STATE OF VERMONT
AGENCY OF TRANSPORTATION

Scoping Report

FOR

Danby BF 0130(3)

FAS ROUTE 130 (TH 1), BRIDGE 9 OVER THE MILL BROOK

January 8, 2015

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I. Site Information

Bridge 9 is a Town owned bridge located on FAS Route 130 (TH 1/Brook Road) approximately 3.1 miles west of the junction with US Route 7. There is an archaeologically sensitive area located downstream of the existing bridge. The bridge is located on a sharp curve with a history of cars running off the road. The intersection of TH 1 with TH 30 and TH 47 is located just after the bridge on the eastern end. The existing conditions were gathered from a combination of a Site Visit, the Inspection Report, the Route Log and the existing Survey. See correspondence in the Appendix for more detailed information.

Roadway Classification	Rural Major Collector
Bridge Type	Rolled Beam Bridge
Bridge Length	74 feet
Year Built	1933
Ownership	Town of Danby

Need

Bridge 9 carries FAS Route 130 across the Mill Brook. The following is a list of deficiencies of Bridge 9 and FAS Route 130 in this location:

1. The existing rolled beams are in satisfactory condition, however they are significantly rusted. The deck is only in fair condition with leaking transverse cracks throughout the entire length of the bridge. The bridge joints are leaky which is contributing to concrete spalling on the backwalls and abutments.

2. The existing bridge width is too narrow for the roadway classification and traffic volumes.

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

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

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2017 and 2037.

TRAFFIC DATA	2017	2037
AADT	660	700
DHV	85	90
ADTT	75	120
%T	3.5	5.2
%D	67	67

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 700, a DHV of 90, and a design speed of 30 mph for a Major Collector.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 5.3	9'/2' (22')	9'/2' (22')	
Bridge Lane and Shoulder Widths	VSS Section 5.3	9'/2.2' (22.4')	9'/3' (24')	Substandard
Clear Zone Distance	VSS Table 5.5		7' fill / 7' cut	
Banking	VSS Section 5.13	Varies	8% (max)	Limit to 6% for side road
Speed		30 mph (Town Ordinance)	30 mph (design)	
Horizontal Alignment	AASHTO Green Book Table 3-9	R = 220'/170'	R_{min} = 506' @ e = 6.0% R_{min} = 199' @ e = 6.0% for 20 mph warning	Substandard
Vertical Grade	VSS Table 5.6	-8.24% (max)	9% (max) for rolling terrain	
K Values for Vertical Curves	VSS Table 5.1	K_{crest} = 49/34, K_{sag} = 14	30 crest / 40 sag	Substandard
Vertical Clearance	VSS Section 5.8	No Issues Noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 5.1	363', 106', 320'	200'	Substandard
Bicycle/Pedestrian Criteria	VSS Table 5.8	2.2' shoulder	3' Shoulder	Substandard
Bridge Railing	Structures Design Manual Section 13	Fascia mounted Heavy Duty Steel Beam Bridge Railing	TL-2	
Hydraulics	VTrans Hydraulics Section	1. Passes Q_{50} storm event with approximately 20' of freeboard 2. 67' Bank full width	1. Pass Q_{50} storm event with 1.0' of freeboard 2. 55'(min) Bank full width	
Structural Capacity	SM, Ch. 3.4.1	Not Structurally Deficient	Design Live Load: HL-93	

Inspection Report Summary

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

6/10/2014 – This structure needs a complete deck replacement and the beams need extensive cleaning and painting. The backwalls also need concrete repairs w/ drainage added behind the walls, to prevent any future deterioration from saturation. ~JWW/JDM

06/06/2012 – Steel beams are in need of full paint recoat. Pavement overlay is in need of full replacement. Approach rails are in need of repairs. Shim paving is needed on both approaches. ~PLB

10/20/2011 – Assessment inspection after Tropical Storm Irene (Round #2). The left upstream bank area is in need of added anti-erosion protection. ~PLB

05/04/10 – Structure is in fair condition due to the rotation in abutments 2" in 4' and the slight bending of the 5 rolled beams, abutments have areas of moderate to heavier scaling and minor undermining of beam 5 and a crack below beam 2 in bridge seat. Pavement along deck have large pot holes along center line abutment 1 end with torn membrane exposed. Structure should be rehabbed or possible full replacement in the near future. ~MJK/FRE

Hydraulics

The existing structure meets the current standards of the VTrans Hydraulic Manual and it meets the stream equilibrium standards for bankfull width (span length). Additionally, all flows up to and including Q500 flow through this bridge, so the existing bridge meets all hydraulic standards. The VTrans Hydraulics Section has made recommendations for either a rehabilitation project or a replacement project. These recommendations can be found in the preliminary hydraulics report in the Appendix.

Utilities

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

Municipal Utilities

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

Public Utilities

Underground:

- There are underground telephone cables which approach the Brook Road/Keeler Road intersection from the west, along the southern edge of Keeler Road. From the pedestal at the Brook Road/Keeler Road intersection (next to the stop sign) the buried telephone cable extends up and along the private drive adjacent to the intersection.

Aerial:

- There are no aerial utilities located in close proximity to the bridge. There is a 3 Phase electric line which extends along the southern side of TH 30 (Keeler Road) (See attached utility sketch); this electric line is several hundred feet from the bridge.

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

Right Of Way

There is an existing 3-rod Right-of-Way centered on TH 1 and an existing 3-rod Right-of-Way centered on both TH 30 and TH 47. The existing Right-of-Way is plotted on the Existing Conditions Layout Sheet. Depending on the alternative selected, additional Right-of-Way may need to be acquired.

Resources

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

Biological:

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

Mill Brook is the only watercourse present in the project area.

The US Corps of Engineers and the Agency of Natural Resources- Department of Environmental Conservation would regulate all activities below ordinary high water within the Mill Brook. Once project plans are conceptualized, potential impacts on waterways will need to be evaluated to determine the environmental permits that will be required for the project.

Wildlife Habitat

Wildlife habitat exists within this project area/corridor. Large blocks of undeveloped land are on each side of the highway and a multitude of species would be present including large and small mammals, a variety of birds, amphibians and reptiles. At this time wildlife passage features are not anticipated as the traffic volume is fairly low in this area.

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

The VT Fish and Wildlife Diversity database indicates that no R/T/E species are present within the project area. The USFWS Information, Planning and Conservation System-(IPac) mapping indicates no occurrences of any federally listed species.

Agricultural

There are no prime agricultural soils within the project area.

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

Archaeological:

A field visit was conducted on 4/18/2014 in order to assess archaeological resources in the project area generally around Bridge 9 over Mill Brook in Danby, Rutland County, Vermont. Field review confirmed the presence of mill remains in the general project area. These remains have been mapped and can be seen on the Existing Conditions Layout Sheet.

Although sparsely populated today, this area was once a hub of residential and industrial activity. A series of six or seven mill structures were located on the inside bend of Mill River, making use of the swift flow and rapid topographic descent. A series of mills were built and owned by William Hoskins and would eventually expand to include both lumber and cheese production. This area also included the District 12 schoolhouse; remnants of this structure are located near, but outside, the project area.

A series of maps have been included in the Appendix to help illustrate the historic density of the area. The foundations remains have been given a Vermont Archaeological Indexes number of VT-RU-0631.

Stormwater:

There are no stormwater concerns for this project.

II. Maintenance of Traffic

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

Option 1: Off-Site Detour

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

1. Brook Road (FAS 130/TH 1), to Keeler Road, VT Route 29, Smokey House Road, back to Brook Road (1.7 mi end-to-end)

A map of this detour route can be found in the Appendix.

Advantages: This option would eliminate the need for a temporary bridge, which would significantly decrease project costs and construction duration. This option would not require the need to obtain rights from adjacent property owners for a temporary bridge. Also, this option would not have impacts to archaeological and historic resources adjacent to the bridge. This option reduces the time and cost of the project both at the development stage and construction. Additionally, the local share would be reduced by 50% if the Town decides to close the bridge during construction.

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

Option 2: Phased Construction

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

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

Based on the current traffic volumes, it is acceptable to close one lane of traffic, and maintain one lane of traffic, both ways, with a traffic signal. However, due to horizontal constraints, this option is not being considered. In order to keep one lane open to traffic, approximately 12 feet of the existing bridge width needs to remain for Phase 1. The existing bridge is 20 feet wide, which does not provide enough of a working width to make this method advantageous. Additionally, this option would increase the design and construction costs, while not improving the existing substandard horizontal alignment.

