STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Georgia BF 023-1(7)

VT ROUTE 104A, BRIDGE 1 OVER ARROW HEAD LAKE

January 8, 2019



Table of Contents

Table of Contents 2

I. Site Information 3

Need 3
Traffic 4
Bicycle Usage and Corridor Width 4
Design Criteria 5
Inspection Report Summary 5
Hydraulics 6
Utilities 6
Resources 7
Biological: 7
Hazardous Materials: 8
Historic: 8
Archaeological: 8
Stormwater: 8

II. Safety 8

III. Maintenance of Traffic 9

Option 1: Off-Site Detour 9
Option 2: Phased Construction 9
Option 3: Temporary Bridge 10

IV. Alternatives Discussion 11

No Action 11
Alternative 1: Minor Rehabilitation 11
Alternative 2: Deck Replacement 11
Alternative 3: Superstructure Replacement 12
Alternative 4: Full Bridge Replacement 13
Causeway Width and Bridge Height Above Water. 14

V. Alternatives Summary 15

VI. Cost Matrix 16

VII. Conclusion 17

VIII. Appendices 18

Appendix A: Site Pictures 19
Appendix B: Town Map 24
Appendix C: Bridge Inspection Report 26
Appendix D: Preliminary Geotechnical Report 28
Appendix E: Natural Resources Memo 30
Appendix F: Natural Resources ID 32
Appendix G: Archeology Memo 35
Appendix H: Historic Memo 45
Appendix I: Hazardous Waste Map 56
Appendix J: Stormwater Memo 58
Appendix K: Crash Data 61
Appendix L: 2013 Road Safety Audit 64
Appendix M: Local Input 106
Appendix N: Operations Input 116
Appendix O: Detour Routes 121
Appendix P: 2013 US Route 7 Vermont 104A Scoping Report by VHB 125
Appendix Q: Plans 162

I. Site Information

Bridge 1 is a State-owned bridge located on VT Route 104A over Arrow Head Lake. The Bridge is located approximately 1.1 miles east of the junction with US Route 7. The bridge is located on a narrow causeway constructed over the lake. The roadway slopes along the causeway are mapped wetlands. The project is also within the range of the Northern Long Eared bat, a federally protected species along with other Rare, Threatened, and Endangered Species. The existing bridge conditions were gathered from a combination of a Site Visit, the Inspection Report, the Route Log and the existing Survey. See correspondence in the Appendix for more detailed information.

Roadway Classification	Minor Arterial
Bridge Type	Single Span Rolled Beam Bridge
Bridge Length	74 feet
Year Built	1937
Ownership	State of Vermont



Need

Bridge 1 carries VT Route 104A across Arrow Head Lake. Bridge 1 is considered functionally deficient and has been reduced down to one-way alternating traffic as a result of a truck crash that happened on the bridge and removed the bridge railing on one side of the bridge. Currently, there is F-Shape concrete barrier up as an interim solution. The following is a list of deficiencies of Bridge 1 and VT Route 104A in this location:

1. Deck Condition: Overall, the deck is in fair condition. However, there are maintenance needs as follows. The curbs have heavy spalling with exposed reinforcing steel. The galvanized steel beam railing is in poor condition with wide spread damage. The reinforced concrete posts have heavy cracking and spalling with exposed reinforcing steel. Following the truck collision in September of 2018, the railing and posts on the northern side of the bridge is in a failed condition. Additionally, the fascias on both sides are in poor condition with heavy cracking and spalling.

2. Superstructure Condition: The superstructure is in satisfactory condition, however there are areas of heavy rust scale at the outer beams and the paint system is failing throughout. Additionally, the bearings have heavy rusting.

3. Substructure Condition: Both backwalls have cracking and spalling on the beam end. The abutment seat areas have minor spalling but are in good condition overall. There is minor undermining on the Abutment 1 side.

4. The bridge has a curb to curb width of 20'-7" with no shoulders. The roadway width on the causeway is 26'. Neither the bridge or causeway width meet the minimum standard for safety and service, or for shared use.

5. Operations Considerations: The bridge is not wide enough for plowing activities, and operations makes repairs to the guardrail on a frequent basis. The bridge elevation is low. Water rises to the deck elevation which makes it difficult to inspect and maintain in the spring high water time. Additionally, the bridge does catch and release woody debris as Lake levels rise and fall.

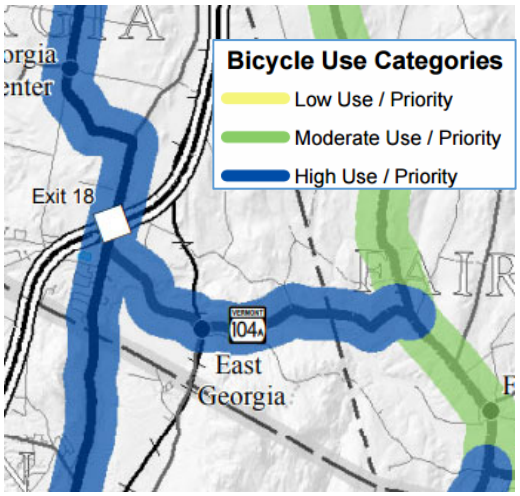
Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2021 and 2041.

Traffic Data	2021	2041
AADT	5,700	6,200
DHV	690	740
ADTT	410	580
%T	2.5	3.3
%D	65	65

Bicycle Usage and Corridor Width

VT Route 104A through the project area has a high use/priority for bicycles. Per the Vermont State Standards, for a minor arterial with a design hourly volume of 740 vehicles per hour at 50 mph, the minimum required shared use shoulder width for bicycles is 5 feet in areas where guardrail is present. There is currently no shoulder over the bridge and a 2-foot shoulder along the causeway. Since the route is classified as High priority, the shoulder width should be increased as much as possible. The VT Route 104A corridor has a width of 28-feet and there are no plans to widen the corridor in the future. Additionally, a minimum 28-foot width is required for winter maintenance. As such, it is proposed that any new construction meet a minimum paved width of 28-feet.



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 6200, a DHV of 740, and a design speed of 50 mph for a Minor Arterial.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 4.3	(24’ to 26’)	11'/5' (32')	Substandard, VT Route 104A corridor width: 28’
Bridge Lane and Shoulder Widths	VSS Table 4.3	10.3’/0’ (20.6')	11'/5' (32')	Substandard, VT Route 104A corridor width: 28’
Clear Zone Distance	VSS Table 4.4	No Issues Noted	20' fill 12' cut (1:3 slope) 14’ cut (1:4 slope)	
Banking	VSS Section 4.13	10% at western approach	8% (max)	
Speed	VSS Section 4.3	50 mph (Posted)	50 mph (Design)	
Horizontal Alignment	AASHTO Green Book, Table 3.10b	R = ∞ (over bridge) R = 1,145 (western approach) R = 5,730 (eastern approach)	R = 1,120’ @ e=7.2% R = 5,400 @ e=2.2% R = 8,150’ @ NC	
Vertical Grade	VSS Table 4.5	-1.60%	5% (max) for rolling terrain	
K Values for Vertical Curves	VSS Table 4.1	117 sag (over bridge) 97 crest (eastern approach)	110 crest / 90 sag	
Vertical Clearance	VSS Section 4.8	No Issues Noted	14' 3" (min)	
Stopping Sight Distance	VSS Table 4.1	1093’	400'	
Bicycle/Pedestrian Criteria	VSS Table 4.7	0' Shoulder over bridge 3’ shoulder on causeway	5' Shoulder	Substandard
Bridge Railing	Structures Design Manual Section 13	W-beam mounted on concrete posts	TL-4	Substandard
Hydraulics	VTrans Hydraulics Manual, Table 6.1	Causeway over lake with bridge acting as equalizer	See Hydraulics Section	
Structural Capacity	Structures Design Manual, Ch. 3.4.1	Not Posted, Structurally Sufficient	Design Live Load: HL-93	

Inspection Report Summary

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

From the Bridge Inspection Reports:

8/2/2017 – Rail and concrete post on the deck should be repaired soon. Deck will need rehab in the near future. ~FRE/JAS

08/28/2015 – * Bridge rail is in poor condition and needs upgrading. Narrow and deteriorating bridge is a good candidate for reconstruction with a new and widened deck. ~ MJ/JS

08/14/2013 – Bridge should be considered for a deck upgrade with new rail system and subsequent widening. Until then, the bridge rail system needs to be repaired, since as much as 80' of the retro-fit steel beam rail is not attached to the posts. Random posts also have some heavy section loss. Critical Maintenance request sent to notify regarding rail problems. Deck was paved with thin lift to smooth since last inspection. ~ MJ/JS

11/02/2011 – * Bridge rail is in poor condition with much of the steel beam detached from the deteriorated concrete posts. It is highly recommended that the fascias be reconstructed, drop style and fascia mounted rail added to gain a margin of horizontal clearance. ~ MJ/DK

Hydraulics

The VTrans Hydraulics Section advises that either a rehabilitation or replacement option would be acceptable. An in-depth hydraulics study has not been completed at this time. The bridge crosses Arrowhead Mountain Lake, which is fed by the Lamoille River and is dam controlled in Milton. The bridge acts as an equalizer for the lake north and south of the causeway. A desk review of the bridge will assess flood elevations for the project area. It is recommended that any alternative chosen maintains or improves the existing low beam and waterway area.

Utilities

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

Municipal Utilities

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

Public Utilities

Underground:

- There are no underground facilities in the project area.

Aerial:

- There are aerial utilities that parallel the causeway on the southern side. The relocation of the aerial utilities is not anticipated for construction.

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

Biological:

Wetlands
There are wetlands in the project area that are associated with the shore zones of Arrowhead Mountain Lake. Wetlands at this site are classified as Palustrine, broad leaved, scrub- shrub/emergent wetlands. Typical vegetation consists of alders, dogwood, bull rush, sedges and ferns. Soils mapped in this area are Au Gres loamy fine sand which is a poorly drained soil. Also mapped are Windsor fine sandy loams, which are well drained soils. Field observations of the soils in the wetland areas were very dark, fine sandy loams with distinct redoximorphic features. The boundaries are abrupt with the causeway approaches and adjacent uplands.

Watercourses
Arrowhead lake is the watercourse in the immediate vicinity of the project location. The lake is created by an impoundment of the Lamoille River. The jurisdiction boundary would be the ordinary high water mark of the causeway. Several unnamed streams enter the lake to the north of the project area. Arrowhead Lake will be regulated by the US Corps of Engineers and the VT ANR.

Wildlife Habitat
The project area is mostly within a lake setting. The bridge crossing should incorporate aquatic organism passage. This area has spawning habitat for northern pike, largemouth bass, yellow perch, black crappie, and other spring-spawning fish. Time of year restrictions for work below OHW should only occur between July 1 and March 15.

Rare, Threatened and Endangered Species (R/T/E):
There are several R/T/E species mapped in the vicinity of this project. The VTrans senior biologist is coordinating with the VT Fish and Wildlife-Wildlife Diversity program to determine if any surveys may need to occur and any special conditions.

The project is within the northern long-eared bat, Myotis septentrionalis (state endangered, federally threatened) range. No documented roosts or hibernacula are within 1-mile of the project area. Potential suitable habitat for this species varies. Typically, suitable habitat consists of forested areas that have trees (dead or alive) $\geq$ 3" dbh that exhibit cracking, peeling bark, holes, crevices, and bridges, etc. Riparian zones and hedge rows are used as travel corridors for this species. There is adjacent potential suitable habitat. In particular, there are several Black Locust trees in the northeast quadrant that would support this sort of habitat. Typical avoidance/minimization measures would typically be time of year restrictions on cutting of potential roost trees (no cutting April 15th – September 30th).

Agricultural Soils
No prime agricultural soils are present.

Hazardous Materials:

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

Historic:

Bridge 1 is not a historic resource.

After reviewing the National and State Registers of Historic Places of 1997, VTrans Historic Preservation Staff have determined the Kemp-Sheppard property located in the northeast quadrant is historically significant.

On the Kemp-Sheppard property are two structures that are noted in the National Register of Historic The Kemp-Sheppard Home and surrounding property must be avoided during construction. All project-related vibrations should be minimized to the extent possible to ensure the Kemp-Sheppard House will not be affected project activity. If the project is expected to cause vibration, then VTrans should consider evaluating the house to create a pre-project conditions assessment. It will be important for the Project Manager to be in contact with the VTrans Historic Preservation Officer about this property during project design.

Archaeological:

While there are areas of archaeological sensitivity within the vicinity of the 200 feet project Area of Potential Effect, these areas should remain undisturbed if work on Bridge No. 1 is confined to the roadway and areas of standing water. If the project includes construction impacts within the limits of the causeway approaches, then further archaeological evaluation will be necessary.

Stormwater:

There are no stormwater concerns for this project.

II. Safety

The bridge is not located within a high crash location. However, there is a crash history on the bridge involving sideswipes, due to the speed and substandard width of the bridge. A safety audit was performed in 2013 and can be found in Appendix L.

III. Maintenance of Traffic

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

Option 1: Off-Site Detour

This option would close the bridge and reroute VT Route 104A traffic onto a signed detour route. The regional detour route would detour traffic from VT Route 104A, to US Route 7, St. Albans State Highway, and VT Route 104, back to VT Route 104A. This regional detour has an end-to-end distance of 22.7 miles and adds 13.6 miles to the through travel distance.

The shortest local bypass route available is 6.0 miles end-to-end and adds 0.2 miles to the through route. The local bypass routes available that local traffic will likely take if Bridge 1 is closed is as follows:

Local Bypass 1. VT Route 104A, to Skunk Hill Road, and US Route 7, back to VT Route 104A (6.0 miles end-to-end)

Local Bypass 2. VT Route 104A, to Arrow Head Lake Road, North Road, Main Street, and US Route 7, back to VT Route 104A (9.3 miles end-to-end)

A map of the detour route and possible local bypass routes, which could see an increase in traffic, can be found in the Appendix.

Advantages: This option would eliminate the need for a temporary bridge or phased construction, which would significantly decrease cost and time of construction. This option would not require rights from adjacent property owners for a temporary bridge. Additionally, this option would have the least impacts to adjacent properties and environmental resources. 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 corridor during construction.

Option 2: Phased Construction

Phased bridge construction involves building one side of the structure at a time, while maintaining traffic on the opposite side of the structure. This allows the road to stay open during construction, while having minimal impacts on neighboring property owners and environmental resources.

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

Based on the current traffic volumes, it is acceptable to close one lane of traffic, and maintain one lane of traffic, both ways, with a traffic signal as existing. However, based on the existing bridge width, if a new deck is placed than phasing is only possible if the bridge is widened approximately 8 feet, and as such will not be an available method of traffic control for all bridge alternatives. See the Appendix for the recommended phasing layout plans.

Advantages: Traffic flow would be maintained through the project corridor during construction. Also, this option would have minimal impacts to adjacent properties. Right-of-Way would not need to be obtained for this option.

Disadvantages: Phased construction generally involves higher costs and complexity of construction. Costs are usually higher and construction duration is longer, since many construction activities have to be performed two times. Additionally, since cars are traveling near construction activity, there is decreased safety. There would be some delays and disruption to traffic, since the road would be reduced to one-way traffic.

Option 3: Temporary Bridge

The bridge is located on a causeway of Arrow Head Lake. As such, a large amount of fill into the lake would be required to construct a temporary bridge. In order to keep impacts to a minimum, it is proposed that any temporary bridge is one-way alternating and is constructed as close to the existing bridge as possible. Sheet piles could be utilized to keep impacts and fill to a minimum.

Advantages: A temporary bridge will maintain traffic flow through the project corridor during construction.

Disadvantages: The costs to construct and signalize a temporary bridge would be high, as well as time consuming. Both an upstream and downstream temporary bridge would have impacts to wetlands. A downstream temporary bridge would also require an aerial utility relocation.

IV. Alternatives Discussion

No Action

The existing bridge is not structurally deficient. The deck is rated as fair, and the superstructure and substructure are rated as satisfactory and good respectively. It is reasonable to assume that this structure could last an additional 10 years. However, due to a collision into the bridge rail, the structure has been reduced down to 1 lane and there is a need to reopen the bridge to two-way traffic. Additionally, there are maintenance issues that should be addressed. The No Action alternative is not recommended.

Alternative 1: Minor Rehabilitation

This rehabilitation option includes the minimal amount of work necessary to open the bridge to two-way traffic and extend the useful life of the bridge. Any loose concrete on the underside of the bridge would be removed and replaced. Additionally, a new fascia would be poured on both sides of the existing deck and new bridge railing would be installed.

After removing the deteriorated and loose concrete from the structure, patching materials can be placed to replace the removed concrete. A disadvantage with this method of rehabilitation in this situation, is that having newer non-chloride laced materials adjacent to the existing concrete can exacerbate the rate of deterioration of the remaining concrete which surrounds the patch. This can be mitigated for approximately 15 years. As this alternative would only be a 15-year fix, painting the existing beams would not be recommended. Additionally, painting the existing beams in place would be extremely difficult and cost prohibitive due clearance of the existing beams over Arrow Head Lake.

The substandard bridge width would not be addressed with this option.

All of the bridge deck joints would be replaced with flexible joint material. Bearings would be evaluated and replaced as necessary.

This alternative would address the railing failure and deterioration issues of the existing bridge. However, the structure will continue to be classified as functionally deficient due to the narrow width of the bridge.

Maintenance of Traffic: Traffic would be maintained via phased construction during construction.

Alternative 2: Deck Replacement

A deck replacement for this bridge would include a new deck and railings, along with resetting the existing rolled beams to a modified spacing, with superstructure and substructure repairs as follows:

- The existing deck would be removed, and a new wider cast-in-place deck would be poured. The new deck may need to be lightweight for the existing bridge components to accommodate a wider typical section.

- The existing steel will be removed and reset to a slightly wider spacing to accommodate a wider bridge. The existing steel superstructure has localized rusting, especially the outer beams, and has areas of minor section loss. Additionally, due to corrosion issues, it would be recommended that the existing steel is painted prior to being reset. Painting the existing beams in place would be extremely difficult and cost prohibitive due clearance of the existing beams over Arrow Head Lake. Painting the existing steel during a bridge closure would add approximately 3 weeks onto the closure period.

- New bearings would be placed on the bridge seats.

Design life: The existing substructures are in Good condition, and it is reasonable to assume that with minimal repairs, the existing substructures could safely carry anticipated traffic loads, including the increased loading from a widened deck, for an additional 40 years. While the existing superstructure is in satisfactory condition overall, there is heavy rust scale on the outer beams. Based on the existing condition of the steel beams, a design life of 30 years will be assumed for this option.

The existing lane widths and shoulders on the bridge are 10.3 feet and 0 feet wide respectively. This does not meet the minimum standard of 32 feet or the corridor width of 28 feet. It is proposed that the overhang on the bridge is increased and the beams are respaced to provide 11-foot lanes and 3-foot shoulders for this alternative. This typical section would meet the existing corridor width. To accommodate the wider superstructure, new wingwalls the length of the approach rail would need to be constructed on all four corners of the bridge. Due to the additional deck width and beam spacing a lightweight deck system may need to be constructed so additional loads on the existing superstructure and substructure are kept to a minimum.

Advantages: This alternative would address the maintenance concerns of the bridge and extend the life of the existing structure an additional 30 years. The effects on the adjacent properties, resources, and wildlife would be minimal. The width of the existing bridge could be widened to a 28-foot width rail-to-rail typical.

Disadvantages: The vertical grade could not be raised for inspection and recreation purposes. Additionally, the new superstructure would not meet the minimum standard for width as set forth in the Vermont State Standards.

Maintenance of Traffic: Traffic could be maintained on an offsite detour, or a temporary bridge during construction.

Alternative 3: Superstructure Replacement

A superstructure replacement option for this bridge would include a new deck, railings, and superstructure. New bearings would also be included. The causeway would be widened by a foot on each side to match the existing corridor.

Design life: The existing substructures are in Good condition, and it is reasonable to assume that with minimal repairs, the existing substructures could safely carry anticipated traffic loads, including the increased loading from a widened deck, for an additional 40 years.

The existing lane widths and shoulders on the bridge are 10.3 feet wide with no shoulders. This does not meet the minimum standard of 32 feet or the corridor width of 28 feet. It is proposed that modified beam locations along with an increased overhang be used to provide 11-foot lanes and 3-foot shoulders for this alternative. This typical section would match the existing VT 104A corridor. To accommodate the wider superstructure, new wingwalls the length of the approach rail would need to be constructed on all four corners of the bridge. The causeway would also be widened to match the corridor typical section. Due to the increased weight if a new wider superstructure, lightweight deck system may be needed in order to minimize additional loads on the substructure.

Advantages: This alternative would address the maintenance concerns of the bridge and extend the life of the existing structure an additional 40 years. The effects on the adjacent properties, resources, and wildlife would be minimal. The width of the existing bridge could be widened to a 28-foot width rail-to-rail typical to match the corridor.

Disadvantages: The new superstructure would have a design life greater than that of the remaining substructures. Additionally, the new superstructure would not meet the minimum standard for width as set forth in the Vermont State Standards.

Maintenance of Traffic: Traffic could be maintained on an offsite detour, or a temporary bridge during construction.

Alternative 4: Full Bridge Replacement

A full bridge replacement would include replacing the deck, superstructure, and substructure at the existing location. The various considerations for this option include the bridge width and length, skew, superstructure type and substructure type. Since the existing bridge is located on a straight horizontal alignment, it is recommended that the horizontal alignment remain unchanged.

a. Bridge Width

The minimum standard bridge width is 32-feet. However, the VT Route 104A corridor has a width of 28-feet. The current bridge provides a curb-to-curb width of 20.6-feet, which does not meet the minimum standard or the existing corridor. To avoid impacts to environmental resources, and decrease the project development duration, any new bridge should match the width of the corridor and provide a rail-to-rail typical section of 28-feet. This would include two 11-foot travel lanes with 3-foot shoulders.

b. Bridge Length and Skew

The existing bridge is 74 feet long with no skew. In order to reduce traffic impacts and costs, it is proposed that the existing bridge seats are cut down and the existing substructure remains in place. The

new substructure would be constructed behind the existing. This would result in a slightly longer span length. An 85-foot span with no skew is recommended.

c. Superstructure

The superstructure depth should be minimized as much as possible to increase the height above the water surface elevation for maintenance, inspection, and recreational purposes. Based on the span length, the superstructure could be a composite steel beam bridge with a cast in place deck or could use Prefabricated Precast Bridge Units (PBUs) or NEXT beams to decrease construction time. The type and configuration of superstructure will be determined by the Design Project Manager.

d. Substructure

There was no ledge visible in the project area during the scoping site visit. New substructures could likely either be supported on piles or on spread footings, to be determined in design. Borings should be taken at each of the substructure locations to determine the in-situ conditions.

e. Maintenance of Traffic

Either an offsite detour or a temporary bridge could be utilized to maintain traffic during construction.

Causeway Width and Bridge Height Above Water.
The vertical grade of the existing structure is such that there is insufficient height for inspection, maintenance, and recreation. In order to reduce Lake impacts, a 1:1½ roadway side slope is recommended. Stone should be added to the slopes to prevent erosion. Grubbing on stone slopes may be required for wildlife.

The width of the causeway through the project area is currently 24 to 26-feet (edge of pavement to edge of pavement). This does not match the corridor width or meet the minimum requirements for winter maintenance. It is recommended that for all alternatives, except for the minor bridge rehabilitation, the bridge and bridge approaches will be constructed to 28-feet to match the corridor and meet maintenance needs.

The table below evaluates the additional roadway cost and impact of the project to raise the bridge 3-feet:

Georgia BF 023-1(7) CAUSWAY WORK	11'/3' Typical Section	
	At Grade	3' Vertical Raise at bridge
Fill Required	300 CY	1,800 cy
Project Length	425 ft	700 ft
Roadway Cost	$375,000	$505,000
ROW Impacts	Yes	Yes
Geometric Design Criteria	Substandard Width	
Impacts to Causeway	Low	Medium
Impacts to Archaeologically Sensitive Areas	Yes - Minimal	Yes - Minimal
Impacts to Wetlands	Yes - Minimal	Yes - Moderate

V. Alternatives Summary

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

Alternative 1: Minor Bridge Rehabilitation with Traffic Maintained with Phasing
Alternative 2a: Deck Replacement with Traffic Maintained on an Offsite Detour
Alternative 2b: Deck Replacement with Traffic Maintained on a Temporary Bridge
Alternative 3a: Superstructure Replacement with Traffic Maintained on an Offsite Detour
Alternative 3b: Superstructure Replacement with Traffic Maintained on a Temporary Bridge
Alternative 4a: Full Bridge Replacement at Grade with Traffic Maintained on an Offsite Detour
Alternative 4b: Full Bridge Replacement with a 3' Raise at the Bridge with Traffic Maintained on an Offsite Detour
Alternative 4c: Full Bridge Replacement at Grade with Traffic Maintained on a Temporary Bridge
Alternative 4d: Full Bridge Replacement with a 3' Raise at Bridge with Traffic Maintained on a Temporary Bridge

VI. Cost Matrix

Georgia BF 023-1(7)		Do Nothing	Alternative 1	Alternative 2		Alternative 3		Alternative 4			
			Minor Rehabilitation	Deck Replacement		Superstructure Replacement		Full Bridge Replacement			
			Phased Construction	a. Offsite Detour	b. Temporary Bridge	a. Offsite Detour	b. Temporary Bridge	a. At Grade, Offsite Detour	b. 3' Raise at Bridge, Offsite Detour	c. At Grade, Temporary Bridge	d. 3' Raise at Bridge, Temporary Bridge
COST	Bridge Cost	$0	36,400	333,000	333,000	675,500	675,500	1,005,900	1,047,600	1,005,900	1,047,600
	Removal of Structure	$0	71,040	71,040	71,040	71,040	71,040	133,200	133,200	133,200	133,200
	Roadway	$0	153,000	187,000	187,000	230,000	230,000	329,000	503,000	329,000	503,000
	Maintenance of Traffic	$0	127,030	127,030	281,540	127,030	281,540	262,030	387,030	479,040	604,040
	Construction Costs	$0	387,470	718,070	872,580	1,103,570	1,258,080	1,730,130	2,070,830	1,947,140	2,287,840
	Construction Engineering & Contingencies	$0	116,241	215,421	305,403	165,536	188,712	397,930	476,291	486,785	571,960
	Total Construction Costs w CEC	$0	503,711	933,491	1,177,983	1,269,106	1,446,792	2,128,060	2,547,121	2,433,925	2,859,800
	Preliminary Engineering	$0	38,747	71,807	87,258	220,714	251,616	259,520	310,625	389,428	457,568
	Right of Way	$0	-	-	30,000	-	30,000	20,000	35,000	20,000	35,000
	Total Project Costs	$0	**542,458**	**1,005,298**	**1,295,241**	**1,489,820**	**1,728,408**	**2,407,579**	**2,892,745**	**2,843,353**	**3,352,368**
	Annualized Costs	$0	54,246	33,510	43,175	37,245	43,210	32,101	38,570	37,911	44,698
TOWN SHARE			0	0	0	0	0	0	0	0	0
TOWN %			0	0	0	0	0	0	0	0	0
SCHEDULEING	Project Development Duration	N/A	1 year	1 year	2 years	1 year	2 years	1 years	2 years	3 years	3 years
	Construction Duration	N/A	3 months	3 months	18 months	3 months	18 months	6 months	6 months	18 months	18 months
	Closure Duration (If Applicable)	N/A	N/A	60 days	N/A	45 days	N/A	45 days	60 days	N/A	N/A
ENGINEERING	Typical Section - Approaches (feet)	26	26	28	28	28	28	28	28	28	28
	Typical Section - Bridge (feet)	20.6	21.5	28	28	28	28	28	28	28	28
	Typical Section - Causeway (feet)	24 to 26	24 to 26	28	28	28	28	28	28	28	28
	Geometric Design Criteria	Substandard Width	Substandard Width	Substandard Width – matches the VT Route 104A Corridor		Substandard Width – matches the VT Route 104A Corridor		Substandard Width – matches the VT Route 104A Corridor			
	Traffic Safety	No Change	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved
	Alignment Change	No Change	No	No	No	No	No	No	Vertical Raise of 3'	No	Vertical Raise of 3'
	Bicycle Access	No Change	No Change	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved
	Pedestrian Access	No Change	No Change	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved
	Hydraulics	No Change	No Change	No Change	No Change	No Change	No Change	No Change	Improved	No Change	Improved
	Utilities	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
OTHER	ROW Acquisition	No	No - Assumed	No - Assumed	Yes - Assumed	No - Assumed	Yes - Assumed	Yes - Assumed	Yes - Assumed	Yes - Assumed	Yes - Assumed
	Archaeological Impacts	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Wetland Impacts	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Road Closure	No	No	Yes	No	Yes	No	Yes	Yes	No	No
	Design Life	10 Years	10	30	30	40	40	75	75	75	75

VII. Conclusion

We recommend **Alternative 4a**; a full bridge replacement while maintaining traffic on an offsite detour.

Structure:

While the existing substructures are in good condition, the bridge is 81 years old and has exceeded its expected design life. While the bridge rehabilitation options have the lowest upfront costs, the full bridge replacement option has a lower annualized cost. There is a need to widen the causeway to match the VT Route 104A corridor. In order to match the existing corridor width while using the existing substructures, a significant amount of substructure work would be required for the existing substructures. Additionally, long retaining walls would be required at all four corners of the structure to accommodate the wider width. This makes the rehabilitation option not as cost effective as the full bridge replacement option.

Since the existing substructures are currently in good condition with no scour issues noted, it is recommended that they remain in place. The existing bridge seats would be cut down and the new substructures would be constructed behind the existing abutments. This will reduce the duration of the road closure and reduce the cost of the project as cofferdams will not be required. The full bridge replacement option is expected to have a design life of 75 years.

The proposed structure would be widened by 8 feet to have two 11-foot travel lanes with 3-foot shoulders. While this width does not meet the minimum standard as set forth in the Vermont State Standards, it matches the existing typical section of the VT Route 104A corridor. The width of the causeway would be slightly widened as well to match the corridor. By matching the corridor width, impacts to archaeological resources and wetlands will be minimized.

Traffic Control:

The recommended method of traffic control is to close the bridge for 45 days and maintain traffic on an offsite detour. This option will have less impacts to Arrow Head Lake and adjacent properties and will not require additional Right-of-Way acquisition for placement of a temporary bridge. The AADT on VT Route 104A is 5,700 vehicles per day. While the regional detour is approximately 22.7 miles, there are several local bypass routes available. The shortest local bypass route has an end-to-end distance of 6.0 miles and adds 0.2 miles to the through route. Constructing a temporary bridge would increase the project development duration by 2 years. Since the current bridge has been reduced to one lane, there is a need to expedite this project. As such, an offsite detour is recommended. By not providing a temporary bridge, both the project development time and the project cost are significantly reduced.

VIII. Appendices

A: Site Pictures
B: Town Map
C: Bridge Inspection Report
D: Preliminary Geotechnical Information (Borings In Progress)
E: Natural Resources Memo
F: Natural Resources ID
G: Archeology Memo
H: Historic Memo
I: Hazardous Waste Map
J: Stormwater Memo
K: Crash Data
L: 2013 Safety Audit
M: Local Input (Georgia and Fairfax)
N: Operations Input
O: Detour Maps
P: 2013 US Route 7 Vermont 104A Scoping Report by VHB
Q: Plans

Appendix A: Site Pictures



Picture 1: Looking East over Bridge 1



Picture 2: Looking West over Bridge 1



Picture 3: Looking Upstream from Bridge 1



Picture 4: Looking Downstream from Bridge 1



Picture 5: Deck and Superstructure Condition



Picture 6: Eastern Abutment



Picture 7: Western Abutment

Appendix B: Town Map

Georgia
VT 104A,
Bridge 1

Scale: 1:65,640

N

- INTERSTATE
- STATE LONG
- STATE SHORT
- TOWN LONG
- FAS/FAU
- BIKE PATH
- INTERSTATE
- STATE HIGHWAY
- CLASS 1
- CLASS 2
- CLASS 3
- CLASS 4
- LEGAL TRAIL
- PRIVATE
- DISCONTINUED
- FAS/FAU HWY
- MAINTENANCE DISTRICT
- POLITICAL BOUNDARY
- VTRANS REGION BOUNDARY
- NAMED RIVER-STREAM
- UNNAMED RIVER-STREAM
- Point from Local Bridge Data *
- Point from Local Culvert Data *

* Points are from local town bridge and culvert inventories. Some points may overlap where VTrans has also conducted an inventory on the Town highway.
Data source: VOBCIT aka VTCulverts

Produced by:
Mapping Section
Division of Policy, Planning and Intermodal Development
Vermont Agency of Transportation
May 2017

GEORGIA

COUNTY-TOWN CODE: **0608-0**
FRANKLIN COUNTY
DISTRICT # 8
District Long Name: St. Albans District
VTrans Four Region: Northwest

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

Appendix C: Bridge Inspection Report

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for GEORGIA **bridge no.:** 00001 **District:** 8

Located on: VT 0104A ALT **over** ARROW HEAD LAKE **approximately** 1.1 MI E JCT. U.S.7 **Owner:** 01 STATE-OWNED

CONDITION

Deck Rating: 5 FAIR

Superstructure Rating: 6 SATISFACTORY

Substructure Rating: 7 GOOD

Channel Rating: 8 VERY GOOD

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200023000106082

Federal Sufficiency Rating: 071.3

Deficiency Status of Structure: FD

AGE and SERVICE

Year Built: 1937 **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): 13

ADT: 003800 **% Truck ADT:** 09

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0072

Structure Length (ft): 000074

Lt Curb/Sidewalk Width (ft): 0.8

Rt Curb/Sidewalk Width (ft): 0.8

Bridge Rdwy Width Curb-to-Curb (ft): 20.9

Deck Width Out-to-Out (ft): 23

Appr. Roadway Width (ft): 026

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 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: 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: 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 1 MEETS CURRENT STANDARD

Structural Evaluation: 6 EQUAL TO MINIMUM CRITERIA

Deck Geometry: 2 INTOLERABLE, REPLACEMENT NEEDED

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 6 OCCASIONAL OVERTOPPING OF ROADWAY WITH INSIGNIFICANT TRAFFIC DELAYS

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

Load Rating Method (Inv): 1 LOAD FACTOR (LF)

Posting Status: A OPEN, NO RESTRICTION

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 2 H 15

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 082017 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

8/2/2017 Rail and concrete post on the deck should be repaired soon. Deck will need rehab in the near future. ~FRE/JAS

*08/28/2015 - * Bridge rail is in poor condition and needs upgrading. Narrow and deteriorating bridge is a good candidate for reconstruction with a new and widened deck. ~ MJ/JS*

08/14/2013 - Bridge should be considered for a deck upgrade with new rail system and subsequent widening. Until then, the bridge rail system needs to be repaired, since as much as 80' of the retro-fit steel beam rail is not attached to the posts. Random posts also have some heavy section loss. C.M. sent to notify regarding rail problems. Deck was paved with thin lift to smooth since last inspection. ~ MJ/JS

*11/02/2011 - * Bridge rail is in poor condition with much of the steel beam detached from the deteriorated concrete posts. It is highly recommended that the fascias be reconstructed, drop style and fascia mounted rail added to gain a margin of horizontal clearance. ~ MJ/DK*

11/02/2009 The overall condition of this bridge is satisfactory, except for slow ongoing deterioration of the deck surface, ongoing structural weakening

Appendix D: Preliminary Geotechnical Report

Appendix E: Natural Resources Memo

OFFICE MEMORANDUM

AOT - PDB - ENVIRONMENTAL SECTION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Rob Young, Project Manager
FROM: Jeff Ramsey, Environmental Specialist Supervisor
DATE: October 13, 2018
Project: Georgia BF 023-1 (7)

ENVIRONMENTAL RESOURCES:

Archaeological Site:	X Yes	___ No	see Archaeological Resource ID memo
Historic/Historic District:	X Yes	___ No	see Historic Resource ID memo
4(f) Property:	X Yes	___ No	see Historic Resource ID memo
Wetlands:	X Yes	___ No	see Natural Resource ID memo
Agricultural Land:	___ Yes	X No	
Fish & Wildlife Habitat:	X Yes	___ No	see Natural Resource ID memo
Wildlife Habitat Connectivity:	___ Yes	X No	
Endangered Species:	X Yes	___ No	see Natural Resource ID memo
Stormwater:	___ Yes	X No	
6(f) Property:	___ Yes	X No	
Hazardous Waste:	___ Yes	X No	
Contaminated Soils:	X Yes	___ No	Some Development Soils to the west, see map
USDA-Forest Service Lands:	___ Yes	X No	
Scenic Highway/Byway:	___ Yes	X No	
Act 250 Permits:	___ Yes	X No	
FEMA Floodplains:	X Yes	___ No	Mapped floodplain to the south, but can assume entire lake.
Flood Hazard Area/ River Corridor:	X Yes	___ No	Mapped floodplain and river corridor, see map.
US Coast Guard:	___ Yes	X No	
Lakes and Ponds:	X Yes	___ No	Any impacts below the Mean Water Level will require a Lake Encroachment Permit
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

Appendix F: Natural Resources ID

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

Agency of Transportation

[phone] 802-279-0583
[fax] 802-828-2334
[ttd] 800-253-0191

To: Jeff Ramsey, VTrans Environmental Specialist Supervisor

From: Glenn Gingras, VTrans Senior Biologist

Date: 10/26/2018

Subject: Georgia BF 023-1(7)-Natural Resource ID

I have reviewed the project area for the above referenced project area. I have identified natural resources 100 feet on both approaches and on both sides of the causeway as noted in figure 1. The project area was identified as VT 104A, Bridge 1. A field visit was conducted to investigate presence/absence of natural resources during the 2018 field season.

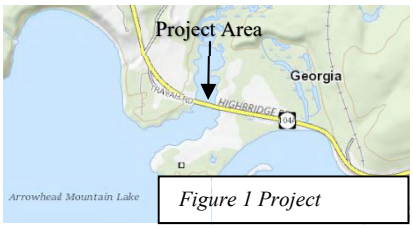


Figure 1 Project

Wetlands

ANR Natural Resource Atlas wetland mapping does indicate presence of VSWI wetlands in the area of the project. The wetlands are associated with the *shore zones* of Arrowhead Mountain Lake as shown in figure 2. Wetlands at this site would be classified as Palustrine, broad leaved, scrub-shrub/emergent wetlands. Typical vegetation consisted of alders, dogwood, bull rush, sedges and ferns. Soils mapped in this area are Au Gres loamy fine sand which is a poorly drained soil. Also mapped are Windsor fine sandy loams, which are well drained soils. Field observations of the soils in the wetland areas where very dark, fine sandy loams with distinct redoximorphic features. The boundaries are abrupt with the causeway approaches and adjacent uplands. Wetland boundaries can be referenced to make dgns.

