto the Main Street.

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.

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

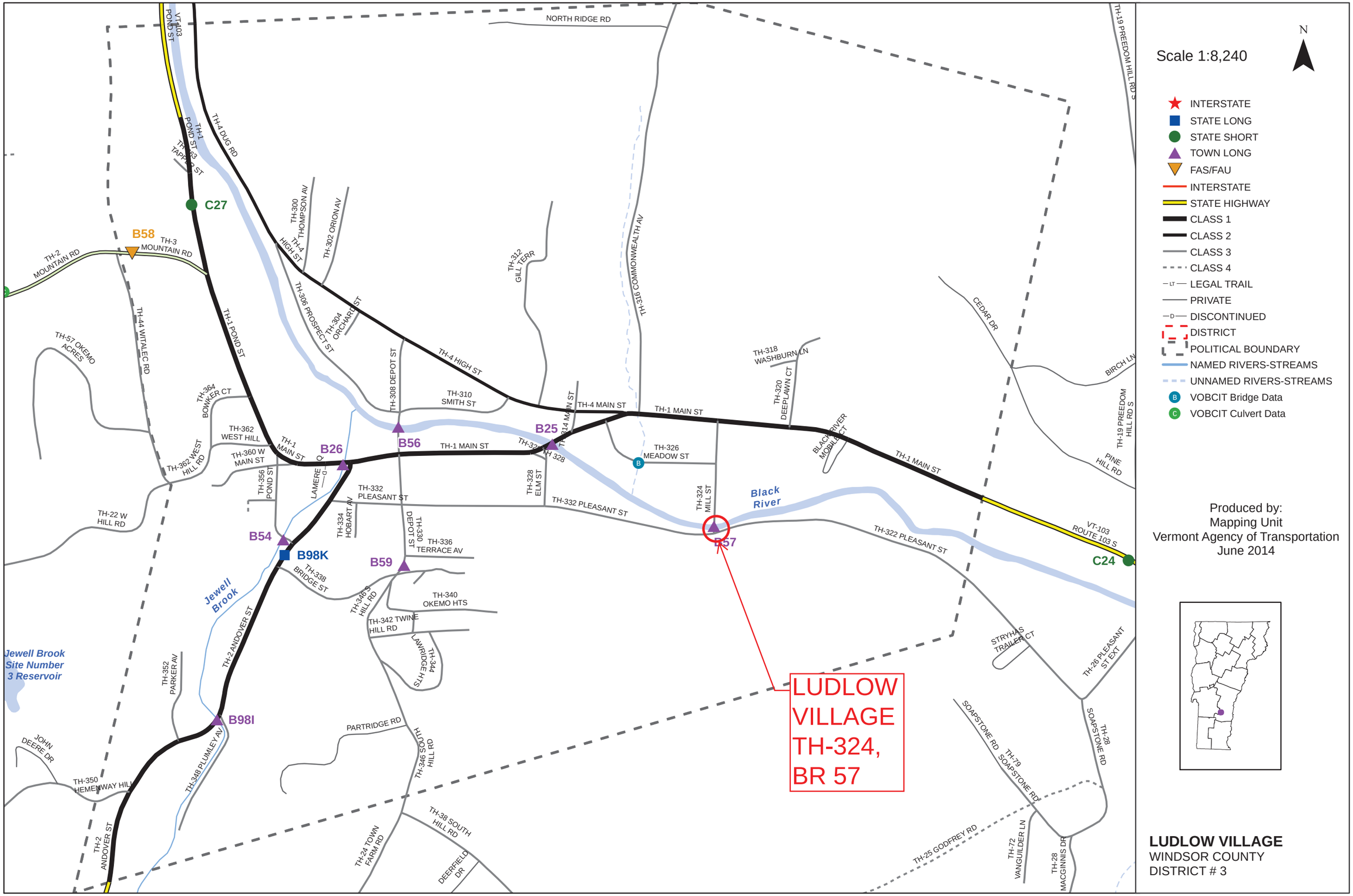
3. Is there any planned expansion of public transit or intercity transit service in the project area? Please provide the name and contact information for the relevant public transit provider.

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.

Front Porch Forum
LPC-TV
Vermont Journal
Message for the Week
TW3 – Public TV Show

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?