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

Option 3: Temporary Bridge

From a constructability standpoint, a temporary bridge could be placed on either the upstream or downstream side of the existing bridge. A downstream temporary bridge would have temporary impacts to archaeologically sensitive resources. Additionally both options would have temporary impacts to drives located in the immediate project vicinity. The intersections of FAS Route 130 with TH 30 and TH 47 would need to be temporarily reconfigured during construction for the placement of a temporary bridge. A temporary bridge would require additional rights from adjacent property owners.

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

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

Disadvantages: This option would require additional Right-of-Way acquisition for placement of the temporary bridge. This option would have adverse impacts to adjacent properties and a downstream bridge would have impacts to archaeological resources at the project site. There would be decreased safety to the workers and to vehicular traffic, because of cars driving near the construction site, and construction vehicles entering and exiting the construction site. This traffic control option would be costly, and time consuming, as construction activities would take a second construction season, in order to set up the temporary bridge.

III. Alternatives Discussion

No Action

The existing bridge is not structurally deficient. However, the existing rolled beams have heavy rusting and peeling paint. These beams will start seeing section loss if not addressed in a timely manner. Additionally there is heavy leaking and cracking all throughout the deck. The substructures are only in fair condition, with spalling on the backwalls and abutments as well as past movements and rotation. In the interest of safety to the traveling public, the No Action alternative is not recommended. No cost estimate has been provided for this alternative since there are no immediate costs.

Bedrock Assessment

The bedrock outcrop that serves as a foundation for the existing bridge overhangs the Brook. A marble block masonry wall was constructed during the original project to support this overhang. As seen in Figure 1 below, there are two areas where marble blocks had been mortared in place beneath the overhanging bedrock. It appears that this was constructed to help stabilize the weak rock which severely overhangs the Brook.

Figure 1: Bedrock overhang with marble block masonry wall support.

Since both the existing or new substructures would bear on rock that is supported on this old rubble masonry, the condition and bearing capacity of the bedrock and the wall should be assessed by a geotechnical engineer regardless of the chosen alternative. Based on the findings of an assessment, the original wall may need to be reinforced.

Deck Replacement

A deck replacement option for this bridge would include a new deck and superstructure and substructure repair as follows:

- The existing rolled beams are rusting. As a part of this option, the existing beams would be cleaned and repainted. This would likely include the removal and containment of lead paint.

- There is no evidence of Alkali Silica Reaction taking place at the substructures. Damage appears to be from chloride attack. Therefore, details for adequate drainage are recommended to keep deicing salts off the wingwall joints.

- There are some areas of spalling in the abutments and on the existing bridge seats. These areas should be prepared for patching, and patched with the appropriate concrete repair class. Also, anodes should be considered for use in the new concrete to discourage further deterioration.

The existing substructure is in fair condition, and it is reasonable to assume that the existing substructure and beams can safely carry anticipated traffic loads for an additional 20 years.

The existing lane widths and shoulders on the bridge are 9 feet wide and 2.2 feet wide respectively; this does not meet the minimum standard of 9 feet and 3 feet respectively. It is proposed that 9 foot lanes with 3 foot shoulders be constructed for this alternative.

Advantages: This alternative would address the deterioration issues of the existing bridge, with minimal upfront costs. This option would have minimal impacts to adjacent properties and resources. The current bridge does not meet the minimum width standards; this option will widen the bridge approximately 9 inches on each side to meet the minimum standard.

Disadvantages: This option would match the existing horizontal and vertical alignments, which are substandard.

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

Superstructure Replacement

A superstructure replacement option for this bridge would include a new prefabricated superstructure and substructure repair as follows:

- There is no evidence of Alkali Silica Reaction taking place at the substructures. Damage appears to be from chloride attack. Therefore, details for adequate drainage are recommended to keep deicing salts off the wingwall joints.

- There are some areas of spalling in the abutments. These areas should be prepared for patching, and patched with the appropriate concrete repair class. Also, anodes should be considered for use in the new concrete to discourage further deterioration

- The existing bridge seats would be cut down and new bridge seats would be poured to accommodate the new superstructure.

The existing substructure is in fair condition, and it is reasonable to assume that the existing substructure can safely carry anticipated traffic loads for an additional 30 years.

The existing lane widths and shoulders on the bridge are 9 feet wide and 2.2 feet wide respectively; this does not meet the minimum standard of 9 feet and 3 feet respectively. It is proposed that 9 foot lanes with 3 foot shoulders be constructed for this alternative.

Advantages: This alternative would address the deterioration issues of the existing bridge, with minimal upfront costs. This option would have minimal impacts to adjacent properties and resources. The current bridge does not meet the minimum width standards; this option will widen the bridge approximately 9 inches on each side, to meet the minimum standard.

Disadvantages: This option would match the existing horizontal and vertical alignments, which are substandard.

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

Full Bridge Replacement On Alignment

Due to the constraints at the project site, the current horizontal alignment will be considered even though it is substandard. By maintaining the existing alignment, impacts to resources and adjacent properties will be minimized. The existing horizontal curve would not meet standards even for a reduced speed warning. The substandard vertical alignment and substandard roadway/bridge widths will be brought up to standard for this option. In order to bring the vertical alignment up to standard, the existing bridge will be raised approximately 1.8 feet.

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

a. Bridge Width

The current curb to curb width is approximately 22 feet. This does not meet the minimum standard of 24 feet. Since a new 80+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A 24 foot width bridge will be proposed.

b. Bridge Length and Skew

The existing bridge is 74 feet long with no skew. This provides a clearspan normal to the channel of approximately 68 feet. This clearspan exceeds the ANR bank full width requirements of 55 feet. Due to exposed bedrock which inhibits the use of integral abutments, vertical abutments will be recommended here. The abutments will be radial, and the location of the abutments shall be determined out in the field by the VTrans geologist, and bedrock competency will be verified with borings. A span length of approximately 70 feet is anticipated. No skew will be recommended in order to match the site conditions.

c. Superstructure Type

A prefabricated structure will be the preferred choice, due to decreased construction time. The possible 70’ length bridge types that are most commonly used in Vermont, are steel and composite concrete deck, and NEXT beams. Due to the curved roadway alignment and span of the bridge, a curved superstructure will likely be necessary, eliminating the possibility for using NEXT beams. The superstructure depth is not critical for meeting hydraulic standards, so the superstructure type shall be determined at a later time.

d. Substructure Type

Both the eastern and western abutments are founded on spread footings on bedrock. The preliminary geotechnical report indicates that the bedrock at this site is weak and that any new substructures should also be reinforced concrete abutments founded on spread footings. Additionally the report indicated that the site would not be conducive to pile supported foundations. Any rapid construction alternative should have sufficient subsurface information to verify the in-situ conditions. In order to reduce construction time, prefabricated abutment components may be used where possible. The location of the abutments shall be determined in the field by the VTrans geologist and verified with boring data. The preliminary geotechnical report can be found in the Appendix.

e. Maintenance of Traffic:

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

Full Bridge Replacement Off Alignment

The current horizontal alignment does not meet the current standards, so an off-alignment option downstream from the existing bridge will be evaluated. This option would have impacts to the archaeological resources in the project area, as well as to the downstream property.

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

a. Alignment

In order to minimize impacts, Section 5.3 of the Vermont State Standards allows a reduction in design speed of 10 mph without needing a design exception. A roadway designed for 30 mph would need to be constructed 150 feet downstream from the existing bridge which would have major impacts to the house located downstream and to archaeological resources. Therefore, the curve should be designed and warned for 20 mph according to Section 5.3 as stated above. This will result in an alignment shifted approximately 10 feet downstream from the existing centerline of road.

b. Bridge Width

The current curb to curb width is approximately 22 feet. This does not meet the minimum standard of 24 feet. Since a new 80+ year bridge is being proposed, the bridge geometry should meet the minimum standards. A 24 foot width bridge will be proposed.

c. Bridge Length and Skew

The existing bridge is 74 feet long with no skew. This provides a clearspan normal to the channel of approximately 68 feet. This clearspan exceeds the ANR bank full width requirements of 55 feet. Due to exposed bedrock which inhibits the use of integral abutments, vertical abutments will be recommended here. The abutments will be radial, and the location of the abutments shall be determined out in the field by the VTrans geologist, and bedrock competency will be verified with borings. A span length of approximately 70 feet is expected. No skew will be recommended in order to match the site conditions.

d. Superstructure Type

A prefabricated structure will be the preferred choice, due to decreased construction time. The possible 70' length bridge types that are most commonly used in Vermont, are steel and composite concrete deck, and NEXT beams. Due to the curved roadway alignment and span of the bridge, a curved superstructure will likely be necessary, eliminating the possibility for using NEXT Beams. The superstructure depth is not critical for meeting hydraulic standards, so the superstructure type shall be determined at a later time.