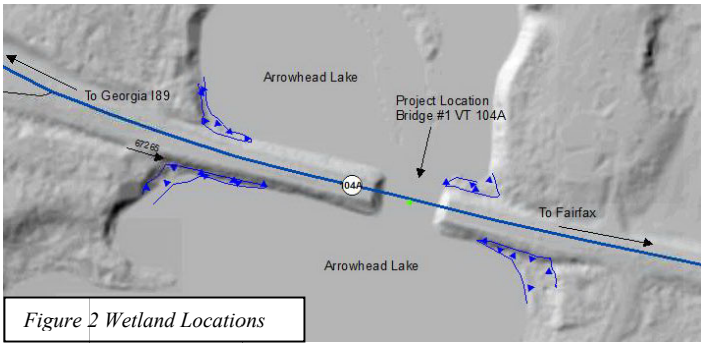


Figure 2 Wetland Locations

Watercourses

Arrowhead lake is the watercourse in the immediate vicinity of the project location. The lake is created by an impoundment of the Lamoille River. The jurisdication boundary would be the ordinary high water mark of the causeway. Several unnamed streams enter the lake to the north of the project area. Arrowhead Lake will be regulated by the US Corps of Engineers and the VT ANR.

Wildlife Habitat

The project area is mostly within a lake setting. The bridge crossing should incorporat aquatic ogranism passage, which I would assume any design would as this is a bridge. I have reached out to VT Fish and Wildlife, Fisheries Biologist Brian Chipman regarding potential instream timing restrictions. He has indicated that this area has spawning habitat for northern pike, largemouth bass, yellow perch, black crappie, and other spring-spawning fish. Time of year restrictions for work below OHW should only occur between July 1 and March 15.

Rare, Threatened and Endangered Species (R/T/E):
There are several R/T/E species mapped in the vicinity of this project as shown in figure 3. I am currently coordinating with VT Fish and Wildlife-Wildlife Diversity program to determine if any surveys that may need to occur and any special conditions.

The project is within the northern long-eared bat, *Myotis septentrionalis* (state endangered, federally T) range. No documented roosts or hibernacula are within 1-mile of the project area. Potential suitable habitat for this species varies. Typically, suitable habitat consists of forested areas that have trees (dead or alive) ≥ 3" dbh that exhibit cracking, peeling bark, holes, crevices, and bridges, etc. Riparian zones and hedge rows are used as travel corridors for this species. There is adjacent potential suitable habitat. In particular, there are several Black Locust trees in the northeast quadrant that would support this sort of habitat. Typical avoidance/minimization measures would typically be time of year restrictions on cutting of potential roost trees (no cutting APR15-SEPT30).

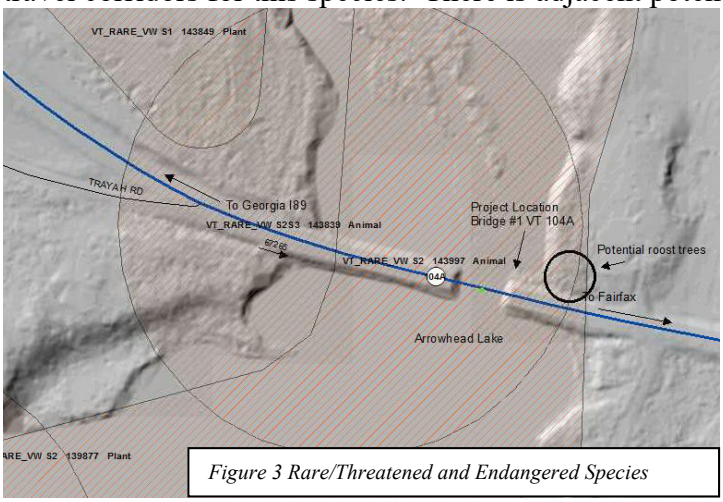


Figure 3 Rare/Threatened and Endangered Species

Agricultural Soils
According to ANR Natural Resource Mapping, soils mapped in the project vicinity statewide significant soils. No prime soils are present.

Summary
In summary, resources that are present within the project vicinity are wetlands, waterbodies, wildlife habitat, and R/T/E species. Ongoing coordination will continue with resource regulatory agencies as the project further moves into design.

Cc

Natural Resource Environmental File

Appendix G: Archeology Memo

VERMONT

Jeannine Russell
VTrans Archaeology Officer
State of Vermont
VTrans Environmental Section
One National Life Drive
Montpelier, VT 05633-5001
802-477-3460
Jeannine.russell@vermont.gov

Agency of Transportation

To: Jeff Ramsey, Environmental Specialist Supervisor

From: Jeannine Russell, VTrans Archaeology Officer via
Alexandria Crowell, Archaeology Technician Apprentice II

Date: November 1, 2018

Subject: Georgia BF 023-1(7) – Archaeological Resource ID

VTrans proposes the rehabilitation of Bridge No. 1 at MM 1.1 on VT Rt. 104A (Figure 1). The scope remains to be defined so an area of approximately 200 foot radius around the project is assumed as the project area of potential effect (APE) for the resource ID. The VTrans Archaeology Officer conducted a field visit on October 9th to survey the area for potential archaeological effect.

To further determine archaeological sensitivity, VTrans Archaeology Staff performed a desk review and background research through consulting the Online Resource Center (ORC), the Vermont ANR Natural Resources Atlas, and the VDHP Environmental Model. The project area is located near the confluence of the Arrowhead Mountain Lake, and the Lamoille River, a known major precontact and historic waterway. Bridge No. 1 carries VT RT. 104A over an outlet of the lake and is surrounded by high vegetation and low slopes (Figure 2). Wetlands lie immediately north and south of the bridge and within the project APE. The area surrounding the project is composed of primarily alluvium soils, has a low-medium heat density according to the ORC's predictive heat map of archaeological potential (Figure 3).

The project location lies just southwest from the site VT-FR-0027, which exists in the NW quadrant of the project area. This site was excavated in 1978 by University of Vermont archaeology staff and did not exceed Phase 1 testing (Figure 4). Although the ArcMap image and street view Google images do not show this, a parking lot has been constructed in the general area of the archaeological site and the area is used as a natural area with footpaths leading from the parking area through the woods to the edge of the lake. Additional sites are scattered around the edge of Arrowhead Mountain Lake and the Lamoille River to the east and west of the project, signifying the area as having the potential for archaeological significance. According to the Historic Beers Map, c. 1872, and Wallings Map, c. 1850s, the area was rural but contained an historic structure belonging to the Kemp family that remains as a residence in the present under the National Register of Historic Places, 1996 (Figures 5 & 6). The Kemp residence lies east of the bridge, and within the vicinity of the project APE.

While there are areas of archaeological sensitivity within the vicinity of the 200 ft. project APE, these areas should remain undisturbed if work on Bridge No. 1 is confined to the roadway and areas of standing water. If the project includes construction impacts within any areas considered archaeologically sensitive as illustrated on the attached map in red then further archaeological evaluation will be necessary. A formal review for Section 106 will be conducted after plans are received.

Please let me know if you have any questions.

Thank you,
Jen Russell
VTrans Archaeology Officer

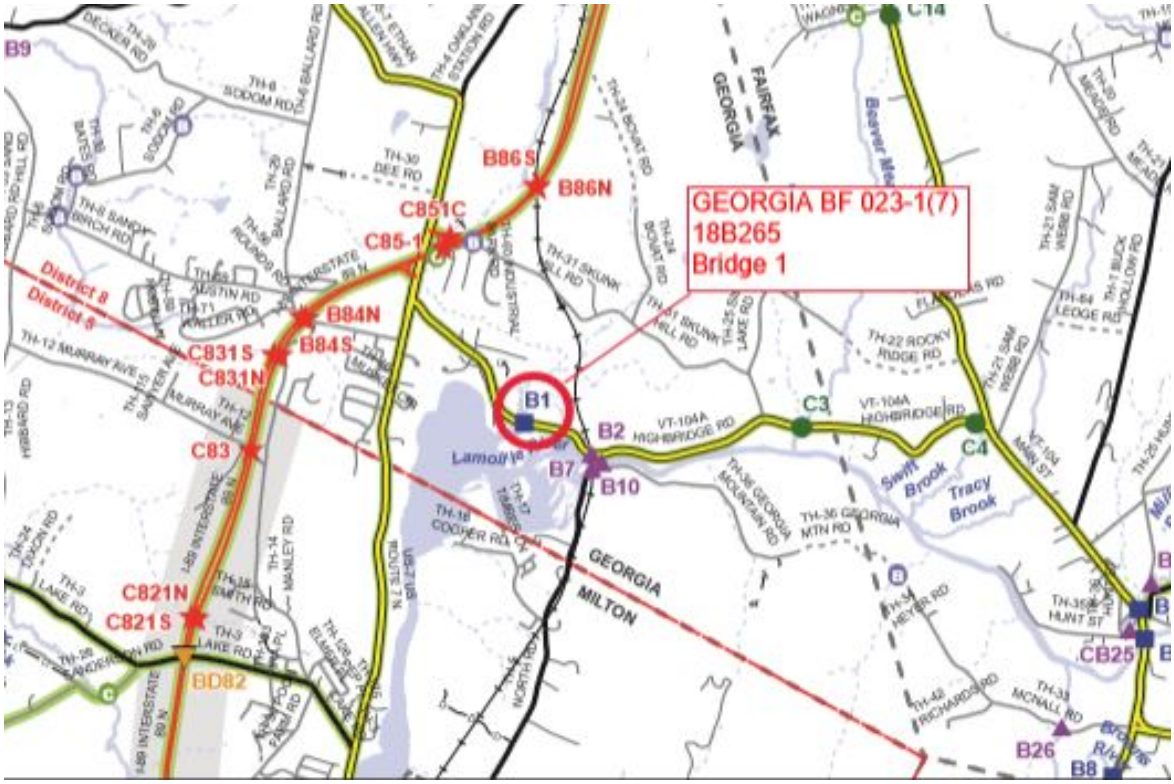


Figure 1: Project Location



Figure 2: LiDAR of Project Area

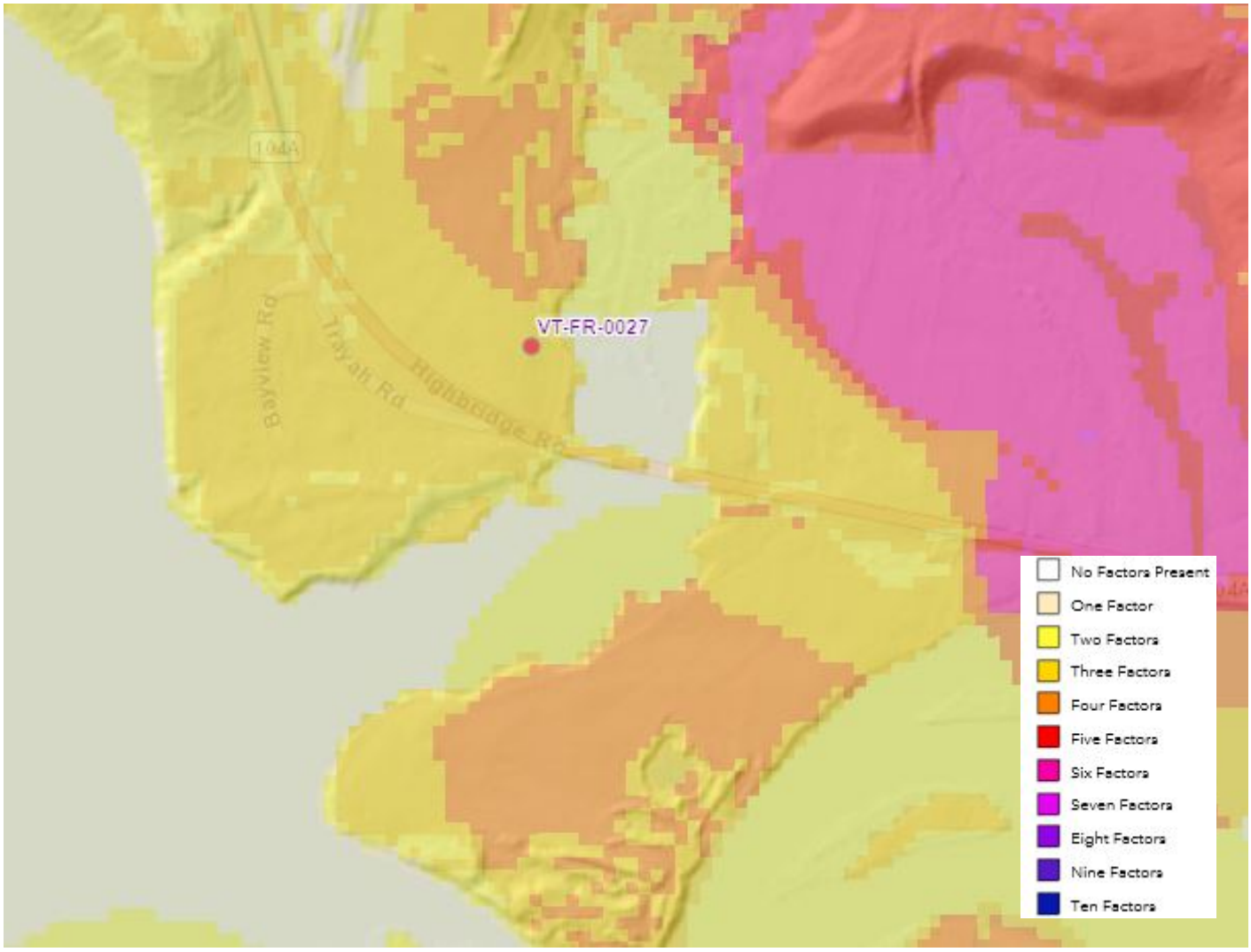


Figure 3: Predictive heat index of archaeological sensitivity dependent upon environmental and cultural factors. Project location lies in low-medium heat index range and is in proximity to medium-high range.

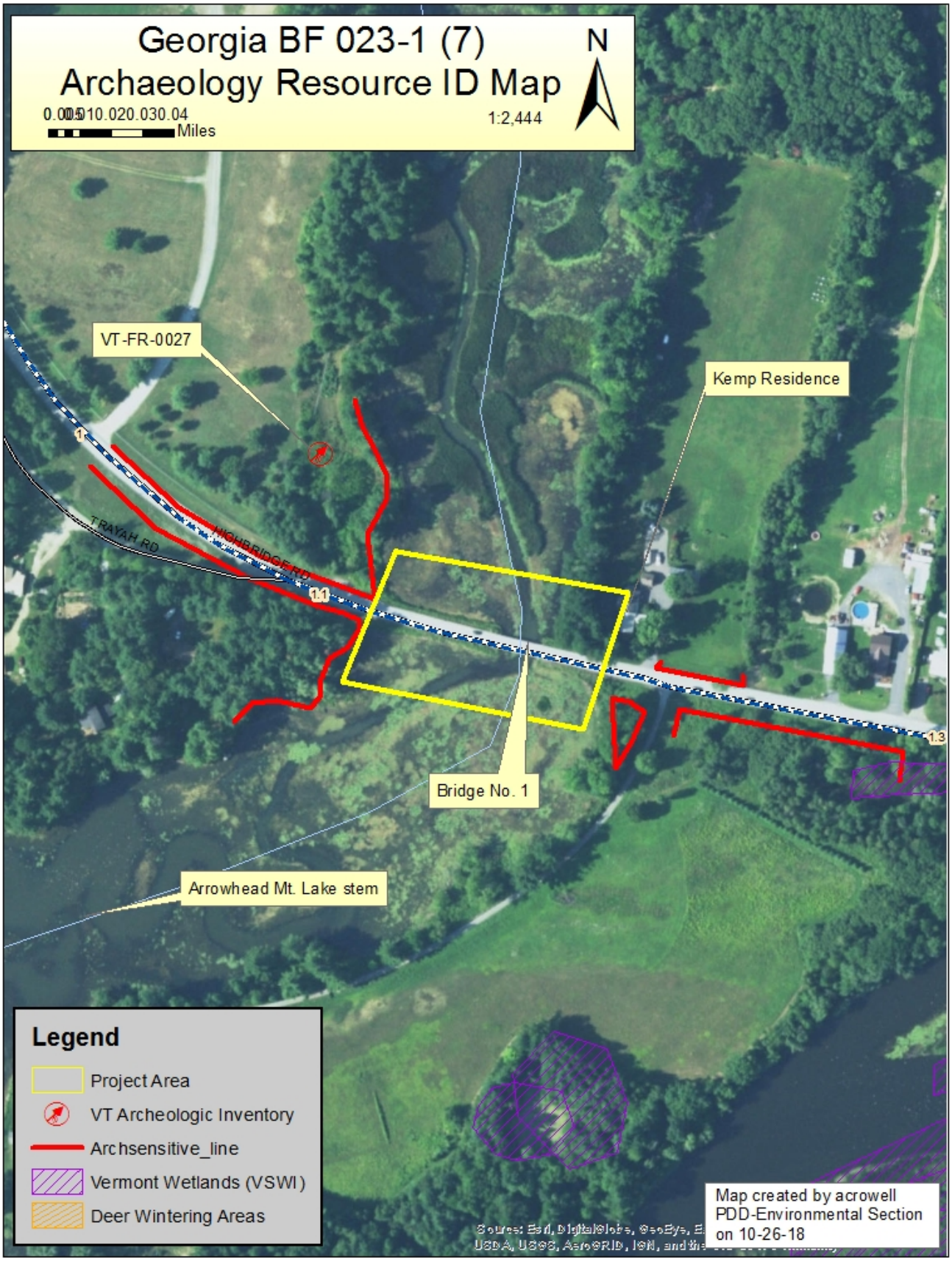
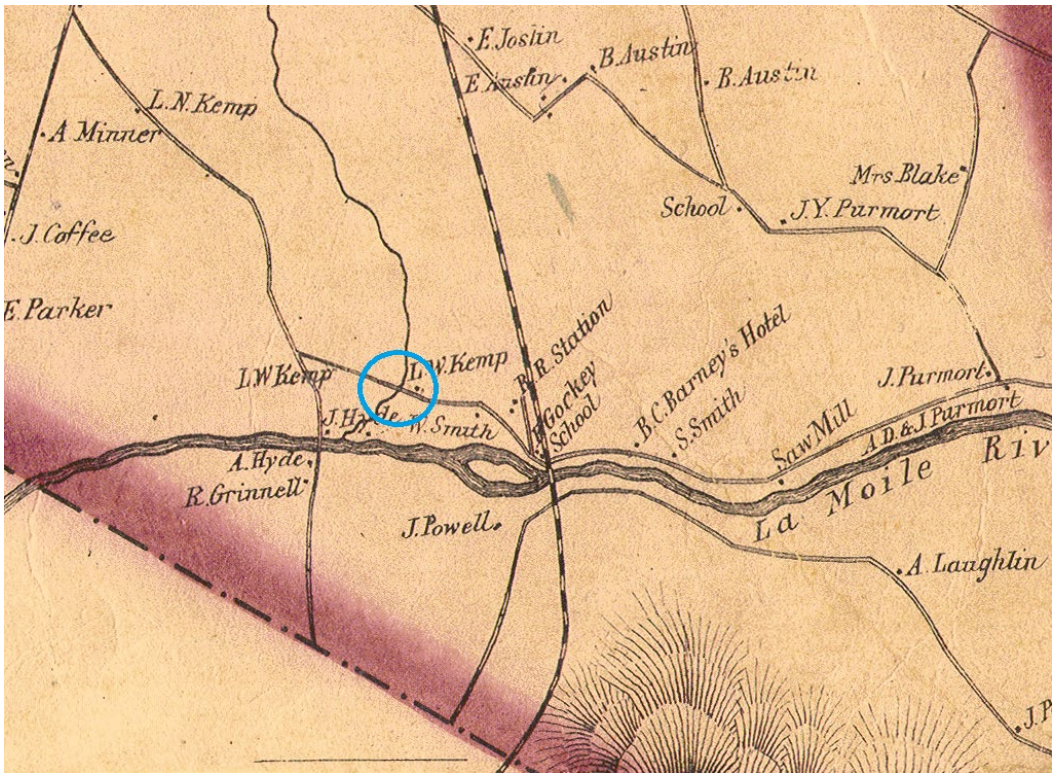


Figure 4: Ortho-photo depicting archaeologically sensitive areas (red), and immediate project area (yellow).

VERMONT



Figures 5 & 6: Historic Beers Map (above) c. 1872, and Historic Wallings Map (below) c. 1850s. Project location (blue) passes over small outlet of Lamoille River before it Clarks Falls dam was created in 1919.



Following images retrieved from Google Earth





Figures 7 & 8: Images of project facing east (above) and west (below).



Figure 9: Image of historic Kemp property in proximity to project location.



Figure 10: Image portraying approximate location of site VT-FR-0027 (red). Site is located just behind the tree line.



Google image showing location of parking area and trails

Appendix H: Historic Memo

VERMONT

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

To: JulieAnn Held, Environmental Specialist Supervisor

From: Judith Williams Ehrlich, VTrans Historic Preservation Officer
Alexandria Crowell, Archaeology Technician Apprentice II

Date: November 6, 2018

Subject: Historic Resource Identification for Georgia BF 023-1(7)

I have completed a resource identification (ID) for Georgia BF 023-1 (7). At this time, the project is expected to include the replacement of Bridge No. 1 on VT Rt. 104A. The full project scope has yet to be defined.

This Resource Identification effort is being undertaken to provide information to the VTrans designers working on a proposed improvement project. Toward that end, VTrans Cultural Resources staff have identified potential resources within a broad preliminary Area of Potential Effect to ensure the designers are aware of all cultural resources that could possibly be affected by a project. Once the project is defined at the Conceptual Design phase, Cultural Resources staff will be able to determine a formal Area of Potential Effect for purposes of Section 106 and 22 VSA § 14.

VTrans Historic Preservation Staff conducted background and desk review to assess the historic sensitivity of the project by consulting VTrans records and the Vermont Division for Historic Preservation Online Resource Center (ORC). According to the Vermont Bridge Inspection Reports, Bridge No. 1 is a 74-foot long, single span, rolled steel beam bridge with concrete abutments and a concrete cast-in-place deck constructed in 1937. The original concrete bridge railing posts have deteriorated extensively, and W-beam has been installed to either side of the bridge to ensure the safety of the travelling public. Bridge No. 1 carries VT Rt. 104A over a stem of Arrowhead Mountain Lake, close to the confluence of the Lamoille River, which lies southwest to the project.

To identify potential historic significance in the project APE, the VTrans Historic Preservation Officer consulted the National and State Registers, Historic Surveys, Historic Maps, and the draft *Metal Truss, Masonry and Concrete Bridges of Vermont 1820-1978.*

VTrans identified two structures and/or buildings within the preliminary Area of Potential Effect:

1. Bridge No. 1:
   VTrans reviewed the Registration Requirements listed in the draft *Metal Truss, Masonry and Concrete Bridges of Vermont, 1820 – 1978* and determined that Bridge No. 1 does not meet the requirements listed therein to be considered historic. VTrans therefore determined that Bridge No. 1 in Georgia is

not eligible for listing on the National Register of Historic Places under Criteria for Evaluation A or C per the Registration Requirements detailed below:

- Criteria A:
  1. Bridge No. 1 is not the first crossing at this location; and
  2. Did not establish a new transportation corridor nor was the direct cause of significant development or changes in land use; and
  3. Was not built as part of a major state highway project or bridge building initiative, and does not possess special characteristics, associations, or integrity that distinguishes it as an exceptional representative of a type.

- Criteria C:
  1. Bridge No. 1 is not an early example of a Simple Span Concrete Bridge;
  2. Is not a rare survivor of this type of bridge;
  3. Is not an exceptional example of work;
  4. Is not an innovative design;
  5. Is not considered to be an exceptional length; and
  6. Is not considered aesthetically important.

This project is in the southeast section of Georgia, placing it outside boundaries of the Georgia Historic District. There are no buildings in project quadrants A, C and D (see below). After reviewing the National and State Registers of Historic Places of 1997, VTrans Historic Preservation Staff have determined the following property located in quadrant B is historically significant (see below):

2. **The Kemp-Sheppard House-** A two-story, residential, brick building and farm built in 1830, with property dating back to the 1790s, making the home one of the earliest settlements in Georgia. Levi N. Kemp, a well-known brick mason, built his home in the Greek Revival style, which includes “gable front form, prominent side-hall entrance with surrounding pilasters and a large intel, shallow overhangs, cornice returns, and a gable peak window in the ell”. A decorative brick diamond is centered in the gable. The 1 x 4 bay, two-story back wing contains more modern additions such as wooden clapboards and trim, a high watertable, and boxed-in cornices, added during the mid-1980s. On the right half of the façade, alterations were made to an open storage barn to accommodate a modern, concrete two car garage.

   The Kemp-Sheppard House is approximately 50 meter from the project location. The Kemp-Sheppard House is architecturally significant for its influence on later homes that were also built in the Greek Revival style cross Franklin and Lamoille counties, dating back to the 1830s and throughout the nineteenth century.

   On the Kemp-Sheppard property are two structures that are noted in the National Register of Historic Places (NRHP), neither of which is considered a contributing feature of the property:

   1. To the north of the residence lies a one-and-a-half story corn crib, built in the eighteenth century. The building was originally made with plank and clapboard siding, which was replaced with modern wooden novelty siding, and a new standing-seam metal sheet roof. The structure now serves as a second garage, and has “modern, double barn doors, and a small, six-over-six window with plain trim in the gable”. The exterior appears modern; however, the building sustains some historic integrity through interior original hand-hewn structural beams, the original barn shape, location, and interior space and loft.

2. To the east of the residence lies a large horse barn, built in the nineteenth century. The barn is a three-level barn, with hand-hewn beams and open, vertical plank siding. It has a front gable open bay, with a partition "most likely separating the front bay from a work shop room in the center, indicated by a change in floor levels". The barn has a dry-laid fieldstone foundation, and was once connected to a cow barn that is no longer standing, through a shared two-story sheep shed, with an upper "bucket" story.

The Kemp-Sheppard House and property remains a significant historic resource that was originally listed on the National Register of Historic Places in 1997. As noted in the National Register, "Despite changes…the property retains a high degree of integrity and remains as a rare surviving example of its type and period. It serves as a visual reminder of Levi N. Kemp's work as a master craftsman and builder, and as an excellent example of Vermont's vernacular farmhouse architecture."

Conclusion:
The two buildings and/or structures in the preliminary Area of Potential Effect and their historic determination are noted below:

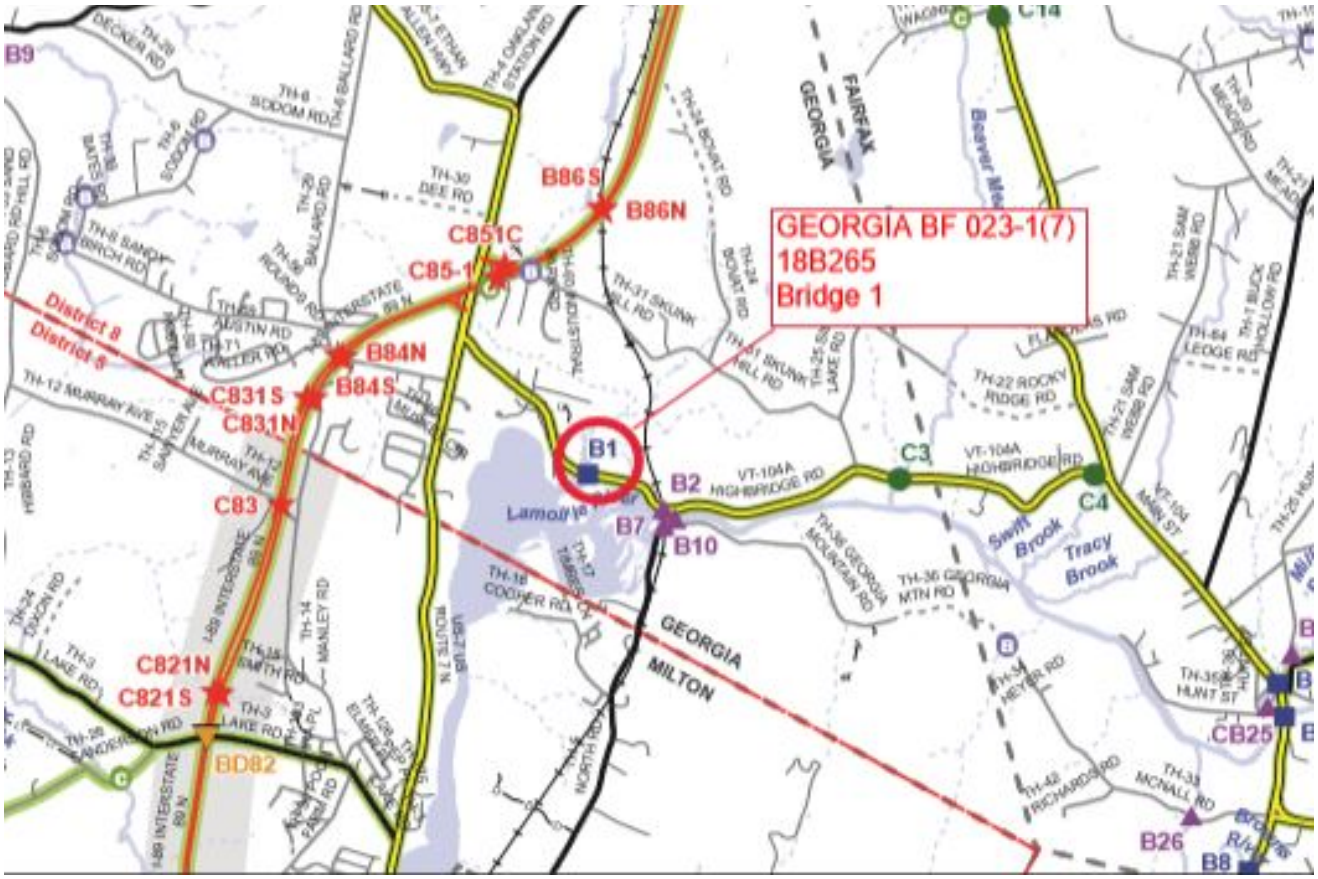
1. **Bridge No. 1 – Not Historic**
2. **The Kemp-Sheppard Home and Property – Historic**

The Kemp-Sheppard Home and surrounding property must be avoided during construction. All project-related vibrations should be minimized to the extent possible to ensure the Kemp-Sheppard House will not be affected project activity. If the project is expected to cause vibration, then VTrans should consider evaluating the house to create a pre-project conditions assessment. It will be important for the Project Manager to be in contact with the VTrans Historic Preservation Officer about this property during project design.

If the project area expands from what was evaluated for this resource ID, please contact me so I can evaluate any additional buildings in the expanded Area of Potential Effect.

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

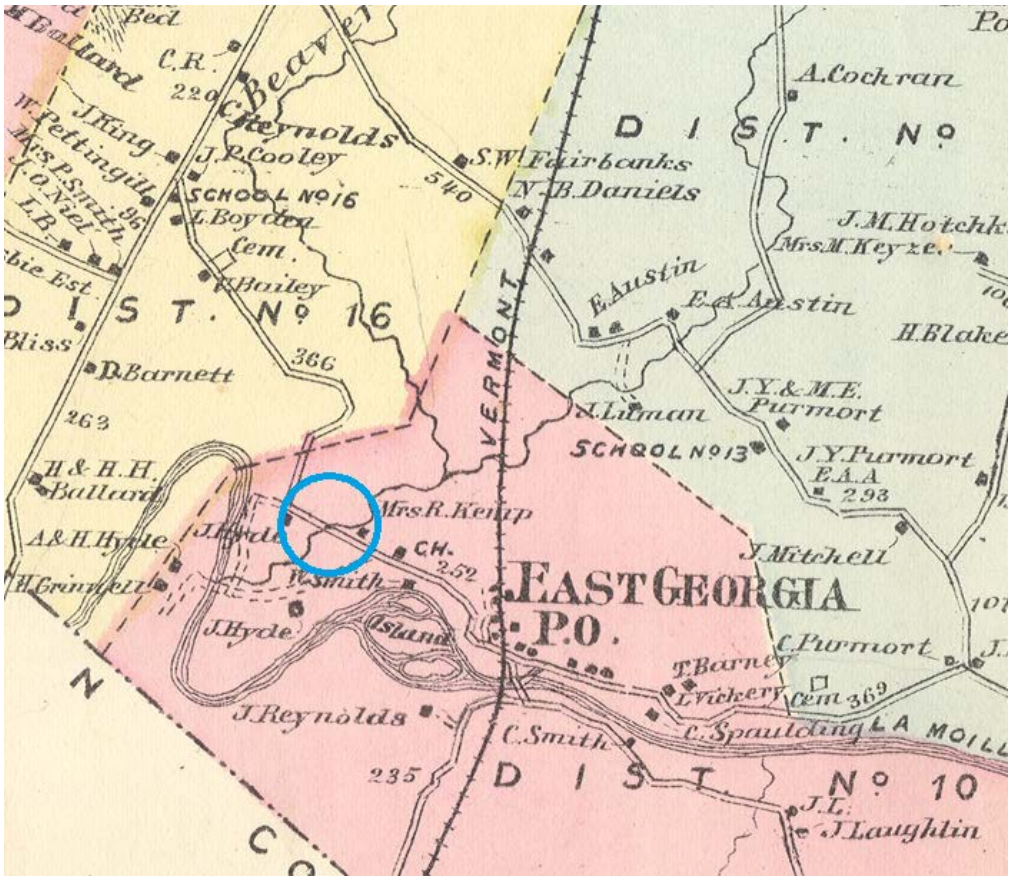
Attachments:
- Map
- Site Plan
- Photos



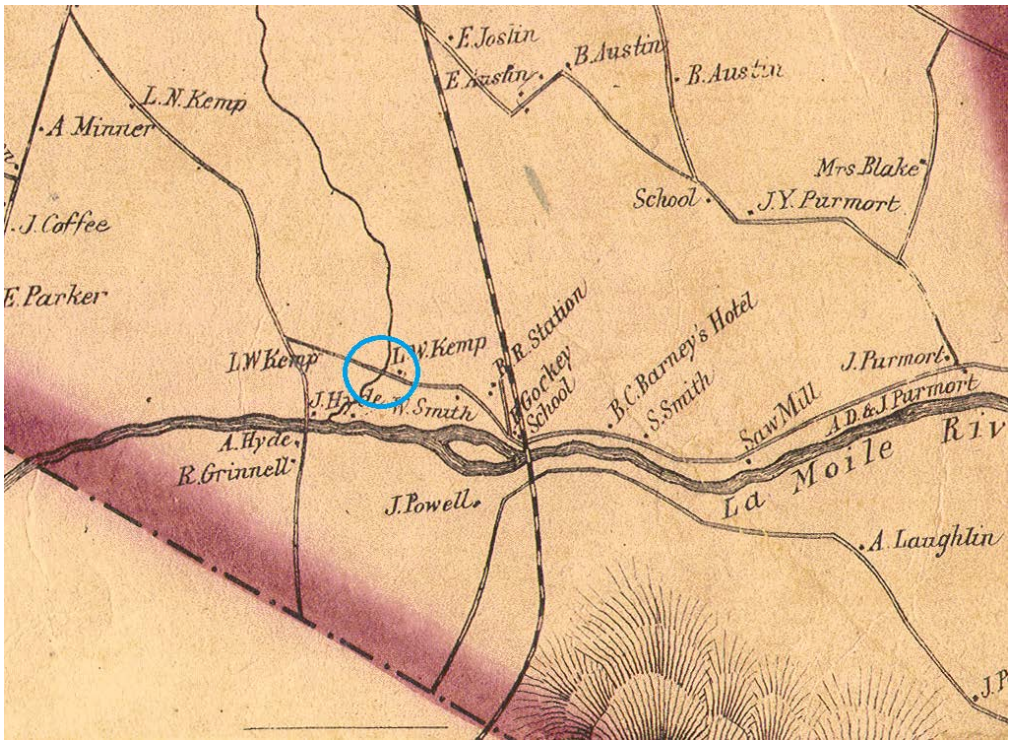
Project location and detailed view of surrounding area and project proximity to Georgia and Milton border.



Resource ID Map illustrating project location, quadrants A-D, and Kemp-Sheppard Home.



Historic Beers Map (c. 1872) with project location (blue). "Mrs. R Kemp" seen adjacent to project location.



Historic Wallings Map (c. 1850s) with project location (blue). "L.W. Kemp" seen adjacent to project location.



Image of bridge no. 1 facing west.



Image of bridge no. 1 facing east.



Image of concrete railings and abutments, steel beams, and W-beam railings. Image retrieved from bridge inspection report.



Image of steel beams and girders. Image retrieved from bridge inspection report.



Image of project location (left) in proximity to the Kemp-Sheppard home (right).



Image of Kemp-Sheppard residence facing north.



Image of corn crib structure, c. 1997 (image retrieved from NRHP listing).



Image of horse barn, c. 1997 (image retrieved from NRHP listing).