NORTH RIDGE RD
VT-103 POND ST
TH-1 POND ST
TH-4 DUG RD
TH-3 TARPLIN ST
C27
B58
TH-3 MOUNTAIN RD
TH-2 MOUNTAIN RD
TH-44 WITALEC RD
TH-57 OKEMO ACRES
TH-1 POND ST
TH-300 THOMPSON AV
TH-4 HIGH ST
TH-302 ORION AV
TH-306 PROSPECT ST
TH-304 ORCHARD ST
TH-312 GILL TERR
TH-319 COMMONWEALTH AV
TH-4 HIGH ST
TH-308 DEPOT ST
TH-310 SMITH ST
TH-4 MAIN ST
TH-1 MAIN ST
TH-314 MAIN ST
B25
B56
B26
TH-328
TH-326 MEADOW ST
TH-318 WASHBURN LN
TH-320 DEEPLAWN CT
BLACK RIVER MOBILE CT
CEDAR DR
BIRCH LN
TH-19 PREEDOM HILL RD S
PINE HILL RD
TH-19 PREEDOM HILL RD S
TH-364 BOWKER CT
TH-362 WEST HILL
TH-362 WEST HILL RD
TH-360 W MAIN ST
TH-356 POND ST
LAMERE QUARRY
TH-332 PLEASANT ST
TH-328 ELM ST
TH-324 MILL ST
Black River
TH-322 PLEASANT ST
VT-103 ROUTE 103 S
C24
TH-22 W HILL RD
B54
B98K
TH-334 HOBART AV
TH-330 DEPOT ST
TH-336 TERRACE AV
B59
TH-338 BRIDGE ST
TH-340 OKEMO HTS
TH-346 S HILL RD
TH-342 TWINE HILL RD
LAWRIDGE HTS
TH-344
Jewell Brook
Jewell Brook Site Number 3 Reservoir
TH-2 ANDOVER ST
TH-352 PARKER AV
B98I
PARTRIDGE RD
TH-346 SOUTH HILL RD
JOHN DEERE DR
TH-350 HEMENWAY HILL
TH-348 PLUMLEY AV
TH-2 ANDOVER ST
TH-24 TOWN FARM RD
TH-38 SOUTH HILL RD
DEERFIELD DR
B57
LUDLOW VILLAGE TH-324, BR 57
STRYHAS TRAILER CT
TH-26 PLEASANT ST EXT
SOAPSTONE RD
TH-79 SOAPSTONE RD
TH-28 SOAPSTONE RD
TH-25 GODFREY RD
TH-72 VANGUILDER LN
TH-28 MACGINNIS DR
N
Scale 1:8,240
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
LUDLOW VILLAGE
WINDSOR COUNTY
DISTRICT # 3

EMERGENCY CONTACT LIST

802-228-2841 or tmanager@tds.net

Ronald Bixby – Emergency Management Director
802-228-8823 or ludins@tds.net

David VanGuilder – Emergency Management Assistant
802-228-4411 or hillsidevang@yahoo.com

Chief Jeffrey Billings – Chief of Police
802-384-0671 or jeffrey.billings@vermont.gov

Ronald Tarbell – Department of Public Works & Road Crew
802-770-9566 or ludlowhighway@tds.net

Peter Kolenda –Fire Chief
802-228-5627 or ludlowfire@tds.net

Carl Matteson – EMS Coordinator
802-228-2880 or ccemtp@msn.com

Steve Laskevich – Animal Control Officer
802-228-4912 or hsps56@hotmail.com

Ralph Pace – Town Health Officer
802-228-7239 or ralphpace@tds.net

Howard Barton, Jr. – Ludlow Select Board, Chair
802-228-3721 or howardb@tds.net

Robert Gilmore – Village Board of Trustees, Chair
802-228-5391 or bgilmore@tds.net

David Rose – Village Water Commission, Chair
802-228-4634 or drose@tds.net

Black River Good Neighbor Services – Community Outreach Services
802-228-3663 or brgn@tds.net

Appendix L: Detour Routes

Pedestrian Detour Route: Mill Street to Meadow Street, Main Street, Elm Street and Pleasant Street, back to Mill Street.

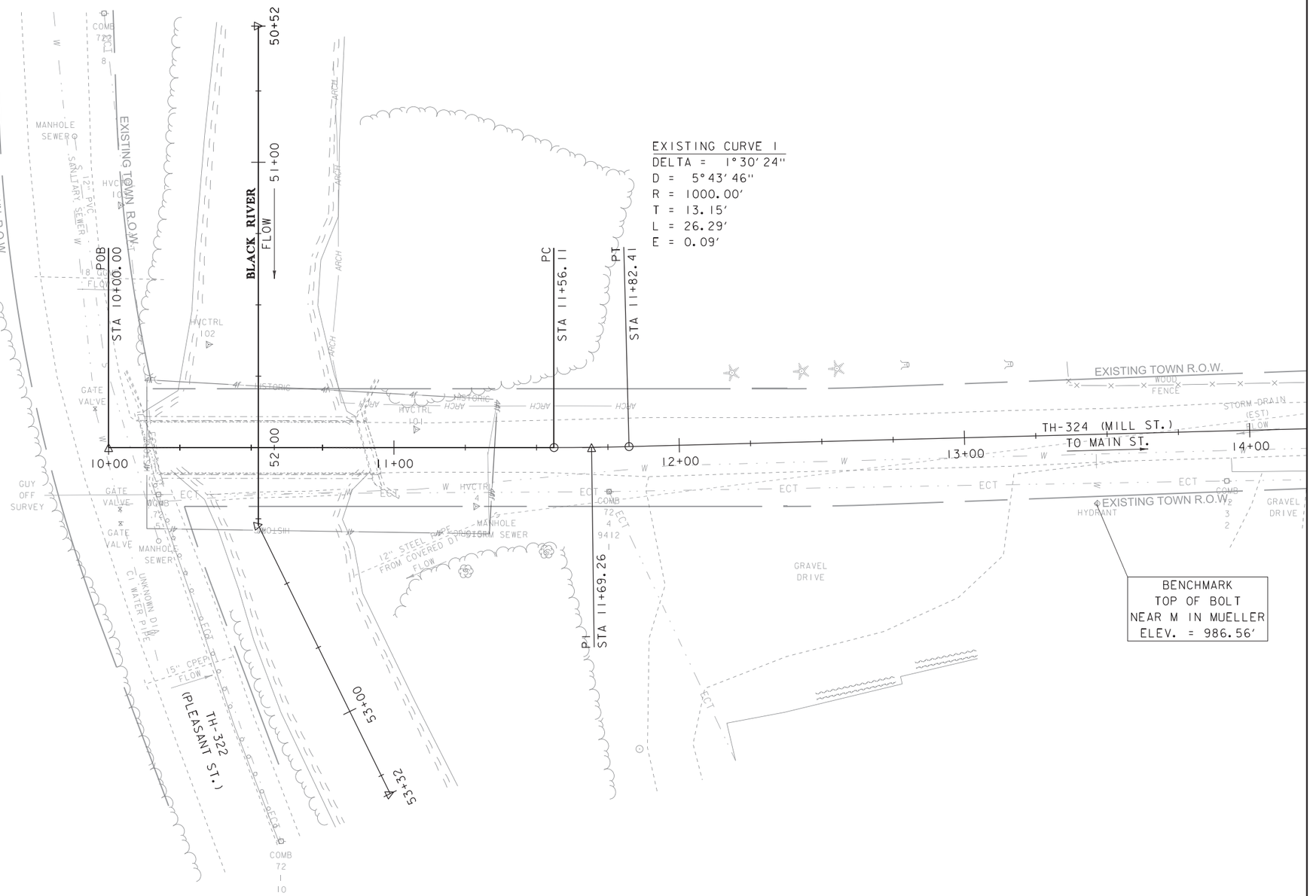
0.7 Miles end-to-end
0.1 Miles Through-Route
0.6 Miles Detour Route
0.5 Miles Added