e. Substructure Type

Both the eastern and western abutments are founded on spread footings on bedrock. The preliminary geotechnical report indicates that the bedrock at this site is weak and that any new substructures should also be reinforced concrete abutments founded on spread footings. Additionally the report indicated that the site would not be conducive to pile supported foundations. Any rapid construction alternative should have sufficient subsurface information to verify the in-situ conditions. In order to reduce construction time, prefabricated abutment components may be used where possible. The location of the abutments shall be determined in the field by the VTrans geologist and verified with boring data. The preliminary geotechnical report can be found in the Appendix.

f. Maintenance of Traffic:

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

IV. Alternatives Summary

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

Alternative 1a: Deck Replacement with Traffic Maintained on Off-Site Detour
Alternative 1b: Deck Replacement with Traffic Maintained on a Temporary Bridge
Alternative 2a: Superstructure Replacement with Traffic Maintained on Off-Site Detour
Alternative 2b: Superstructure Replacement with Traffic Maintained on a Temporary Bridge
Alternative 3a: Full Bridge Replacement with Traffic Maintained on Off-Site Detour
Alternative 3b: Full Bridge Replacement with Traffic Maintained on Temporary Bridge
Alternative 4a: Full Bridge Replacement Off Alignment with Traffic Maintained on Off-Site Detour
Alternative 4b: Full Bridge Replacement Off Alignment with Traffic Maintained on a Temporary Bridge

V. Cost Matrix[1]

Danby BF 0130(3)		Do Nothing	Alt 1a	Alt 1b	Alt 2a	Alt 2b	Alt 3a	Alt 3b	Alt 4a	Alt 4b
			Deck Replacement		Superstructure Replacement		Full Bridge Replacement		Full Bridge Replacement Off Alignment	
			Offsite Detour	Temporary Bridge	Offsite Detour	Temporary Bridge	Offsite Detour	Temporary Bridge	Offsite Detour	Temporary Bridge
COST	Bridge Cost	$0	$247,000	$247,000	$403,000	$403,000	$720,000	$720,000	$723,000	$723,000
	Removal of Structure	$0	$25,000	$25,000	$25,000	$25,000	$67,000	$67,000	$67,000	$67,000
	Roadway	$0	$185,000	$185,000	$185,000	$185,000	$260,000	$260,000	$355,000	$355,000
	Maintenance of Traffic	$0	$42,000	$162,000	$42,000	$162,000	$66,000	$186,000	$74,000	$194,000
	Construction Costs	$0	$499,000	$619,000	$655,000	$775,000	$1,113,000	$1,233,000	$1,219,000	$1,339,000
	Construction Engineering + Contingencies	$0	$150,000	$186,000	$197,000	$233,000	$334,000	$370,000	$366,000	$402,000
	Total Construction Costs w CEC	**$0**	**$648,700**	**$804,700**	**$851,500**	**$1,007,500**	**$1,446,900**	**$1,602,900**	**$1,584,700**	**$1,740,700**
	Preliminary Engineering[2]	**$0**	**$149,700**	**$185,700**	**$196,500**	**$232,500**	**$278,250**	**$308,250**	**$304,750**	**$334,750**
	Right of Way	**$0**	**$0**	**$55,710**	**$0**	**$55,710**	**$100,170**	**$110,970**	**$146,280**	**$200,850**
	Total Project Costs	$0	$798,400	$1,046,110	$1,048,000	$1,295,710	$1,825,320	$2,022,120	$2,035,730	$2,276,300
	Annualized Costs	$0	$40,000	$52,400	$35,000	$43,200	$22,900	$25,300	$25,500	$28,500
TOWN SHARE			$19,960 (2.5%)	$52,310 (5%)	$26,200 (2.5%)	$64,790 (5%)	$91,300 (5%)	$202,210 (10%)	$101,790 (5%)	$227,630 (10%)
SCHEDULING	Project Development Duration[3]		2 years	4 years	2 Years	4 Years	4 years	4 years	4 years	4 Years
	Construction Duration		4 months	18 months	4 months	18 months	6 months	18 months	6 months	18 months
	Closure Duration (If Applicable)		Approximately 2 weeks	N/A	Approximately 2 weeks	N/A	Approximately 16 weeks	N/A	Approximately 16 weeks	N/A
ENGINEERING	Typical Section - Roadway (feet)	22'	22'	22'	22’	22’	22'	22'	22'	22’
	Typical Section - Bridge (feet)	2.2-9-9-2.2	3-9-9-3	3-9-9-3	3-9-9-3	3-9-9-3	3-9-9-3	3-9-9-3	3-9-9-3	3-9-9-3
	Geometric Design Criteria	Substandard horizontal and vertical curve and substandard width	Substandard horizontal and vertical curve		Substandard horizontal and vertical curve		Substandard horizontal curve		Meets All Geometric Criteria	
	Traffic Safety	No Change	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved
	Alignment Change	No	No		No		Vertical Change (Roadway raised approximately 1.8 feet at the bridge)		Horizontal and Vertical Change	
	Bicycle Access	No Change	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved
	Hydraulic Performance	Substandard BFW	Meets Standard	Meets Standard	Meets Standard	Meets Standard	Meets Standard	Meets Standard	Meets Standard	Meets Standard
	Pedestrian Access	No Change	Improved	Improved	Improved	Improved	Improved	Improved	Improved	Improved
	Utility	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change	No Change
OTHER	ROW Acquisition	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
	Road Closure	No	Yes	No	Yes	No	Yes	No	Yes	No
	Design Life	<10 years	20 years		30 Years		80 years		80 years	

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

VI. Conclusion

We recommend **Alternative 4a**; to replace the existing structure on an improved alignment slightly downstream while maintaining traffic on an offsite detour.

Structure:
While the rehabilitation option has the lowest upfront costs, a bridge replacement has a lower per year cost based on an 80 year design life compared to a 20 or 30 year design life. While the On Alignment option has a slightly lower cost, it does not address the current substandard horizontal curve. The Town of Danby has indicated that many cars have run off the road at this curve, and that an improved alignment is desired. The new alignment should be designed and warned for 20 mph as allowed in Section 5.3 of the Vermont State Standards in order to minimize impacts.

The proposed structure will have two 9 foot travel lanes with 3 foot shoulders. Part of the substructure will likely be founded on ledge. The bridge will have a single span of approximately 70 feet with radial abutments and no skew to match the channel. The exact span shall be determined out in the field by the VTrans geologist based on bedrock competency. The superstructure will have curved girders with a composite cast-in-place deck to accommodate the horizontal alignment.

Traffic Control:
It is recommended that traffic be maintained on an offsite detour. This option will not have permanent impacts to surrounding archaeological resources and adjacent properties and will not require additional Right-of-Way acquisition for placement of a temporary bridge. The ADT on TH 1 is 660, which is considered relatively low. Additionally, there are several reasonable detour routes that could be signed by the Town of Danby. Therefore, it is reasonable to close the road and reroute traffic while the new bridge is constructed. By not providing a temporary bridge, both the project development time and the project cost are significantly reduced. Additionally, by closing the bridge to traffic during construction, the local share is reduced by 50%.

Design Criteria:
FAS Route 130: FAS Route 130 currently has several substandard design features. The horizontal alignment, vertical alignment (substandard k-values and stopping sight distance), and bridge shoulder width are substandard through the project area. This proposed alternative will not require a design exception for any geometric design features.