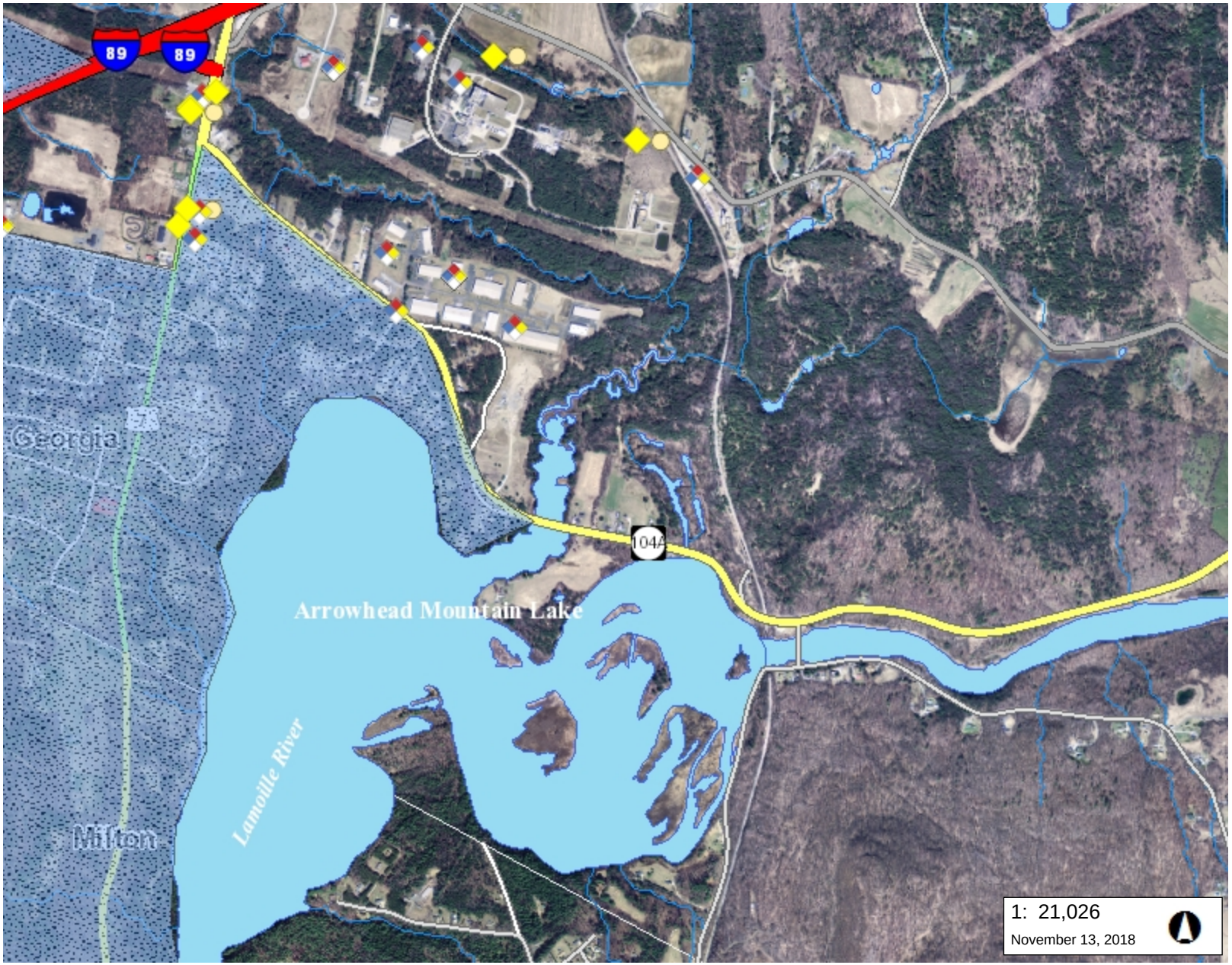
Appendix I: Hazardous Waste Map

VERMONT

Haz Waste Dev Soils

Vermont Agency of Natural Resources

vermont.gov





LEGEND

- Landfills
  - OPERATING
  - CLOSED
- Land Use Restrictions
  - Class IV GW Reclass
  - Class VI GW Reclass
  - Deed Restriction
  - Easement
  - Land Record Notice
  - Other
- Hazardous Site
- Hazardous Waste Generators
- Brownfields
- Salvage Yard
- Aboveground Storage Tank
- Underground Storage Tank (w
- Dry Cleaner
- Urban Soil Background Areas
- Roads
  - Interstate
  - Principal Arterial
  - Minor Arterial
  - Major Collector
  - Minor Collector
  - Local
  - Not part of function Classification S
- Waterbody

NOTES

Map created using ANR's Natural Resources Atlas

1,068.0 0 534.00 1,068.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 1752 Ft. 1cm = 210 Meters

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Appendix J: Stormwater Memo

State of Vermont *Agency of Transportation*
Environmental Section
One National Life Drive [phone] 802-279-0583
Montpelier, VT 05633-5001 [fax] 802-828-2334
www.aot.state.vt.us [ttd] 800-253-0191

To: Jeff Ramsey, VTrans Environmental Specialist Supervisor
From: Emily Peck, VTrans Assistant Stormwater Management Engineer
Date: October 23rd, 2018
Subject: Georgia BF 023-1(7) - Stormwater Resource ID Review

Project Description: I have reviewed the project area for Georgia BF 023-1(7) for stormwater related regulatory and water quality concerns. The project will involve bridge 1 and associated work on VT 104A in Georgia, VT. My evaluation has included the review of existing imagery and mapping (ANR Natural Resource Atlas, VTrans Operational Stormwater Permits & VTrans Corridor Needs) to capture existing stormwater features and existing drainage.

Regulatory Considerations

There are no noteworthy stormwater regulatory concerns at this time.

The project site area does not have any existing stormwater permits.
This project site is not within an MS4 area.
This project site is not within a designated public water supply source protection area.
The project site does not include an impaired (303(d) list) or stressed waters.

Existing Drainage

The project site is in a rural setting where much of the roadway is not curbed; stormwater runoff is collected in roadside drainage swales or is conveyed away from the roadway via overland flow. Bridge 1 crosses the Lamoille river. On the north side of the western approach to bridge 1 there is an existing stormwater treatment swale which is shown in the attached Stormwater Infrastructure map.

VERMONT

Stormwater Infrastructure

Vermont Agency of Natural Resources

vermont.gov





LEGEND

Existing stormwater point

- <all other values>
- Pipe Cross (not connected)
- Catchbasin
- Dry Well
- Drop Inlet
- Grate/Curb Inlet
- Yard drain
- Junction Box
- Stormwater Manhole
- Outfall
- Culvert inlet
- Culvert outlet
- Pond outlet structure
- Treatment feature (see notes)
- Retrofit
- Unknown Point
- Information Point

Existing stormwater line

- Storm line
- Storm line (old Sanitary line)
- Tunnel (storm)
- Swale
- Footing drain
- Under drain
- Roof drain
- Infiltration pipe
- French drain
- Trench drain
- Emergency spillway
- Stream
- Overland flow

Existing stormwater area

Sanitary Points

Sanitary Lines

Combined Sewer Points

- CB tied to sanitary sewer
- Combined sewer MH
- Known CSO outfalls (location approximate)

Combined Sewer Lines

Roads

1: 3,907

1in = 326 ft.
1cm = 39 meters

198.0 0 99.00 198.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere

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THIS MAP IS NOT TO BE USED FOR NAVIGATION

NOTES

Map created using ANR's Natural Resources Atlas

Appendix K: Crash Data

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

WHERE Year of Crash >= 2012 AND Year of Crash <= 2016

*	Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
	VT0060100/13SA00740	St. Albans Town	3.50	02/09/2013	21:47	Other - Explain in Narrative	No improper driving	Other - Explain in Narrative	1	0	0	S	SH
	VT0060100/15SA000947	St. Albans Town	3.65	01/30/2015	07:03	Snow	Unknown	Other - Explain in Narrative	0	0	0	N	SH
	VT0060100/15SA009187	St. Albans Town	3.82	09/27/2015	20:37	Clear	Fatigued, asleep	Single Vehicle Crash	0	0	0	N	SH
	VT0060100/16SA000596	St. Albans Town	3.95	01/21/2016	11:54	Clear	Failure to keep in proper lane, Inattention	Single Vehicle Crash	0	0	0	S	SH State Owned
	VT0060100/14SA000367	St. Albans Town	4.07	01/12/2014	19:58	Unknown		No Turns, Thru moves only, Broadside ^<	0	0	0	N	SH
	VT0060100/15SA005316	St. Albans Town	4.10	06/09/2015	15:30	Clear	Followed too closely, Inattention, No improper driving	Rear End	0	0	0	N	SH
	VT0060100/15SA002051	St. Albans Town	UNK	03/12/2015	04:25	Severe Crosswinds	Failure to keep in proper lane, Inattention	[No Direction of Collision]	0	0	0	S	SH
	VTVSP0700/16A204318	St. Albans Town	UNK	08/27/2016	10:28	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
	VTVSP0700/16A206238	St. Albans Town	UNK	12/15/2016	20:08	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
Route: VT-104A													
	VTVSP0700/14A200948	Georgia	0.00	03/12/2014	15:41	Snow	No improper driving	[No Direction of Collision]	0	0	0	S	SH
	VTVSP0700/15A202393	Georgia	0.00	05/28/2015	15:46	Cloudy	Made an improper turn, No improper driving	Same Direction Sideswipe	0	0	0	W	SH
	VTVSP0700/16A201019	Georgia	0.00	03/10/2016	08:14	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
	VTVSP0700/16A201684	Georgia	0.25	04/16/2016	00:00	Clear	Under the influence of medication/drugs/alcohol, Failure to keep in proper lane	Single Vehicle Crash	1	0	0	S	SH State Owned
	VTVSP0700/12A205444	Georgia	0.54	11/16/2012	12:39	Clear	Inattention, No improper driving	No Turns, Thru moves only, Broadside ^<	1	0	0	S, W	SH
	VTVSP0700/16A201377	Georgia	0.54	03/29/2016	15:42	Clear	Inattention, Followed too closely, No improper driving	Other - Explain in Narrative	1	0	0	E	SH State Owned
	VTVSP0700/12A204975	Georgia	0.75	10/22/2012	18:23	Clear	Other improper action, No improper driving	Other - Explain in Narrative	0	0	0	W, E	SH
	VTVSP0700/13A201185	Georgia	1.16	03/13/2013	15:21	Cloudy	No improper driving, Failure to keep in proper lane	Opp Direction Sideswipe	1	0	0	N	SH
	VTVSP0700/15A204142	Georgia	1.21	08/29/2015	21:01	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP0700/15A200739	Georgia	1.27	02/16/2015	10:29	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP0700/13A202476	Georgia	1.36	06/05/2013	15:00	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP0700/15A202753	Georgia	1.38	06/16/2015	05:43	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VT0060000/15FRC003408	Georgia	1.44	07/11/2015	21:26	Clear	Inattention, Not Distracted, No improper driving	Rear End	0	0	0	N	SH

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

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

WHERE Year of Crash >= 2012 AND Year of Crash <= 2016

*	Reporting Agency/ Incident No.	City/Town	Mile Marker	Crash Date	Time	Weather	Contributing Circumstances	Direction of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
	VTVSP0700/12A200099	Georgia	1.45	01/08/2012	11:20	Cloudy	Driving too fast for conditions	Single Vehicle Crash	0	0	0	W	SH
	VTVSP0700/12A200100	Georgia	1.45	01/08/2012	11:25	Cloudy	Inattention, Driving too fast for conditions	Single Vehicle Crash	0	0	0	E	SH
	VTVSP0700/15A202564	Georgia	1.61	06/07/2015	20:55	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP0700/15A202504	Georgia	1.73	06/03/2015	17:56	Clear	Inattention, Followed too closely, No improper driving	Rear End	1	0	0	E	SH
	VTVSP0700/16A205434	Georgia	1.87	10/31/2016	18:28	Clear	Driving too fast for conditions	Single Vehicle Crash	0	0	0	E	SH State Owned
	VTVSP0700/12A200104	Georgia	1.97	01/08/2012	12:30	Cloudy	Driving too fast for conditions, Failure to keep in proper lane, Wrong side or wrong way	Opp Direction Sideswipe	0	0	0	W, E	SH
	VT0060000/12FRC1822	Georgia	2.59	10/23/2012	18:24	Clear	No improper driving	Single Vehicle Crash	0	0	0	E	SH
	VTVSP0700/13A203737	Georgia	2.89	08/21/2013	12:54	Clear	No improper driving	Other - Explain in Narrative	1	0	0	N, S	SH
	VTVSP0700/14A200719	Georgia	2.89	02/21/2014	21:06	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP0700/15A205369	Georgia	2.89	11/12/2015	18:26	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP0700/13A202493	Georgia	2.90	06/07/2013	07:56	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP0700/13A200701	Georgia	UNK	02/11/2013	22:02	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP0700/13A205525	Georgia	UNK	12/15/2013	11:13	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP0700/13A205659	Georgia	UNK	12/21/2013	22:29	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP0700/14A200653	Georgia	UNK	02/16/2014	16:44	[No Weather]		[No Direction of Collision]	0	0	0		SH
	VTVSP0700/16A206283	Georgia	UNK	12/17/2016	23:27	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
	VT0060000/16FRC002970	Fairfax	0.27	06/08/2016	10:32	Clear	Inattention, Not Distracted	Single Vehicle Crash	1	0	0	E	SH State Owned
	VT0060000/13FRC2125	Fairfax	0.32	12/12/2013	20:18	Clear	Driving too fast for conditions, Inattention	Single Vehicle Crash	0	0	0	E	SH
	VTVSP0700/15A205949	Fairfax	0.48	12/18/2015	06:23	Clear	Unknown	Single Vehicle Crash	1	0	0	E	SH
	VT0060000/16FRC005296	Fairfax	0.58	10/19/2016	14:37	Clear	Driving too fast for conditions, Not Distracted	Single Vehicle Crash	0	0	0	W	SH State Owned
	VT0060000/16FRC004760	Fairfax	0.63	09/12/2016	11:56	Clear	Driving too fast for conditions	Single Vehicle Crash	1	0	0	E	SH State Owned
	VTVSP0700/16A201614	Fairfax	0.71	04/11/2016	23:44	[No Weather]		[No Direction of Collision]	0	0	0		SH State Owned
	VT0060000/14FRC1415	Fairfax	1.16	08/06/2014	19:43	Clear	Followed too closely, No improper driving	Rear End	0	0	0	E	SH
	VTVSP0700/13A200644	Fairfax	UNK	02/08/2013	15:37	[No Weather]		[No Direction of Collision]	0	0	0		SH

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

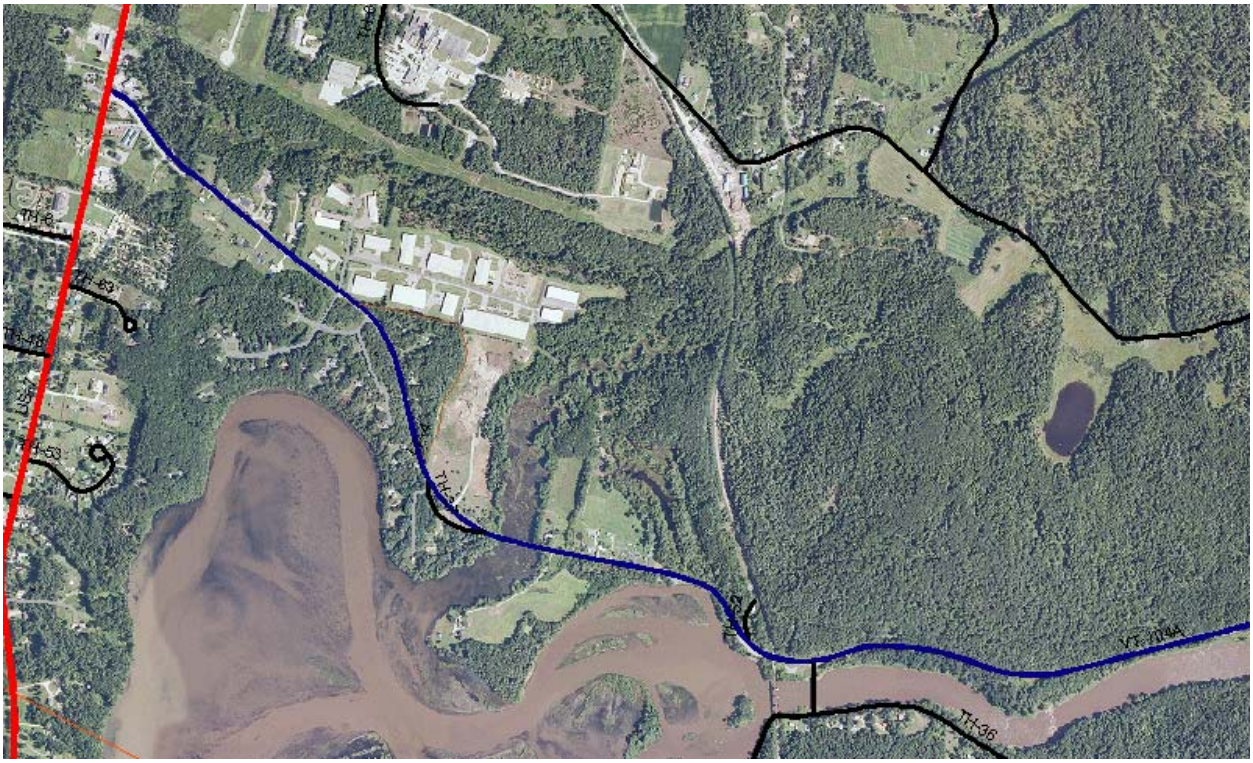
Appendix L: 2013 Road Safety Audit

Traffic Safety Section

Road Safety Audit Review

Town:	Georgia	**Date Reviewed:**	June 6 2013
Route:	VT 104a	**Mile points:**	0.00 to 2.00

Location Map:



Definitions

A ***Road Safety Audit Review*** (RSAR) is a formal examination of an existing road in which an independent, multi-discipline team (the Audit Team) reports on potential safety issues. “Independent" means that the members of the team will not be directly involved with the location being audited.

In addition to the Audit Team, a RSAR involves the following key players: Local Coordinator, Local Input Team and Responsible Entities.

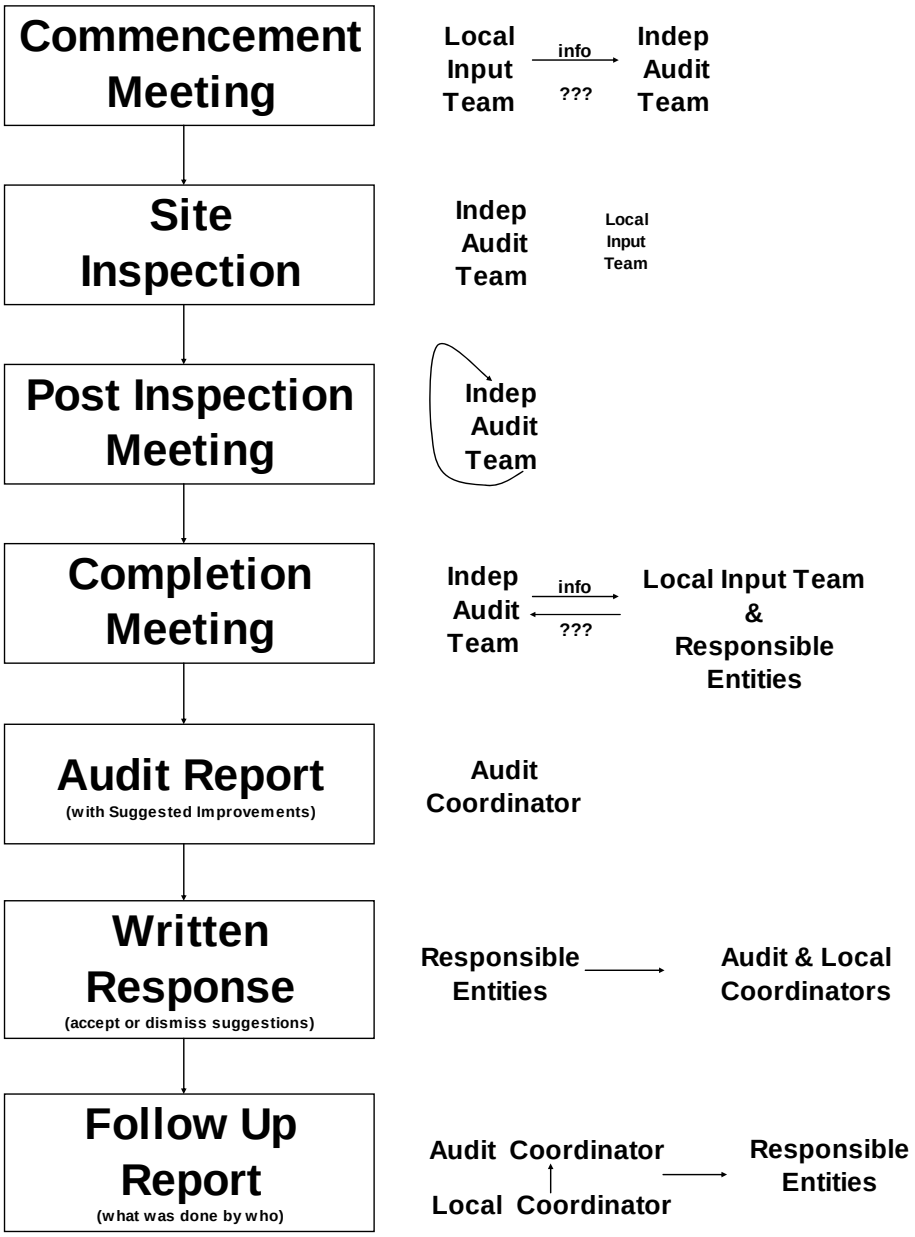
The ***Local Coordinator*** is either a representative of the Town/City or the local regional planning commission. His/her role is to put a Local Input Team together, aggregate traffic and safety information, lead the commencement meeting and follow-up with local responsible entities. The role of the ***Local Input Team*** is to provide a local perspective at the commencement meeting. It

is composed of representatives from the community such as Selectboard Members, Police, EMT, VAOT District, and Other Local People. The ***Audit Team*** is responsible for performing a site visit, identifying safety issues and coming to a consensus with respect to possible guidance. ***Responsible Entities*** are any groups who own a roadway feature or who are responsible for making an improvement or initiating further studies. These could include for example, the VTRANS Design Section, the Local Town, the Police or the Local RPC/MPO. The role of the Responsible Entities is to assess the viability of the suggestions provided by the Audit Team and provide a written response to the Audit Coordinator, to schedule and/or perform the improvements if deemed necessary and to follow-up with the audit or local coordinator when the project is completed. Finally, the ***Audit Coordinator*** is the person responsible for setting up the audit and other meeting dates, to put the audit team together, to facilitate the post inspection meeting and the completion meeting, and to prepare the audit report.

RSAR Process

The RSAR process is composed of several steps as shown in the diagram below. The process starts with a ***Commencement Meeting*** between the Local Input Team and the Audit Team. The purpose of the meeting is for the Local Input Team to present community concerns to the Audit Team. A ***Site Inspection*** is then performed by the Audit Team. Members from the Local Input Team can accompany the Audit Team to further explain concerns. The site visit involves the identification of safety deficiencies as seen in the field. The Audit Team will usually drive through the location of interest to

Figure 1. ROAD SAFETY AUDIT PROCESS



"get a feel" for the area, traveling through each approach in the case of intersections. The team is to then drive at a slower posted speed to make observations. If needed, the team will also walk the location. Following the site inspection, the Audit Team holds a ***Post Inspection***

Meeting. It is during this meeting that the team members discuss their observations and identify safety issues. The team is to reach a consensus on the importance of each safety issue mentioned. Only those issues for which a consensus is reached are included in the RSAR findings. The final RSAR report (Written Report) is finalized following the Completion Meeting during which the issues identified by the audit team are discussed with the Local Input Team and Responsible Entities. The meeting is to be constructive and foster dialogue between the parties involved. The ***Written Report*** identifies safety concerns and proposes guidance. These issues and solutions are presented in a tabular format associated to each Responsible Entity for ease of reporting. The Responsible Entities are to provide a Written Response on every finding of the Written Report as to its implementation. The Responsible Entity is not obliged to implement the findings in the Written Report. However, the reasons for not implementing a finding should be documented (e.g. physical constraints, excessive cost, environmental constraints, etc.).

The RSAR herein covers physical features which may affect road user safety and it has sought to identify potential safety hazards. However, the audit team points out that no guarantee is made that every deficiency has been identified. Further, it should also be understood that the adoption of the guidance in this report should improve the level of safety of the facility but not necessarily remove all the risks.

Location

The location of this RSAR is the section of VT 104a between US 7 and a point 1000 feet east of the Arrow Head Lake Rd intersection. Specifically, the areas of concern are the intersection with US 7, Bridge 1 and the series of curves east of Bridge 1. The mile markers mentioned in this report start from the US 7 intersection at 0.0 and increase eastward.

Purpose of the RSAR

This RSAR was conducted at the request of the Northwest Regional Planning Commission and the Town of Georgia. This request came out of a recent public meeting for the VT 104A/US 7 Intersection and Bridge 1 feasibility study. While the permanent solution at Bridge 1 is to replace the narrow bridge, the community recognizes that this is many years away and that in the meantime, a RSAR could identify some short-term improvements.

RSAR Team

The independent, multi-disciplined Road Safety Audit Review Team included the following individuals:

Greg Bakos,	VHB
Aaron Guyette,	VHB
Marcos Miller,	Traffic Ops, VAOT

Randy Snelling, District 5, VAOT

RSAR Team Coordinator

The road safety audit review coordinator was:

Mario Dupigny-Giroux, Traffic Ops, VAOT

Local Coordinator

The local coordinator was:

Bethany Remmers, Northwest Regional Planning Commission (NRPC)

Local Input Team

The following individuals from the local community were present at the Commencement Meeting:

Wesley Combs,	Road Foreman, Georgia
Ric Nye,	Highway Road Com, Georgia
Diane Perley,	District 8, VAOT
Jay Sweeny,	Franklin County Sheriffs
Deb Woodward,	Town Administrator, Georgia

Information Reviewed

Horizontal and Vertical Curves

There are several horizontal curves along the segment under study. Table 1 below summarizes the locations of these curves along with the current warning signs that are associated with these curves.

In addition to the horizontal curves listed in Table 1, there are two vertical curves along this section of road. One is a negative three percent grade that goes from mile point 0.70 to 0.90 while the other one is a seven percent grade vertical curve between mile points 1.55 and 1.60 that is further combined with an horizontal curve.

Traffic Safety Section

Road Safety Audit Review

Table 1, Horizontal Curve Locations

Curve Location	Mile Point	Degree	Radius ft	Existing Signage	Crashes 5 years
Start Curve Right	0.590	4.91	725		0
End Curve Right	0.734				
Start Curve Left	0.884	4.87	732	EB Curve Left W1-2L @ 0.784 missing?	0
End Curve Left	1.118				
Start Curve Right	1.458	9.27	384	EB Mod Right Reverse W1-4MR + W13-1 40 mph @ 1.42 A	3
End Curve Right	1.540			W1-6 Large Arrow @ 1.507, 1.501 WB E/F	
Start Curve Left	1.570	6.82	587	W1-6 Large Arrow EB @ 1.6 A, 1.64 B, 1.67 B	6
End Curve Left	1.798			Right Reverse Curve W1-4R + W13-1 40 mph @ 1.725 WB F	
Start Curve Right	1.816	5.71	623	Left Reverse Curve W1-4L + W13-1 40 mph @ 1.94 WB F	1
End Curve Right	1.890				
Start Curve Right	1.946	3.1	1148		2
End Curve Right	2.010				

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Bridge Information

Bridge 1 is located approximately 1.1 miles east of US 7. It was built in 1937. Its roadway width curb-to-curb is 20.9 feet while its length is 74 feet.

Speed and Traffic Volume

The posted speed limit is 40 mph from US 7 to just east of Yankee Park Rd and it is 50 mph from that point eastward.

Advisory speeds that suggest the preferred speed to travel at along certain curves are posted at mile point 1.42 for eastbound traffic, at mile point 1.72 for westbound traffic and at mile point 1.94 also for westbound traffic.

The 2011 Average Annual Daily Traffic was 4300 vehicles per day between US 7 and Arrow Head Lake Rd and it was 3700 vehicles per day east of Arrow Head Lake Rd up to the Fairfax townline.

A 2010 automatic vehicle classification count on VT 104a at mile point 3.15 revealed that traffic on VT 104a is composed of approximately 95% passenger vehicles, 4% single vehicle trucks and 2% tractor trailer trucks.

Based on a 2012 turning movement count, the percentage of trucks approaching the US 7 intersection from VT 104a is 7.6%. Of the trucks approaching the intersection from the east, 1.9% are tractor trailer trucks and 5.65% are single unit trucks (approximately 43 and 128 vehicles of each type respectively over the 12-hour period of 6:00 am to 6:00 pm). Of these trucks, 77.3% are turning right and 22.7% are making a left turn. This distribution is very similar to the one of passenger vehicles. Overall on the VT 104a approach, the raw 2012 count indicated that 1804 vehicles were turning right compared to 387 vehicles that were turning left and 71 that were continuing across US 7 to the bank entrance.

Pavement Condition

The 2012 pavement condition rating for this portion of VT 104a was qualified as “very poor”. Between US 7 and mile marker 1.0, the average rut depth of both wheel paths was 0.268 inch and the composite index was 18.87, while for the section between mile markers 1.0 and 2.0, the composite index was 28.79 and the average rut depth was 0.25 inch.

The very poor determination of the overall condition of the road surface was determined from the composite index (in our case, 28.79 and 18.87) using the following scale with 0 being the worst possible condition and 100 being the best. Specifically, this scale is: 0-40 Very Poor, 40-65 Poor, 65-80 Fair, 80-100 Good.

Traffic Committee Action

The Town of Georgia requested in March 2009 that the Traffic Committee evaluate and reduce the posted speed limit to 40 mph from the Arrowhead Industrial Park driveway to a point easterly on Highbridge Rd. The Traffic Committee considered this request at its September 2009 meeting and elected to retain the existing speed limit.

The decision of the Traffic Committee was based on the findings of a July 2009 engineering study that determined that the 85th percentile speed at three locations ranged between 50 and 52 mph, which indicated at the time, based on guidance from the Manual on Uniform Traffic Control Devices, that the existing speed limit was adequate for this section of road.

Specifically, the study determined that at around mm 0.88, the 85th percentile speed was 52 mph and the 10-mile pace (the 10-mile range of speeds within which most vehicles travel) was 44 to 53 mph. Near mile marker 1.45, the 85th percentile speed was 50 mph and the 10-mile pace was 42 to 51 mph while at the third location near mile point 1.73, the percentile speed was 51 mph and the 10-mile pace was also 42 to 51 mph.

USLimits, an expert system software available from FHWA's website, was used to further assess the speed limit in this area. The software considers traffic, but not specifically truck traffic. Input to the analysis included, the 2009 speed study, the 2008-2012 crash data, the area type and the number of driveways. Based on this, USLimits suggests that the appropriate speed limit be 50 mph and that areas with adverse alignments may require lower advisory speeds.

Past Projects

This section of VT 104a was last paved in the late 90's. According to VTrans Pavement Management, it will be at least five more years before this road is paved again (discussion with Mike Fowler on May 29, 2013).

A work order (01-081) was completed on April 18, 2001. This work order included VT 104a from US 7 to about mile marker 2.0 (just east of 2664 Highbridge Rd) and was mostly for the replacement of signs. The work order adjusted the placement of the large arrows between mile markers 1.5 and 1.7. The work order retained the two modified turn signs and their associated 40 mph advisory plaques near mile points 1.4 and 1.7, replaced the reverse curve sign near mile point 2.0 and installed a new curve sign for eastbound traffic near mile point 0.784 for the curve near Harrison Sand Inc.

A second work order (09-494) was completed on January 28, 2010. This work order was for new sign applications. The work order installed object markers near the abutment of Bridge 1 on all four corners. It also installed narrow bridge warning signs in advanced of the bridge. Figure 2 shows the bridge in 2008 without the object markers and the bridge in 2012 with the object markers. This work order also installed Watch For Turning Vehicles warning signs with a Next ½ Mile plaque at mile points 0.878 and 1.538 in the vicinity of the fishing access.

Figure 2, Before and After Pictures of Bridge 1 without and with Object Markers



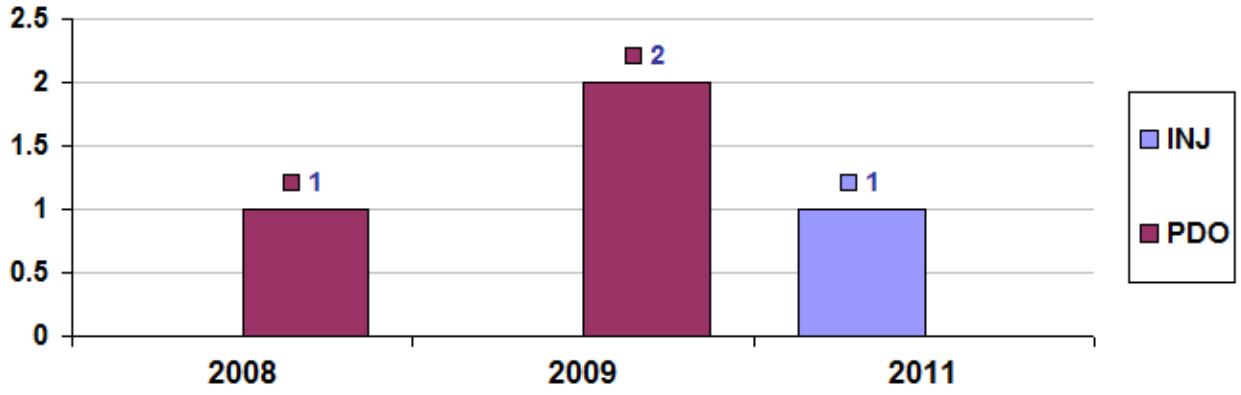


Crash History

Crash history was reviewed for the area between US 7 and Bridge 1 and for the area around the Arrow Head Lake Rd intersection.

There were ten crashes on VT 104a between US 7 and Bridge 1 from 2008 to May 2013. Of these ten crashes, five took place on the VT 104a approach of the US 7 intersection. Specifically, four of the five crashes displayed a similar pattern: Same direction sideswipe involving a tractor trailer that had to swing wide to make the right turn while a vehicle was passing on the right (There is only one lane on the approach, but it is wide enough for two vehicles to stand side-by-side). The distribution of these same direction sideswipe crashes is shown in Figure 3. The other crash at the US 7 intersection was a rear-end crash.

Figure 3, Severity Distribution of Same Direction Sideswipe Crashes at the US 7 intersection



During the same period, there was one crash that took place on the bridge, a recent occurrence that happened earlier in 2013 between a school bus and a truck. There were no injuries in the crash as the two vehicles brushed off each other which resulted in one of the mirrors of the bus to shatter.

The other three crashes within this section took place at various points and did not show any specific patterns.

There were twelve crashes between 2008 and May 2013 on VT 104a in the area extending half a mile on each side of the Arrow Head Lake Rd intersection. The graph in Figure 4 below shows the distribution of these crashes over the period. It is to be noted that the three crashes in 2012 took place on the same day within a short period of time.

Of the twelve crashes, nine involved a vehicle that ran-off-the-road or hit a fixed object (75%). For 55% of these nine crashes, the road surface was either snow covered or icy (but the weather was either sunny or cloudy). Seventy percent of these vehicles were also traveling westbound.

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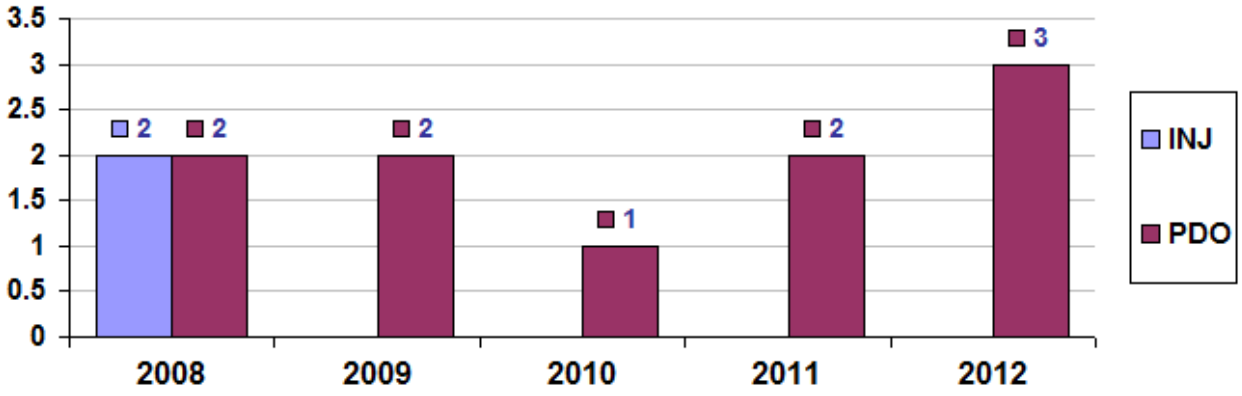
Figure 4, Severity Distribution of Crashes ½ mile each side of Arrow Lake Rd



There are two sub-areas were crashes are happening within the area of the Arrow Head Lake Rd intersection. The first is between the fishing access and Jed Shepard Rd. The common crash type in this area is a vehicle that lost control.

The other hot spot location is between Arrow Head Lake Road and a point about 0.25 miles east of the Arrow Head Lake intersection. There was only one specific intersection type crash at the intersection of Arrow Head Lake Rd (a vehicle that was waiting to make a left turn and that got rear-ended). Loss of control crashes were determined to be happening east of the intersection within the first 100 feet and also somewhere 0.2 to 0.25 miles east of the intersection.

Traffic Studies

The Northwest Regional Planning Commission initiated a feasibility study for long term improvements at the US Route 7 and VT 104A Intersection as well as for Bridge 1. Major geometric improvements at the intersection include a traffic signal or a roundabout. For the bridge, it is being proposed to widen it to 30 feet.

There are a number of studies that are being done as part of Act 250. These include new developments on US 7 in the area of the VT 104a intersection (Dollar General near Georgia Market) and a proposed query between Skunk Hollow Road and VT 104a.

Local Concerns

The following issues were brought forward by the local team during the commencement meeting.

- Two years ago, the RPC initiated a feasibility study for the US 7/VT 104a intersection. Bridge 1 was added to the study since it had been a concern for the Town.
- Bridge 1 is narrow and for the traffic condition, it should be 30 ft wide.
- The guardrail system is failing on the bridge.
- The centerline marking is currently not visible.
- As a result of the recent bus incident on the bridge, the school suggested to bus drivers that they stop before entering the bridge when there is opposing traffic.
- There has been an increase in truck traffic on VT 104a due principally to Husky.
- There is increasing development in Fairfax and thus an increase in commuter traffic.

Potential Safety Concerns

This section lists the areas of safety concern identified by the audit team during the field visit and from their analysis of available data along with potential remedial actions. The concerns are not listed in order of importance. These safety concerns are also summarized on the observations table presented at the end of this section. The observations table lists the group most likely to be responsible for making the improvements.