Appendix M: Plans

INDEX OF SHEETS

N

VT STATE PLANE GRID



EXISTING CONDITIONS

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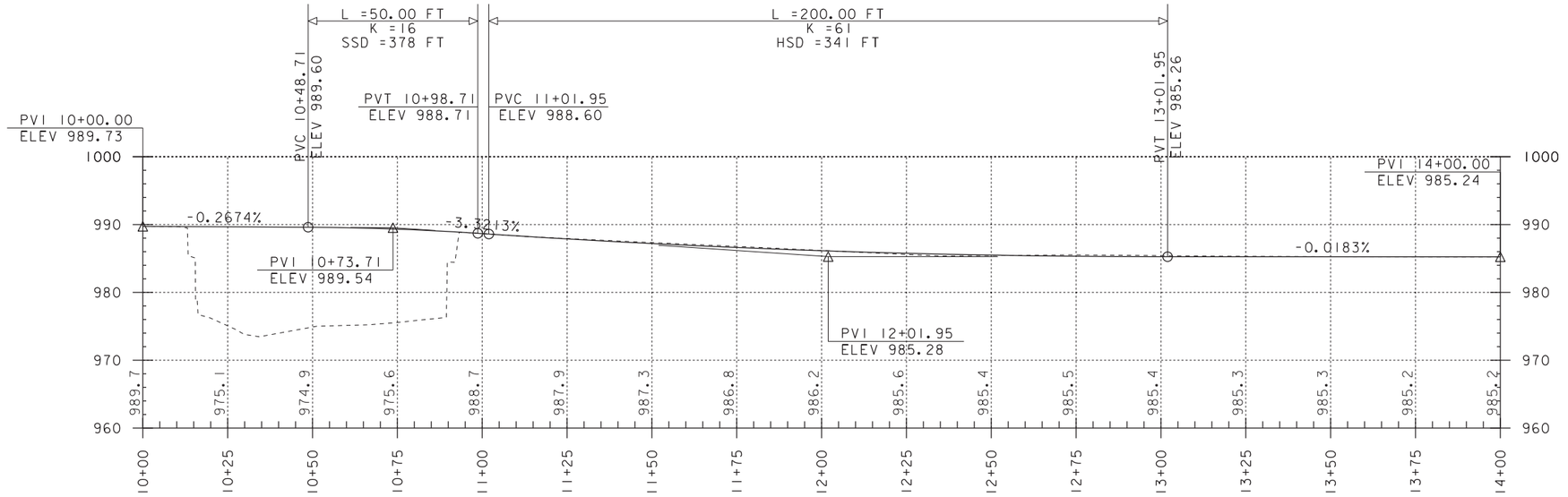
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
EXISTING CONDITIONS	SHEET 1 OF 9



TOWN HIGHWAY 324 PROFILE

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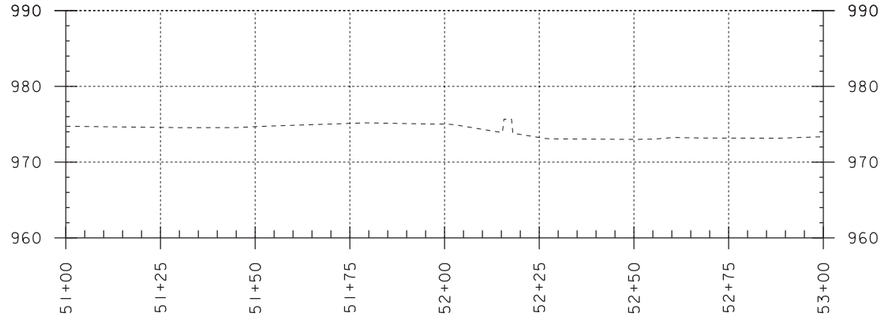