VII. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Report
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources Memo
- Archeology Memo
- Historic Memo
- Local Input
- Detour Map
- Plans
    - Existing Conditions, Proposed Typical Sections, Layouts, and Profiles, and Traffic Control Sheets

Looking East over the bridge

Looking West over the bridge

Looking Upstream

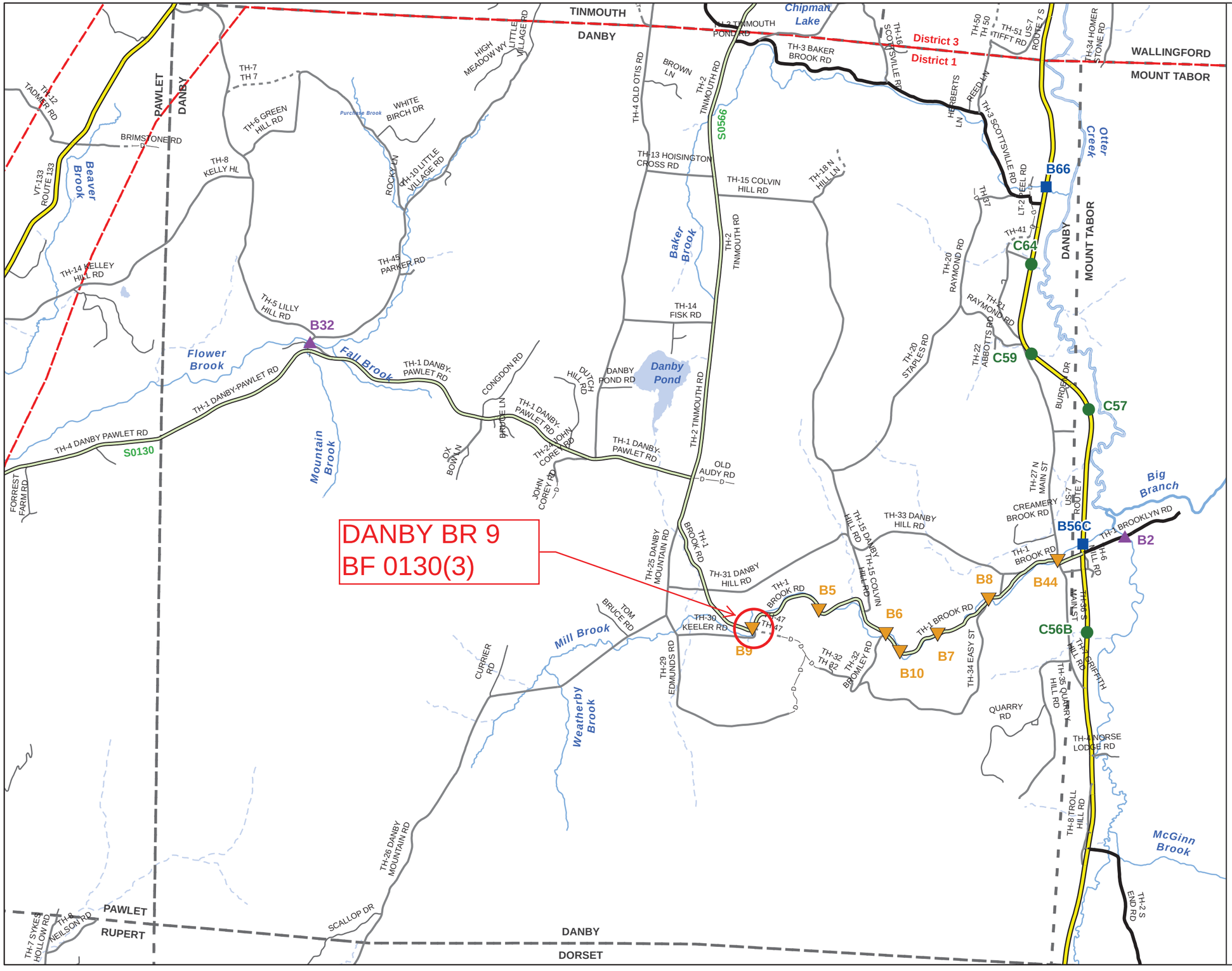
Western Abutment

Eastern Abutment

Abutment Spalling

Rusty Beams and Peeling Paint

Cracking throughout deck soffit with leaking



Scale 1:43,057

N

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

Produced by:
Mapping Unit
Vermont Agency of Transportation
August 2011

DANBY
RUTLAND COUNTY
DISTRICT # 1

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for DANBY **bridge no.:** 00009 **District:** 1

Located on: TR 01 FAS 130 **over** MILL BROOK **approximately** 3.1 MI W JCT. U.S.7 **Owner:** 03 TOWN-OWNED

CONDITION

Deck Rating: 5 FAIR

Superstructure Rating: 6 SATISFACTORY

Substructure Rating: 5 FAIR

Channel Rating: 8 VERY GOOD

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200130000911062

Federal Sufficiency Rating: 056.6

Deficiency Status of Structure: ND

AGE and SERVICE

Year Built: 1933 **Year Reconstructed:** 0000

Service On: 1 HIGHWAY

Service Under: 5 WATERWAY

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 27

ADT: 000480 **% Truck ADT:** 06

Year of ADT: 1995

GEOMETRIC DATA

Length of Maximum Span (ft): 0072

Structure Length (ft): 000074

Lt Curb/Sidewalk Width (ft): 0

Rt Curb/Sidewalk Width (ft): 0

Bridge Rdwy Width Curb-to-Curb (ft): 22.4

Deck Width Out-to-Out (ft): 24

Appr. Roadway Width (ft): 022

Skew: 10

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 2 PREFORMED FABRIC

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 1 MEETS CURRENT STANDARD

Transitions: 1 MEETS CURRENT STANDARD

Approach Guardrail: 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 1 MEETS CURRENT STANDARD

Structural Evaluation: 5 BETTER THAN MINIMUM TOLERABLE CRITERIA

Deck Geometry: 4 MEETS MINIMUM TOLERABLE CRITERIA

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 8 SLIGHT CHANCE OF OVERTOPPING ROADWAY

Approach Roadway Alignment: 3 INTOLERABLE, CORRECTIVE ACTION NEEDED

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

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

Posting Status: 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: 062014 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

6/10/2014 This structure needs a complete deck replacement and the beams need extensive cleaning and painting. The backwalls also need concrete repairs w/ drainage added behind the walls, to prevent any future deterioration from saturation. JWW/JDM

06/06/2012 Steel beams are in need of full paint recoat. Pavement overlay is in need of full replacement. Approach rails are in need of repairs. Shim paving is needed on both approaches. PLB

10/20/2011 Assessment inspection after Tropical Storm Irene (Round #2). The left upstream bank area is in need of added anti-erosion protection. PLB

05/04/10 Structure is in fair condition due to the rotation in abutments 2" in 4' and the slight bending of the 5 rolled beams, abutments have areas of moderate to heavier scaling and minor undermining of beam 5 and a crack below beam 2 in bridge seat. Pavement along deck have large pot holes along center line abutment 1 end with torn membrane exposed. Structure should be rehabbed or possible full replacement in the near future. ~MJK/FRE

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Chris Williams, Structures Project Manager

FROM: Leslie Russell, P.E., Hydraulics Project Supervisor

DATE: 11 July 2014

SUBJECT: Danby BF 0130(3) TH 1 (FAS 130) BR 9 over Mill Brook – Preliminary Hydraulics

---

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

Existing Conditions

The existing structure is a single span rolled beam bridge that was built in 1933. The abutments are concrete built on ledge. The clear span is approximately 67.5' wide with a clear height of about 25'. The stream makes a slight turn as it goes through the structure, but the bridge is generally perpendicular to the channel, with no abutment skew. There are high cliffs of ledge through the structure and ledge all through the reach. The bridge inspection reports do not indicate any hydraulic problems.

Our calculations, field observations and measurements indicate the existing structure does meet the current standards of the VTrans Hydraulic Manual and it does meet the stream equilibrium standards for bankfull width (span length). The ledge is naturally constricting the channel width. With the average low beam elevation of 1239.5' and a Q50 water surface elevation of 1217.6', there is more than enough freeboard with this bridge. In fact, all flows up to and including Q500 flow through this bridge.

Recommendations

In sizing a new structure we attempt to select structures that meet both the current VTrans hydraulic standards, state environmental standards with regard to span length and opening height, and allow for roadway grade and other site constraints. Since this bridge is hydraulically adequate, our primary concern with a new bridge is not to increase Q100 water surface elevation.

Based on the above considerations and the information available, we recommend any of the following structures as a replacement at this site or downstream slightly of the existing bridge:

1. If the new abutments are poured on ledge with no stone fill slopes the clear span can be reduced to 55'. This will not impact the bridge hydraulics up to Q100. Due to the geometry of the site, the new bridge will still be approximately 25' high with a minimum waterway opening of 1010 sq. ft. This means the low beam elevation can be at 1235.1', allowing for a superstructure depth of 6.7' assuming the roadway elevations stay the same. However, if need be, we can check lower low beam elevations. Preliminary investigations indicate that low beam elevation can be as low as 1225.0' and not adversely affect hydraulics at this site.

2. This site does not appear to be a good fit for integral abutments. If you wish to use integral abutments or any structure with stone fill slopes in front of the abutments down to the channel,

please let us know and we can work with you to find limits that fit the site and meet hydraulic standards.

3. Of course, replacing the bridge with the same size bridge as the existing more than meets the minimum standards, as well.

General Comments

If a new bridge is installed, the bottom of abutment footings should be at least six feet below the channel bottom, or to ledge, to prevent undermining. Abutments on piles should be designed to be free standing for a scour depth at least 6' below channel bottom.