Problem #1

Narrow bridge and lack of visual clues (especially when the centerline is completely faded)

Immediate to Short Term Actions (within 6 months)

Install recessed yellow centerline markings on the bridge and its approaches

Install additional object 3 markers on the back of the existing object markers

Install a vertical retroreflective strip on the post of each object 3 marker

Relocate the Narrow Bridge signs

Replace all reflectors inside the guardrail on the bridge and its approaches

Mid Term Actions (within 12 months)

Prioritize a project for a wider bridge

Problem #2

Travel speeds perceived too high for traffic, land use and geometric conditions

Immediate to Short Term Actions (within 6 months)

Install a 40 mph advisory speed plaque beneath each Narrow Bridge Sign (upsize warning signs to 36")

Evaluate the need for updated signage (including ball banking) for the curves listed in Table 1

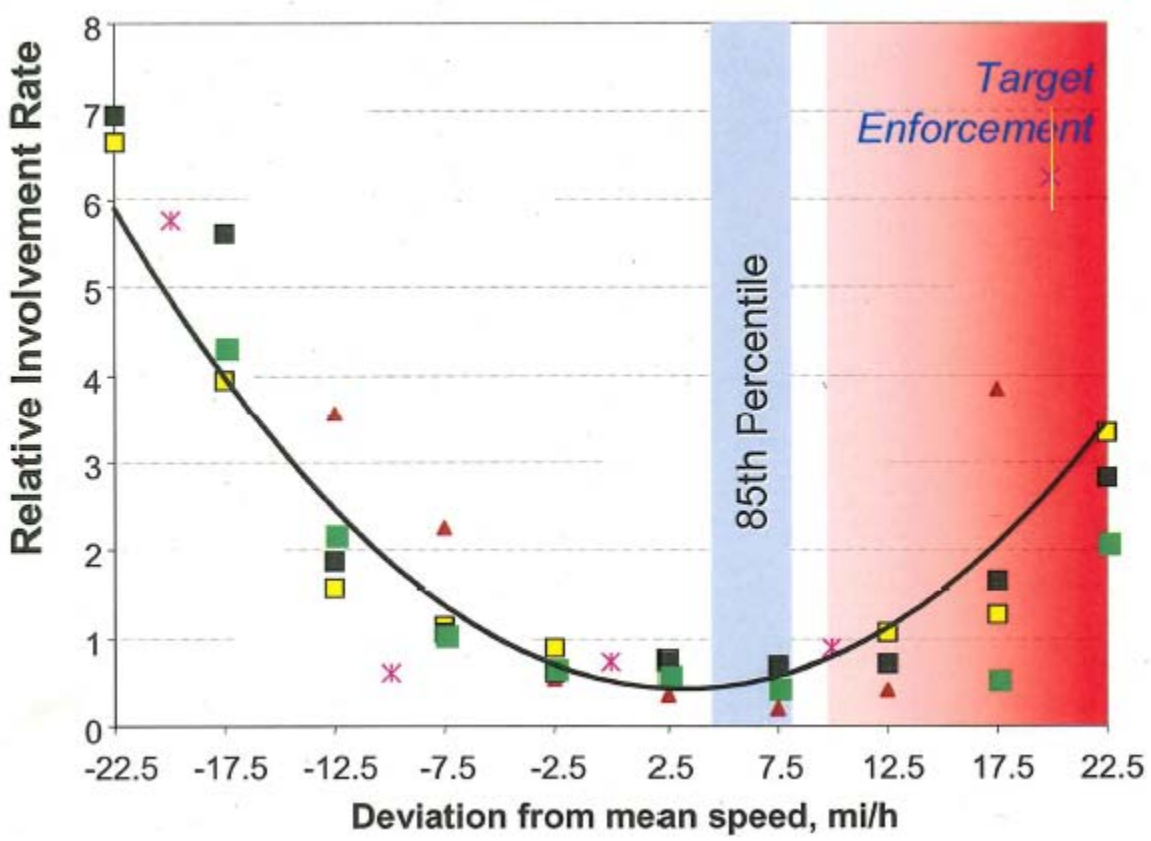
Measure the corner sight distance at the Arrow Head Lake Rd intersection and assess the situation

Request from VTrans a reevaluation of the posted speed limit given new traffic generators and increased truck and commuter traffic

Increase enforcement and target drivers traveling above 56 mph

Concept: *From the enforcement side, if enforcement is to contribute to the safety of this road, it should be done according to the following concept suggested by FHWA. As depicted in Figure 4, Research has shown that the crash involvement rate increases as traveling speeds deviate from the 85th percentile speed. This means that targeting motorists that are traveling above the 85th percentile speed will apprehend motorists that are more likely to cause a crash. Crash involvement starts to increase more drastically 5 mph above the 85$^{th.}$ Applying this concept to this section of VT 104a means that the focus should be put on vehicles that are traveling at or above 56 mph.*

Figure 4, Targeted Enforcement Concept



Problem #3

High proportion of single vehicle crashes on an icy/snowy road surface

Immediate to Short Term Actions (within 6 months)

Evaluate past practices and develop a policy to improve, as needed, winter maintenance on VT 104a

Mid Term Actions (within 12 months)

Prioritized the programming of a resurfacing project

Mid Term to Long Term Actions (12 months to five years)

Resurface VT 104a

Install a high friction surface treatment with calcined bauxite aggregates in the section between mile points 1.45 and 1.75.

Problem #4

Conflicting movements between a right turning truck and a second right turning vehicle caused by the de facto right turning lane on the VT 104a approach of the US 7 intersection. Conflicting movements between right turning vehicles on the VT 104a approach and right turning motorists that use the road that acts as some kind of a slip lane. See Figures 5a & 5b.

Immediate to Mid Term Actions (within 24 months)

Develop (and construct) a low cost project to strip and signs the approach as one left turn lane and one right turn lane (This will require modifying the island on the northeast corner of the intersection to accommodate trucks with a wider radius and possibly a truck apron as to not make the approach too wide. It will also be highly desirable to close off the access to what acts as a “slip lane”).

Problem #5

Potential for motorists that leave Interstate Auto Service & Movement Center to go the wrong way on the “slip lane” towards VT 104a

Immediate Actions

Install Do Not Enter signs at the end of the “slip lane” where it meets VT 104a

Figure 5a, VT 104a Approach to the US 7 Intersection (Visidata 2012)



Figure 5b, VT 104a Intersection Leg at US 7 (Visidata 2012)



Action Plans

The safety concerns and potential actions that were just described in the previous section are further summarized in the next table. In this table, the safety issues of concern are listed in the first column. The second set of columns identifies the groups that are most likely capable of implementing a solution. For each safety issue, the audit team suggested the actions that are listed in the column titled “strategy” as possible remedial solutions. For each safety issue, the groups identified by an X are asked to review the proposed strategies and evaluate their ability to implement these strategies by indicating in the appropriate column if they agree to implement these measures and if not, by supporting their decision by writing a reason in the last column. The groups identified are not obliged to follow the findings of the RSAR report. However, the reasons for not implementing a finding should be documented (e.g. physical constraints, excessive cost, environmental constraints, etc.). Each group should return their completed table to the audit coordinator as soon as possible.

Observation	NWRPC	Town of Georgia	Sheriff	AOT Traf Ops	AOT District	AOT Traffic Design	AOT Traffic Pavement	Strategy	Decision Agree Reject	Planned Completion Date	Comments
Problem #1 Narrow bridge and lack of visual clues (especially when the centerline is completely faded)				X				**Immediate to Short Term Actions (within 6 months)** Install recessed yellow centerline markings on the bridge and its approaches			
				X				Install additional object 3 markers on the back of the existing object markers			
				X				Install a vertical retroreflective strip on the post of each object 3 marker			
				X				Relocate the Narrow Bridge Sign			

Observation	NWRPC	Town of Georgia	Sheriff	AOT Traf Ops	AOT District	AOT Traffic Design	AOT Traffic Pavement	Strategy	Decision Agree Reject	Planned Completion Date	Comments
					X			Replace all reflectors inside the guardrail on the bridge and its approaches			
	X							**Mid Term Actions (within 12 months)** Prioritize a project for a wider bridge			
Problem #2 Travel speeds perceived too high for traffic, land use and geometric conditions				X				**Immediate to Short Term Actions (within 6 months)** Install a 40 mph advisory speed plaque beneath each Narrow Bridge Sign (upsize warning signs to 36")			
				X				Evaluate the need for updated signage (including ball banking) for the curves listed in Table 1			

Observation	NWRPC	Town of Georgia	Sheriff	AOT Traf Ops	AOT District	AOT Traffic Design	AOT Traffic Pavement	Strategy	Decision Agree Reject	Planned Completion Date	Comments
				X				Measure the corner sight distance at the Arrow Head Lake Rd Intersection and assess the situation			
		X						Request from VTrans a reevaluation of the posted speed limit given new traffic generators and increased truck and commuter traffic			
			X					Increase enforcement and target drivers traveling above 56 mph			
Problem #3 High proportion of single vehicle crashes on an icy/snowy road surface					X			**Immediate to Short Term Actions (within 6 months)** Evaluate past practices and develop a policy to improve, as needed, winter maintenance on VT 104a			

Observation	NWRPC	Town of Georgia	Sheriff	AOT Traf Ops	AOT District	AOT Traffic Design	AOT Traffic Pavement	Strategy	Decision Agree Reject	Planned Completion Date	Comments
							X	**Mid Term Actions (within 12 months)** Prioritized the programming of a resurfacing project			
							X	**Mid Term to Long Term Actions (12 months to five years)** Resurface VT 104a			
							X	Install a high friction surface treatment with calcined bauxite aggregates in the section between mile points 1.45 and 1.75.			

Observation	NWRPC	Town of Georgia	Sheriff	AOT Traf Ops	AOT District	AOT Traffic Design	AOT Traffic Pavement	Strategy	Decision Agree Reject	Planned Completion Date	Comments
Problem #4 Conflicting movements between a right turning truck and a second right turning vehicle caused by the de facto right turning lane on the VT 104a approach of the US 7 intersection. Conflicting movements between right turning vehicles on the VT 104a approach and right turning motorists that use the road that acts as some kind of a slip lane.				X	X	X		**Immediate to Mid Term Actions (within 24 months)** Develop (and construct) a low cost project to strip and signs the approach as one left turn lane and one right turn lane (This will require modifying the island on the northeast corner of the intersection to accommodate trucks with a wider radius and possibly a truck apron as to not make the approach too wide. It will also be highly desirable to close off the access to what acts as a "slip lane")			
Problem #5 Potential for motorists that leave Interstate Service & Movement Center to go the wrong way on the "slip lane" towards VT 104a				X				**Immediate Actions** Install Do Not Enter signs at the end of the "slip lane" where it meets VT 104a			

Collision Diagrams

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COLLISION DIAGRAM

Key Number = 0

MUNICIPALITY: Georgia	COUNTY:	FILE: RSARVT104aG
INTERSECTION: VT-104A		CASE # :
PERIOD: 5 YEARS 5 MONTHS	FROM 1/1/2008 TO 5/27/2013	BY: DATE: 5/29/2013



SYMBOLS			MANNER OF COLLISION	
MOVING VEHICLE	P	PEDESTRIAN	REAR END	HEAD ON
TURNING VEHICLE	B	BICYCLIST	LEFT TURN	RIGHT TURN
BACKING VEHICLE	A	ANIMAL	LEFT TURN	RIGHT TURN
PARKED VEHICLE		FIXED OBJECT	OVERTAKE	RIGHT ANGLE
999 RECORD NUMBER		Fatal	OUT OF CONTROL	SIDE SWIPE

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COLLISION DIAGRAM

Key Number =

MUNICIPALITY: *Georgia* COUNTY:	FILE: *RSARVT104aG*
INTERSECTION: *VT-104A*	CASE # :
PERIOD: *5* YEARS *5* MONTHS FROM *1/1/2008* TO *5/27/2013*	BY: DATE: *5/29/2013*



SYMBOLS		MANNER OF COLLISION	
MOVING VEHICLE	P PEDESTRIAN	REAR END	HEAD ON
TURNING VEHICLE	B BICYCLIST	LEFT TURN	RIGHT TURN
BACKING VEHICLE	A ANIMAL	LEFT TURN	RIGHT TURN
PARKED VEHICLE	FIXED OBJECT	OVERTAKE	RIGHT ANGLE
999 RECORD NUMBER	Fatal	OUT OF CONTROL	SIDE SWIPE

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COLLISION DIAGRAM

Key Number = 3

MUNICIPALITY: Georgia	COUNTY:	FILE: RSARVT104aG
INTERSECTION: VT-104A		CASE # :
PERIOD: 5 YEARS 5 MONTHS	FROM 1/1/2008 TO 5/27/2013	BY: DATE: 5/29/2013



SYMBOLS			MANNER OF COLLISION	
MOVING VEHICLE	P	PEDESTRIAN	REAR END	HEAD ON
TURNING VEHICLE	B	BICYCLIST	LEFT TURN	RIGHT TURN
BACKING VEHICLE	A	ANIMAL	LEFT TURN	RIGHT TURN
PARKED VEHICLE		FIXED OBJECT	OVERTAKE	RIGHT ANGLE
999 RECORD NUMBER		Fatal	OUT OF CONTROL	SIDE SWIPE

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COLLISION DIAGRAM

Key Number = 4

MUNICIPALITY: Georgia COUNTY:	FILE: RSARVT104aG
INTERSECTION: VT-104A	CASE # :
PERIOD: 5 YEARS 5 MONTHS FROM 1/1/2008 TO 5/27/2013	BY: DATE: 5/29/2013



SYMBOLS			MANNER OF COLLISION	
MOVING VEHICLE	P	PEDESTRIAN	REAR END	HEAD ON
TURNING VEHICLE	B	BICYCLIST	LEFT TURN	RIGHT TURN
BACKING VEHICLE	A	ANIMAL	LEFT TURN	RIGHT TURN
PARKED VEHICLE		FIXED OBJECT	OVERTAKE	RIGHT ANGLE
999 RECORD NUMBER		Fatal	OUT OF CONTROL	SIDE SWIPE

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COLLISION DIAGRAM

Key Number = 1

MUNICIPALITY: Georgia COUNTY:

INTERSECTION: VT-104A

PERIOD: 5 YEARS 0 MONTHS FROM 1/1/2008 TO 12/31/2012

FILE: GeorgiaArrowH

CASE # :

BY: DATE: 4/30/2013



SYMBOLS			MANNER OF COLLISION	
MOVING VEHICLE	P	PEDESTRIAN	REAR END	HEAD ON
TURNING VEHICLE	B	BICYCLIST	LEFT TURN	RIGHT TURN
BACKING VEHICLE	A	ANIMAL	LEFT TURN	RIGHT TURN
PARKED VEHICLE		FIXED OBJECT	OVERTAKE	RIGHT ANGLE
999 RECORD NUMBER		Fatal	OUT OF CONTROL	SIDE SWIPE

Note: THIS DOCUMENT IS EXEMPT FROM DISCOVERY OR ADMISSION UNDER 23 U.S.C. 409

COLLISION DIAGRAM

Key Number = 2

MUNICIPALITY: Georgia COUNTY:	FILE: GeorgiaArrowH
INTERSECTION: VT-104A	CASE # :
PERIOD: 5 YEARS 0 MONTHS FROM 1/1/2008 TO 12/31/2012	BY: DATE: 4/30/2013



SYMBOLS			MANNER OF COLLISION	
MOVING VEHICLE	P	PEDESTRIAN	REAR END	HEAD ON
TURNING VEHICLE	B	BICYCLIST	LEFT TURN	RIGHT TURN
BACKING VEHICLE	A	ANIMAL	LEFT TURN	RIGHT TURN
PARKED VEHICLE		FIXED OBJECT	OVERTAKE	RIGHT ANGLE
999 RECORD NUMBER		Fatal	OUT OF CONTROL	SIDE SWIPE

Note: THIS DOCUMENT IS EXEMPT FROM DISCOVERY OR ADMISSION UNDER 23 U.S.C. 409

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
1	VT-104A	1.45	1/8/2012	11:20	Cloudy	0	0	Single Vehicle Crash	Single vehicle crash on VT Rt. 104A near the fishing access. The roads were icy and the weather was partly cloudy without any precipitation. The visibility was clear. Operator #1 advised me that she was travelling west at approximately 40mph in a posted 50 mph zone due to the icy road conditions. Said that she came around the curve and started to lose control as her vehicle proceeded downhill. Then advised that she started to spin around, hit the guardrail, and then overturned the vehicle. It should be noted that there were three other crashes in the same area that occurred within a 20-minute period. Veh 1 F 19 Inj 5
2	VT-104A	1.45	1/8/2012	11:25	Cloudy	0	0	Single Vehicle Crash	Single vehicle crash near the fishing access. The roads were icy and the weather was partly cloudy without any precipitation. Operator #1 advised that she was travelling west at approximately 50mph in a posted 50 mph zone. Operator #1. Said that she had come around the curve and as she started to travel downhill she noticed the current single vehicle crash and Georgia fire trucks stopping traffic. Operator #1 slammed on the brakes, but hit the patch of ice and started to lose control as her vehicle proceeded downhill. Operator #1 said that she started to slide, hit the guardrail, and slowed to a stop just missing the other vehicles. Operator #1 came to a position of controlled rest in the fishing access pull off. Operator #1 hit the same patch of ice that a previous crash hit about 5 minutes sooner. Veh 1 F 19 Inj 5

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
3	VT-104A	1.50	4/17/2008	13:23	Clear	1	0	Single Vehicle Crash	Motorcycle crash with extensive injuries. 528 ft west of Jed Shepard RD. The road at the time of the accident was dry, and the weather was clear. From looking at the scene with multiple Troopers, it was determined that Operator #1 was traveling westbound on Route 104A when he came into a moderate curve. His motorcycle drove off the westbound side of the road and into the dirt before striking the guardrails. He left the roadway approximately 141feet prior to his position of uncontrolled rest landing in the westbound lane near the end of the guardrails. Operator #1 advised that he was traveling approximately 40 mph when the incident occurred, and went into the curve too high. He stated that this caused him to go into the dirt. He also advised that he had his helmet on, yet the strap was not tight. Veh 1 M 56
4	VT-104A	1.60	4/1/2008	4:13	Clear	1	0	Single Vehicle Crash	Tractor trailer crash on Route 104A (grain truck that rolled over). 100 ft west of Jed Shepard RD. Operator # 1 advised that he was traveling eastbound on Route 104A when he felt the vehicle shift abruptly. He advised that it then shifted again and he ended up rolling over. Advised that he had been traveling approximately 35-40 mph. It was apparent that the vehicle had been traveling eastbound on Route 104A before coming to the up-hill curve prior to Jed Shepard Rd. Upon exiting the curve on the up-hill slope, the vehicle crossed the center line, and then rolled over. From the green marks along the guard rails, it was determined that the "boom" for the grain truck had scraped across it for approximately 30 feet while the trailer was on its side headed east. Officer said that the road at the time of the accident was partially wet, yet that there were no weather issues that should have been a factor. It was dark out during the crash, and the road was not lighted. The cause of the accident was determined to be failing to keep the vehicle on the roadway and this could possibly have been a factor of too much speed, or because of a heavy load issue. Veh 1 M 44 Inj 3

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
5	VT-104A	1.60	1/16/2009	21:41	Cloudy	0	0	Single Vehicle Crash	Single vehicle crash in the area of Jed Shepard RD (100 ft west of). The area where the crash occurred is at the crest of a hill and a curve. The road conditions were icy. Operator # 1 was traveling west at approximately 55 MPH. Explained that as he crested the hill, he lost control of his vehicle. Upon doing so, he went off the side of the road causing the vehicle to roll. Veh 1 M 16 Inj 5
6	VT-104A	1.72	5/27/2010	7:51	Clear	0	0	Rear End	Three vehicle crash at the intersection with Arrowhead Lake Road. The road was dry and the weather was clear and sunny. Operator # 1said she had rear-ended Vehicle 2, which subsequently travelled into the rear of Vehicle 3. Said she had been traveling west at approximately 50 mph when she rear-ended Vehicle 2, which had been stopped waiting for Vehicle 3 to turn onto Arrowhead Lake Rd. Operator # 2, confirmed that he had been stopped in the westbound travel lane as Vehicle 3 was stopped in front of him, waiting to turn onto Arrowhead Lake Road. This area of roadway is a straight, downward slope that provides several hundred feet of unobstructed visibility. The point of possible perception for Operator #1 to have seen the stopped traffic was several hundred feet east of this stopped traffic. Veh 1 F 40 Inj 5, Veh 2 M 37 Inj 5, Veh 3 F 33 Inj 5
7	VT-104A	1.73	11/1/2011	22:22	Clear	0	0	Single Vehicle Crash	40 Ft east of the intersection of Arrow Head Lake Rd. The weather was clear and the roadway was dry at the time of the crash. Op 1 advised he had consumed 3 or 4 alcoholic drinks that night. There were scuff marks in the westbound lane traveling into the opposite lane. There were scuff marks on the guardrail along the south side of the road and another scuff mark leading away from the guardrail and traveling back into the westbound lane. The vehicle traveled off of the roadway on the north side of the road and overturned, coming to a position of uncontrolled rest on the drive side of the vehicle. The reading indicated a BAC of 0.141% at 23:01 hours. Veh 1 M 23 Inj 5

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Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
8	VT-104A	1.73	12/10/2011	9:13	Clear	0	0	Single Vehicle Crash	Single vehicle crash 15 feet east of Arrowhead Lake Road intersection. The conditions the day of the crash were clear, however there was snow and ice on the road. Witness advised that he was traveling west when he was passed by Operator #1. Said that he was traveling at approximately 55 MPH in a marked 50 zone, and that shortly after he was passed he came upon the vehicle in the middle of the roadway at a stop. Advised that after speaking with Operator #1, she advised that she spun out on the roadway and struck a guardrail before coming to rest. Operator # 1said that she was traveling west at approximately 55 MPH. Advised that while driving, her front right tire crossed the white line and hit a patch of ice. The operator advised that the vehicle spun and crossed the centerline striking the guardrail. The operator advised that she came to rest after colliding with the guardrail. Veh 1 F 20 Inj 5
9	VT-104A	1.75	1/26/2009	8:24	Clear	0	0	Single Vehicle Crash	Single Vehicle rollover. Vehicle had gone off the westbound side of VT 104A just 100 ft east of Arrowhead Lake Rd. Operator #1 advised that she was traveling westbound when she started sliding. She advised that she attempted to correct herself, but ended up leaving the roadway and rolling over. Advised that she was traveling approximately 45-50 mph at the time. The weather at the time was clear, yet the road was still icy in spot due to the recent weather. The road was headed downhill and on a moderate to sharp curve. Veh 1 F 31 Inj 5

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Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
10	VT-104A	1.85	12/20/2008	18:35	Cloudy	0	0	Opp Direction Sideswipe	Two-vehicle collision between Jed Shepard Rd and the 104a state fishing access. At the time of the collision, it was nighttime and extremely cold. The roadway was snow covered and extremely icy. The officer was able to see an icy gloss of the roadway when illuminated by headlights. Upon the arrival of the officer, he noticed a brown colored SUV, facing in a North/North West direction (towards Rt 7) directly adjacent to the state fishing access. Operator #2 advised that he was traveling towards Fairfax when he was struck by the other vehicle. Operator #1 advised that he was traveling Rt 104a towards Rt 7 when the collision occurred. Passenger in vehicle 1 said that the vehicle became sideways just before the collision occurred. Veh 1 M 32 Inj 5, Veh 2 M 19 Inj 5
11	VT-104A	1.93	4/29/2008	20:50	Clear	0	0	Single Vehicle Crash	Single vehicle crash approximately 0.2 miles east of Arrow Head Lake Rd. The weather at the time of the crash was clear and dry. Operator #1 said he was traveling east at approximately 50 MPH when a car came around the corner. Operator #1said the car traveling in the other direction traveled into his lane forcing him to hit the guard rail. Vehicle #2 did not stop. If Operator #2 is located s/he will be cited for Leaving the Scene of an Accident. Veh 1 M 29 Inj 5

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Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
12	VT-104A	1.97	1/8/2012	12:30	Cloudy	0	0	Opp Direction Sideswipe	Two-vehicle crash on VT Rt. 104A 0.25 miles east of the intersection with Arrow Head Lake Rd. Officer was currently in response to 2 separate crashes that had occurred on VT Rt. 104A while this call came in. Officer observed that the roads were icy and the weather was partly cloudy without any precipitation. The visibility was clear. Vehicle#1 hit a section of ice on the roadway, which resulted in a loss of traction on a downhill curve that ultimately led to the crash. This was the third crash within approximately 20 minutes in this 3 mile stretch of the roadway. Operator #1 advised me that she was travelling west at approximately 45 mph in a posted 50 mph zone. Operator #1 said that she came around the curve and as she started to travel downhill her vehicle started to fishtail. Operator#1 then slammed on the emergency brake because she felt herself losing control of the vehicle. However, this action created more of a hazard as vehicle #1 then started to spin 1-2 full rotations as she continued west. Operator #1 then noticed vehicle #2 approaching her, but she could not react as she was not in control of her vehicle and was sliding down the middle of the roadway. Operator #1 stated that she struck the guardrail and then collided into the side of vehicle #2. Operator #2 stated that she was travelling east at approximately 35 mph due to the icy roads. Said that she saw vehicle #1 approaching her and observed that she was out of control as the vehicle was spinning down the roadway. Veh 1 F 17 Inj 5, Veh 2 F 51 Inj 5

Note: THIS DOCUMENT IS EXEMPT FROM DISCOVERY OR ADMISSION UNDER 23 U.S.C. 409

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
13	VT-104A	0.00	12/3/2008	6:40	Clear	0	0	Same Direction Sideswipe	Two-vehicle collision involving a Tractor Trail at the intersection of Route 104a and Route 7 in the Town of Georgia. Route 104a consists of only one lane at his intersection. OP#1 advised that she was traveling west on Route 104A approaching the intersection of Route 104A and Route 7. OP#1 observed a pickup truck in front of her with a left hand signal and a TT unit in front of the pick-up. OP#1 advised that the TT unit appeared to be turning left onto Route 7. OP#1 then passed the pick-up truck and TT unit on the right hand side to make a right hand turn onto Route 7 off from Route 104A. OP#1 advised that the TT unit began making a left hand turn onto Route 7 and clipped the front drives side of her vehicle. OP#2 he advised that he was making left hand turn onto Route 7 from Route 104a when he was flagged down by a motorist who advised him he had just clipped a car. OP#2 advised he had to swing to the right in order to make the left hand turn. OP#2 advised he did not realize he had hit the vehicle he thought he had just driven over the curb.

Note: THIS DOCUMENT IS EXEMPT FROM DISCOVERY OR ADMISSION UNDER 23 U.S.C. 409

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
14	VT-104A	0.00	2/13/2009	15:58	Clear	0	0	Same Direction Sideswipe	Involving a TT Unit at the intersection of Route 104A and Route 7 in Georgia. The weather was clear at the time and the sun was out. There were no road conditions that would have affected this. Op 1 advised that he was driving on Route 104A when he approached the intersection of Route 7. He advised that the TT Unit pulled up to left side of the road and activated his left directional signal. He advised that because of this, he pulled to the right of the truck in order to get up to that same intersection. He advised that the TT Unit then started to turn right and struck the side of his vehicle. Op 1was adamant about stating that the TT Unit had its left blinker on, yet then turned on his right blinker at a later time. Operator of the TT Unit advised that he pulled up to the intersection and had his right directional on. He stated that he needs to go to the left in order to make the right turn, yet still had his right blinker on. He advised that when he went to turn right, he did not see the vehicle next to him and struck the side of it. He advised that the vehicle was not at the intersection when he pulled up to it. Officer wrote: There are no separate lines that differentiate between a right and left turn lane, and as stated above, there is a whole separate lane for bearing right. Regardless of the right directional signal being used or not, when the Cobalt pulled up to the intersection, it made its own lane next to the TT Unit. It is recommended that the Highway Department access this location and determine whether a "One Lane" sign needs to be placed in the area. Vehicles routinely pull up at this intersection together, yet there are no clearly marked separate lanes.

Note: THIS DOCUMENT IS EXEMPT FROM DISCOVERY OR ADMISSION UNDER 23 U.S.C. 409

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
15	VT-104A	0.00	12/4/2009	7:36	Clear	0	0	Same Direction Sideswipe	A minivan and tractor trailer unit were involved. At the time of the crash it was sunny and the roadway was dry. Operator #1 advised that he was on the left portion of the roadway attempting to turn right. Operator #1 advised that he had his right directional on. Operator #1 advised that a vehicle pulled up on his right and he had to wait for that vehicle to pass. Operator #1 advised after the vehicle passed he turned right. Operator #1 advised that he did not see Vehicle #2. Operator #2 advised that she was behind Vehicle #1 approaching the intersection. Operator #2 advised that she observed Vehicle #1 to be on the left edge of the roadway indicating a left turn. Operator #2 advised she drove to the right of Vehicle #1 and stopped at the stop sign. Operator #2 advised that Vehicle #1 then pulled out. Operator #2 advised that the trailer crashed into her car. Witness was behind Operator #2 in traffic. Advised that he observed Vehicle #1 to be indicating a left hand turn. Advised that he observed Vehicle #2 pulled alongside Vehicle #1. Advised that Vehicle #1 changed its directional and pulled out.
16	VT-104A	0.00	8/27/2010	13:31	Cloudy	0	0	Rear End	Vehicle #2 stopped at stop sign, vehicle #1 failed to stop behind #2 and struck it in the rear. Both vehicles west bond on 104a, upon reaching intersection of 7 and 104a vehicle #2 stopped at the stop sign with vehicle #1 stopping behind him. Operator #1 stated that her foot slipped on the clutch and she lurched ahead striking #2 in the rear.
17	VT-104A	0.00	12/13/2010	7:38	Rain	1	0	Rear End	Two-vehicle crash on route 104a in Georgia. The weather was clear and dry. Operator #2 advised she was traveling east on route 104a. Operator #2 advised she was attempting to turn into her work parking area when vehicle #1 struck her from behind. Operator #1 advised she was traveling west on 104a. Operator #1 advised she dropped her coffee and picked it up. Operator #1 advised when she looked up she saw the vehicle in front of her but it was too late to avoid crashing into Vehicle #2.

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
18	VT-104A	0.00	3/25/2011	9:15	Cloudy	1	0	Same Direction Sideswipe	Both operators W bound on 140a with op #2 in front of op #1. Operator #2 stopped for stop sign at jct of 104a and Route 7, he had direction lights on to turn right. Operator #1 advised she saw no directional lights. Operator #2 started a right turn to head north on rt 7. Veh #1 thought veh #2 was turning left to head south on Rt 7 and started passing veh #2 on the right. As veh #2 turned right the right rear of his trailer struck the left front of veh #1 as she attempted to pass on the right and turn right.
19	VT-104A	0.54	11/16/2012	12:39	Clear	1	0	No Turns, Thru moves only, Broadside ^<	Two-car crash at the intersection of route 104A and Industrial park road in Georgia, VT. At the time of the accident, the weather was clear and the roadway was dry. It appeared that V1 was turning out of the industrial park and V2 was heading west on route 104A at the time of the crash. Operator 1 stated that day was her first day at work and upon leaving, she never stopped at the stop sign. Op 2 was traveling west towards Georgia at approx. 30 mph when V1 entered route 104A without stopping.
20	VT-104A	0.75	10/22/2012	18:23	Clear	0	0	Other - Explain in Narrative	Property damage accident that occurred on Rte 104A in Georgia. A 2 x 4 had fallen off a truck and struck another vehicle. Operator 2 stated that he was traveling east on Rte 104 A when he saw an approaching truck with a 2 x 4 sticking out of the back of the bed into the east lane. The 2 x 4 struck the front of his vehicle and possibly the roof when the impact dislodged it. Operator 1 was operating a Harrison Concrete vehicle carrying a load of 2 x 4's used from a job. He was unaware that on had struck another vehicle. Vehicle 1 was carrying a load of 2 x 4's that were unsecure and not strapped in. As the two vehicles passed in traffic a 2 x 4 struck vehicle 2 causing minor damage to the front bumper and possibly the roof.

Crash Number	Road	Marker	Date	Time	Weather	Injuries	Fatalities	Type	Description
21	VT-104A	0.90	9/20/2008	10:52	Clear	1	0	Single Vehicle Crash	Single vehicle motor vehicle. Op1 stated she was traveling south on route 104A, towards Fairfax, when she drifted off the travel portion of the roadway. Stated when she steered back onto the travel portion, she overcorrected and lost control of the vehicle. Stated she then struck the guardrail. The minor damage caused to the vehicle supported Op 1's claim to be traveling below the post 50 mile an hour speed limit. Near 3617 Highbridge
22	VT-104A	1.16	3/13/2013	15:21	Cloudy	1	0	Opp Direction Sideswipe	Two-vehicle crash on Route 104A. The point of impact is on a narrow bridge. The weather at the time of the accident was cold and cloudy. The roadway was dry. Operator #1 advised that she was operating a Georgia Elementary School bus (north on VT 104a). She had her window open. She was traveling across the Arrowhead Lake Bridge. She advised a truck was crossing at the same time. She advised that the truck impacted her mirror. The mirror shattered sending pieces into the passenger area of the bus. She then stopped the bus after traveling off the bridge. This was a scheduled stop to drop off a student. Witness #1 advised that they were traveling from Georgia to Fairfax VT on 104A. She noticed an 18-wheeler approaching them. The vehicle was across the center line. The vehicle appeared to be going too fast because it looked like it was out of control. The vehicle traveled back into its lane before it passed them. Witness #2 advised she was traveling to Fairfax on RTE 104A. She advised that an 18 wheeler almost collided with her on the Arrowhead Lake Bridge. She had to swerve to avoid a crash. Upon investigation the tractor trailer continued on. The vehicle was not located.

Appendix M: Local Input

Town of Georgia

Local & Regional Input Questionnaire

This project, BF 023-1(7), focuses on Bridge 1 on VT Route 104A in Georgia, Vermont. The bridge had a severe incident and is in need of either a major maintenance action or replacement. Potential options being considered for this project include a deck rehabilitation, deck replacement, superstructure replacement, or full bridge replacement. It is possible that VTrans will recommend a road closure and detour traffic away from the project site for the duration of the work. Efforts will be made to limit the detour to State roads.

Community Considerations

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

   NO

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

   NO

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

   There are areas of the Town of Georgia that the response of fire, police, ambulance and highway department (plowing) would be adversely impacted by road closure.

   Contact person for all: Town Administrator Michael McCarthy ph- 802-524-9794 e-mail: administrator@townofgeorgia.com

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

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

   NO

6. What other municipal operations could be adversely affected by a road/bridge closure or detour? school busses for both Georgia and Fairfax

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

   yes. Skunk Hill Road in Georgia. This road is already being impacted by a higher volume of traffic. This road has paved and unpaved sections.

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

   Georgia Industrial Development Corp.
   Contact: Tim Smith e-mail: tim@feide.com
   ph! 802-524-2194

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

Schools

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

   Georgia Elementary School
   Ethan Allen Highway
   Sept. - June

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

   yes - school buses.

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/angler use on the bridge?

   Moderate to Low

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

   No

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

   yes

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

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? Fishing access area and natural walking area.

Communications

1. Please identify any local communication channels that are available for us to use in communicating with the local population. Include weekly or daily newspapers, blogs, radio, public access TV, Front Porch Forum, etc. Also include any unconventional means such as local low-power FM. St. Albans Messenger, Milton Independent, LCAT-TV

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?

   Yes Extraordinarily too narrow.

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.

   NO

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

   No

Land Use & Zoning

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

   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.

   N/A

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.

   N/A

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. See pg 3

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?

   Fairfax and Georgia Selectboards

Local & Regional Input Questionnaire

This project, BF 023-1(7), focuses on Bridge 1 on VT Route 104A in Georgia, Vermont. The bridge had a severe incident and is in need of either a major maintenance action or replacement. Potential options being considered for this project include a deck rehabilitation, deck replacement, superstructure replacement, or full bridge replacement. It is possible that VTrans will recommend a road closure and detour traffic away from the project site for the duration of the work. Efforts will be made to limit the detour to State roads.

Town of Fairfax contribution

Community Considerations

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

   We have regularly scheduled events, mostly in the summer months including races, farmers' markets, and a parade. It is hard to gauge if there will be a noticeable impact to these events from road closure or construction.

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

   As a commuter path for residents of Fairfax, there is no slow season for this roadway.

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.

   Fairfax Fire Department and Fairfax Rescue (a private non-profit) are located along Main Street in Fairfax, south of Route 104A.

   David Raymond, Battalion Chief- fire@fairfax-vt.gov

   Bambi Dame, Director, Fairfax Rescue- director@fairfaxrescue.org

   Tim Wasilewski, President, Fairfax Rescue- president@fairfaxrescue.org

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

   As the road in question is the main conduit between I-89 and the Town of Fairfax, all operations that require deliveries (BFA-Fairfax, local markets and food service operations, Runamok Maple, etc.) would potentially see effects from closures or detour.

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

   N/A

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

   Our contracted trash hauler (Casella) may be affected by closure or detour.

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

   Skunk Hill Road (Georgia)
   Westford-Milton Road (Milton & Westford)

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

   N/A

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

   N/A

Schools

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

BFA-Fairfax, Hunt Street in Fairfax. Open Sept-June with lightened use over the Summer

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)?

   Fairfax Recreational fields

Pedestrians and Bicyclists

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

   Defer to Town of Georgia

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

   See Georgia

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

   See Georgia

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

   See Georgia

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).

   N/A

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?

   N/A

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?

   See NRPC recommendations.

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

   See NRPC recommendations

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

   See Town of Georgia

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

   Unknown

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

   N/A

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

   Unknown

7. Are there any utilities (water, sewer, communications, power) attached to the existing bridge? Please provide any available documentation.

   N/A

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

   N/A

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

   N/A

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.

   N/A

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.

   N/A

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.

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?

Appendix N: Operations Input

Bridge Scoping Project Georgia BF 023-1(7)
Operations Input Questionnaire

The Structures Section has begun the scoping process for BF 023-1(7), VT Route 104A, Bridge 1, over Arrow Head Lake. This is a rolled beam / concrete cast in place deck bridge constructed in 1937. The most recent Structure Inspection, Inventory, and Appraisal Sheet (attached) rates the deck as 5 (fair), the superstructure as 6 (Satisfactory), and the substructures as 7 (Good). This is from August of 2017, so we expect that those ratings may change in the near future. 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. What are your thoughts on the general condition of this bridge and the general maintenance effort required to keep it in service?

   District notes the bridge is not wide enough. The condition of the curb and facia concrete is crumbling evident in our bridge washing operations. The original bridge had cable guardrail which was modified to W beam in the 1970's. The guardrail was knocked off the bridge and rebolted in past decades. The elevation is low. Water rises to the deck elevation which makes it difficult to inspect and maintain in the spring high water time.

2. What are your comments on the current geometry and alignment of the bridge (curve, sag, banking, sight distance)?

   The alignment is ok. The current geometry works. Brush has been trimmed that was an issue last year. Water sheds off the bridge satisfactorily.

3. Do you feel that the posted speed limit is appropriate?

   No, too fast for the current bridge width. Yes, if a future wider bridge with reasonable shoulders is constructed.

4. Is the current bridge and approach roadway width adequate for winter maintenance including snow plowing?

   No. The current width is a safety concern as modern day plow trucks plow across this narrow bridge meeting oncoming traffic.

5. Are the joints salvageable or would you recommend replacement?

   No

6. Are the remaining railings constantly in need of repair or replacement? What type of railing works best for your district? (We are recommending more and more box beam guardrail on our bridges because of crash-worthiness and compatibility with accelerated projects).

   Yes, constant rail maintenance, see the conditions at the bottom of the bridge report. W-beam works best for the District. However, we do understand permitting issues. We want the widest possible new deck width.

7. Are you aware of any unpermitted driveways within close proximity to the bridge? We frequently encounter driveways that prevent us from meeting railing and safety standards.

   About 190' SE at mm 1.20 left and right, two existing drives are not permitted. One is the Hyde Point Farm at 3323.

   Note a new access 375' NW for a Nature Area Parking.

   D8 requests the lake access roughly 275' NW of bridge is not blocked by new guardrail.

8. 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.

   Believe a brick home access will be in your construction traffic control Q making access for them quite difficult.

   Mike McCarthy, Georgia Town administrator, can help us with this. Do you want me to reach out or will you? We note a wheel chair advisory sign close to the bridge. Also a blind person sign on a nearby side road.

9. 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 requires repair?

   No real extra effort to stabilize. However, bridge maintenance access is not possible during high water.

10. Does this bridge seem to catch an unusual amount of debris from the waterway?

    It does catch and release woody debris as Lake levels rise and fall. Slow moving water. Not a lot of debris and it cleans itself out.

11. Are you familiar with traffic volumes in the area of this project?

    3500 per day

12. Do you think a closure with off-site detour and accelerated construction would be appropriate? Do you have any opinion about a possible detour route, assuming that we use State route for State projects and any route for Town projects? Are there locations on a potential detour that are already congested that we should consider avoiding?

    The State road detour will impact several busy intersections in Essex Junction, Essex, Colchester, Georgia and St. Albans the most. Therefore, we do believe accelerated construction is appropriate.
    The State road detour on the Georgia side will be from VT 104 A to US 7 north to I-89 Exit 18 north or south. From the Fairfax side the best choice will be VT 104A to VT 104 north to I-89 Exit 19 north and South. Consider not advertising the potential detour along 104 to 128 to 15 then 89 south because of all of the construction in the area.