BLACK RIVER PROFILE

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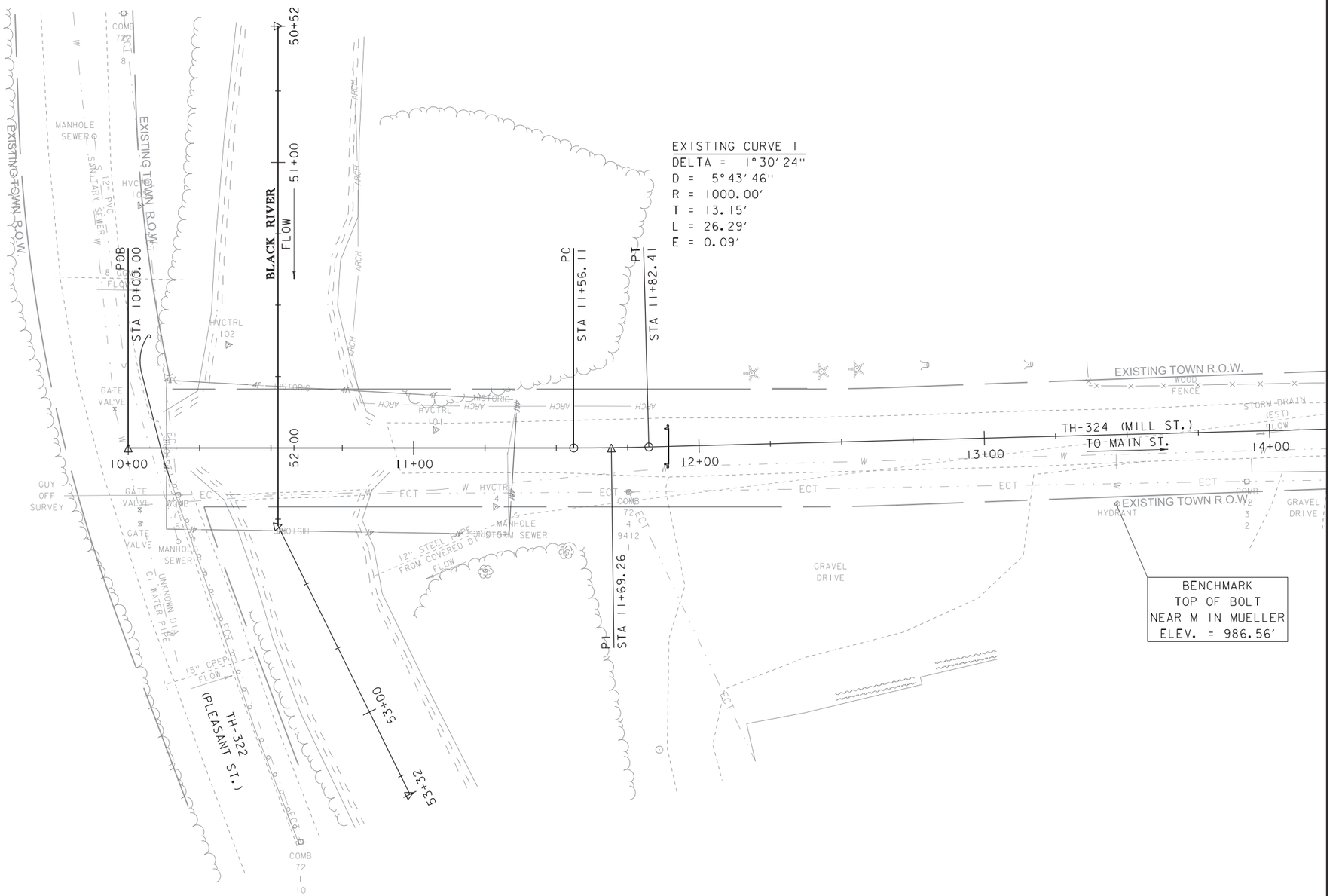
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PROFILE SHEET	SHEET 2 OF 9

N

VT STATE PLANE GRID



STRATEGIC DISINVESTMENT

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PROJECT NUMBER:	BO 1443(52)
FILE NAME: 12j638/s12j638border.dgn	PLOT DATE: 02-JUL-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
STRATEGIC DISINVESTMENT LAYOUT	SHEET 3 OF 9