It is always desirable for a new structure of this size to have flared wingwalls at the inlet and outlet, to smoothly transition flow through the structure, and to protect the structure and roadway approaches from erosion. The wingwalls should match into the channel banks. Any new structure should be properly aligned with the channel, and constructed on a grade that matches the channel. A new structure should span the natural channel width.

Stone Fill, Type IV should be used to protect any disturbed channel banks or roadway slopes at the structure's inlet and outlet, up to a height of at least one-foot above the top of the opening. The stone fill should not constrict the channel or structure opening.

Please contact us if you have any questions or if we may be of further assistance.

LGR

cc: Hydraulics Project File via NJW
Hydraulics Chrono File

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Chris Williams, Project Manager, Structures

TDE CCB

From: Thomas D. Eliassen, Transportation Geologist via Christopher C. Benda, Soils and Foundations Engineer

Date: April 14, 2014

Subject: Danby BF 0130(3) Preliminary Geotechnical Information Report

In an effort to assist the Structures Section with their bridge type study, the Soils and Foundations Unit within the Materials and Research Section has completed a review of available geological data near Bridge No. 9 on Brook Road near the intersection of Keeler Road in Danby, Vermont. Bridge 9 is of rolled beam construction that crosses over Mill Hollow Brook. Figure 1 shows the bridge as viewed from the east.

Figure 1 View of Bridge No. 9 on Brook Road in Danby, VT.

This review included an evaluation of as-built record plans, the examination of historical in-house bridge boring files, observations made during a site visit, a review of USDA Natural Resources Conservation soil survey records, published surficial and bedrock geologic maps and water well logs on-file at the Agency of Natural Resources.

This bridge is of rolled beam construction. Figure 2 shows the eastern abutment. As can be seen in the Figure, the abutment lies directly on bedrock. Foliation within the bedrock dips into the slope and a pronounced overhang is evident. Two areas can be seen where marble blocks had been mortared in place beneath the overhanging bedrock. It appears that this was constructed to help stabilize the weak rock which severely overhangs the brook. Figure 3 presents a sketch from the 1943 plans of the bridge showing footing elevations, general surface of bedrock and "cement rubble masonry" which had been placed near the brook level.

Figure 2 Photograph of eastern abutment.

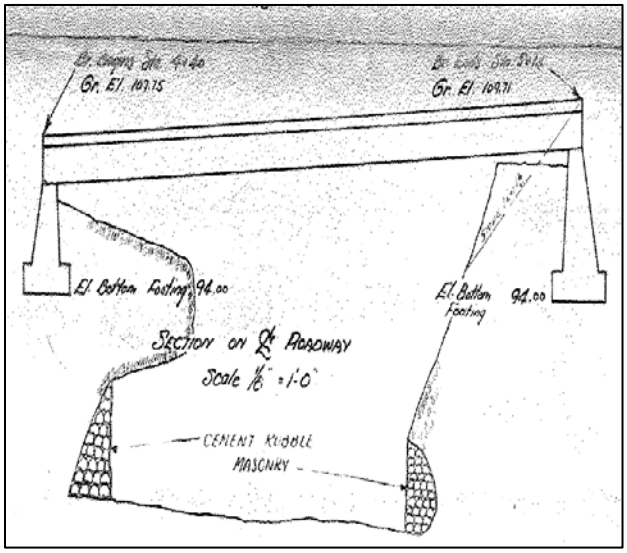


Figure 3 Sketch from 1943 plans showing footing elevations, bedrock surface and cement rubble masonry.

Figure 4 shows the western abutment. It rests directly on bedrock that is dipping toward the brook.

Figure 4 Photograph showing the western abutment of Bridge No. 9.

No historical boring log data were found in the Soils & Foundations project database, in-house historical boring log records or within historical record plans.

Surficial mapping conducted for the 1970 Surficial Geologic Map of Vermont indicates that the subject area is underlain by glacial Till, a dense poorly graded mix of gravel, cobbles and boulders in a matrix of silt.

According to the 2011 bedrock map of Vermont, the bedrock here consists of shale and phyllite of the Walloomsac Formation within the Vermont Valley Sequence of rocks.

USDA Natural Resources Conservation soil survey records indicate that surficial soils in the area of the bridge, depicted as 98E on Figure 5, consist of Quonset-Warwick complex soils, 25 to 45 percent slopes.

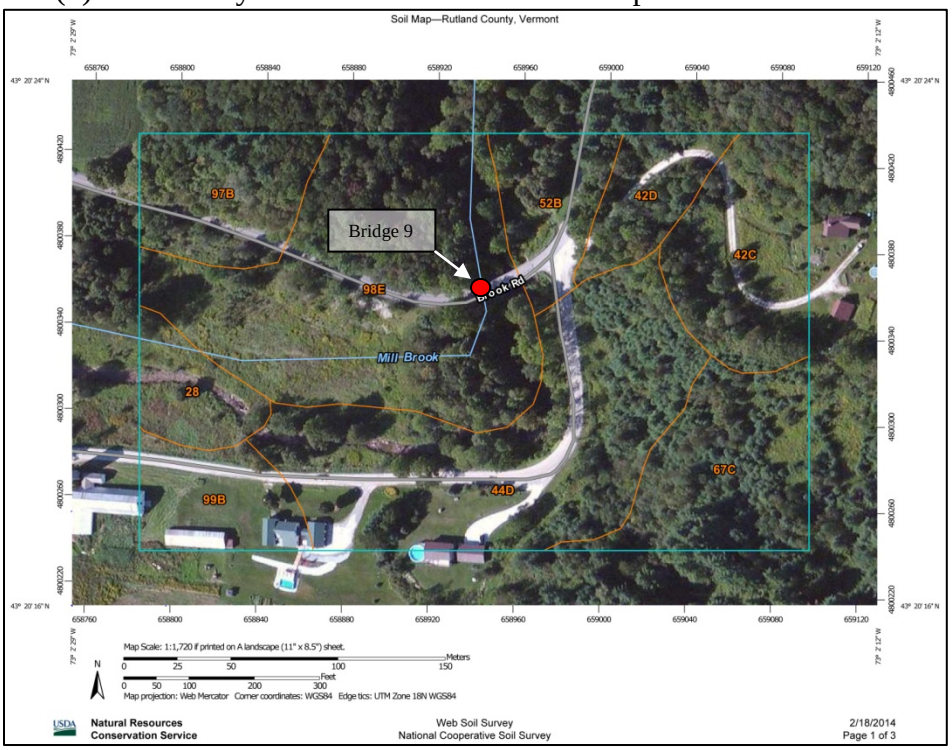


Figure 5 NRCS soil survey map of project area.

Drilling logs from private drinking water wells in the area of a project can be helpful in anticipating what may be encountered in the subsurface. The Agency of Natural Resources Private Well Locator interactive map was reviewed for these purposes.

Three water wells are present within approximately 1,000 foot radius from the subject project location. Based on lithologies reported on the driller logs, the subsurface immediately west of the project area is underlain by 20 to 100 feet of clay, sand and boulders overlying bedrock. Figure 6 depicts the reported lithologies encountered in these nearby water wells.

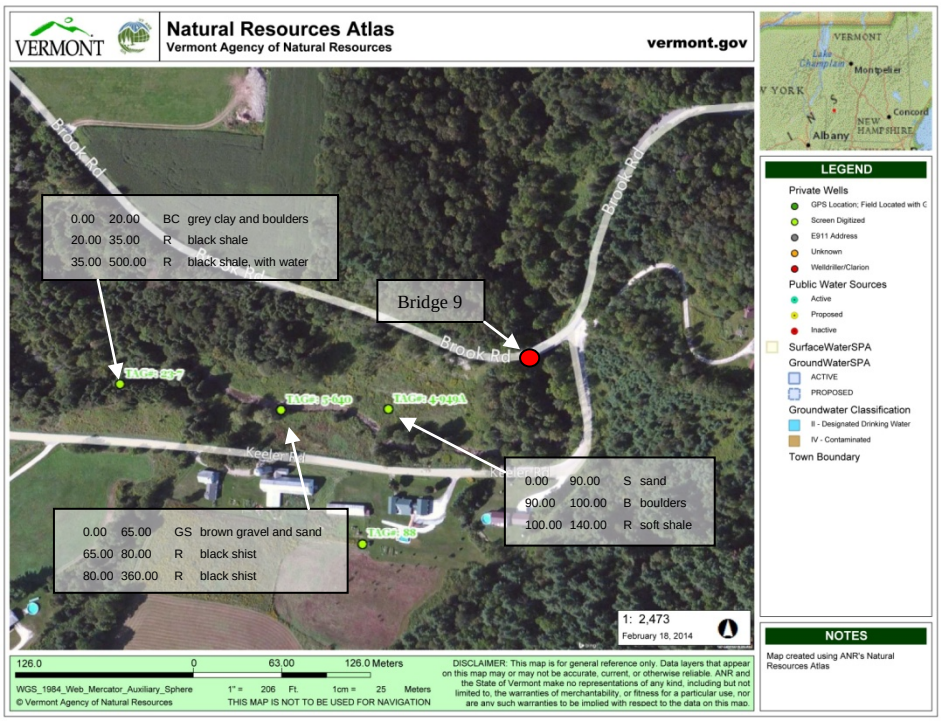


Figure 6 Map showing water well locations in the vicinity of Bridge 9. Also listed on this map are the driller well log notes referencing the stratigraphy encountered.