    Local folks will probably use local Town roads without much complaint.

13. Please describe any larger projects that you have completed that may not be reflected on the attached Appraisal sheet, such as deck patches, paving patches, railing replacement with new type, steel coating, etc.

    None really. However, we are about to run power and set temporary signal poles which could be of benefit to design in future phases of construction.

14. If there is a sidewalk on this bridge, how effective are the Town's efforts to keep it free of snow and ice?

    No sidewalks now. However, this is a very hot political topic. Several local State Representatives have expressed the need for a much wider deck that includes sidewalks. There are no approach sidewalks. I believe a wider shoulder will satisfy all concerned. Possibly a 4-11-11-4 typical?

15. Are there any drainage issues that we should address on this project?

    No, just consider a higher new deck elevation.

16. Are you aware of any complaints that the public has about issues that we can address on this project?

    The narrow structure has produced many complaints over the years. Locals are very upset and very much want a wider deck for safety reasons.

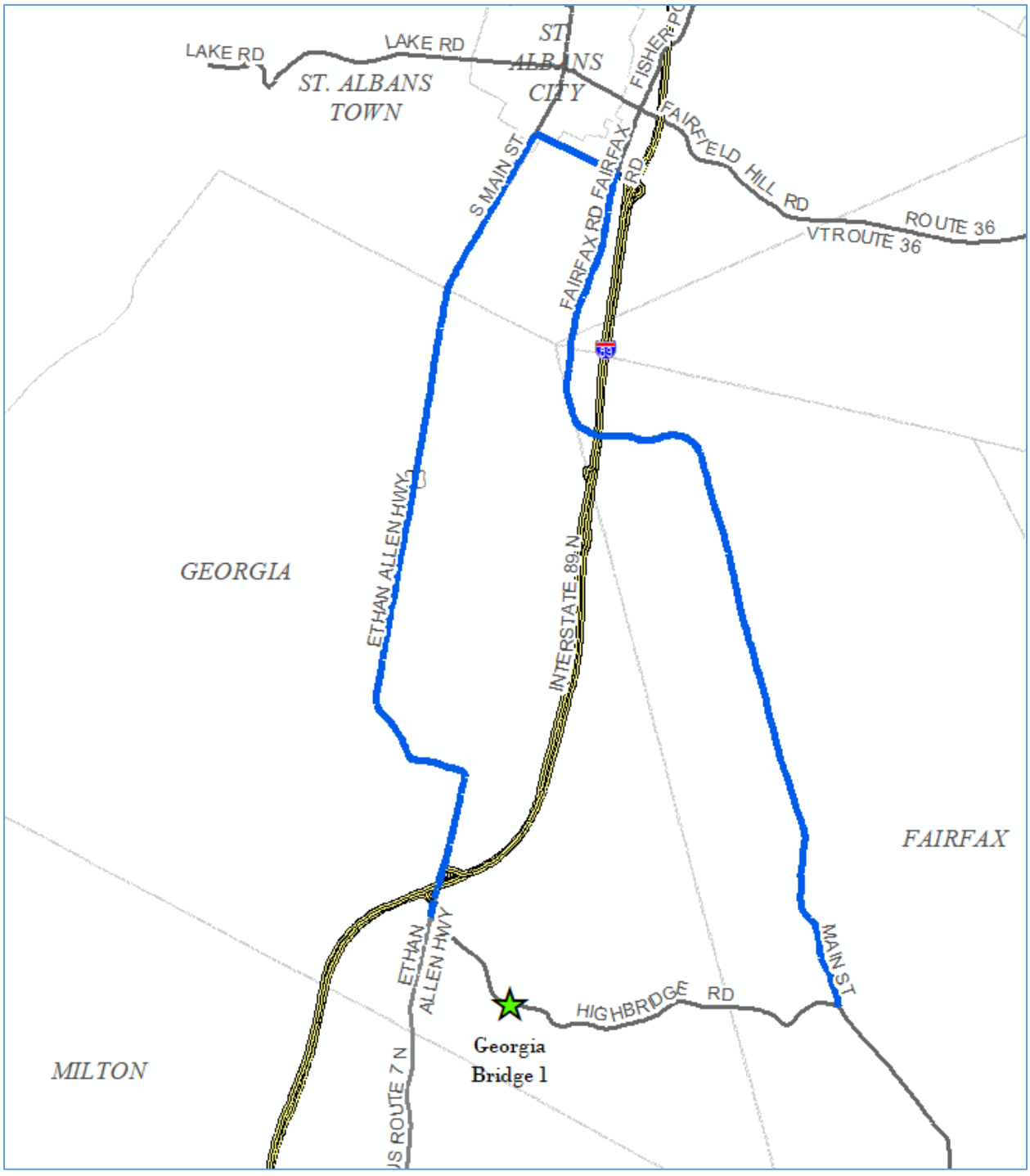
17. How is the current traffic control working?

    Currently down to one lane controlled by traffic signals. This is not ideal, especially during winter months.

18. Is there anything else we should be aware of?

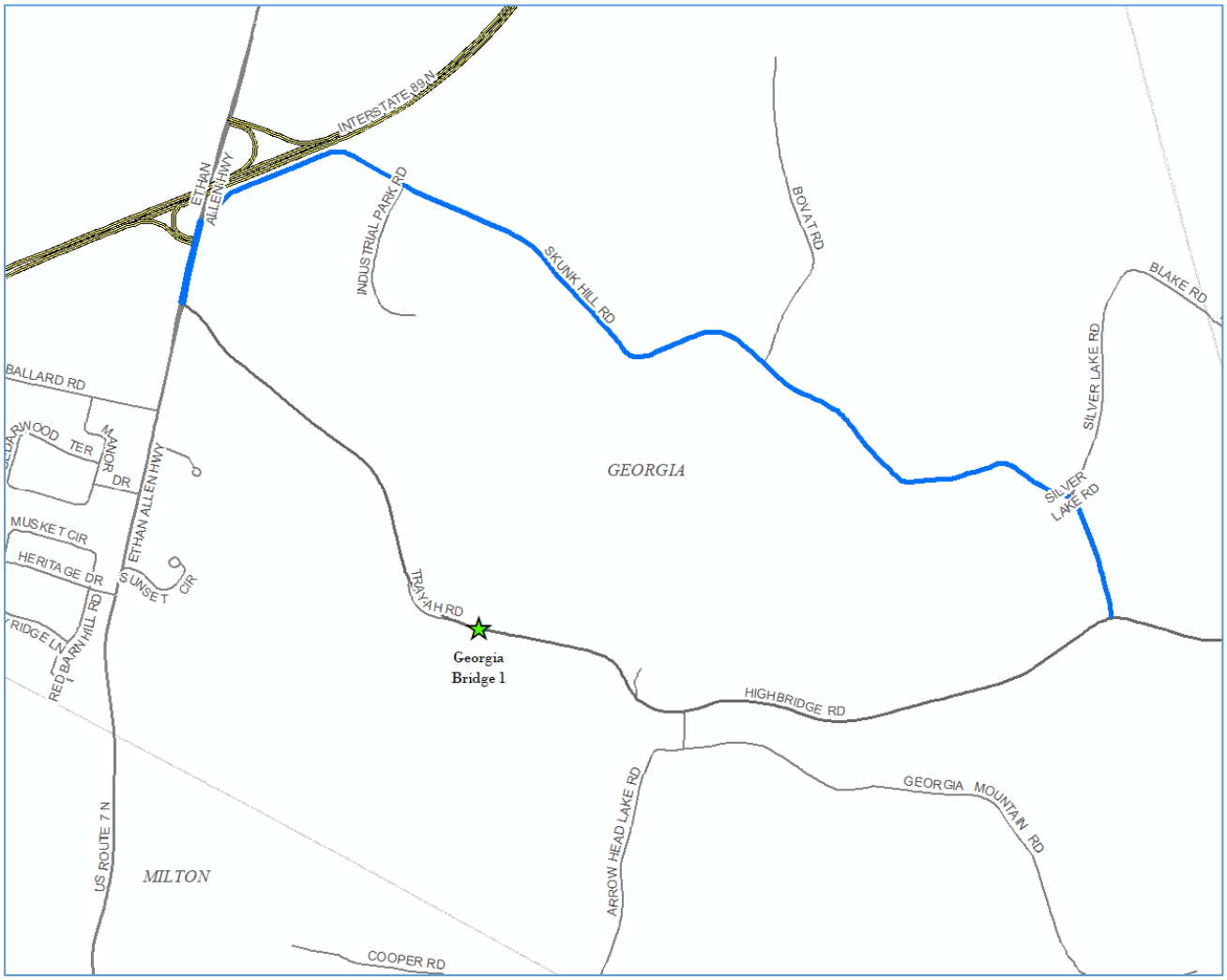
    The area is growing. Harrison Concrete has an approved pit about to open east of the bridge. Due to heavy traffic and construction in Essex many Fairfax people are choosing to use VT 104A to Exit 18 now vs VT 128 and 15. The Georgia Town administrator recently expressed that concern to me. Fairfax has approved over 500 new home sites, growing fast. Georgia has a street scape project in motion that impacts VT 104A, Exit 18 ramps, the park and ride and much more to include sidewalks, on street US 7 parking, several new signaled US 7 intersections etc. Fairfax is adding sidewalks in Town.

Appendix O: Detour Routes



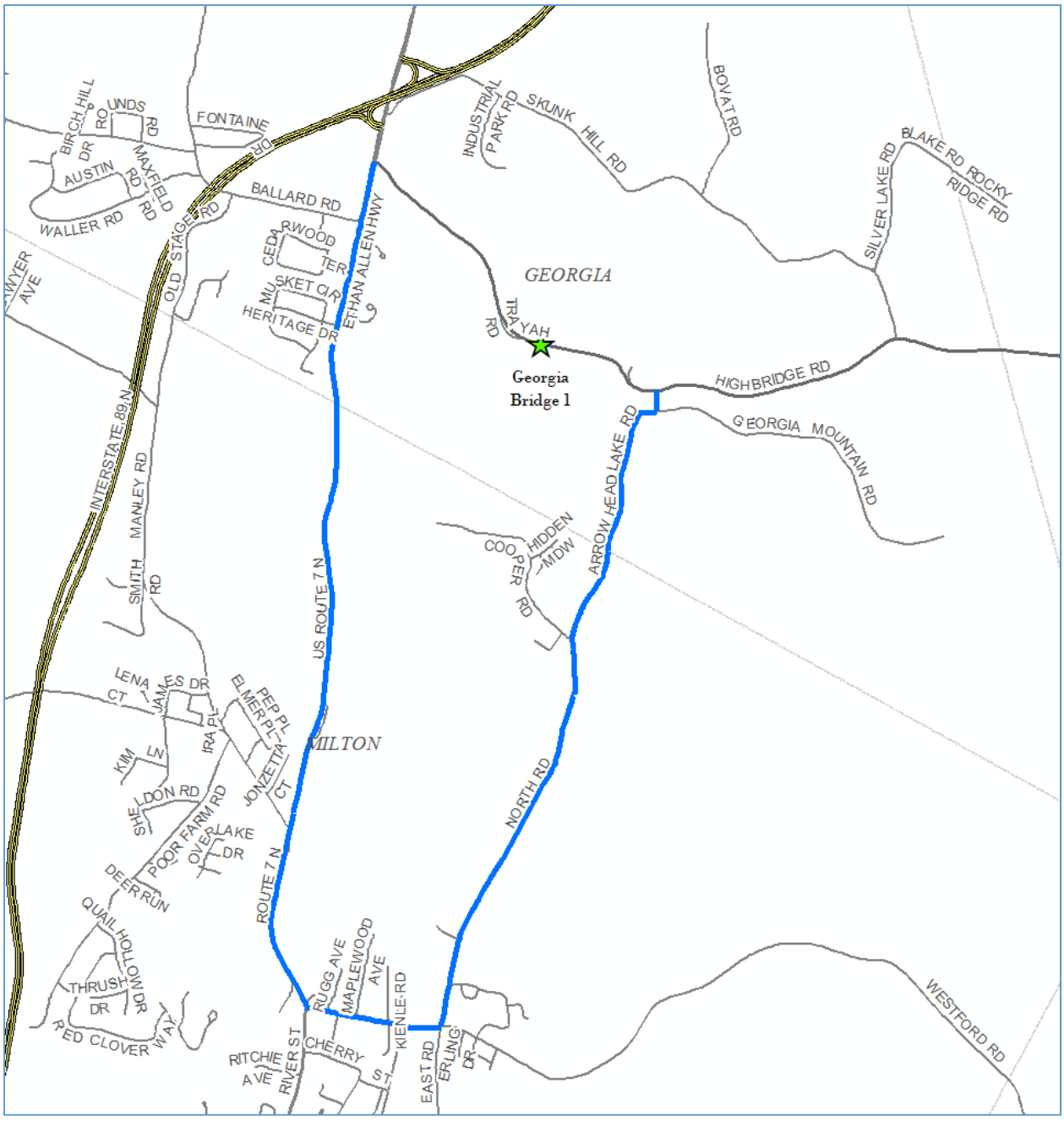
Regional Detour Route: VT Route 104A, to US Route 7, St. Albans State Highway, and VT Route 104, back to VT Route 104A

22.7 Miles end-to-end
4.5 Miles Through-Route
18.2 Miles Detour Route
13.7 Miles Added



Local Bypass 1: VT Route 104A, to Skunk Hill Road, and US Route 7, back to VT Route 104A

6.0 Miles end-to-end
2.9 Miles Through-Route
3.1 Miles Detour Route
0.2 Miles Added



Local Bypass 2: VT Route 104A, to Arrow Head Lake Road, North Road, Main Street, and US Route 7, back to VT Route 104A (9.3 mi end-to-end)

9.3 Miles end-to-end
1.7 Miles Through-Route
7.6 Miles Detour Route
5.9 Miles Added

Appendix P: 2013 US Route 7 Vermont 104A Scoping Report by VHB

Scoping Report







US Route 7 / VT 104A Intersection and VT104A Bridge No. B1 over Arrowhead Mountain Lake

In the Town of Georgia, Vermont

Prepared for:

The Northwest Regional Planning Commission and

The Town of Georgia

Prepared by

VHB Vanasse Hangen Brustlin, Inc.

September 30, 2013

Table of Contents

1.0 Introduction 1

1.1 US7 / VT104A Intersection 1-2

1.2 Bridge No. 1 over Arrowhead Mountain Lake 1-2

1.3 Local Concerns Meeting 1-3

1.4 Project Purpose and Need 1-3

2.0 Documentation of Existing Conditions 2-1

2.1 Introduction 2-1

2.2 Data Collection 2-1

2.3 US7 / VT104A Intersection 2-1

2.4 Bridge B-1 2-5

3.0 Evaluation of Solution Alternativess 3-1

3.1 Introduction 3-1

3.2 Intersection Alternatives 3-2

3.3 Bridge Alternatives 3-5

4.0 Summary and Recommendations 4-1

Appendices

A –VHB Traffic and Accident Summary Memorandum

B – VTrans Local Concerns Meeting & Public Informational Meeting

Author: Gregory L. Bakos gbakos@vhb.com

1

Introduction

The Town of Georgia identified the need for safety and operational improvements at the intersection of US7 and VT104A. They also identified concerns at the VT104A Bridge (Bridge No. B1) over Arrowhead Mountain Lake. This report summarizes the results of a study that was conducted to address these needs with support from the Northwest Regional Planning Commission. This report identifies existing deficiencies and evaluates potential solutions that address the project Purpose and Need.

Each chapter of this report is split into two sections because there are two distinct areas of concern within the study area. The first sections are for the intersection and the second sections are for the bridge. The map below depicts both locations within the study area.



1.1 US7 / VT104A Intersection



The US7 / VT104A intersection is located due south of the Exit 18 - US7 / I89 interchange. The existing US7 corridor is predominantly two lanes with center turn lanes at intersections and at the interstate ramps. There are currently no traffic signals within the study area and the adjacent land use is predominantly commercial in the vicinity of the subject intersection. VT104A forms a "T" intersection with US7 and is STOP controlled.

1.2 Bridge No. B1 over Arrowhead Mountain Lake



Bridge B-1 carries VT104A across a small stream fed arm of Arrowhead Mountain Lake. VT104A has become a primary commuter route since it provides access to US7 and I-89 from outlying communities. Arrowhead Mountain Lake is fed by the Lamoille River and is dam controlled in Milton.

1.3 Local Concerns Meeting

A Local Concerns Meeting was held at the Georgia Town Office on August 27, 2012 to gather input from local, regional and State officials, as well as concerned citizens. The intent of the meeting was to guide the study team in understanding the concerns and desires of the community relative to the two study locations. It was also a useful data gathering step since many of the public comments were insightful in describing the concerns from the local perspective and regional context.

1.4 Project purpose and Need

The Local Concern Meeting supplemented the study team's project understanding and therefore helped develop the following project Purpose & Need Statement.

US 7 / VT 104A Intersection:

PURPOSE:

The purpose of this project component is to improve mobility and safety for motorists, pedestrians and bicyclists through the US 7 / VT 104A intersection. These improvements should be accomplished within the context of the Community's current and long range vision for the South Village Core that includes changes in adjacent land use, traffic patterns, aesthetics and community character.

NEED:

The project need is largely defined by the following concerns and deficiencies:

Traffic Mobility and Safety:

During peak hours it is often difficult for motorists on VT 104A to find suitable gaps to safely enter US 7. VT 104A and the opposing People's Trust Company bank driveway are Stop controlled, whereas US 7 is uncontrolled through the intersection. This results in extensive peak hour delays on VT 104A, and this contributes to safety concerns when motorist frustration leads to risk taking into 40 MPH US 7 traffic.

The VT 104A approach is not striped for two lanes, however it does function that way since left and right turning vehicles tend to stack side by side at the stop line. Large trucks have difficulty making right turns without using the entire approach width, and this sometimes creates conflicts with cars.

The short cut-through that connects VT 104A to US 7 North is a minor concern because it is unclear to some motorists that it is not intended as a right turn slip ramp, but rather exists to provide access to the two businesses that abut the State right-of-way at the intersection.

Another safety related concern is the relatively high number of active business driveways within close proximity of the intersection. These drives represent potential conflict points as motorists pass through the intersection.

Pedestrian and Bike Accommodations

The only sidewalks within the project limits are on the west side of US 7 and they generally consist of short segments that do not connect. There are no pedestrian crosswalks across either roadway within the project limits. There are no special bike accommodations within the project, although the paved US 7 shoulders are wide enough for bikes.

VT 104A Bridge - B1

PURPOSE:

The purpose of this project component is to address the poor condition and substandard geometry of VT 104A bridge B1 in an environmentally responsible and cost effective manner.

NEED:

The project need is largely defined by the following concerns and deficiencies:

Bridge Condition:

The existing bridge, built in 1937, is in satisfactory condition overall, but there is ongoing deterioration of the deck and rusting of the steel beams. The existing concrete guardrail posts are severely deteriorated and the steel beam guardrail has become detached from the posts in areas and is an immediate safety concern.

Bridge and Roadway Geometry:

The existing bridge is very narrow, with only a 20'-7" curb to curb width and no shoulders or sidewalks. (The current State standard width would be in the range of 30' to 34'.) The bridge often functions as a one-lane bridge since large trucks tend to straddle the centerline, preventing oncoming vehicles from crossing at the same time. It is very intimidating for bikes and pedestrians to cross with motor vehicles due to the narrow width and lack of sidewalks and pedestrian railings.

The bridge approaches are also narrow and environmentally constrained since they are built on fill in the lake. The road width on these causeways is approximately 26'.

Bridge Clearance:

The bottom of the steel bridge beams are only 1' to 2' above the surface of Arrow Head Lake. The VTrans bridge inspections note occasional topping of the road during flood conditions, although this was not corroborated by the community. The Community has mentioned that it is difficult for kayakers to pass under the bridge. A higher bridge profile should be considered in the event the superstructure is replaced.

2

Documentation of Existing Conditions

2.1 Introduction

Prior to developing solution alternatives it was first necessary to document the existing conditions at the two study locations. This involved data gathering, review of relevant correspondence and previous reports, and field-based observations and measurements. The following section describes the data gathering results.

2.2 Data Collection

The study team's initial data gathering primarily consisted of Geographic Information Systems (GIS) data gathering supplemented by direct field observations and collection of relevant traffic and crash data from VTrans. Environmental fieldwork was performed at a reconnaissance level only. VHB did not delineate wetland boundaries since wetlands were either not present (at the intersection) or were obvious (along the causeway at the bridge).

Physical considerations that were observed included roadside embankments, commercial and residential properties, driveways, sidewalks, signs, drainage culverts and swales, and utility poles. In addition, motorist operations and behavior were closely observed at the intersection and the bridge.

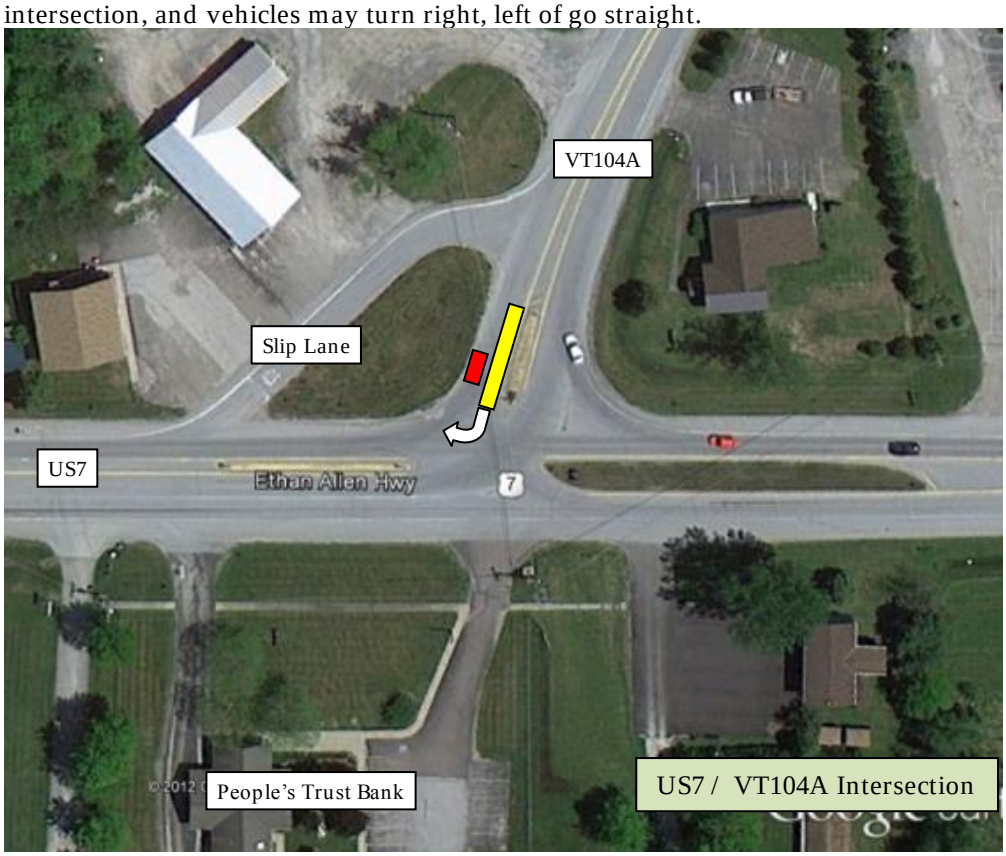
2.3 US7 / VT104A Intersection

Intersection Geometry

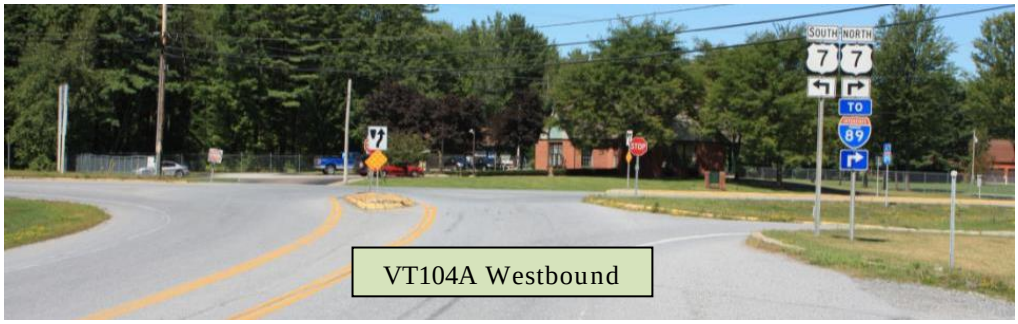
Within the study intersection US7 has 12-foot wide single northbound and southbound through lanes, and a single southbound left turn lane onto VT104A. US7 has 6 to 8-foot paved shoulders and raised center medians within the intersection limits.

VT104A has 11-foot travel lanes and narrow shoulders. The westbound approach intersects US7 at a slight skew, and there is a paved one-way slip lane that connects from VT104A westbound to US7 northbound.

The exit from the People's Trust bank forms a fourth leg of the intersection directly opposite VT104A. This stop controlled approach is one-way eastbound into the intersection, and vehicles may turn right, left of go straight.



It is important to note that the westbound VT104A approach is striped as one lane, however vehicles are frequently observed forming a left and a right (and/ or a through) lane. In addition, right turning trucks are observed starting the right turn from the left side of the aprpoach in an effort to make the right turn without the rear wheels off-tracking into the grass. This is problematic when right turning automobiles move up beside the trucks unaware that the trucks will turn right. This has resulted in crashes since the truck drivers (in yellow above) do not expect the



The VT104A westbound to US7 northbound slip lane is a minor concern because some motorists use it to avoid delays at the stop sign at US7. This slip lane is meant to provide access to the adjacent businesses, but it also introduces some confusion for

motorists uncertain about whether they should be using it to turn right onto US7. The re-entry point at US7 is at a very skewed angle and introduces a second potential point of conflict for vehicles on US7 in less than 100 feet. The below photo also shows that the placement of the exiting guide signs might suggest that motorists should use the slip lane to access US7, which is not the intent.



Traffic Operations

A study of the existing and projected traffic shows that the VT104A and Bank driveway approaches are predicted to operate at Levels of Service (LOS) E in the assumed construction year of 2016, and LOS F in the 2036 design year if no improvements are made. This analysis is consistent with field observations of significant peak hour delays on VT104A. A traffic signal warrant analysis indicates that a traffic signal is warranted at the intersection. A memorandum that summarizes the traffic analysis and crash history in greater detail is included in the appendix.

Traffic safety

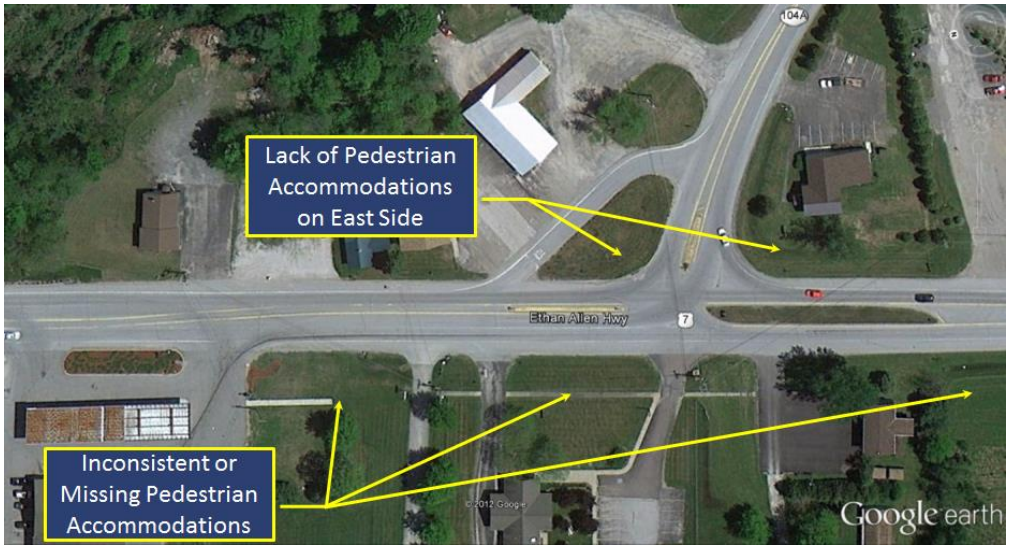
The intersection is not classified as a high crash location based on the crash data that was available from 2007 through 2011. The adjacent US7 segments were classified as high crash locations however. The multiple commercial drives along this corridor are likely contributing factors. Within the intersection congestion and delay on the VT104A approach is a safety concern since motorists are more apt to take chances and fill small gaps in the steady US7 traffic flow when they have been slowly advancing in a long queue to the 104A stop sign.

Use of the one lane westbound VT104A approach as two lanes also introduces safety concerns when right turning trucks occupy the left side of the approach, as previously described. The crash data shows that this does result in crashes, although they are very low speed. The more critical crashes are broadside crashes that result from turning vehicles crossing or entering the US7 traffic since US7 is signed for 40 MPH.

Bike and Pedestrian Accommodations

The intersection currently has minimal accommodations for pedestrians as shown in the figure below. The sidewalks that do exist are on the west side and are not continuous. There are no sidewalks on the east side and there are no crosswalks across US7 or VT104A.

There are no formal bike accommodations within the study intersection, however US7 does have paved shoulders. At the Local Concerns Meeting the public noted that VT107A is not a bike friendly route since it has minimal shoulders and 40-50 MPH speeds. US7 also has relatively high speeds but shoulders are more prevalent. Neither route is a designated bike route.



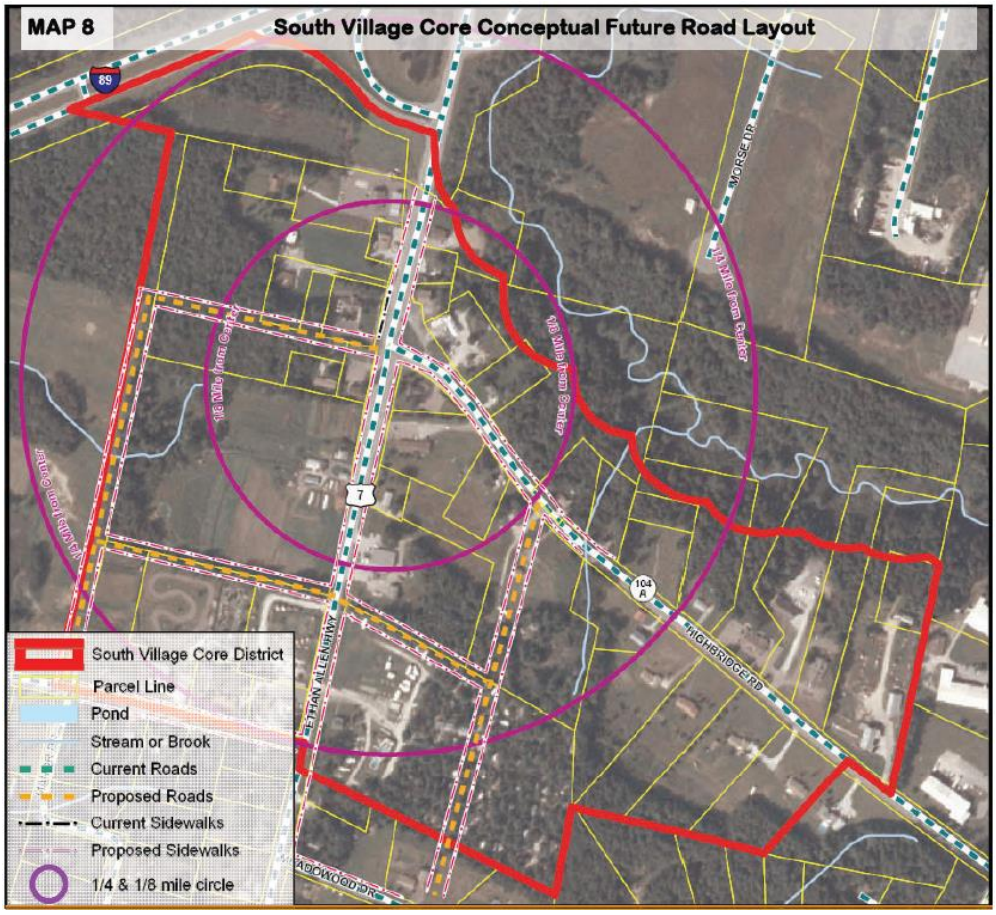
In 2012 RSG, Inc. completed a Georgia South Village Bicycle and pedestrian Feasibility Study for Town of Georgia and the Northwest Regional Planning Commission. That study included a larger study area than this inetrsection study. It advised that the long term intersection improvements include the folloiwng characteristics to be consistent with the overal study recommendations.

- Minimize pedestrian crossing distances,
- Use design elements to enhance motorist yielding behavior to bicyclists and pedestrians,
- Provide marked pedestrian crossings where appropriate,
- Allow for bicycle through and turning movements,
- Allow for future transit circulation,
- Allow for future expansion of an eastbound leg (currently from the bank) into the intersection, and

The final improvements of the above study should accommodate sidewalks and crossings at all four legs of theintersection.

Context

The US7 / VT104A intersection falls within the South Village Core, as discussed in the Town's 2009 *Georgia South Village Core Strategic Plan*. That plan describes a vision for concetrated mixed use development around the southern US7 corridor. It would include a network of connecting roads as shown in the below graphic from the study, and it would include pedestrian ammenities and streetscape enhancements. The effect on the US7 / VT104A intersection is that it would provide a new street context that would justify reduced posted speeds and increased bike and pedestrian accommodations. The street network would ideally include a public roadway that would form a fourth leg to the US7 / VT104A intersection. As shown in the graphic, the intersection is a focal point of the South Village Core, so improvements that are proposed should consider the potential long range context as envisioned by the South Village Core Strategic Plan.



2.4 Bridge B-1

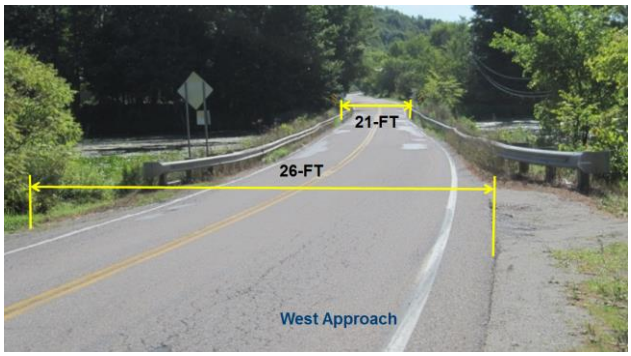
Brisge B-1 is a short and narrow bridge on VT104A that has both structural and functional concerns that warrant consideration. The concerns are documented in general terms in the Purose and Need Statement, and this section is meant to provide additional detail on the existing conditions.

Bridge Geometry

The existing bridge span is 74 feet and the measured pavement width is approximately 20 feet and 7 inches. This is a severe constraint since the bridge has guardrail on both sides. Large vehicles tend to cross the centerline in order to avoid contact with the guardrail. The pavement widens on either side of the bridge to approximately 26 feet. The bridge approaches are on short causeways formed by filling Arrowhead Mountain Lake. The below aerial photo depicts the bridge site.



The below photos illustrate how the pavement narrows at the bridge. They also shows that both approaches are curved and the bridge is on a small crest vertical curve. Note in the left photo that vegetation is beginning to encroach on sight lines on the inside of curves.





Traffic and Safety

The posted speed through the bridge site is 50 MPH. Lower advisory speeds are posted on specific curves, but the bridge falls within an area where speeds are generally observed in the 50's.

The 2011 Average Annual Daily Traffic was 4300 vehicles per day through the bridge site. Traffic is comprised of approximately 95% passenger vehicles and 5% trucks.

Crash history on the bridge has mostly included sideswipe accidents, one including a school bus and a truck in 2013. The narrow bridge, the high speeds and the deficient guardrail heighten safety concerns above what the crash history suggests.

On June 6, 2013 VTrans organized and completed a road safety audit that included the bridge site. The detailed observations and recommendations are included in the appendix.

Structural Concerns

The latest VTrans bridge rating yielded a Sufficiency Rating of 72 (with a score of 100 being the best). This is not a poor enough rating for the bridge to be considered a priority by VTrans. The supporting steel members appear to be in fair condition; however the guardrail system is in poor condition and the deck appears to have areas of concern. The guardrail is of particular concern since it may not contain an errant vehicle on the narrow bridge. The existing concrete posts are in various stages of disrepair and in some locations the steel beam rails have become detached from the posts. The below photos illustrate some of the areas of concern.











3

Evaluation of Solution Alternatives

3.1 Introduction

The observations from the data collection phase, combined with public input, help shape the types of design solutions that will be possible or necessary to satisfy the project Purpose and Need Statement. This chapter identifies and evaluates conceptual design solutions that could be employed to address the project Purpose and Need.

This study is primarily focused on long term solutions at the intersection and the bridge. Short and mid-term solutions, as described in detail in the VTrans Road Safety Audit Review document are also possible and encouraged.

3.2 Intersection Improvement Alternatives

Alternative 1. No Build

This alternative would not involve construction activities and is included for comparison purposes only since "do nothing" is always an alternative. This alternative would only include continued maintenance.

Advantages:

- Lowest cost
- Zero Impact to resource areas and abutting properties

Disadvantages:

- No safety, operational, or bike and pedestrian benefits
- Does not support the South Village Core Master Plan

Discussion:
This alternative falls well short of satisfying the project Purpose and Need.

Alternative 2. Signalized Intersection

This build alternative would install an actuated traffic signal to control the US7, VT104A and People's Bank Drive approaches. The improvements would include geometric modifications as depicted on the below plan.



Note that this plan would close the slip lane from VT104A to US7. It would also recommend the creation of a circulating driveway at the bank so patrons would enter and exit through the signal. The traffic signal is expected to operate at Level of Service C (Good) in the design year.