N

VT STATE PLANE GRID

EXISTING CURVE 1
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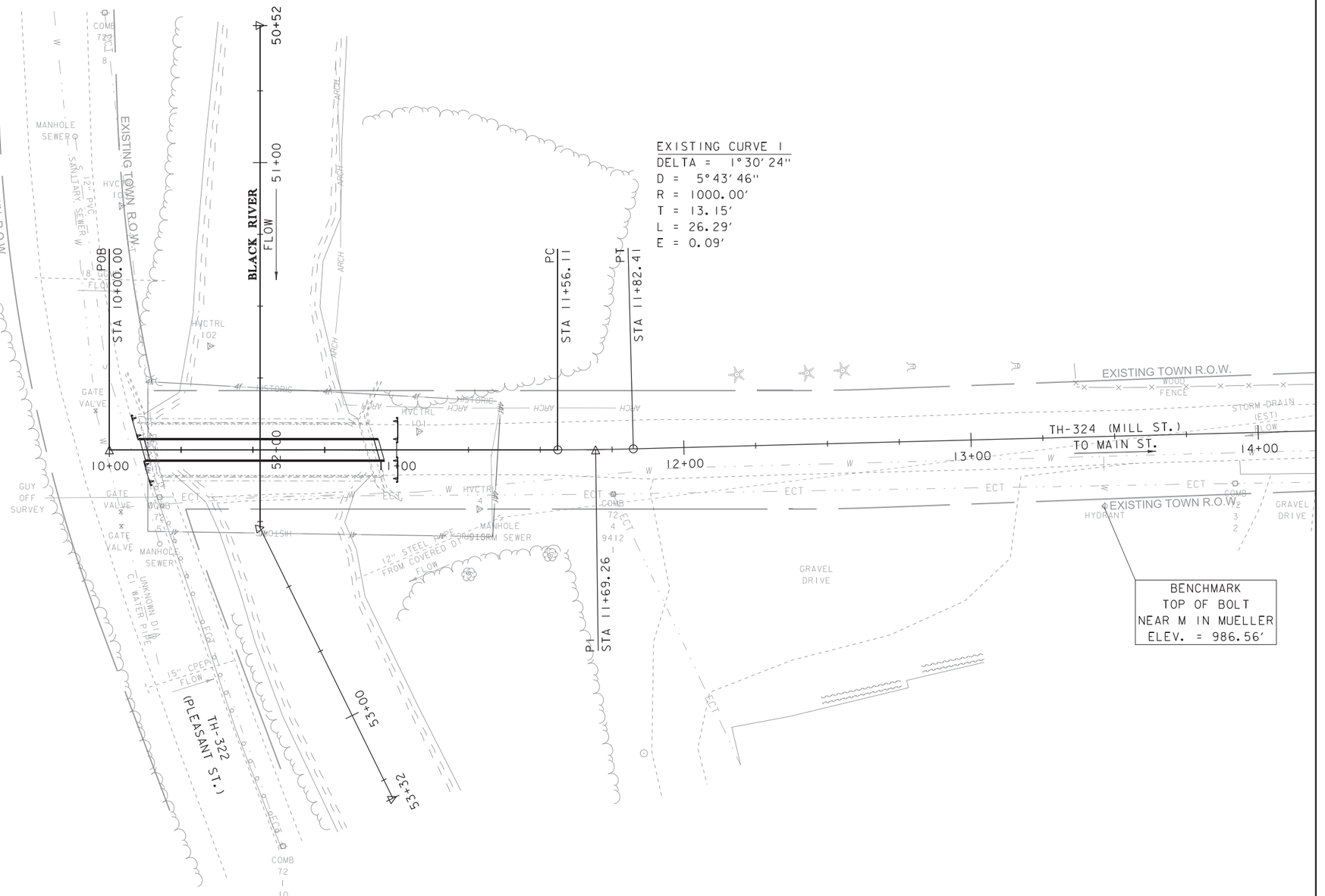
R = 1000.00′
T = 13.15′
L = 26.29′
E = 0.09′



STRATEGIC DISINVESTMENT W/ PEDESTRIAN BRIDGE

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PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
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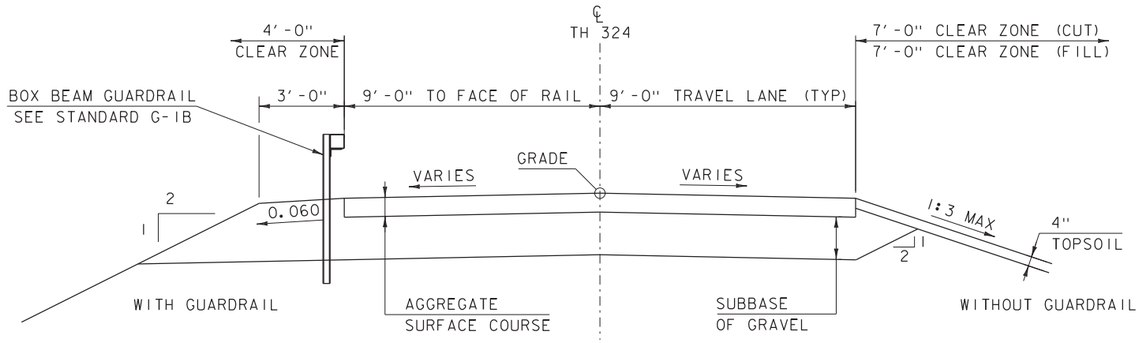

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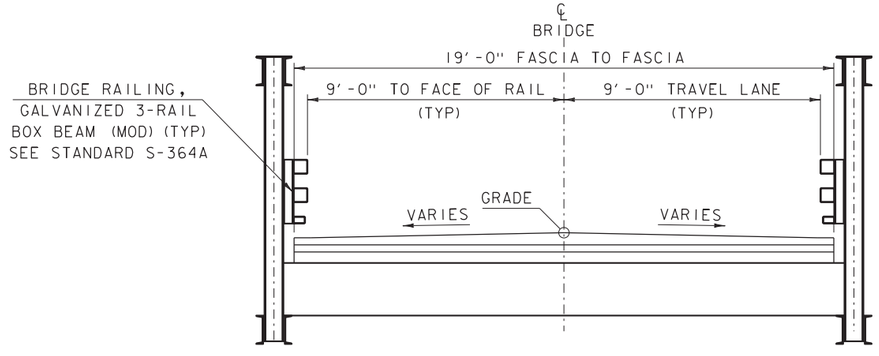