It should be noted that these logs were developed and provided by the well drilling companies whose employees may have had little to no training in identifying soil and rock.

A site visit was performed on April 4, 2014 for the purposes of assessing topographic and geologic conditions that may impact the design and/or construction of the proposed bridge. Observations were also made of existing utility locations and logistical site access conditions.

The topography is characterized as gently sloping ground off of the northern flank of Danby Mountain. Mill brook flows on a gentle slope from the west and at the subject bridge begins to cut deeply into the surface as it steepens in gradient toward the east. The brook bottom is floored by gravel, cobbles, boulders and bedrock. There was no evidence of overhead or underground cable, telephone or power lines along the sides of Brook Road. Access for drilling borings could prove challenging in the northern abutment area as the ground surface becomes very steep outboard of the roadway. Drilling adjacent to the southern abutment should be easier as the ground surface here is not as steep.

As a result of our preliminary investigation, we recommend abutments for a future structure at this location consist of reinforced concrete abutments on spread footings. Additional geotechnical and geological data needs to be collected and based on the results of those investigations, more specific recommendations will be developed.

We recommend drilling one boring at or near each existing abutment corner in order to more fully assess the subsurface conditions at the site including, but not limited to, the soil properties, ground water conditions and depth to, condition and stability of bedrock. In addition, the VTrans geologist should conduct a thorough geologic evaluation on the properties, condition and stability of the bedrock exposed along the alignment.

If you have any questions, please feel free to contact us at 828-6916.

c: WEA/Read File
CCB/Project File

VERMONT

State of Vermont
Program Development Division
One National Life Drive
Montpelier, VT 05633-5001
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[fax] 802-828-2334
[ttd] 800-253-0191

Agency of Transportation

To: James Brady, VTrans Environmental Specialist

From: Glenn Gingras, VTrans Environmental Biologist

Date: 04/17/14

Subject: Danby BF 0130(3) - Natural Resource ID

I have completed my natural resource scoping review for the above referenced project. My evaluation has included the following resources: wetlands, wildlife habitat, agricultural soils, and rare, threatened and endangered species. I have reviewed all existing mapped information and performed a site review of the project area.

The project involves bridge 9 on FAS013 in Danby, VT. The bridge carries travelers over Mill Brook at this location. As the project is in scoping an alternative has not been selected. Resources have been identified in the surrounded area to aid in the determination of a least damaging practical alternative.

Wetlands/Watercourses

No wetlands are present within the project area.

Mill Brook is the only watercourse present in the project area.

The US Corps of Engineers and the Agency of Natural Resources- Department of Environmental Conservation would regulate all activities below ordinary high water within the Mill Brook. Once project plans are conceptualized we can evaluate potential impacts on waterways and evaluate project permits that will be required.

Wildlife Habitat

Wildlife habitat exists within this project area/corridor. Large blocks of undeveloped land are on each side of the highway and a multitude of species would be present including large and small mammals, a variety of birds, amphibians and reptiles. At this time we do not anticipate any wildlife passage needs as the traffic volume is fairly low in this area.

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

I have queried the VT Fish and Wildlife Wildlife Diversity database and no R/T/E species are present within the project area. The USFWS Information, Planning and Conservation System-(IPac) mapping indicates no occurrences of any federally listed species.

Agricultural Soils

There are no prime agricultural soils within the project area.

VERMONT

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

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

Agency of Transportation

To: James Brady, VTrans Environmental Specialist

From: Jeannine Russell, VTrans Archaeology Officer
via Brennan Gauthier, VTrans Archaeologist

Date: 4/22/2014

Subject: Danby BF 0130(3) – Archaeological Resource ID

James,

A field visit was conducted on 4/18/2014 in order to assess archaeological resources in the project area generally around Bridge 9 over Mill Brook in Danby, Rutland County, Vermont. Field review confirmed the presence of mill remains in the general project area. These remains have been mapped and area available in the archaeology geodatabase for inclusion in future plan sets.

Although sparsely populated today, this area was once a hub of residential and industrial activity. A series of six or seven mill structures were located on the inside bend of Mill River, making use of the swift flow and rapid topographic descent. A series of mills were built and owned by William Hoskins and would eventually expand to include both lumber and cheese production. This area also included the District 12 schoolhouse; remnants of this structure are located near, but outside, the project area.

I've included a series of maps to help illustrate the historic density of the area. Please feel free to contact me with any questions or concerns that may arise as part of this project. The foundations remains have been given a Vermont Archaeological Indexes number of VT-RU-0631.

Sincerely,

Brennan

Brennan Gauthier
VTrans Archaeologist
Vermont Agency of Transportation
Program Development Division
Environmental Section
1 National Life Drive
Montpelier, VT 05633
tel. 802-828-3965
fax. 802-828-2334
Brennan.Gauthier@state.vt.us