Advantages:

- Provides conventional and adjustable traffic control
- Minimal impact to abutting properties and little disruption during construction
- Can accommodate the future South Village Core Master Plan improvements
- Can accommodate the addition of sidewalks and crosswalks at all four corners of the intersection (though not all are shown due to current lack of destinations and continuity)

Disadvantages:

- Does little to calm traffic
- Little opportunity to improve community character

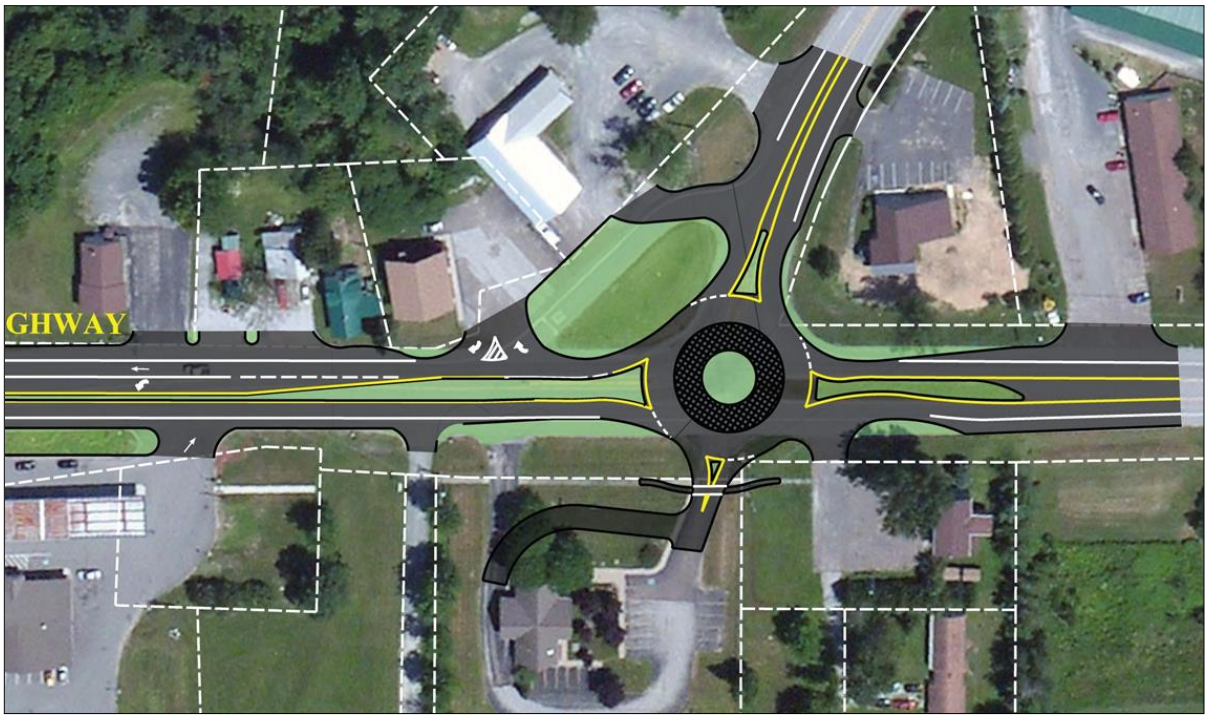
Discussion:

This alternative will satisfy the primary objectives of the project Purpose and Need, which are to improve safety, operations and bike and pedestrian accommodations. It

falls short on serving as an attractive gateway to the future South Village Core however.

Alternative 3. Construct Roundabout

This build alternative would install one-lane modern roundabout to control the US7, VT104A and People's Bank Drive approaches. The improvements would include geometric modifications as depicted on the below plan.



Note that this alternative would also close the slip lane from VT104A to US7. It would also recommend the creation of a circulating driveway at the bank so patrons would enter and exit through the 4th leg of the roundabout. The roundabout is also expected to operate at Level of Service C (Good) in the design year.

Advantages:

- Provides smooth traffic control during all hours
- Minimal impact to abutting properties
- Can accommodate the future South Village Core Master Plan improvements
- Can accommodate the addition of sidewalks and crosswalks at all four corners of the intersection (though not all are shown due to current lack of destinations and continuity)
- Highest safety improvement is expected
- Provides opportunities for aesthetic improvements and gateway/ focal point

Disadvantages:

- Highest initial cost

Discussion:

This alternative will satisfy the primary objectives of the project Purpose and Need, which are to improve safety, operations and bike and pedestrian accommodations. Roundabouts are known to greatly reduce the severity of crashes because the operating speeds are significantly lower than through signalized intersections. Roundabouts also tend to reduce the crash rate since the number of potential conflict points would be reduced. A roundabout at this location may also have a positive safety effect on the adjacent US7 roadway segments that are currently classified as high crash sections. This is due to the overall traffic calming effect compared to the existing free-flow condition as well as the Alternative 2 traffic signal.

The roundabout also provides an opportunity to create an attractive gateway or central focal point that will work well with the future South Village Core. Roundabouts are known to accommodate pedestrians very well and this is compatible with the long-term goal of making the South Village Core more pedestrian friendly.

Intersection Evaluation Matrix:

The below evaluation matrix provides an at-a-glance summary of the three alternatives that are being considered.

	Alternative 1 No Build	Alternative 2 Signalization	Alternative 3 Roundabout
2036 Level of Service	F (Side Streets)	C	C
US 7 Speed Reduction	None	Fair	Good
Expected Crash Reduction	None	Fair	Very Good
Right-of-Way Impacts	None	Minor	Minor
Construction Cost	None	$ 450,000.	$ 750,000.
Community Character	No Improvement	Little Improvement	Improved

3.3 Bridge Alternatives

Alternative 1. No Build

This alternative would not involve construction activities and is included for comparison purposes only since "do nothing" is always an alternative. This alternative would only include continued maintenance and perhaps the short term improvements recommended by the VTrans Roadway Safety Audit Review.

Advantages:

- Lowest initial cost
- Zero Impact to resource areas and abutting properties

Disadvantages:

- No safety, operational, or bike and pedestrian benefits
- Continued repair costs

Discussion:
This alternative falls well short of satisfying the project Purpose and Need.

Alternative 2. Widen Bridge and Approaches

This build alternative would increase the bridge and causeway width to 11' lanes and 4' shoulders as per guidance in the Vermont State Standards. The existing bridge span length would be maintained and it is likely that the steel bridge beams would be replaced due to their age. The improvements would include geometric modifications as depicted on the below concept plan.



This alternative would result in lake impacts from the proposed roadway and bridge widening. It may be possible to increase the vertical clearance over the lake if the bridge beams are replaced, but this would generally result in more lake impacts due to the resulting wider fill slopes, and a crest curve at the bridge is not very desirable. Phasing the construction may require a temporary bridge off to one side since the existing bridge is so narrow. Alternating one-way traffic will probably be necessary during construction because of the tight environmental constraints.

Advantages:

- Greatly improved road and bridge width that will accommodate vehicles, bikes and pedestrians
- New deck and railing systems will improve safety and reduce current repair costs
- Only moderate overall costs and lake impacts

Disadvantages:

- Temporary Environmental and traffic impacts during construction

Discussion:

This alternative satisfies the project Purpose and Need. Environmental impacts could be reduced by constructing retaining walls along the causeway, but at great cost. The 4' shoulders could be expanded to 5' to better accommodated bikes and pedestrians on the bridge and causeway.

Alternative 3. Widen and lengthen Bridge

This build alternative would increase the bridge and causeway width to 30 feet as per guidance in the Vermont State Standards. The existing bridge span length would be greatly increased to approximately 350'. The improvements would include geometric modifications as depicted on the below concept plan.



This alternative would result in a reduction in permanent lake bottom impacts because the causeway would be greatly shortened. It may be possible to increase the vertical clearance over the lake under this design. Phasing the construction may require an alignment shift and/ or over widening the bridge to maintain at least one lane of traffic at all times during construction.





Advantages:

- Greatly improved road and bridge width that will accommodate vehicles, bikes and pedestrians
- New deck and railing systems will improve safety and reduce current repair costs
- Reduced permanent lake bottom impacts

Disadvantages:

- High initial cost
- Greater long term maintenance cost due to the large amount of bridge structure over water

Discussion:

This alternative satisfies the project Purpose and Need. Environmental impacts would be reduced by removing the causeway and replacing it with bridge spans, but with great initial and long term costs.

Bridge Evaluation Matrix:

The evaluation matrix on the next page provides an at-a-glance summary of the three alternatives that are being considered. It should be noted that a moderate span bridge option, one that would have a span somewhere in between the short and long spans of Alternatives 2 and 3 is another potentially viable solution. The advantage might be that the lake bottom impacts due to wider causeway fills could be compensated for by lengthening the bridge and removing an equal amount of causeway.

	Alternative 1 No Build	Alternative 2 Widen Existing Bridge	Alternative 3 Widen Bridge and Span Causeway
Bridge Width	21’	30’	30’
Bridge Length	74’	74’	350’
Improved Clearance	No	No	Possible
Lake Impacts	None	Yes	Reduced
Satisfies Purpose & Need	No	Yes	Yes
Construction Cost	None	$1,600,000	$ 5,000,000

4

Summary and Recommendations

This intersection and bridge improvement alternatives considered as part of this study were presented to the public and the overwhelming feedback was that the existing needs and deficiencies need to be addressed soon, and the solutions that are selected are almost secondary because of the pressing needs. The long term solution alternatives described in this study are not currently funded and are not on State priority lists. The Northwest Regional Planning Commission transportation advisory committee is therefore hoping to add the bridge project as a critical need, recently ranking it first in the region due to safety concerns.

In the interim, the near and mid-term recommendations from the VTrans Road Safety Audit Review should be implemented to the extent possible. Those improvements include low cost improvements such as enhanced signing and pavement markings as well as minor geometric modifications, such as rounding the northeast corner at the US7/ VT104A intersection to allow trucks to turn right easier from the right side of the westbound approach.

Intersection Recommendations

The Alternative 3 – Roundabout solution is recommended as the long term intersection improvement alternative. This is primarily because of its traffic calming attributes, its superior safety enhancements and its comparable traffic operations when compared to the Traffic Signal alternative. The roundabout also provides better streetscape and gateway opportunities, and it would be most compatible with the Georgia South Village Strategic Plan.

Bridge Recommendations

The Alternative 2 – Widen Bridge and Causeway alternative is the recommended bridge improvement alternative. This is primarily because it addresses the primary deficiency, which is the bridge and causeway width, while maintaining the existing span length and therefore controlling costs.

Both of these alternatives are influenced by their local and regional context. The intersection falls within a designated future village core, and the bridge is located on an important route that is expected to experience continued growth in traffic due to commuter patterns and development trends in outlying communities. The solutions should therefore be responsive to the changes that are forecast.

This feasibility study provides the tools for the community to take additional steps toward implementing the preferred solutions. Cost estimates, resource impacts and property needs will be identified in greater detail in subsequent project development phases. This study is intended to lay the foundation for those next steps.

Appendix

A - Traffic and Accident Summary Memorandum

Transportation
Land Development
Environmental
Services

Vanasse Hangen Brustlin, Inc.

Six Bedford Farms Drive, Suite 607
Bedford, New Hampshire 03110-6532
603 644-0888
FAX 603 644-2385

Memorandum

To:

Date: September 24, 2012

Project No.: 57512.00

From: Nick Sanders, P.E.
Senior Project Engineer

Re: Existing Traffic and Crash Summary Memorandum

Vanasse Hangen Brustlin, Inc. (VHB) has completed an existing conditions evaluation for the US Route 7 / VT Route 104A intersection feasibility study in Georgia, VT. This memorandum includes the following:

- A description of the existing roadway network in the vicinity project intersection;
- A summary of the crash data at the project intersection;
- A description of the traffic volume network development; and
- An evaluation of traffic operations at the project intersection.

EXISTING CONDITIONS

US Route 7 (Ethan Allen Highway) provides north-south travel through the western portion of Vermont. Locally, US Route 7 is a residential and commercial corridor that connects the Town of Georgia with St. Albans to the north and points in Chittenden County to the south. Within the project area US Route 7 is a two lane roadway with (one travel lane in each direction) with a posted speed limit of 40 miles per hour.

VT Route 104A (Highbridge Road) provides an east-west link between I-89/ US Route 7 in Georgia with VT Route 104/ VT Route 128 in Fairfax. VT Route 104A is primarily used as a commuter route. Near the intersection of US Route 7, VT Route 104A is a two lane roadway (one travel lane in each direction) with a posted speed limit of 40 miles per hour.

VT Route 104A and the exit only driveway from the People's Trust Company (bank) intersect US Route 7 from the east and west respectively to form a four-way unsignalized intersection. Although there is no striping on the VT Route 104A approach, this westbound approach does operate as two lane approach (separate left and right turn lanes). The bank exit only driveway provides a single left/ through/ right lane. US Route 7 provides a single shared through/ right lane from the south and a left-turn lane and a through lane from the north. VT Route 104A and the bank driveway operate under stop control while US Route 7 has the right of way. A one-way access road bisects the northeastern corner of the intersection providing access and egress to two businesses (Movement Center (dance) and Interstate Auto Service.

Turning movement traffic counts conducted by VTrans on August 4 and 5, 2008 at the project intersection of US Route 7 at VT Route 104A during the weekday morning and evening peak periods were used as the basis for this evaluation. Copies of the traffic volume count data are provided in the Appendix.

CRASH SUMMARY

Crash data provided by VTrans were reviewed and evaluated for the project intersection of US Route 7 and VT Route 104A. The detailed crash data covers the period from January 1, 2007 through December 31, 2011.

The intersection of US Route 7 and VT Route 104A experienced 14 crashes over the five-year period for an average of just under 3 crashes per year. Of these 14 crashes, 7 (50 percent) were same direction sideswipe crashes, 2 (14 percent) were rear end crashes, 2 (14 percent) were left-turn broadside crashes, 1 (7 percent) was a left-turn head on crash, 1 was a through movement broadside crash, and 1 was an unidentified or unknown crash. There were 4 crashes that resulted in personal injury and no fatal crashes reported during this five-year period.

This evaluation determined that the project intersection is not a High Crash Location (HCL) intersection as the actual/ critical crash ratios for the intersection was less than 1.00. Additionally, the HCL listings on VTrans website (2006 to 2010) by intersection and section were reviewed for completeness. This data confirmed that the project intersection is not a HCL intersection, but that the section of US Route 7 adjacent to VT Route 104A (mile marker 1.046 – 1.346) is classified as a HCL section. A detailed summary table of the crash data including crash rates and determination of HCL is included in the Appendix.

TRAFFIC NETWORKS

The weekday morning and evening peak periods were selected as the critical hours for analysis purposes. The 2008 peak hour traffic volumes counts were projected to the opening year (2016) and the future design year (2036) for evaluation purposes.

Since it is impractical to design for the highest volume encountered during the year, VTrans guidelines recommend a compromise between capacity and cost. Design Hourly Volume (DHV) criteria allow roads to be designed for the 30th highest hourly volume of the year. Historical data from VTrans traffic count station on US Route 7 in Georgia (P6F029 - located 1.7 miles north of I-89) was reviewed to establish an appropriate DHV condition. The majority of the top 30 highest hours occurred during the weekday evening peak hour; indicating that a weekday evening DHV condition is appropriate. The weekday morning peak hour was adjusted to reflect a peak month condition. The following DHV and seasonal adjustments were made to the raw turning movement counts:

- A 1.07 DHV adjustment was applied to the August 2008 weekday evening data; and
- A 1.30 peak month adjustment was applied to the August 2008 weekday morning data.

Detailed calculations for the weekday evening DHV adjustment and the weekday morning peak month adjustment are provided in the Appendix.

Traffic growth is a function of expected land development in the region. To predict a rate at which traffic can be expected to grow during the forecast period, historical traffic growth and planned area developments were examined. The regression analysis for the urban highway group conducted by VTrans suggests that regional traffic growth will be flat (no growth). However a review of the closest continuous traffic count station in Georgia (P6F029) revealed that volumes will grow at about 0.4 percent per year over the next twenty years. Conversations with the Northwest Regional Planning Commission did not reveal any specific developments in the immediate vicinity of the site that would impact traffic projections. However, it the Planning Commission noted that traffic growth would likely be higher than the 0.4 percent (annually) indicated by the VTrans regression analysis because of expected continued growth in the nearby town of Faifax and the change in zoning of the Georgia South Village Distract to high density. Therefore, it was concluded that an average annual growth rate of 1.0 percent would provide a conservative assessment of traffic growth in the region and account for any other nearby development projects that may occur. VTrans regression analysis is provided in the Appendix.

The 2016 and 2036 traffic volumes were developed by applying the average annual growth rate of 1.0 percent per year to the 2008 DHV/ seasonally adjusted peak hour traffic volumes. The 2016 and 2036 weekday evening DHV and weekday morning peak hour traffic volumes networks are provided in the Appendix.

TRAFFIC ANALYSES

Levels of service (LOS) were calculated based on the criteria published in the 2000 Highway Capacity Manual[1]. Level of service is the term that defines the conditions that may occur on a given roadway or at an intersection when accommodating various traffic volume loads. Levels of service range from A to F with LOS A representing the best operating conditions and LOS F representing the worst. Copies of the level of service calculations have been provided in the Appendix.

Intersection capacity analyses were performed for the 2016 opening year, the 2036 No Build, and 2036 Build alternatives during the weekday morning peak hour condition and the weekday evening DHV condition. The results of the analysis indicate that the minor street approaches of Route 104A and the bank driveway operate at a LOS E and F respectively in the 2016 opening year No Build condition. Without any improvements these minor street approaches are expected to operate at a LOS F with long delays in the 2036 future year condition. A review peak hour warrant (Warrant 3) from the 2009 Edition of the Manual on Uniform Traffic Control Devices indicates that a signal is warranted in both the opening year and the future year conditions. With a traffic signal and additional turn lanes (northbound left-turn lane and separate westbound left and right-turn lanes) this intersection is expected to operate at a LOS C or better through the future year of 2036. Additionally, a single lane roundabout was evaluated, which is expected to operate acceptably through the future year with an overall LOS C. Unsignalized, signalized, and roundabout capacity analysis are provided in the appendix.

[1] Highway Capacity Manual, Federal Highway Administration, Transportation Research Board, 2000.

Vtrans

Counter: T1199
Counted By: C Smith
Weather: Sunny
Town: 7-31 Georgia

File Name : 7-31am08
Site Code : 30608705
Start Date : 8/5/2008
Page No : 1

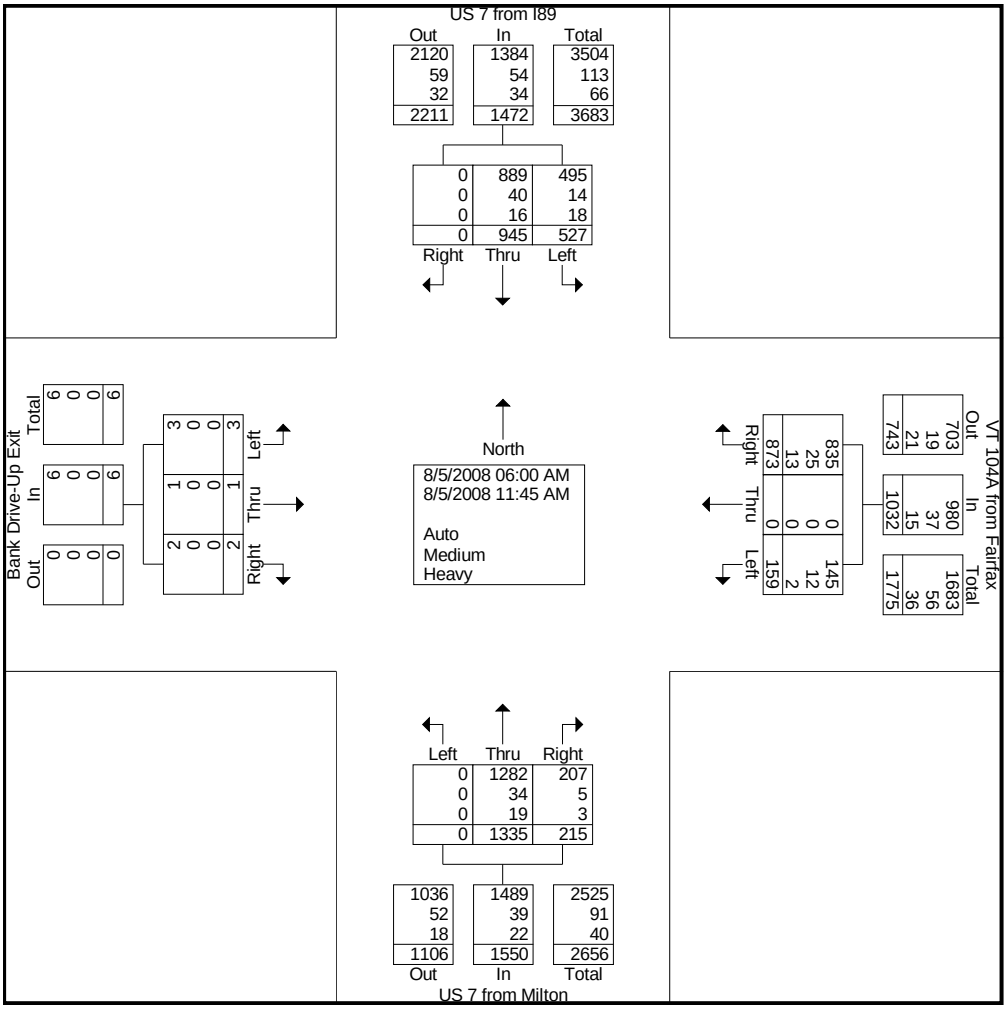
US 7 & VT 104A

Groups Printed- Auto - Medium - Heavy

	US 7 from I89 From North			VT 104A from Fairfax From East			US 7 from Milton From South			Bank Drive-Up Exit From West			
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:00 AM	0	36	16	30	0	2	8	50	0	0	0	0	142
06:15 AM	0	32	28	47	0	6	3	76	0	0	0	0	192
06:30 AM	0	32	62	43	0	5	9	67	0	0	0	0	218
06:45 AM	0	44	60	45	0	5	13	79	0	0	0	0	246
Total	0	144	166	165	0	18	33	272	0	0	0	0	798
07:00 AM	0	33	17	64	0	9	4	92	0	0	0	0	219
07:15 AM	0	49	23	65	0	8	9	94	0	0	0	0	248
07:30 AM	0	37	30	64	0	7	6	73	0	0	0	0	217
07:45 AM	0	26	33	62	0	5	6	53	0	0	0	0	185
Total	0	145	103	255	0	29	25	312	0	0	0	0	869
08:00 AM	0	42	16	45	0	6	11	73	0	0	0	0	193
08:15 AM	0	40	20	33	0	10	9	59	0	0	0	0	171
08:30 AM	0	45	10	48	0	2	6	55	0	0	0	0	166
08:45 AM	0	33	17	41	0	9	9	32	0	0	0	0	141
Total	0	160	63	167	0	27	35	219	0	0	0	0	671
09:00 AM	0	38	15	25	0	12	14	51	0	0	0	0	155
09:15 AM	0	33	12	29	0	3	8	41	0	0	0	0	126
09:30 AM	0	26	13	23	0	11	3	55	0	0	0	0	131
09:45 AM	0	43	12	24	0	4	10	38	0	0	0	0	131
Total	0	140	52	101	0	30	35	185	0	0	0	0	543
10:00 AM	0	35	16	26	0	4	9	47	0	0	0	0	137
10:15 AM	0	43	14	24	0	4	11	45	0	0	0	0	141
10:30 AM	0	36	18	24	0	9	6	37	0	0	0	0	130
10:45 AM	0	54	22	15	0	6	14	47	0	0	0	0	158
Total	0	168	70	89	0	23	40	176	0	0	0	0	566
11:00 AM	0	46	16	30	0	9	8	62	0	2	0	1	174
11:15 AM	0	46	22	20	0	10	8	46	0	0	0	0	152
11:30 AM	0	49	14	22	0	7	14	32	0	0	0	2	140
11:45 AM	0	47	21	24	0	6	17	31	0	0	1	0	147
Total	0	188	73	96	0	32	47	171	0	2	1	3	613
Grand Total	0	945	527	873	0	159	215	1335	0	2	1	3	4060
Apprch %	0	64.2	35.8	84.6	0	15.4	13.9	86.1	0	33.3	16.7	50	
Total %	0	23.3	13	21.5	0	3.9	5.3	32.9	0	0	0	0.1	
Auto	0	889	495	835	0	145	207	1282	0	2	1	3	3859
% Auto	0	94.1	93.9	95.6	0	91.2	96.3	96	0	100	100	100	95
Medium	0	40	14	25	0	12	5	34	0	0	0	0	130
% Medium	0	4.2	2.7	2.9	0	7.5	2.3	2.5	0	0	0	0	3.2
Heavy	0	16	18	13	0	2	3	19	0	0	0	0	71
% Heavy	0	1.7	3.4	1.5	0	1.3	1.4	1.4	0	0	0	0	1.7

Vtrans

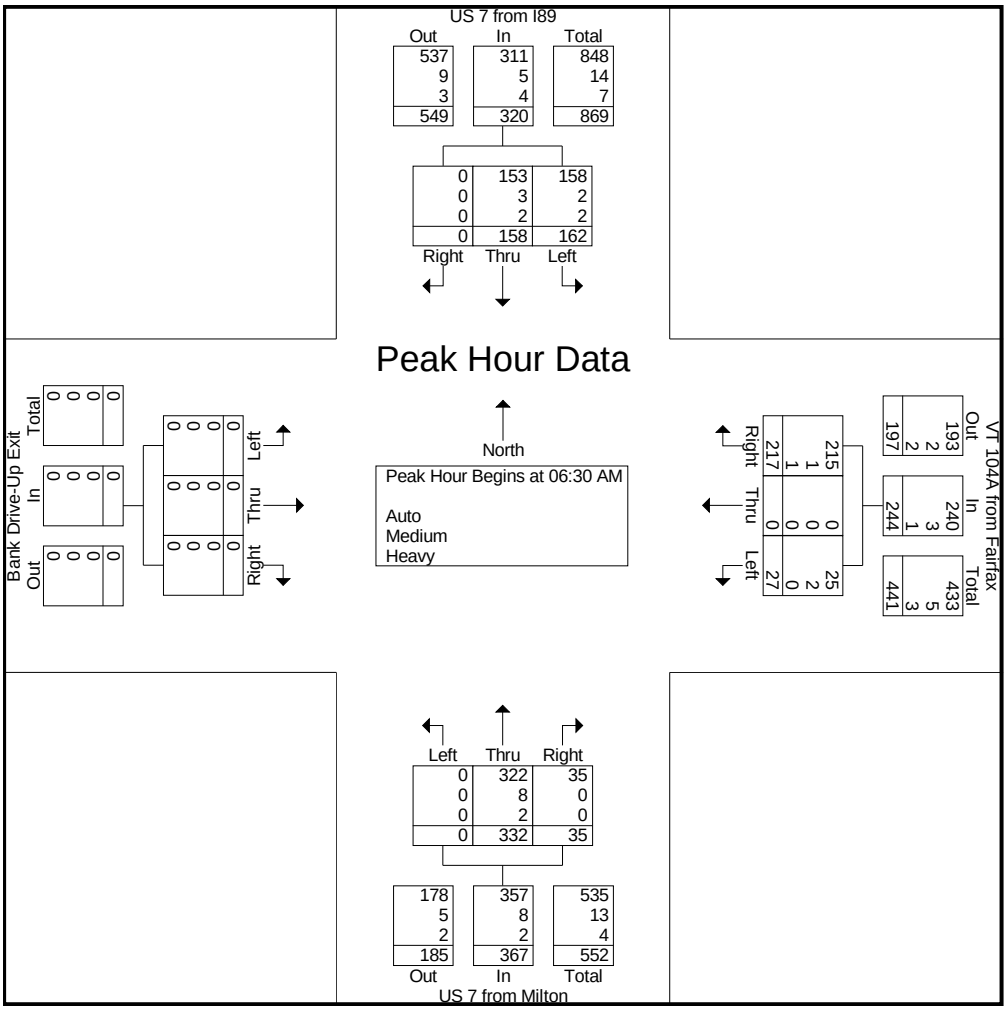
File Name : 7-31am08
Site Code : 30608705
Start Date : 8/5/2008
Page No : 2



Vtrans

File Name : 7-31am08
Site Code : 30608705
Start Date : 8/5/2008
Page No : 3

	US 7 from I89 From North				VT 104A from Fairfax From East				US 7 from Milton From South				Bank Drive-Up Exit From West				
Start Time	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Right	Thru	Left	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:30 AM																	
06:30 AM	0	32	**62**	94	43	0	5	48	9	67	0	76	0	0	0	0	218
06:45 AM	0	44	60	**104**	45	0	5	50	**13**	79	0	92	0	0	0	0	246
07:00 AM	0	33	17	50	64	0	**9**	**73**	4	92	0	96	0	0	0	0	219
07:15 AM	0	**49**	23	72	**65**	0	8	73	9	**94**	0	**103**	0	0	0	0	**248**
Total Volume	0	158	162	320	217	0	27	244	35	332	0	367	0	0	0	0	931
% App. Total	0	49.4	50.6		88.9	0	11.1		9.5	90.5	0		0	0	0		
PHF	.000	.806	.653	.769	.835	.000	.750	.836	.673	.883	.000	.891	.000	.000	.000	.000	.939
Auto	0	153	158	311	215	0	25	240	35	322	0	357	0	0	0	0	908
% Auto	0	96.8	97.5	97.2	99.1	0	92.6	98.4	100	97.0	0	97.3	0	0	0	0	97.5
Medium	0	3	2	5	1	0	2	3	0	8	0	8	0	0	0	0	16
% Medium	0	1.9	1.2	1.6	0.5	0	7.4	1.2	0	2.4	0	2.2	0	0	0	0	1.7
Heavy	0	2	2	4	1	0	0	1	0	2	0	2	0	0	0	0	7
% Heavy	0	1.3	1.2	1.3	0.5	0	0	0.4	0	0.6	0	0.5	0	0	0	0	0.8



Vtrans

Counter: T1199
Counted By: C Smith
Weather: Sunny
Town: 7-31 Georgia

File Name : 7-31pm08
Site Code : 30608705
Start Date : 8/4/2008
Page No : 1

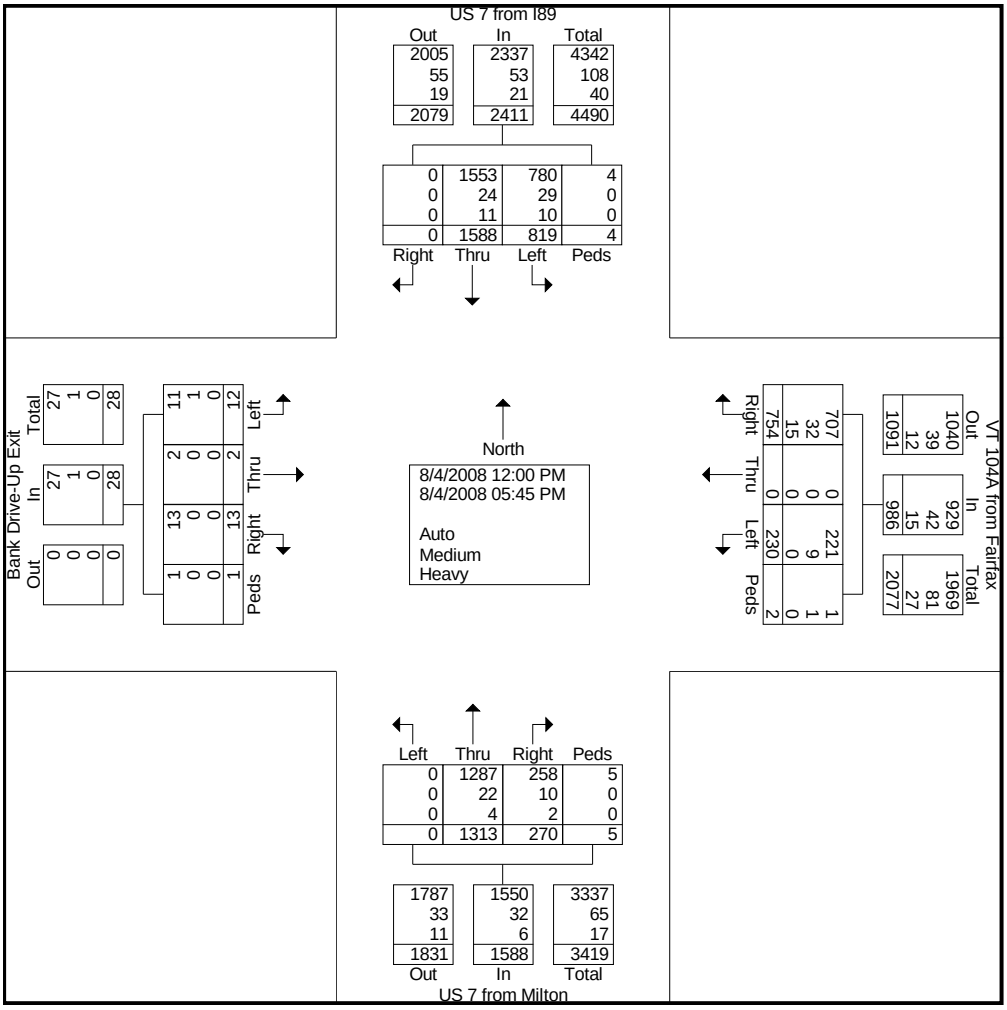
US 7 & VT 104A

Groups Printed- Auto - Medium - Heavy

	US 7 from I89 From North				VT 104A from Fairfax From East				US 7 from Milton From South				Bank Drive-Up Exit From West				
Start Time	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Int. Total
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
12:00 PM	0	54	16	1	24	0	10	0	27	48	0	2	0	0	0	0	182
12:15 PM	0	46	13	0	39	0	11	0	13	40	0	1	0	0	0	0	163
12:30 PM	0	44	24	0	23	0	6	0	19	52	0	1	0	0	0	0	169
12:45 PM	0	46	20	0	16	0	11	0	6	55	0	0	0	0	0	0	154
Total	0	190	73	1	102	0	38	0	65	195	0	4	0	0	0	0	668
01:00 PM	0	45	7	0	25	0	7	0	9	62	0	0	1	1	2	0	159
01:15 PM	0	36	25	0	26	0	7	1	5	38	0	0	0	0	1	0	139
01:30 PM	0	37	23	0	23	0	2	0	9	46	0	0	0	0	0	0	140
01:45 PM	0	42	24	0	32	0	6	0	10	42	0	0	0	1	0	0	157
Total	0	160	79	0	106	0	22	1	33	188	0	0	1	2	3	0	595
02:00 PM	0	44	28	1	25	0	6	0	11	44	0	0	1	0	3	0	163
02:15 PM	0	43	31	0	32	0	12	0	4	51	0	0	4	0	2	0	179
02:30 PM	0	47	28	0	23	0	6	0	7	61	0	0	4	0	3	0	179
02:45 PM	0	69	25	1	27	0	4	0	7	36	0	0	2	0	1	0	172
Total	0	203	112	2	107	0	28	0	29	192	0	0	11	0	9	0	693
03:00 PM	0	73	33	0	45	0	6	0	5	55	0	0	0	0	0	1	218
03:15 PM	0	78	26	0	55	0	15	0	10	58	0	0	1	0	0	0	243
03:30 PM	0	70	38	0	37	0	7	0	9	53	0	0	0	0	0	0	214
03:45 PM	0	63	53	0	26	0	4	0	7	51	0	0	0	0	0	0	204
Total	0	284	150	0	163	0	32	0	31	217	0	0	1	0	0	1	879
04:00 PM	0	66	28	0	30	0	11	0	5	39	0	0	0	0	0	0	179
04:15 PM	0	91	47	0	32	0	13	0	13	57	0	0	0	0	0	0	253
04:30 PM	0	105	55	0	33	0	15	0	25	63	0	0	0	0	0	0	296
04:45 PM	0	116	58	1	30	0	19	0	8	73	0	0	0	0	0	0	305
Total	0	378	188	1	125	0	58	0	51	232	0	0	0	0	0	0	1033
05:00 PM	0	89	51	0	39	0	16	0	15	77	0	0	0	0	0	0	287
05:15 PM	0	98	61	0	27	0	14	0	18	80	0	0	0	0	0	0	298
05:30 PM	0	103	60	0	48	0	11	1	14	70	0	0	0	0	0	0	307
05:45 PM	0	83	45	0	37	0	11	0	14	62	0	1	0	0	0	0	253
Total	0	373	217	0	151	0	52	1	61	289	0	1	0	0	0	0	1145
Grand Total	0	1588	819	4	754	0	230	2	270	1313	0	5	13	2	12	1	5013
Apprch %	0	65.9	34	0.2	76.5	0	23.3	0.2	17	82.7	0	0.3	46.4	7.1	42.9	3.6	
Total %	0	31.7	16.3	0.1	15	0	4.6	0	5.4	26.2	0	0.1	0.3	0	0.2	0	
Auto	0	1553	780	4	707	0	221	1	258	1287	0	5	13	2	11	1	4843
% Auto	0	97.8	95.2	100	93.8	0	96.1	50	95.6	98	0	100	100	100	91.7	100	96.6
Medium	0	24	29	0	32	0	9	1	10	22	0	0	0	0	1	0	128
% Medium	0	1.5	3.5	0	4.2	0	3.9	50	3.7	1.7	0	0	0	0	8.3	0	2.6
Heavy	0	11	10	0	15	0	0	0	2	4	0	0	0	0	0	0	42
% Heavy	0	0.7	1.2	0	2	0	0	0	0.7	0.3	0	0	0	0	0	0	0.8

Vtrans

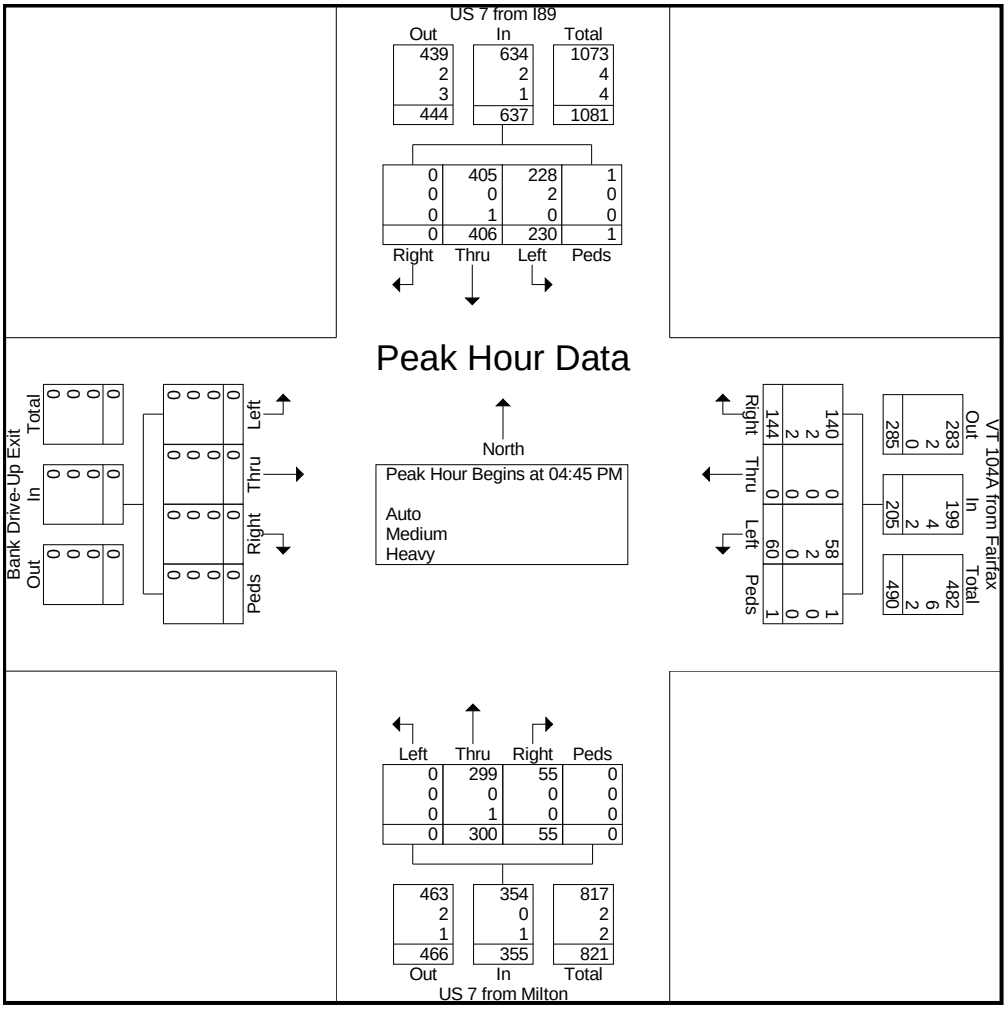
File Name : 7-31pm08
Site Code : 30608705
Start Date : 8/4/2008
Page No : 2