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PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: G.SWEENY	CHECKED BY: G.SWEENY
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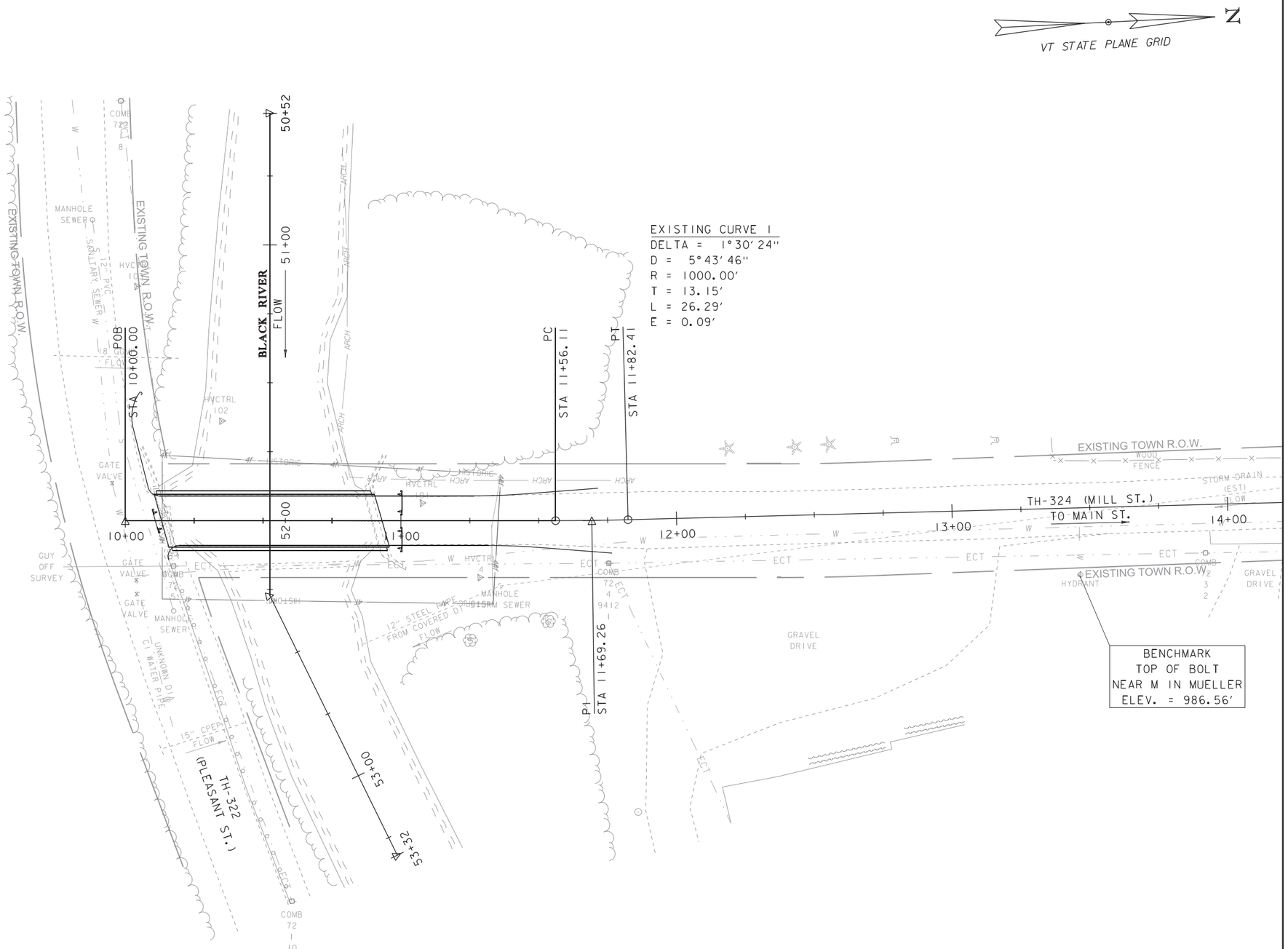