VTrans Working to Get You There
Vermont Agency of Transportation

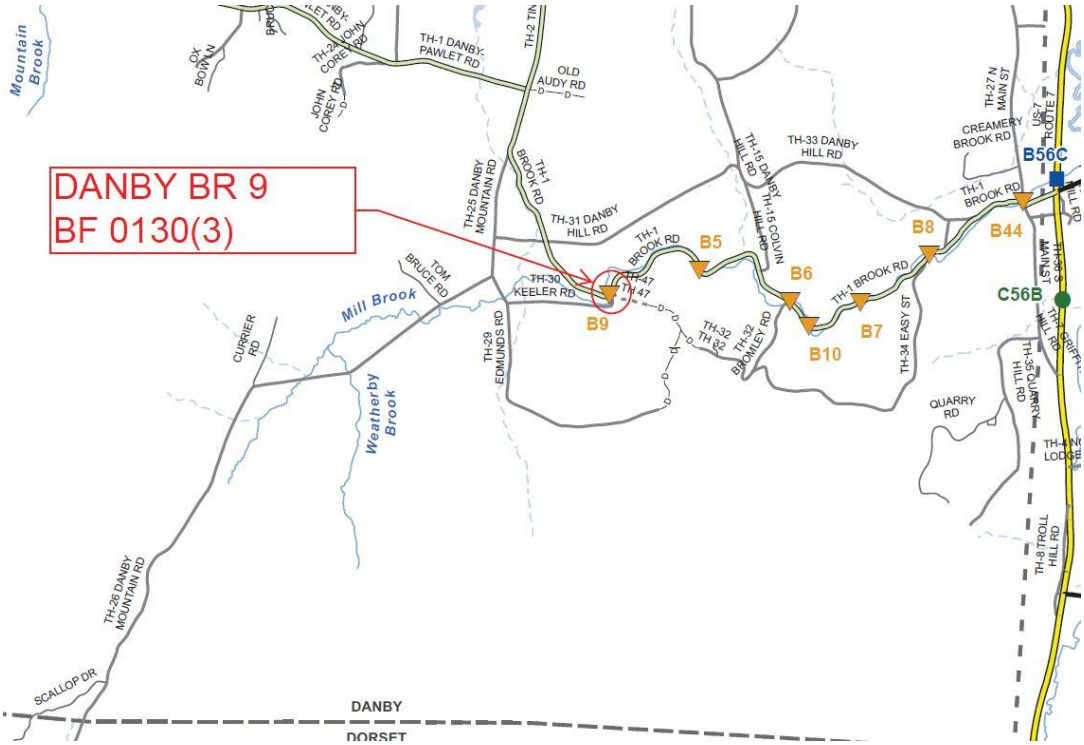


Figure 1: Current Location Map

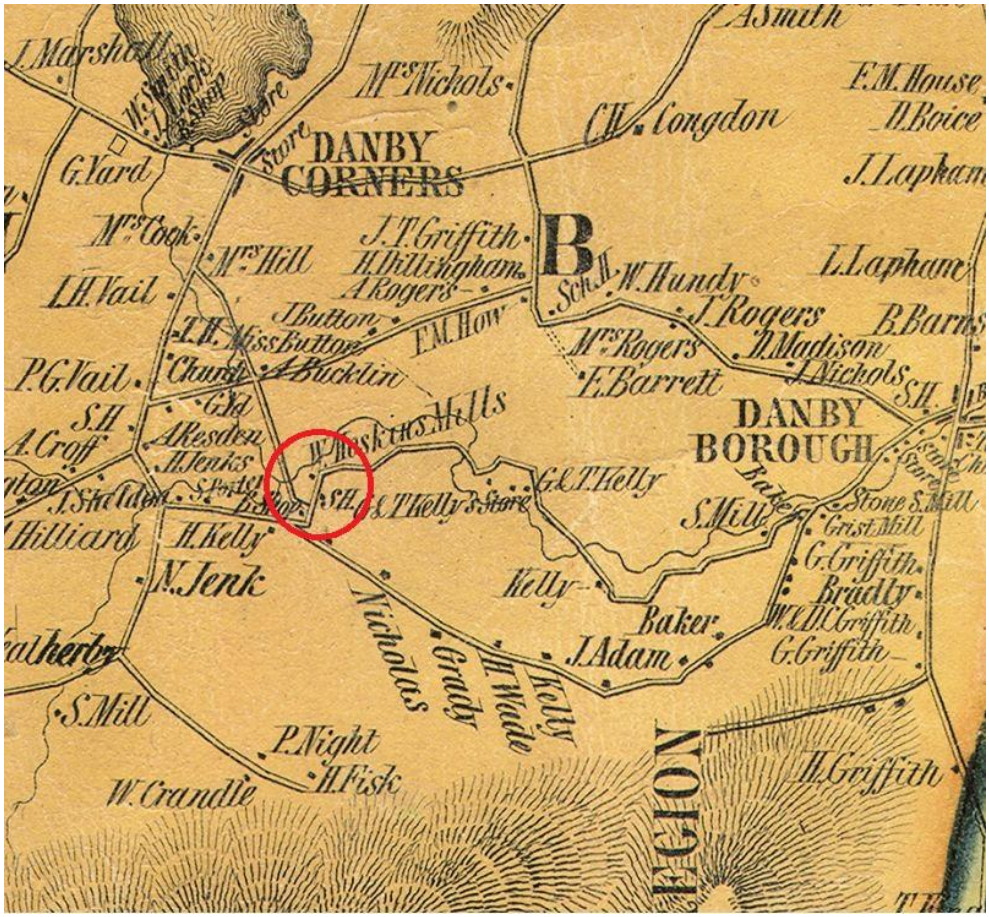


Figure 2: 1850s Map

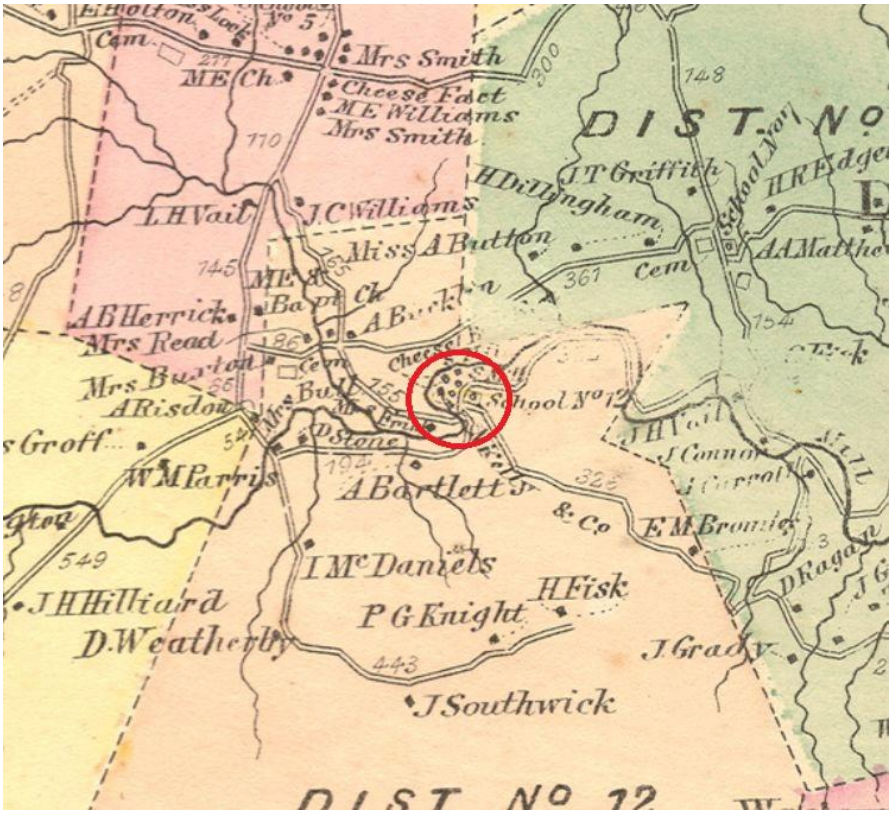


Figure 3: 1860s Map

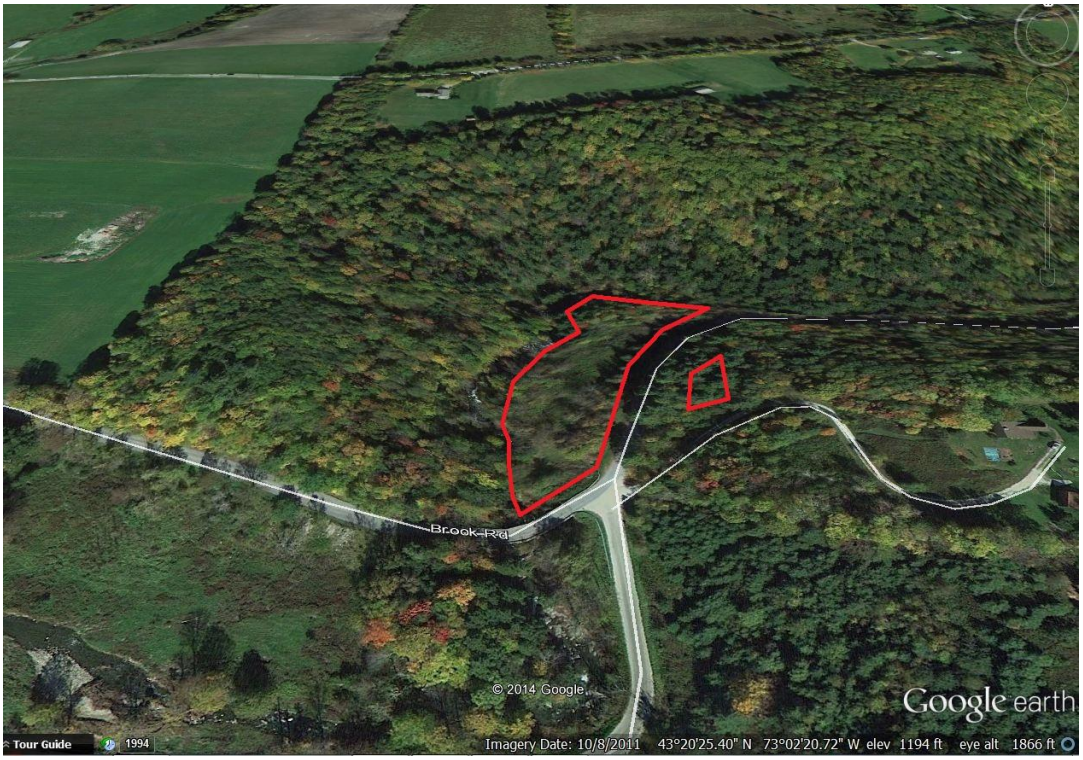


Figure 4: VT-RU-0631

Stone, Laura

From: Newman, Scott
Sent: Monday, February 03, 2014 12:10 PM
To: Brady, James
Cc: O'Shea, Kaitlin; Williams, Chris; Newman, Scott
Subject: Danby BF 0130(3) Br9 Resource ID
Attachments: photo.JPG; ATT00001.txt

James,

Same as Poultney Bridge 2: this one has not been distributed in NERD yet, but the historic ID is complete.

Danby Br. 9 is a rolled beam bridge that carries RT 130 over Mill Brook. The structure itself is not historic, and there are no above-ground historic properties in the project area. When this comes through for NEPA, it will be processed as an un-conditioned NHPA for historic. I'll keep this ID to provide a reference for you when it comes it (unless CW cares to throw it into the mix now).