Vtrans

File Name : 7-31pm08
Site Code : 30608705
Start Date : 8/4/2008
Page No : 3

	US 7 from I89 From North					VT 104A from Fairfax From East					US 7 from Milton From South					Bank Drive-Up Exit From West					
Start Time	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	**116**	58	**1**	**175**	30	0	**19**	0	49	8	73	0	0	81	0	0	0	0	0	305
05:00 PM	0	89	51	0	140	39	0	16	0	55	15	77	0	0	92	0	0	0	0	0	287
05:15 PM	0	98	**61**	0	159	27	0	14	0	41	**18**	**80**	0	0	**98**	0	0	0	0	0	298
05:30 PM	0	103	60	0	163	**48**	0	11	**1**	**60**	14	70	0	0	84	0	0	0	0	0	**307**
Total Volume	0	406	230	1	637	144	0	60	1	205	55	300	0	0	355	0	0	0	0	0	1197
% App. Total	0	63.7	36.1	0.2		70.2	0	29.3	0.5		15.5	84.5	0	0		0	0	0	0		
PHF	.000	.875	.943	.250	.910	.750	.000	.789	.250	.854	.764	.938	.000	.000	.906	.000	.000	.000	.000	.000	.975
Auto	0	405	228	1	634	140	0	58	1	199	55	299	0	0	354	0	0	0	0	0	1187
% Auto	0	99.8	99.1	100	99.5	97.2	0	96.7	100	97.1	100	99.7	0	0	99.7	0	0	0	0	0	99.2
Medium	0	0	2	0	2	2	0	2	0	4	0	0	0	0	0	0	0	0	0	0	6
% Medium																					
Heavy	0	1	0	0	1	2	0	0	0	2	0	1	0	0	1	0	0	0	0	0	4
% Heavy	0	0.2	0	0	0.2	1.4	0	0	0	1.0	0	0.3	0	0	0.3	0	0	0	0	0	0.3



Run Date: 2012/09/14

Vermont Agency of Transportation
Technical Services Division
Traffic Research Unit
Special Count - Volume
2011

Site ID: S6F105 **Town:** Georgia **Final AADT:** 9100
Functional Class: RURAL:MAJOR COLLECTOR **Count Type:** VOLUME **Route No:** US7
Location: Georgia: US7 S of I89 Exit18 **Counter Type:** Tube

Date	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Daily Factor	MADT	ACF	Adj. Vol.
2011/06/22 Wed	64	22	31	34	89	279	736	1050	621	525	520	537	602	582	628	928	1047	1105	687	446	345	224	173	103	11378	0.95	0.90	0.97	9485
2011/06/23 Thu	43	34	50	43	85	299	693	1017	700	524	501	557	693	571	622	892	954	968	786	476	359	254	143	93	11357	0.93	0.90	0.97	9253
2011/06/24 Fri	65	23	30	30	84	238	666	954	652	578	611	633	706	665	693	978	932	1083	734	496	393	308	241	137	11930	0.89	0.90	0.97	9263
2011/06/25 Sat	70	51	49	35	47	121	221	306	433	474	590	674	700	678	630	615	580	576	467	363	297	279	205	151	8612	1.18	0.90	0.97	8892
2011/06/26 Sun	80	45	41	34	31	90	138	222	278	384	461	496	609	535	550	508	493	447	417	373	301	224	134	66	6957	1.40	0.90	0.97	8553
2011/06/27 Mon	29	22	22	35	75	271	622	883	609	500	479	517	565	476	512	765	824	843	579	396	343	253	126	72	9818	0.97	0.90	0.97	8307
2011/06/28 Tue	57	25	31	39	79	257	644	907	582	494	476	457	539	484	488	731	833	894	607	419	331	222	130	89	9815	0.95	0.90	0.97	8141
Average:	58	32	36	36	70	222	531	763	554	497	520	553	631	570	589	774	809	845	611	424	338	252	165	102					

	Sun *	Mon *	Tue *	Wed *	Thu *	Fri *	Sat *	Weekday	Weekend	All Days**
Hours Averaged:	24	24	24	24	24	24	24	120	48	168
Average Volume:	6957	9818	9815	11378	11357	11930	8612	10860	7785	9981

Average Peak Volume:
AM Peak*:** 962
PM Peak*:** 979

Preliminary AADT: 8800
Poll Site: P6F029
Poll Group: Urban

* Averaging by hour(0-23), then by day of week (Sun-Sat)
** Adjusted Average Day equals 5/7 * Avg Weekday + 2/ 7 * Avg Weekend Day
*** AM _PM Peak Average Volumes are only from the weekday days

Run Date: 2012/09/14

Vermont Agency of Transportation
Technical Services Division
Traffic Research Unit
Special Count - Volume
2011

Site ID: S6F378 **Town:** Georgia **Final AADT:** 7400
Functional Class: RURAL:MAJOR COLLECTOR **Count Type:** CLASS **Route No:** US7
Location: Georgia: US7 betw Ballard Rd/VT104A **Counter Type:** Tube

Date	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total	Daily Factor	MADT	ACF	Adj. Vol.
2011/06/21 Tue													478	470	458	610	741	852	576	410	332	222	118	60	5327	0.94	0.90		4516
2011/06/22 Wed	42	10	19	16	48	164	402	657	457	369	386	441	524	461	487	633	767	818	559	350	292	169	118	60	8249	0.95	0.90		7071
2011/06/23 Thu	33	24	25	21	38	182	391	620	471	348	373	460	584	434	439	625	721	806	608	407	285	200	104	54	8253	0.93	0.90		6914
2011/06/24 Fri	38	20	16	22	38	130	377	599	437	384	455	503	566	510	522	663	739	835	574	408	301	235	176	109	8657	0.89	0.90		6912
2011/06/25 Sat	50	32	33	21	22	64	130	202	359	371	479	576	624	611	562	567	562	549	439	371	251	235	167	125	7402	1.18	0.90		7858
2011/06/26 Sun	56	32	28	17	20	56	94	155	226	331	433	449	555	501	549	491	463	432	445	356	303	173	99	54	6318	1.40	0.90		7987
2011/06/27 Mon	23	14	10	16	33	159	411	614	436	395	413	481	509	434	433	661	793	824	595	404	326	224	101	62	8371	0.97	0.90		7283
2011/06/28 Tue	42	14	14	17	40	172	413	627	439	382	380	412	492	427	408	612	788	874	614	397	280	186	103	65	8198	0.95	0.90		6992
2011/06/29 Wed	27	12	20	17	49	174	406	596	478	369	417	472													3037	0.94	0.90		2563
Average:	39	20	21	18	36	138	328	509	413	369	417	474	542	481	482	608	697	749	551	388	296	206	123	74					

	Sun *	Mon *	Tue *	Wed *	Thu *	Fri *	Sat *	Weekday	Weekend	All Days**
Hours Averaged:	24	24	36	36	24	24	24	144	48	192
Average Volume:	6318	8371	8236	8258	8253	8657	7402	8349	6860	7923

Average Peak Volume:
AM Peak*:** 623
PM Peak*:** 831

Preliminary AADT: 7300
Poll Site: P6F029
Poll Group: Urban

* Averaging by hour(0-23), then by day of week (Sun-Sat)
** Adjusted Average Day equals 5/7 * Avg Weekday + 2/ 7 * Avg Weekend Day
*** AM _PM Peak Average Volumes are only from the weekday days

Vermont Agency of Transportation

Date: 09/13/2012

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

From 01/01/07 To 12/31/11 General Yearly Summaries Information

*	Reporting Agency/ Number	Town	Mile Marker	Date MM/DD/YY	Time	Weather	Contributing Circumstances	Direction Of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
Route: US-7													
	0613/5133-07	Georgia	1.01	03/31/2007	16:40	Clear	No improper driving, Failed to yield right of way	Head On	0	0	0	N	SH
	VTVSP0700/10A20 5080	Georgia	1.05	11/13/2010	17:36	Clear	No improper driving		0	0	0	S	SH
	0613/2208-07	Georgia	1.1	02/10/2007	13:23	Clear	No improper driving, Unknown	Same Direction Sideswipe	0	0	0		SH
	VTVSP0700/09A20 4923	Georgia	1.1	10/23/2009	16:55	Cloudy	Failed to yield right of way, No improper driving	No Turns, Thru moves only, Broadside ^<	2	0	0		SH
	VTVSP0700/10A20 3634	Georgia	1.1	08/20/2010	16:43	Other - Explain in Narrative	Failed to yield right of way, Unknown	Left Turn and Thru, Angle Broadside -->v--	0	0	0	E	SH
	VT0060000/11FRC 0479	Georgia	1.1	02/10/2011	10:01	Clear	Failed to yield right of way, Inattention, No improper driving	Left Turn and Thru, Angle Broadside -->v--	1	0	0	E	SH
	VTVSP0700/11A20 2211	Georgia	1.1	05/23/2011	15:25	Clear	No improper driving, Inattention	Left Turn and Thru, Head On ^v--	0	0	0		SH
	0613/4408-07	Georgia	1.12	03/23/2007	14:38	Clear	Followed too closely, No improper driving	Same Direction Sideswipe	0	0	0	S	SH
	0613/3463-07	Georgia	1.17	02/17/2007	16:06	Clear	Failed to yield right of way, No improper driving	Left Turn and Thru, Angle Broadside -->v--	2	0	0	N	SH
	0613/16507-07	Georgia	1.2	12/13/2007	07:31	Cloudy	No improper driving, Failed to yield right of way	Left Turn and Thru, Angle Broadside -->v--	0	0	0		SH
	VTVSP0700/08A20 5584	Georgia	1.2	10/19/2008	08:36	Cloudy	Failed to yield right of way, No improper driving	No Turns, Thru moves only, Broadside ^<	0	0	0	E	SH
	VTVSP0700/11A20 2723	Georgia	1.2	06/20/2011	18:13	Clear	Failed to yield right of way, Inattention, No improper driving	Same Direction Sideswipe	0	0	0	N	SH
								Totals:	**5**	**0**	**0**		

Total Crash Count = 12 **Fatal Crash Count = 0** **Injury Crash Count = 3** **PDO Crash Count = 9**

Note: US-7Georgia MM 0.98-1.22 only.
VT-104A intersects US-7 at mile point 1.10.
Untimely Deaths are the result of death prior to a crash event. These deaths are not counted in the Fatal/Fatality type counts. They are considered an Incapacitating Injury and are counted in Injury Type crashes.
L. Roberts - Vtrans
THIS DOCUMENT IS EXEMPT FROM DISCOVERY OR ADMISSION UNDER 23 U.S.C 409.

THIS DOCUMENT IS EXEMPT FROM DISCOVERY OR ADMISSION UNDER 23 U.S.C. 409.

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

Vermont Agency of Transportation

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

From 01/01/07 To 12/31/11 General Yearly Summaries Information

*	Reporting Agency/ Number	Town	Mile Marker	Date MM/DD/YY	Time	Weather	Contributing Circumstances	Direction Of Collision	Number Of Injuries	Number Of Fatalities	Number Of Untimely Deaths	Direction	Road Group
Route: VT-104A													
	0613/12674-07	Georgia	0	09/27/2007	10:41	Cloudy	Failed to yield right of way, No improper driving	Same Direction Sideswipe	0	0	0		SH
	VTVSP0700/08A20 6282	Georgia	0	12/03/2008	06:40	Clear	Made an improper turn, Unknown	Same Direction Sideswipe	0	0	0	N	SH
	VTVSP0700/09A20 0654	Georgia	0	02/13/2009	15:58	Clear	Other improper action	Same Direction Sideswipe	0	0	0	W	SH
	VTVSP0700/09A20 5532	Georgia	0	12/04/2009	07:36	Clear		Same Direction Sideswipe	0	0	0		SH
	VT0060000/10FRC 3413	Georgia	0	08/27/2010	13:31	Cloudy	Inattention, No improper driving	Rear End	0	0	0	W	SH
	VTVSP0700/10A20 5572	Georgia	0	12/13/2010	07:38	Rain	Followed too closely, No improper driving	Rear End	1	0	0	E	SH
	VT0060000/11FRC 0997	Georgia	0	03/25/2011	09:15	Cloudy	Other improper action, No improper driving	Same Direction Sideswipe	1	0	0	W	SH
								Totals:	**2**	**0**	**0**		

Total Crash Count = 7 **Fatal Crash Count = 0** **Injury Crash Count = 2** **PDO Crash Count = 5**

Note: VT-104A Georgia MM 0.00-0.12 only.
US-7 intersects VT-104A at mile point 0.00.
Untimely Deaths are the result of death prior to a crash event. These deaths are not counted in the Fatal/Fatality type counts. They are considered an Incapacitating Injury and are counted in Injury Type crashes.
L. Roberts - Vtrans
THIS DOCUMENT IS EXEMPT FROM DISCOVERY OR ADMISSION UNDER 23 U.S.C 409.

THIS DOCUMENT IS EXEMPT FROM DISCOVERY OR ADMISSION UNDER 23 U.S.C. 409.

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

Appendix Q: Plans

INDEX OF SHEETS

SHEET NO.	SHEET DESCRIPTION
1-2	Existing Conditions
3	Existing Profile Sheet
4	Raised Profile Sheet
5	Existing Typical Section
6	Bridge Rehabilitation Typical Sections
7-8	Bridge Rehabilitation Layout
9	Deck/Superstructure Replacement Typical Sections
10-11	Deck/Superstructure Replacement Layouts
12	Bridge Replacement Typical Sections
13-14	Bridge Replacement at Grade Layout
15-16	Bridge Replacement Raised Grade Layout
17	Phased Construction Typical Sections
18-21	Phased Construction Layouts
22-23	Temporary Bridge Layouts

YANKEE CORPORATION

TOWN OF GEORGIA

ARROWHEAD LAKE

MIRANDA, CHARLES & TERESA

MOQUIN, ELIZABETH M.; SOUTHWELL, KILEY S.

TOWN OF GEORGIA

ARROWHEAD LAKE

N

VT STATE PLANE GRID

POB STA 55+30.07

PC STA 55+64.83

PT STA 60+36.64

PI STA 58+04.13

APPROX. EXISTING R.O.W.

APPROX. EXISTING R.O.W.

APPROX. EXISTING R.O.W.

APPROX. EXISTING R.O.W.

55+30

VT ROUTE 104A
TO US ROUTE 7

56+00

57+00

58+00

59+00

60+00

VT ROUTE 104A
TO FAIRFAX

61+

TH-37
TRAYAH ROAD

MATCH LINE
STA 61+00

EXISTING CURVE 1
DELTA = 23°35'26"
D = 5°00'00"
R = 1145.92'
T = 239.30'
L = 471.81'
E = 24.72'

BENCHMARK
RAILROAD SPIKE
IN ROOT
ELEV.=297.96

EXISTING BRIDGE INFORMATION
BUILT 1937, 74' LENGTH
SINGLE SPAN ROLLED BEAM
WITH CIP CONCRETE DECK
CURRENTLY SINGLE LANE
DUE TO TRUCK CRASH

EXISTING CONDITIONS

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

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME:	18b265/s18b265border.dgn
PROJECT LEADER:	R.YOUNG
DESIGNED BY:	L.J.STONE
EXISTING CONDITIONS LAYOUT	
PLOT DATE:	08-JAN-2019
DRAWN BY:	D.D.BEARD
CHECKED BY:	L.J.STONE
SHEET	1 OF 23

N

VT STATE PLANE GRID

SAWYER, JACQUELINE M.

WRIGHT, BRADLEY & CYNTHIA

MARTELL, JOHN & JACQUELINE

STATE OF VERMONT

ARROWHEAD LAKE

ARROWHEAD LAKE

PI
STA 50+00.00

POB
STA 50+00.00

50+00

CHANNEL FLOW

51+00

PC
STA 62+83.56

PT
STA 65+32.47

APPROX. EXISTING R.O.W.

APPROX. EXISTING R.O.W.

VT ROUTE 104A
TO US ROUTE 7

VT ROUTE 104A
TO FAIRFAX

62+00

63+00

64+00

65+00

66+00

STA 62+29.28=
CHAN 51+00.00
Δ = 90°0'0" RT

MATCH LINE
STA 61+00

PI
STA 52+00.00

POE
STA 52+00.00

52+00

EXISTING CURVE 2
DELTA = 2°29'21"
D = 1°00'00"
R = 5729.58'
T = 124.47'
L = 248.90'
E = 1.35'

PI
STA 64+08.03

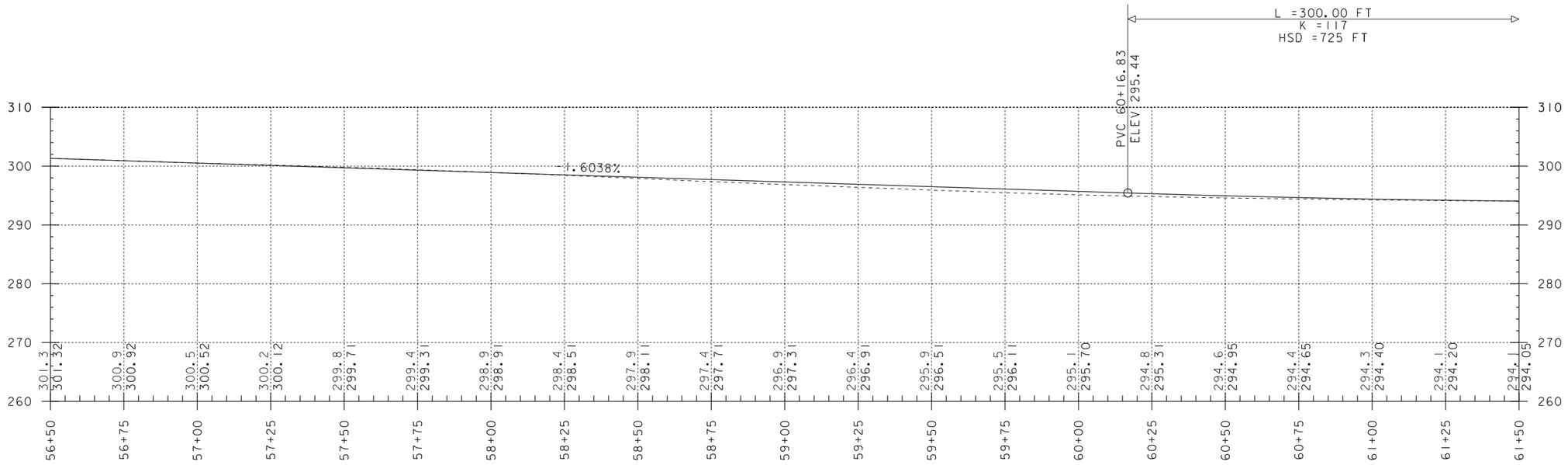
BENCHMARK
RAILROAD SPIKE
IN POLE
ELEV.=294.19

EXISTING BRIDGE INFORMATION
BUILT 1937, 74' LENGTH
SINGLE SPAN ROLLED BEAM
WITH CIP CONCRETE DECK
CURRENTLY SINGLE LANE
DUE TO TRUCK CRASH

EXISTING CONDITIONS

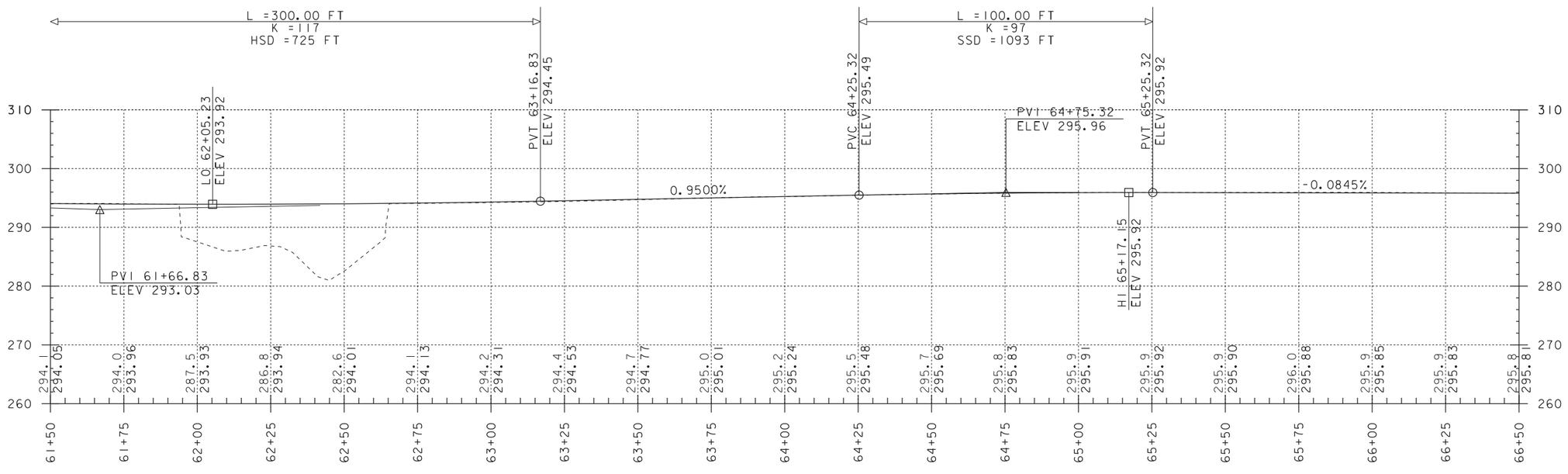
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME:	I8b265/sI8b265border.dgn
PROJECT LEADER:	R.YOUNG
DESIGNED BY:	L.J.STONE
EXISTING CONDITIONS LAYOUT	
PLOT DATE:	08-JAN-2019
DRAWN BY:	D.D.BEARD
CHECKED BY:	L.J.STONE
SHEET	2 OF 23



VT ROUTE 104A EXISTING PROFILE SECTION 1

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



VT ROUTE 104A EXISTING PROFILE SECTION 2

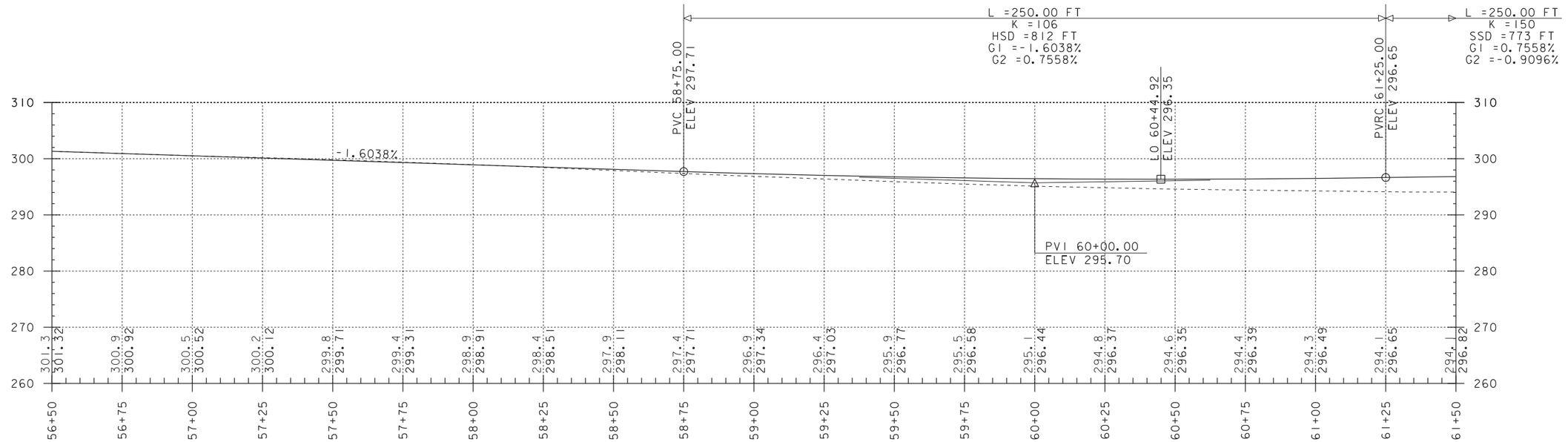
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

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

PROJECT NAME: GEORGIA
PROJECT NUMBER: BF 023-1(7)

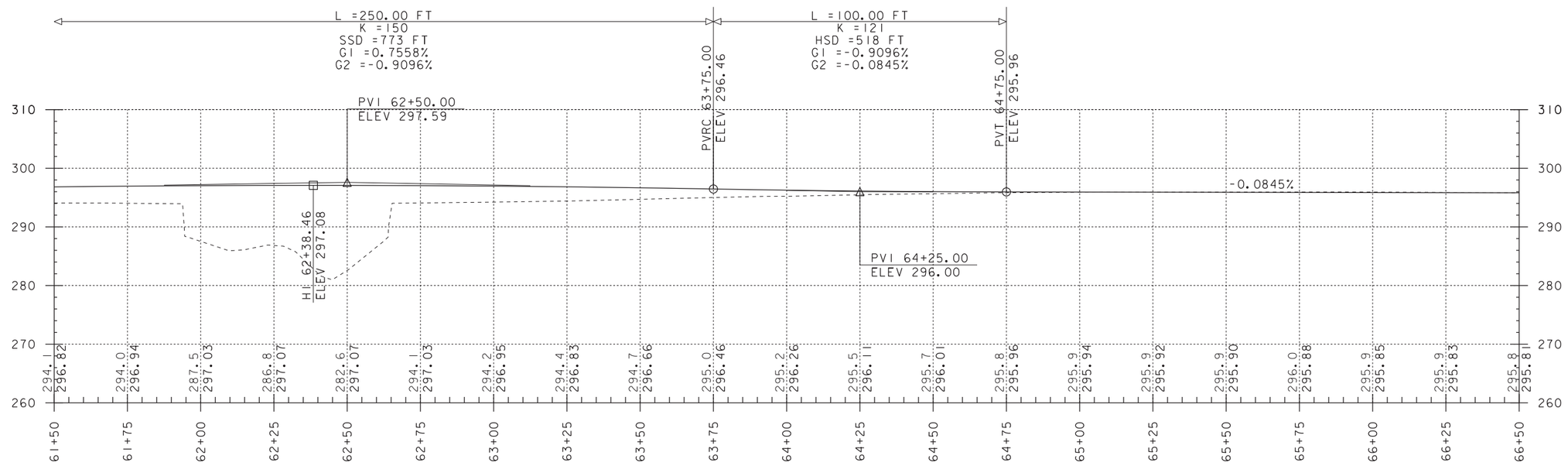
FILE NAME: 18b265/sl8b265profile.dgn
PROJECT LEADER: R.YOUNG
DESIGNED BY: L.J.STONE
PROFILE SHEET

PLOT DATE: 08-JAN-2019
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 3 OF 23



VT ROUTE 104A RAISED PROFILE SECTION 1

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



VT ROUTE 104A RAISED PROFILE SECTION 2

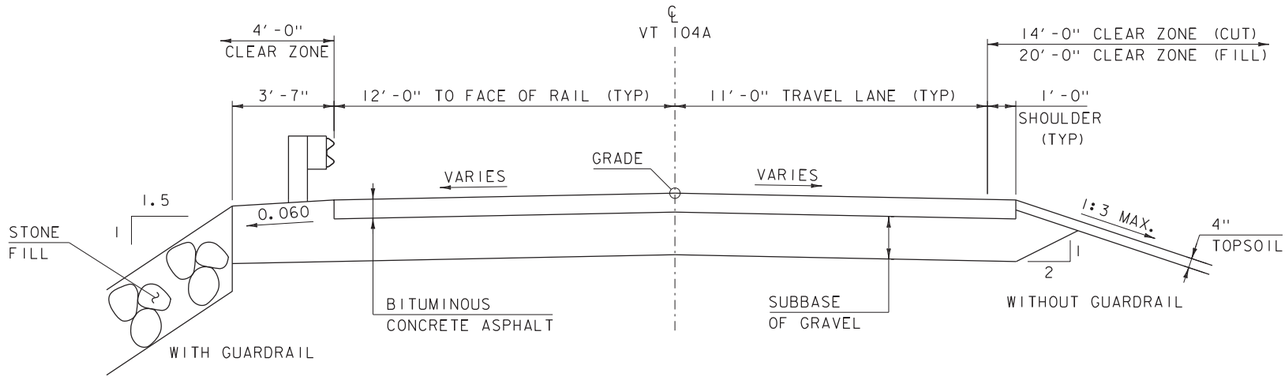
SCALE: HORIZONTAL 1"=20'-0"
VERTICAL 1"=10'-0"

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

PROJECT NAME: GEORGIA
PROJECT NUMBER: BF 023-1(7)

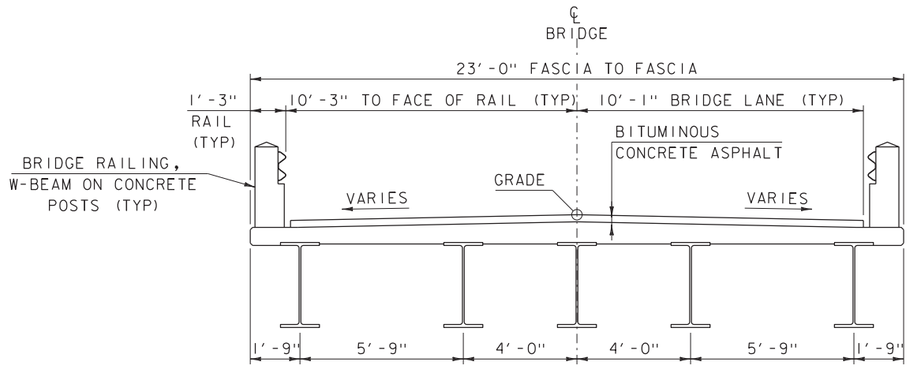
FILE NAME: 18b265/sl8b265profile.dgn
PROJECT LEADER: R.YOUNG
DESIGNED BY: L.J.STONE
PROFILE SHEET 2

PLOT DATE: 08-JAN-2019
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE



EXISTING VT 104A CAUSEWAY / ROADWAY TYPICAL SECTION

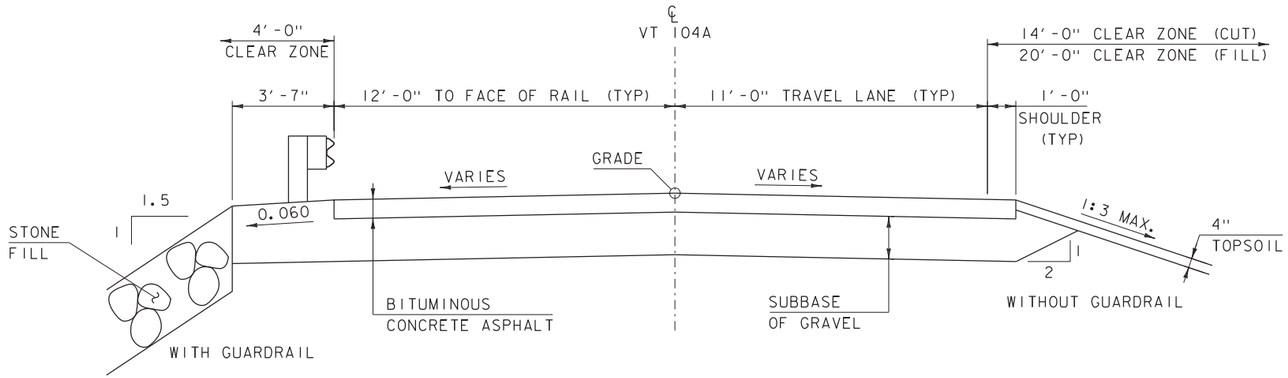
SCALE 3/8" = 1'-0"



EXISTING BRIDGE TYPICAL SECTION

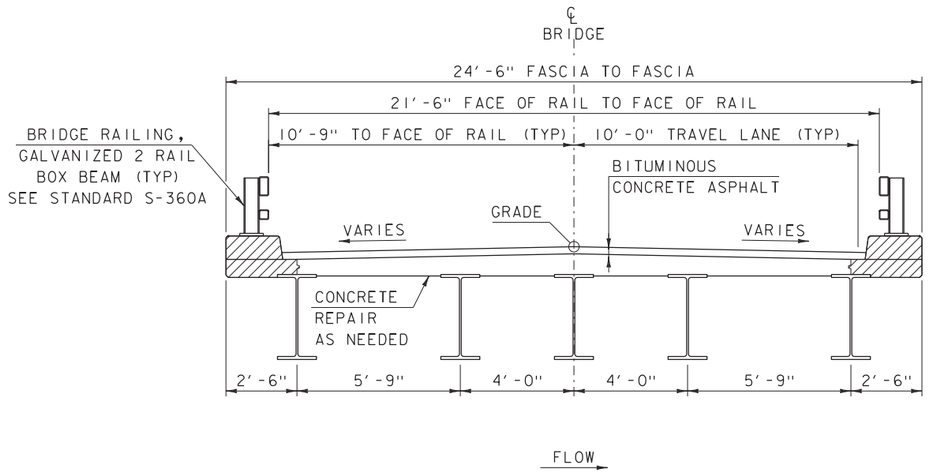
SCALE 3/8" = 1'-0"

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME: 18b265\s18b265typical.dgn	PLOT DATE: 08-JAN-2019
PROJECT LEADER: R.YOUNG	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
EXISTING TYPICAL SECTIONS	SHEET 5 OF 23



PROPOSED VT 104A CAUSEWAY / ROADWAY TYPICAL SECTION

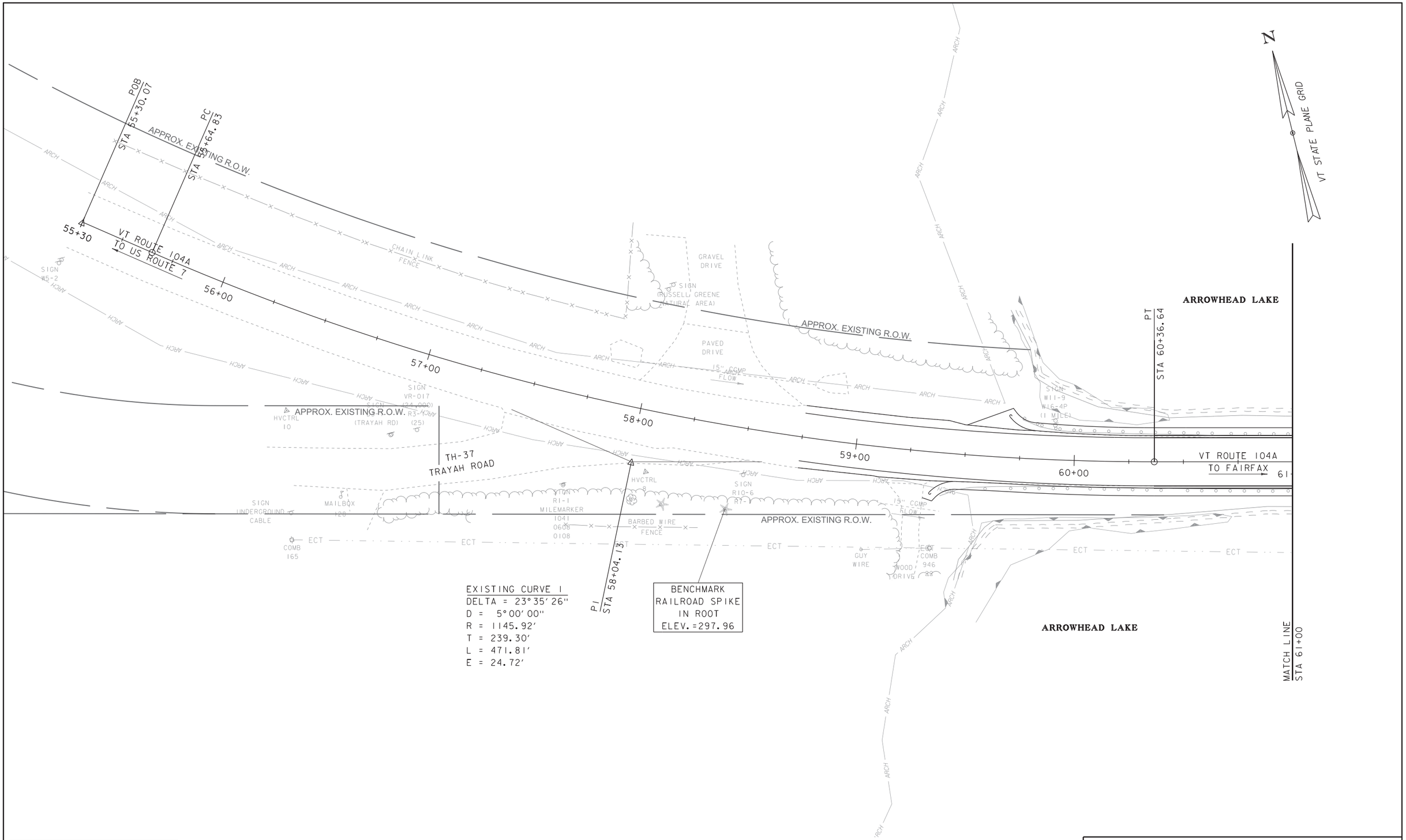
SCALE 3/8" = 1'-0"



DECK REHABILITATION TYPICAL SECTION

SCALE 3/8" = 1'-0"

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME: I8b265\sI8b265typical.dgn	PLOT DATE: 08-JAN-2019
PROJECT LEADER: R.YOUNG	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
DECK REHABILITATION TYPICAL SECTIONS	SHEET 6 OF 23



EXISTING CURVE 1
DELTA = 23°35'26"
D = 5°00'00"
R = 1145.92'
T = 239.30'
L = 471.81'
E = 24.72'

EXISTING BRIDGE INFORMATION
BUILT 1937, 74' LENGTH
SINGLE SPAN ROLLED BEAM
WITH CIP CONCRETE DECK
CURRENTLY SINGLE LANE
DUE TO TRUCK CRASH

BRIDGE REHABILITATION LAYOUT

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

PROJECT NAME: GEORGIA
PROJECT NUMBER: BF 023-1(7)

FILE NAME: I8b265/sI8b265border.dgn
PROJECT LEADER: R.YOUNG
DESIGNED BY: L.J.STONE
BRIDGE REHAB LAYOUT

PLOT DATE: 08-JAN-2019
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 7 OF 23

N

VT STATE PLANE GRID

ARROWHEAD LAKE

CHANNEL FLOW

50+00

51+00

52+00

PC STA 62+83.56

PT STA 65+32.47

PI STA 64+08.03

VT ROUTE 104A
TO US ROUTE 7

VT ROUTE 104A
TO FAIRFAX

62+00

63+00

64+00

65+00

66+00

APPROX. EXISTING R.O.W.