TRUSS REHABILITATION / PEDESTRIAN ONLY

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PROJECT NUMBER:	BO 1443(52)
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PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
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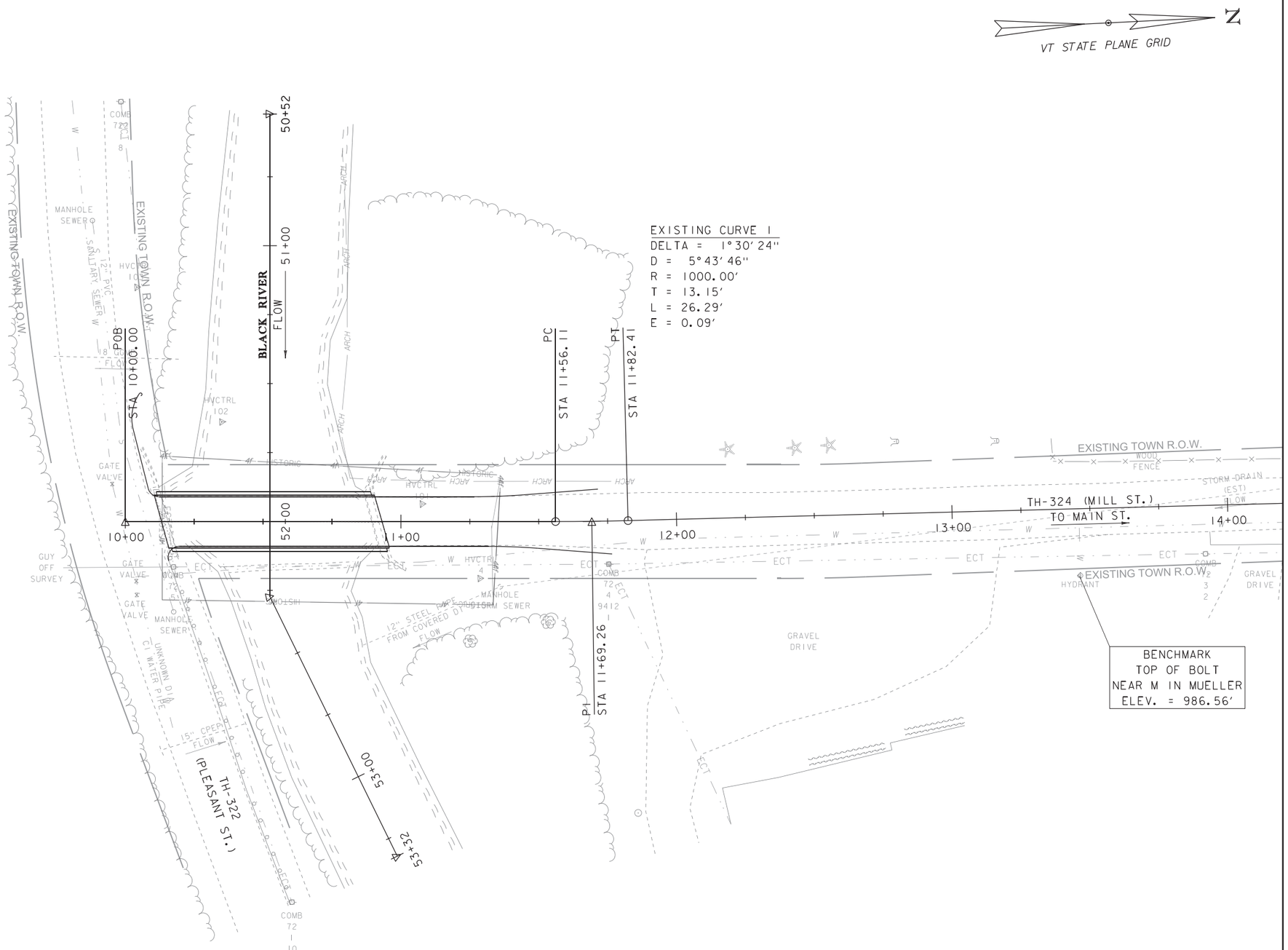

TRUSS REHABILITATION

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PROJECT NUMBER:	BO 1443(52)
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PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
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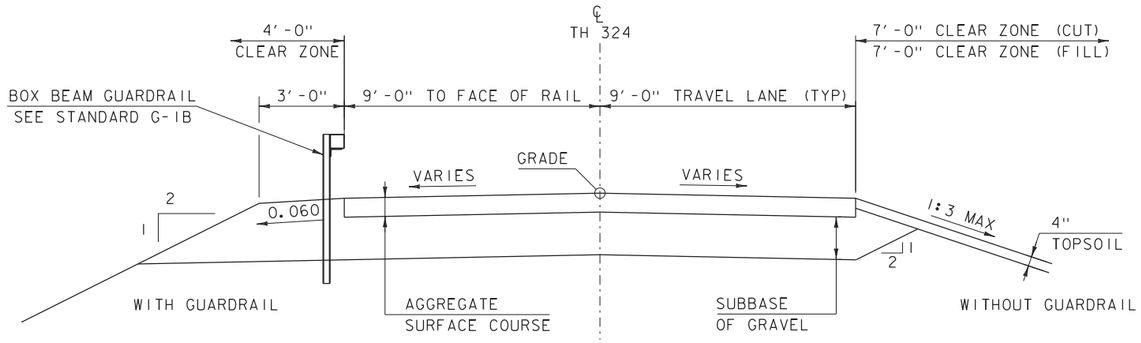
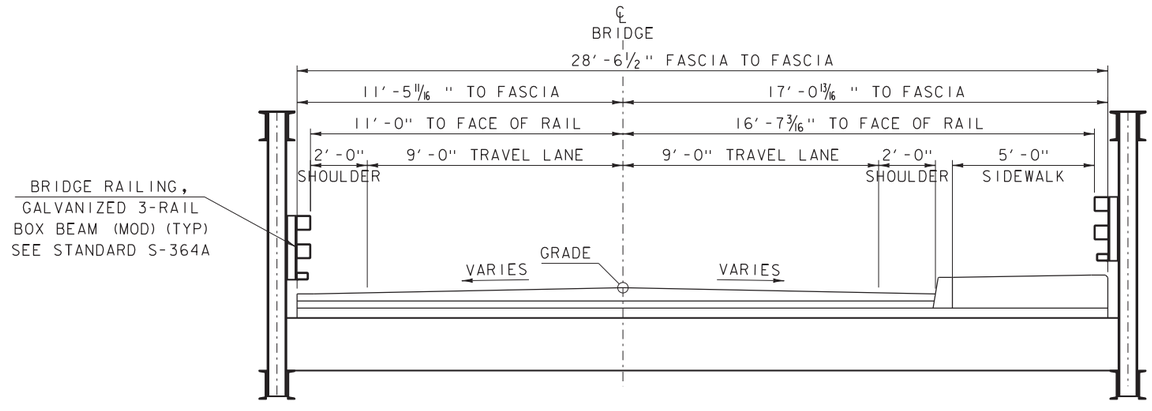


PROPOSED TH 324 TYPICAL SECTION

SCALE 3/8" = 1'-0"



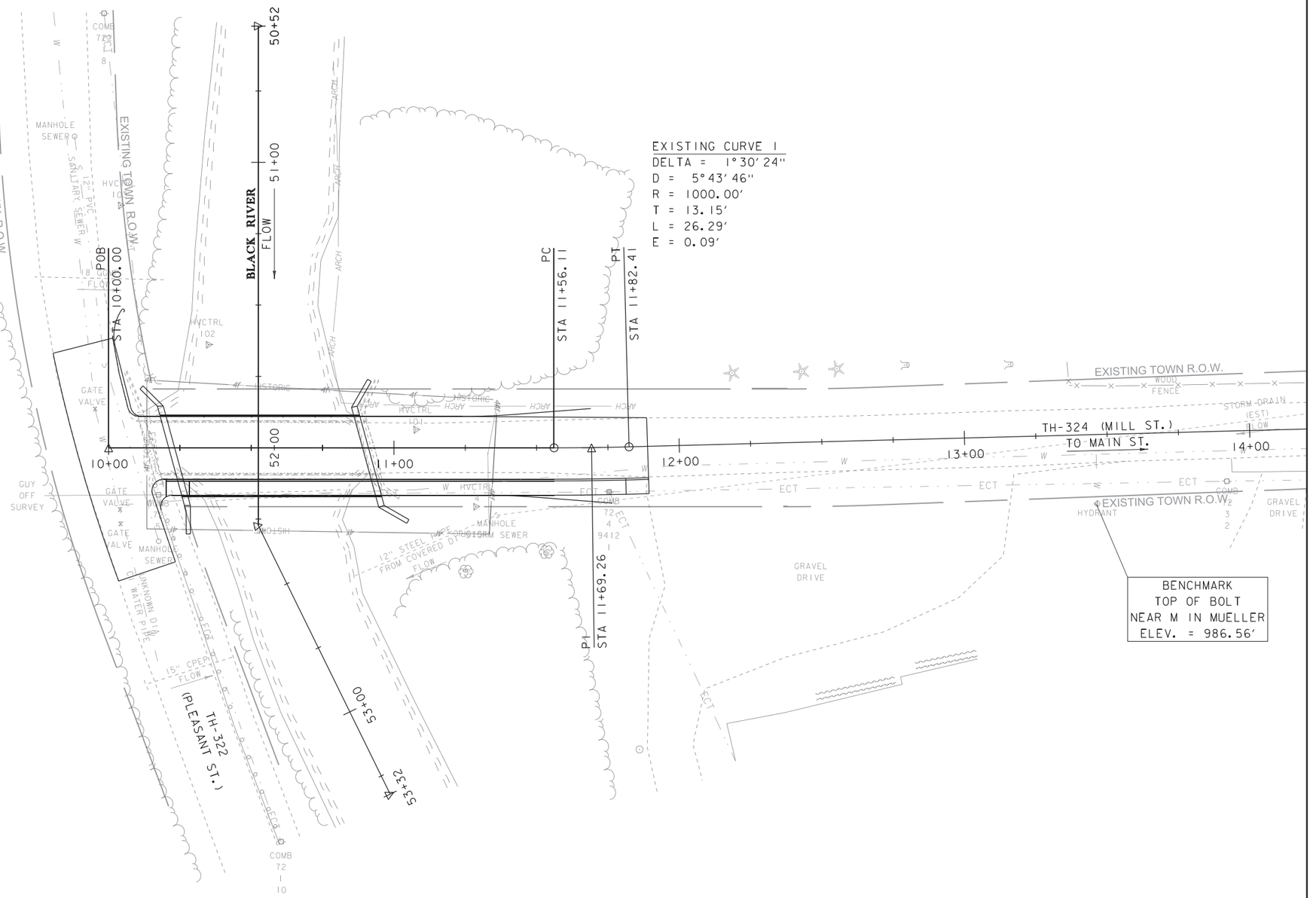
BRIDGE REPLACEMENT TYPICAL SECTION

SCALE 3/8" = 1'-0"

PROJECT NAME:	LUDLOW VILLAGE
PROJECT NUMBER:	BO 1443(52)
FILE NAME: 12j638\sl2j638typ.dgn	PLOT DATE: 02-JUL-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: G.SWEENY	CHECKED BY: G.SWEENY
BRIDGE REPLACEMENT TYPICAL SECTIONS	SHEET 8 OF 9

N

VT STATE PLANE GRID



BRIDGE REPLACEMENT

SCALE 1" = 20'-0"

20 0 20

PROJECT NAME:	LUDLOW VILLAGE
PROJECT NUMBER:	BO 1443(52)
FILE NAME: 12j638/s12j638border.dgn	PLOT DATE: 02-JUL-2019
PROJECT LEADER: N.WARK	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
BRIDGE REPLACEMENT LAYOUT	SHEET 9 OF 9