APPROX. EXISTING R.O.W.

HISTORIC

HISTORIC

HISTORIC

HISTORIC

HISTORIC

ELCT

GRAVEL DRIVE

WOOD FENCE

6"X6" CONCRETE BOUNDRY MARKER, UP 1'

SIGN OM3-L

SIGN OM3-R

SIGN R10-6

HVCTRL 101

HVCTRL 100

SIGN VD-701 OM3-R (BRI VT-104A)

SIGN OM3-L

ECT

ARCH

HDWY

COMB 946 23

MAILBOXES #3328 #3323

GRAVEL DRIVE

CMP

MATCH LINE
STA 61+00

STA 62+29.28=
CHAN 51+00.00
Δ = 90°0'0" RT

ARROWHEAD LAKE

EXISTING CURVE 2
DELTA = 2°29'21"
D = 1°00'00"
R = 5729.58'
T = 124.47'
L = 248.90'
E = 1.35'

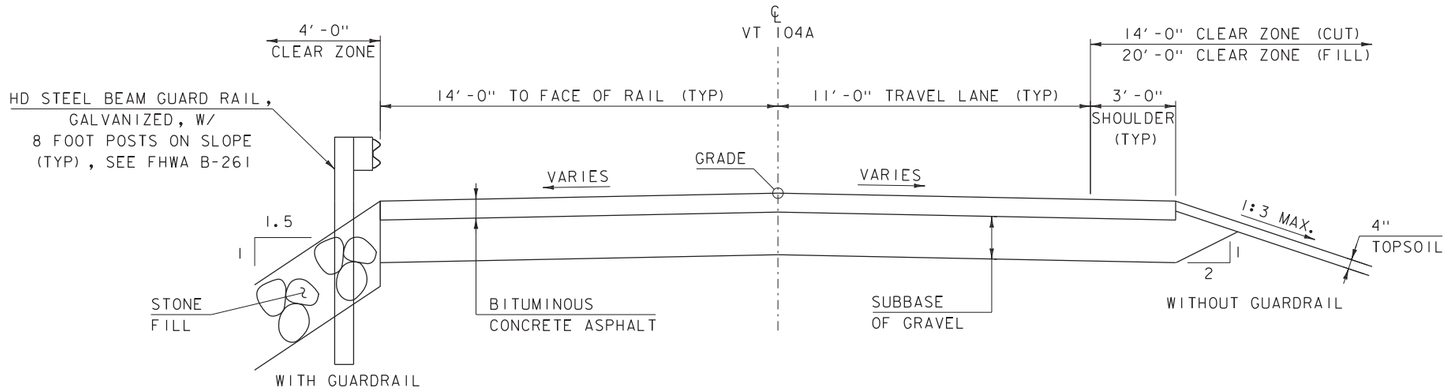
BENCHMARK
RAILROAD SPIKE
IN POLE
ELEV. =294.19

EXISTING BRIDGE INFORMATION
BUILT 1937, 74' LENGTH
SINGLE SPAN ROLLED BEAM
WITH CIP CONCRETE DECK
CURRENTLY SINGLE LANE
DUE TO TRUCK CRASH

BRIDGE REHABILITATION LAYOUT

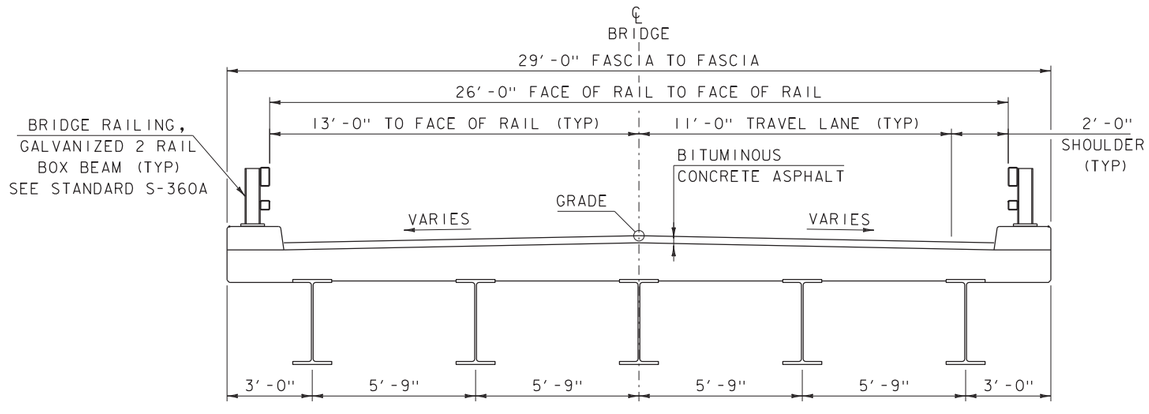
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME:	I8b265/sI8b265border.dgn
PROJECT LEADER:	R.YOUNG
DESIGNED BY:	L.J.STONE
BRIDGE REHAB LAYOUT	
PLOT DATE:	08-JAN-2019
DRAWN BY:	D.D.BEARD
CHECKED BY:	L.J.STONE
SHEET	8 OF 23



PROPOSED VT 104A CAUSEWAY / ROADWAY TYPICAL SECTION

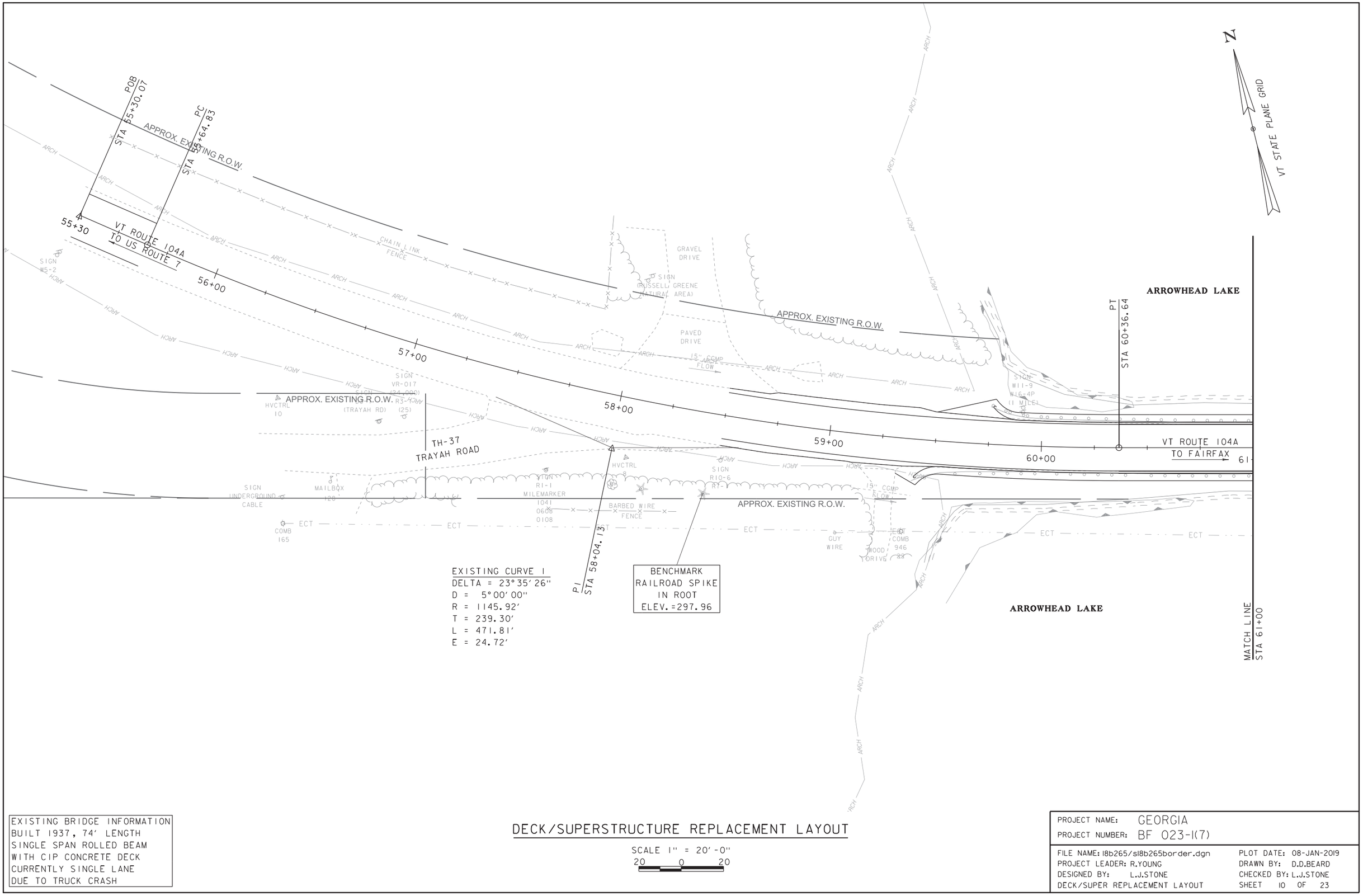
SCALE 3/8" = 1'-0"



DECK OR SUPERSTRUCTURE REPLACEMENT TYPICAL SECTION

SCALE 3/8" = 1'-0"

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME: I8b265\sI8b265typical.dgn	PLOT DATE: 08-JAN-2019
PROJECT LEADER: R.YOUNG	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
DECK/SUPER REPLACEMENT TYP SECTIONS	SHEET 9 OF 23



EXISTING BRIDGE INFORMATION
BUILT 1937, 74' LENGTH
SINGLE SPAN ROLLED BEAM
WITH CIP CONCRETE DECK
CURRENTLY SINGLE LANE
DUE TO TRUCK CRASH

DECK/SUPERSTRUCTURE REPLACEMENT LAYOUT

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

PROJECT NAME: GEORGIA
PROJECT NUMBER: BF 023-1(7)

FILE NAME: I8b265/sI8b265border.dgn
PROJECT LEADER: R.YOUNG
DESIGNED BY: L.J.STONE
DECK/SUPER REPLACEMENT LAYOUT

PLOT DATE: 08-JAN-2019
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 10 OF 23

N

VT STATE PLANE GRID

ARROWHEAD LAKE

CHANNEL FLOW

50+00

51+00

52+00

PC STA 62+83.56

PT STA 65+32.47

PI STA 64+08.03

VT ROUTE 104A TO US ROUTE 7

VT ROUTE 104A TO FAIRFAX

62+00

63+00

64+00

65+00

66+00

STA 62+29.28=
CHAN 51+00.00
Δ = 90°0'0" RT

ARROWHEAD LAKE

MATCH LINE STA 61+00

EXISTING CURVE 2
DELTA = 2°29'21"
D = 1°00'00"
R = 5729.58'
T = 124.47'
L = 248.90'
E = 1.35'

BENCHMARK
RAILROAD SPIKE
IN POLE
ELEV.=294.19

APPROX. EXISTING R.O.W.

HISTORIC

ECT

ARCH

WOOD FENCE

GRAVEL DRIVE

CONCRETE BOUNDRY MARKER UP 1'

SIGN OM3-L

SIGN OM3-R

SIGN R10-6

HVCTRL

MAILBOXES #3328 #3323

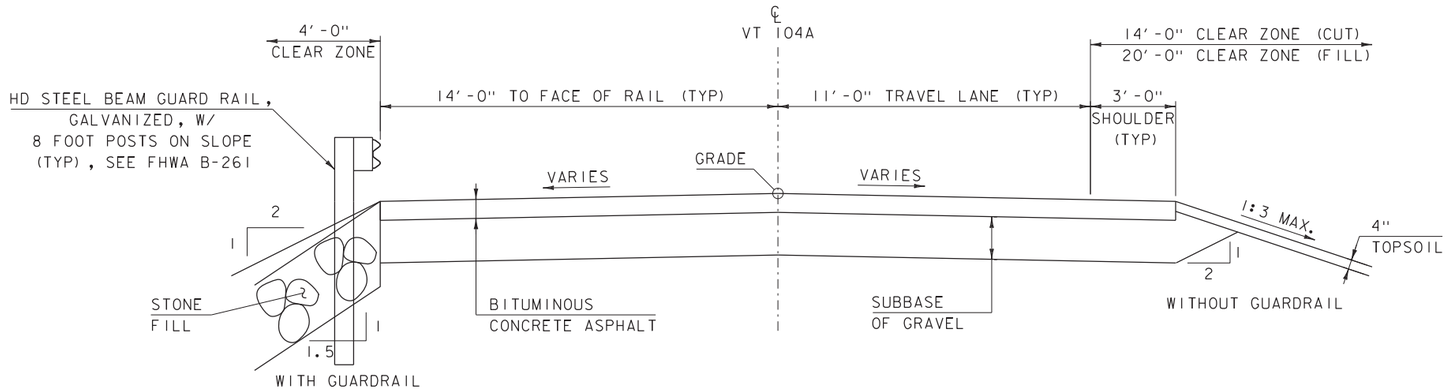
COMB WIR 23

EXISTING BRIDGE INFORMATION
BUILT 1937, 74' LENGTH
SINGLE SPAN ROLLED BEAM
WITH CIP CONCRETE DECK
CURRENTLY SINGLE LANE
DUE TO TRUCK CRASH

DECK/SUPERSTRUCTURE REPLACEMENT LAYOUT

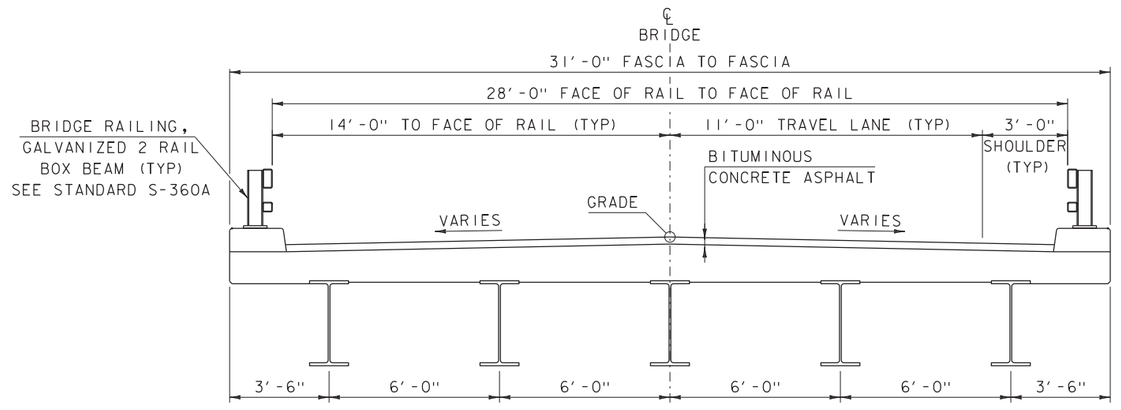
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME:	l8b265/sl8b265border.dgn
PROJECT LEADER:	R.YOUNG
DESIGNED BY:	L.J.STONE
DECK/SUPER REPLACEMENT LAYOUT	
PLOT DATE:	08-JAN-2019
DRAWN BY:	D.D.BEARD
CHECKED BY:	L.J.STONE
SHEET	11 OF 23



VT 104A CAUSEWAY / ROADWAY TYPICAL SECTION

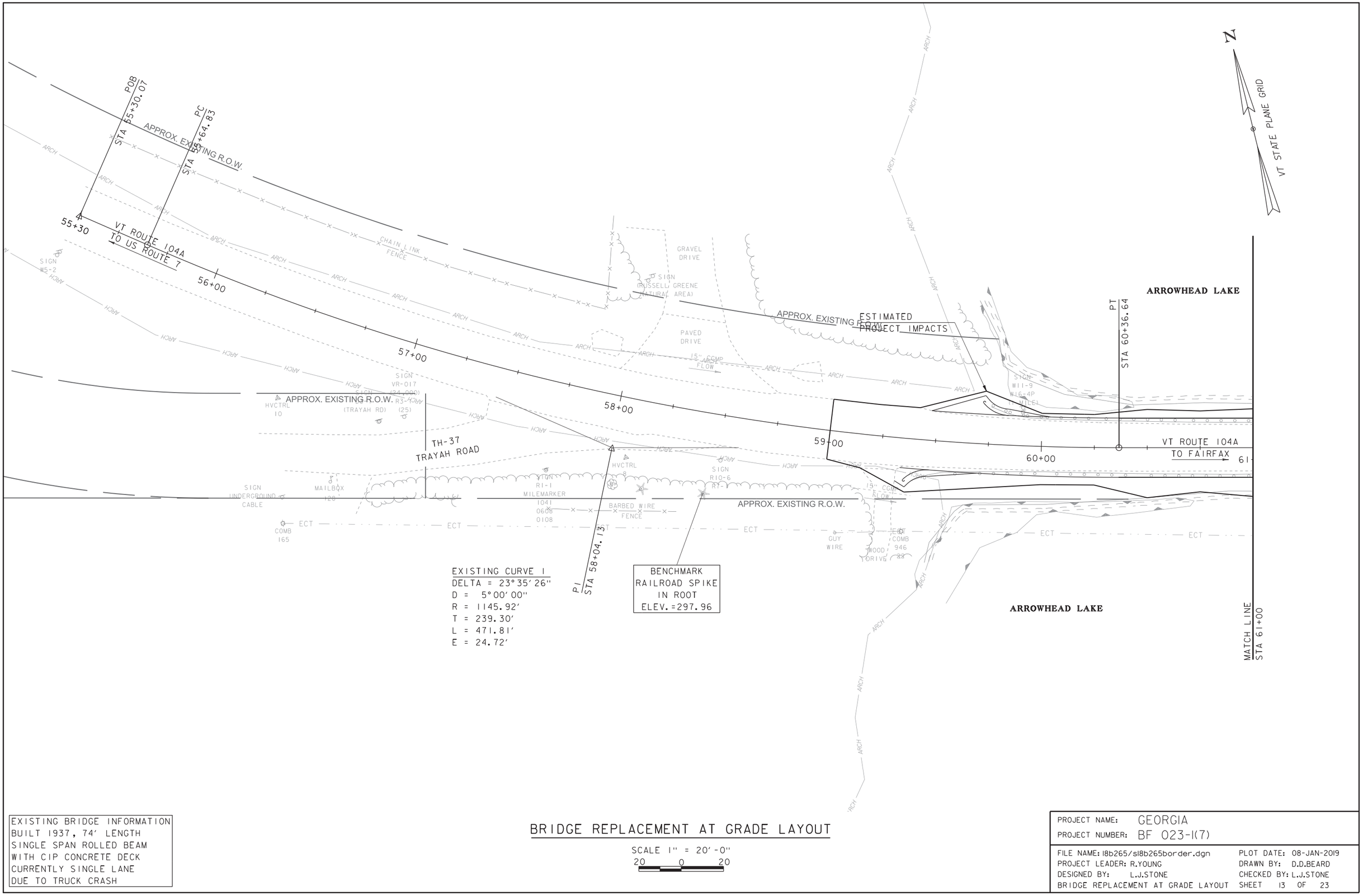
SCALE 3/8" = 1'-0"



BRIDGE REPLACEMENT TYPICAL SECTION

SCALE 3/8" = 1'-0"

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME: 18b265\s18b265typical.dgn	PLOT DATE: 08-JAN-2019
PROJECT LEADER: R.YOUNG	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
BRIDGE REPLACEMENT TYP SECTIONS	SHEET 12 OF 23



EXISTING CURVE 1
DELTA = 23°35'26"
D = 5°00'00"
R = 1145.92'
T = 239.30'
L = 471.81'
E = 24.72'

BENCHMARK
RAILROAD SPIKE
IN ROOT
ELEV. =297.96

EXISTING BRIDGE INFORMATION
BUILT 1937, 74' LENGTH
SINGLE SPAN ROLLED BEAM
WITH CIP CONCRETE DECK
CURRENTLY SINGLE LANE
DUE TO TRUCK CRASH

BRIDGE REPLACEMENT AT GRADE LAYOUT

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

PROJECT NAME: GEORGIA
PROJECT NUMBER: BF 023-1(7)

FILE NAME: 18b265/sl8b265border.dgn
PROJECT LEADER: R.YOUNG
DESIGNED BY: L.J.STONE
BRIDGE REPLACEMENT AT GRADE LAYOUT

PLOT DATE: 08-JAN-2019
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 13 OF 23

N

VT STATE PLANE GRID

ARROWHEAD LAKE

CHANNEL FLOW

50+00

51+00

52+00

PC STA 62+83.56

PT STA 65+32.47

PI STA 64+08.03

VT ROUTE 104A
TO US ROUTE 7

VT ROUTE 104A
TO FAIRFAX

62+00

63+00

64+00

65+00

66+00

APPROX. EXISTING R.O.W.

ESTIMATED
PROJECT IMPACTS

MATCH LINE
STA 61+00

ARROWHEAD LAKE

EXISTING CURVE 2
DELTA = 2°29'21"
D = 1°00'00"
R = 5729.58'
T = 124.47'
L = 248.90'
E = 1.35'

BENCHMARK
RAILROAD SPIKE
IN POLE
ELEV. =294.19

HISTORIC

WOOD FENCE

GRAVEL DRIVE

CONCRETE BOUNDRY MARKER, UP 1'

SIGN OM3-L

SIGN OM3-R

SIGN R10-6

HVCTRL

STUMP

MAILBOXES #3328 #3323

GRAVEL DRIVE

ECT

ARCH

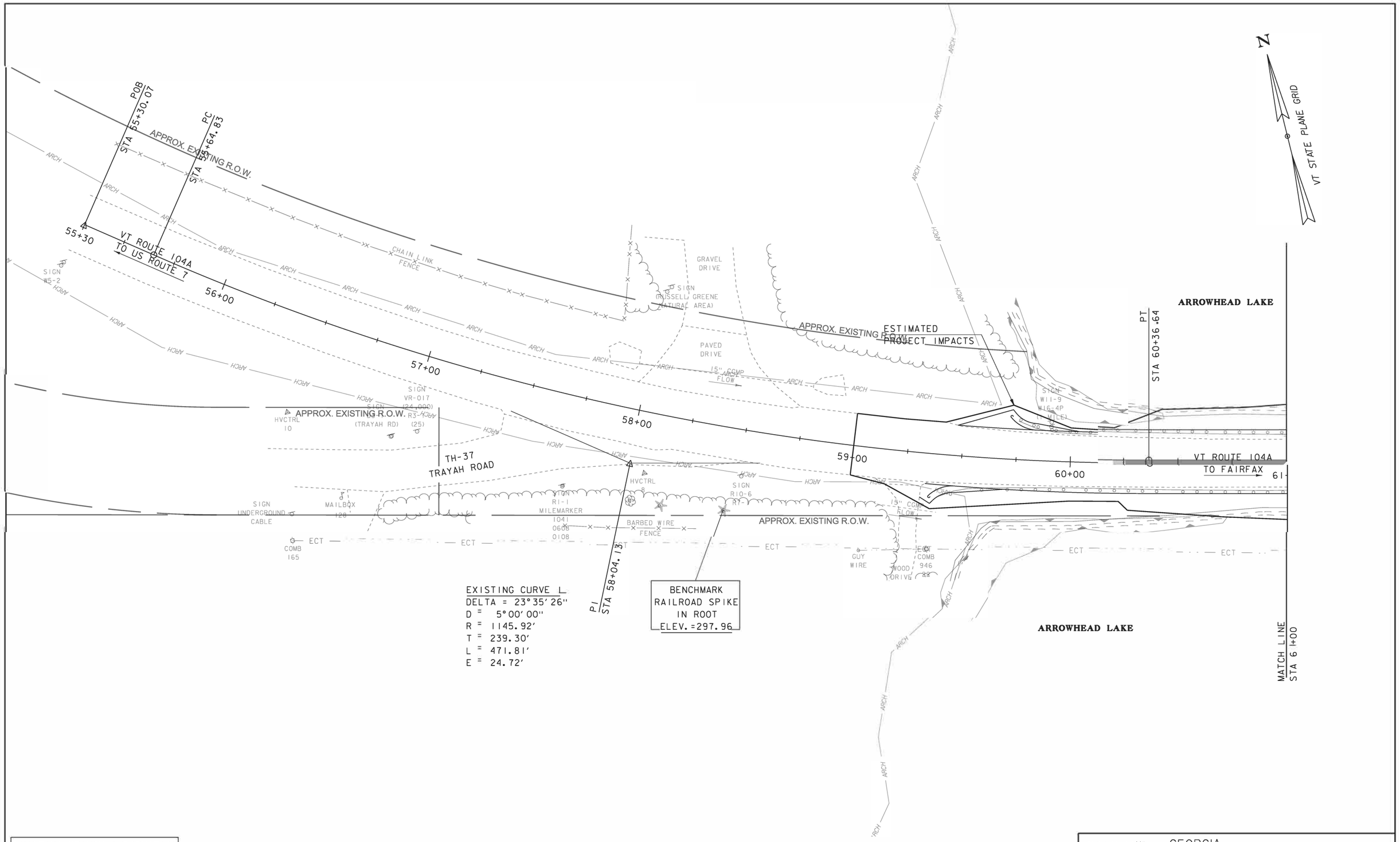
COMB

EXISTING BRIDGE INFORMATION
BUILT 1937, 74' LENGTH
SINGLE SPAN ROLLED BEAM
WITH CIP CONCRETE DECK
CURRENTLY SINGLE LANE
DUE TO TRUCK CRASH

BRIDGE REPLACEMENT AT GRADE LAYOUT

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

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME:	I8b265/sI8b265border.dgn
PROJECT LEADER:	R.YOUNG
DESIGNED BY:	L.J.STONE
BRIDGE REPLACEMENT AT GRADE LAYOUT	
PLOT DATE:	08-JAN-2019
DRAWN BY:	D.D.BEARD
CHECKED BY:	L.J.STONE
SHEET	14 OF 23



EXISTING CURVE L
DELTA = 23°35'26"
D = 5°00'00"
R = 1145.92'
T = 239.30'
L = 471.81'
E = 24.72'

BENCHMARK
RAILROAD SPIKE
IN ROOT
ELEV. =297.96

EXISTING BRIDGE INFORMATION
BUILT 1937, 74' LENGTH
SINGLE SPAN ROLLED BEAM
WITH CIP CONCRETE DECK
CURRENTLY SINGLE LANE
DUE TO TRUCK CRASH

BRIDGE REPLACEMENT RAISED GRADE LAYOUT

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

PROJECT NAME: GEORGIA
PROJECT NUMBER: BF 023-1(7)

FILE NAME: 18b265/sl8b265border.dgn
PROJECT LEADER: R.YOUNG
DESIGNED BY: L.J.STONE
BRIDGE REPLACEMENT AT GRADE LAYOUT

PLOT DATE: 08-JAN-2019
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 15 OF 23

N

VT STATE PLANE GRID

CHANNEL FLOW

50+00

51+00

52+00

ARROWHEAD LAKE

PC STA 62+83.56

PT STA 65+32.47

PI STA 64+08.03

6"X6" CONCRETE BOUNDRY MARKER UP 1'

SIGN OM3-L

SIGN OM3-R

HVCTRL

TOT

VT ROUTE 104A TO US ROUTE 7

62+00

63+00

64+00

65+00

66+00

VT ROUTE 104A TO FAIRFAX

HISTORIC

WOOD FENCE

GRAVEL DRIVE

SIGN RIO-6

APPROX. EXISTING R.O.W.

ARCH

ECT

MAILBOXES #3328 #3323

GRAVEL DRIVE

ESTIMATED PROJECT IMPACTS

COMB 346 23

EXISTING CURVE 2
DELTA = 2°29'21"
D = 1°00'00"
R = 5729.58'
T = 124.47'
L = 248.90'
E = 1.35'

BENCHMARK
RAILROAD SPIKE
IN POLE
ELEV.=294.19

MATCH LINE STA 61+00

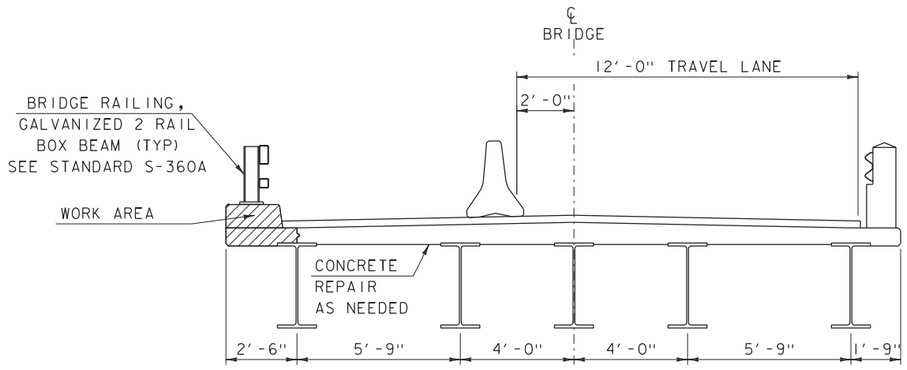
ARROWHEAD LAKE

EXISTING BRIDGE INFORMATION
BUILT 1937, 74' LENGTH
SINGLE SPAN ROLLED BEAM
WITH CIP CONCRETE DECK
CURRENTLY SINGLE LANE
DUE TO TRUCK CRASH

BRIDGE REPLACEMENT RAISED GRADE LAYOUT

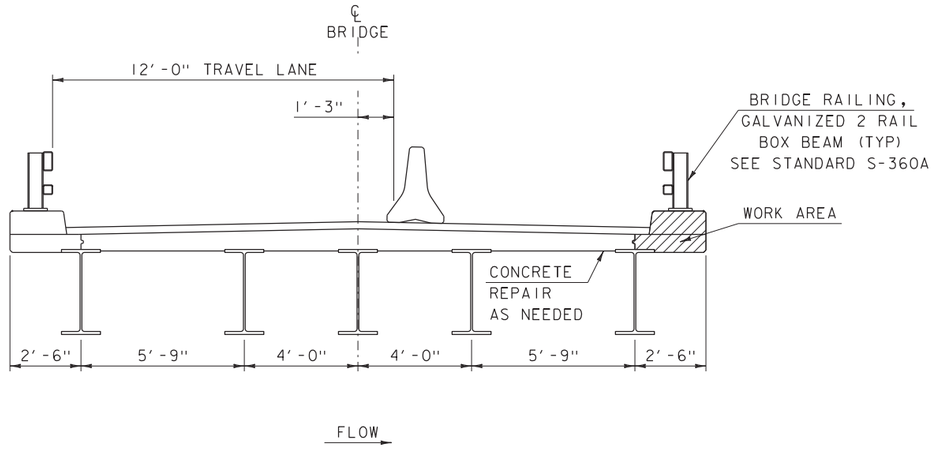
SCALE 1" = 20'-0"
20 0 20

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME: I8b265/sI8b265border.dgn	PLOT DATE: 08-JAN-2019
PROJECT LEADER: R.YOUNG	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
BRIDGE REPLACEMENT AT GRADE LAYOUT	SHEET 16 OF 23



PHASE 1 TYPICAL SECTION

SCALE 3/8" = 1'-0"



PHASE 2 TYPICAL SECTION

SCALE 3/8" = 1'-0"

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME: I8b265\sI8b265phasing.dgn	PLOT DATE: 08-JAN-2019
PROJECT LEADER: R.YOUNG	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
PHASING TYPICAL SECTIONS	SHEET 17 OF 23

YANKEE CORPORATION

TOWN OF GEORGIA

ARROWHEAD LAKE

MIRANDA, CHARLES & TERESA

MOQUIN, ELIZABETH M.; SOUTHWELL, KILEY S.

TOWN OF GEORGIA

ARROWHEAD LAKE

POB STA 55+30.07

PC STA 55+64.83

PT STA 60+36.64

PI STA 58+04.13

55+30

56+00

57+00

58+00

59+00

60+00

VT ROUTE 104A TO US ROUTE 7

VT ROUTE 104A TO FAIRFAX

TH-37 TRAYAH ROAD

APPROX. EXISTING R.O.W.

APPROX. EXISTING R.O.W.

APPROX. EXISTING R.O.W.

BENCHMARK
RAILROAD SPIKE
IN ROOT
ELEV. =297.96

MATCH LINE STA 61+00

N

VT STATE PLANE GRID

PHASE I LAYOUT

SCALE 1" = 20'-0"

20 0 20

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME: I8b265/sI8b265TCborder.dgn	PLOT DATE: 08-JAN-2019
PROJECT LEADER: R.YOUNG	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
PHASE I LAYOUT	SHEET 18 OF 23

N

VT STATE PLANE GRID

SAWYER, JACQUELINE M.

WRIGHT, BRADLEY & CYNTHIA

MARTELL, JOHN & JACQUELINE

STATE OF VERMONT

ARROWHEAD LAKE

ARROWHEAD LAKE

PI
STA 50+00.00

POB
STA 50+00.00

50+00

CHANNEL FLOW

PC
STA 62+83.56

PT
STA 65+32.47

APPROX. EXISTING R.O.W.

APPROX. EXISTING R.O.W.

VT ROUTE 104A
TO US ROUTE 7

VT ROUTE 104A
TO FAIRFAX

62+00

63+00

64+00

65+00

66+00

51+00

STA 62+29.28=
CHAN 51+00.00
Δ = 90°0'0" RT

MATCH LINE
STA 61+00

PI
STA 52+00.00

POE
STA 52+00.00

52+00

PI
STA 64+08.03

BENCHMARK
RAILROAD SPIKE
IN POLE
ELEV.=294.19

CONCRETE BOUNDRY MARKER UP 1'

WOOD FENCE

GRAVEL DRIVE

MAIL BOXES #3328 #3323

GRAVEL DRIVE

SIGN OM3-L

SIGN OM3-R

SIGN R10-6

HVCTRL

HISTORIC

ECT

ARCH

290

PHASE I LAYOUT

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

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME:	I8b265/sI8b265TCborder.dgn
PROJECT LEADER:	R.YOUNG
DESIGNED BY:	L.J.STONE
PHASE I LAYOUT	
PLOT DATE:	08-JAN-2019
DRAWN BY:	D.D.BEARD
CHECKED BY:	L.J.STONE
SHEET	19 OF 23

YANKEE CORPORATION

TOWN OF GEORGIA

ARROWHEAD LAKE

MIRANDA, CHARLES & TERESA

MOQUIN, ELIZABETH M.; SOUTHWELL, KILEY S.

TOWN OF GEORGIA

ARROWHEAD LAKE

POB STA 55+30.07

PC STA 55+64.83

PT STA 60+36.64

PI STA 58+04.13

55+30

56+00

57+00

58+00

59+00

60+00

VT ROUTE 104A TO US ROUTE 7

VT ROUTE 104A TO FAIRFAX

TH-37 TRAYAH ROAD

APPROX. EXISTING R.O.W.

APPROX. EXISTING R.O.W.

APPROX. EXISTING R.O.W.

BENCHMARK RAILROAD SPIKE IN ROOT ELEV. =297.96

MATCH LINE STA 61+00

N

VT STATE PLANE GRID

PHASE 2 LAYOUT

SCALE 1" = 20'-0"

20 0 20

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME: I8b265/sI8b265TCborder.dgn	PLOT DATE: 08-JAN-2019
PROJECT LEADER: R.YOUNG	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
PHASE 2 LAYOUT	SHEET 20 OF 23

N

VT STATE PLANE GRID

SAWYER, JACQUELINE M.

WRIGHT, BRADLEY & CYNTHIA

ARROWHEAD LAKE

PI
STA 50+00.00

POB
STA 50+00.00

50+00

CHANNEL FLOW

PC
STA 62+83.56

PT
STA 65+32.47

APPROX. EXISTING R.O.W.

VT ROUTE 104A
TO US ROUTE 7

VT ROUTE 104A
TO FAIRFAX

62+00

63+00

64+00

65+00

66+00

51+00

52+00

STA 62+29.28=
CHAN 51+00.00
Δ = 90°0'0" RT

ARROWHEAD LAKE

PI
STA 64+08.03

BENCHMARK
RAILROAD SPIKE
IN POLE
ELEV.=294.19

MATCH LINE
STA 61+00

PI
STA 52+00.00

POE
STA 52+00.00

STATE OF VERMONT

MARTELL, JOHN & JACQUELINE

PHASE 2 LAYOUT

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

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME:	I8b265/sI8b265TCborder.dgn
PROJECT LEADER:	R.YOUNG
DESIGNED BY:	L.J.STONE
PHASE 2 LAYOUT	
PLOT DATE:	08-JAN-2019
DRAWN BY:	D.D.BEARD
CHECKED BY:	L.J.STONE
SHEET	21 OF 23

YANKEE CORPORATION

TOWN OF GEORGIA

ARROWHEAD LAKE

MIRANDA, CHARLES & TERESA

MOQUIN, ELIZABETH M.; SOUTHWELL, KILEY S.

TOWN OF GEORGIA

ARROWHEAD LAKE

POB STA 55+30.07

PC STA 55+64.83

PT STA 60+36.64

PI STA 58+04.13

55+30

56+00

57+00

58+00

59+00

60+00

VT ROUTE 104A TO US ROUTE 7

VT ROUTE 104A TO FAIRFAX

TH-37 TRAYAH ROAD

APPROX. EXISTING R.O.W.

APPROX. EXISTING R.O.W.

APPROX. EXISTING R.O.W.

BENCHMARK RAILROAD SPIKE IN ROOT ELEV. =297.96

MATCH LINE STA 61+00

N

VT STATE PLANE GRID

TEMPORARY BRIDGE LAYOUT

SCALE 1" = 20'-0"

20 0 20

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME: I8b265/sI8b265TCborder.dgn	PLOT DATE: 08-JAN-2019
PROJECT LEADER: R.YOUNG	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
TEMPORARY BRIDGE LAYOUT	SHEET 22 OF 23

N

VT STATE PLANE GRID

SAWYER, JACQUELINE M.

WRIGHT, BRADLEY & CYNTHIA

PI
STA 50+00.00

POB
STA 50+00.00

50+00

CHANNEL FLOW

ARROWHEAD LAKE

PC
STA 62+83.56

PT
STA 65+32.47

APPROX. EXISTING R.O.W.

VT ROUTE 104A
TO US ROUTE 7

VT ROUTE 104A
TO FAIRFAX

62+00

63+00

64+00

65+00

66+00

51+00

APPROX. EXISTING R.O.W.

STA 62+29.28=
CHAN 51+00.00
Δ = 90°0'0" RT

ARROWHEAD LAKE

MATCH LINE
STA 61+00

PI
STA 52+00.00

POE
STA 52+00.00

52+00

STATE OF VERMONT

PI
STA 64+08.03

BENCHMARK
RAILROAD SPIKE
IN POLE
ELEV.=294.19

MARTELL, JOHN & JACQUELINE

TEMPORARY BRIDGE LAYOUT

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

PROJECT NAME:	GEORGIA
PROJECT NUMBER:	BF 023-1(7)
FILE NAME: I8b265/sI8b265TCborder.dgn	PLOT DATE: 08-JAN-2019
PROJECT LEADER: R.YOUNG	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
TEMPORARY BRIDGE LAYOUT	SHEET 23 OF 23