Thanks,
Scott

Local & Regional Input Questionnaire

Project Name:Danby BR9 **Project Number: BF1030 (3)**

Community Considerations

1. Are there any 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: a bike race, festivals, cultural events, farmers market, concerts, etc. that could be impacted? If yes, please provide date, location and event organizers' contact info.
   none
2. Is there a "slow season" or period of time from May through October where traffic is less?
   When school is out- mid summer
3. Please describe the location of emergency responders (fire, police, ambulance) and emergency response routes. **Fire houses on Main Street and Tinmouth Road and there are easy alternate routes**
4. Where are the schools in your community and what are their schedules? **School is on Main Street and out mid June to end of August.**
5. In the vicinity of the bridge, is there a land use pattern, existing generators of pedestrian and/or bicycle traffic, or zoning that will support development that is likely to lead to significant levels of walking and bicycling? Please explain.**No- Danby Pawlet Road is close by for any bicyclists to use**
6. Are there any businesses (including agricultural operations) that would be adversely impacted either by a detour or due to work zone proximity?
   No
7. Are there any important public buildings (town hall or community center) or community facilities (recreational fields or library) in close proximity to the proposed project?
   No
8. Are there any town highways that might be adversely impacted by traffic bypassing the construction on another local road?
   No except that Danby Pawlet Road is a Class 3, gravel road
9. Are there any other municipal operations that could be adversely impacted if the bridge is closed during construction? If yes, please explain. **No**
10. Please identify any local communication channels that are available—e.g. weekly or daily newspapers, blogs, radio, public access TV, Front Porch Forum, etc. Also include any unconventional means such as local low-power FM. **Front Porch Forum and VT News Guide**
11. Is there a local business association, chamber of commerce or other downtown group that we should be working with? **No**

Design Considerations

1. Are there any concerns with the alignment of the existing bridge? For example, if the bridge is located on a curve, has this created any problems that we should be aware of? **There is a curve there and has a history of cars running off the road at this site. Any alignment improvements would be helpful.**

2. Are there any concerns with the width of the existing bridge? **Yes- it could be widened. It is narrow.**

3. What is the current level of bicycle and pedestrian use on the bridge? **Unknown**

4. If a sidewalk or wide shoulder is present on the existing bridge, should the new structure have one? Are there existing bicycle and/or pedestrian facilities on the approaches to the bridge? **No**

5. Does the Town have plans to construct either bicycle or pedestrian facilities leading up to the bridge? Please provide a copy of the planning document that demonstrates this (e.g. scoping study, master plan, corridor study) Please explain and provide documentation. **No**

6. Does the bridge provide an important link in the town or statewide bicycle or pedestrian network such that you feel that bicycle and pedestrian traffic should be accommodated during construction? **No- there are close alternate routes**

7. Are there any special aesthetic considerations we should be aware of? **No**

8. Are there any traffic, pedestrian or bicycle safety concerns associated with the current bridge? If yes, please explain. **No**

9. Does the location have a history of flooding? If yes, please explain. **No**

10. Are you aware of any nearby Hazardous Material Sites? **No**

11. Are you aware of any historic, archeological and/or other environmental resource issues? **Unknown**

12. Are there any other comments you feel are important for us to consider that we have not mentioned yet? **No**

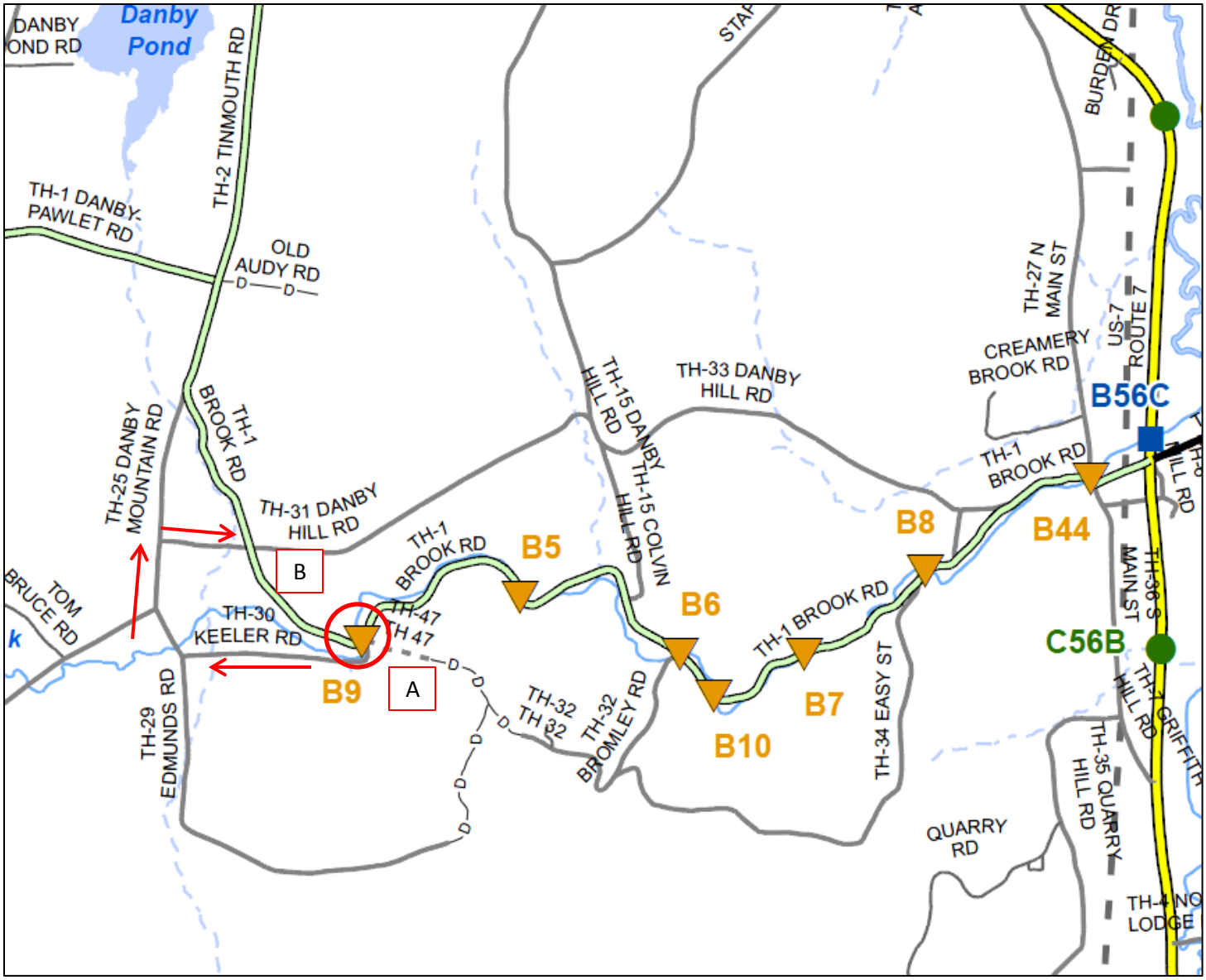
Land Use & Public Transit Considerations – to be filled out by the municipality or RPC.

1. Does your municipal land use plan reference the bridge in question? If so please provide a copy of the applicable section or sections of the plan.

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

3. Are there any existing, pending or planned development proposal that would impact future transportation patterns near the bridge? If so please explain. **No**

4. Is there any planned expansion of public transit service in the project area? If not known please contact your Regional Public Transit Provider. **No**



Possible Detour 1

Brook Road (FAS 130/TH 1), to Keeler Road, VT Route 29, Smokey House Road, back to Brook Road

A – B Through Route: 0.5 Miles
A – B Detour Route: 1.2 Miles
Added Miles: 0.7 Miles
End-End Distance: 1.7 Miles

McWILLIAM, SCOTT &
McWILLIAM, JOHN

LIVELLARA, RICHARD & JUDITH

SMOKEY HOUSE CENTER

SMOKEY HOUSE CENTER

POB STA 40+00.00

POE STA 46+08.73

PC STA 41+36.23

PT STA 45+10.79

PT STA 43+35.62

PC STA 43+61.82

PI STA 42+43.36

PI STA 44+41.47

BENCHMARK 4
RAIL ROAD SPIKE IN
ROOT OF MED PINE
ELEV. = 1256.65

BENCHMARK 15
RAIL ROAD SPIKE IN
ROOT OF MED PINE
ELEV. = 1243.44

EXISTING TOWN
RIGHT OF WAY

TH 1 (BROOK ROAD)
TO PAWLET

TH 1 (BROOK ROAD)
TO MOUNT TABOR

TH 30
(KEELER RD)

MILL BROOK
FLOW

VT STATE PLANE GRID

N

EXISTING CURVE 1
DELTA = 51°55′46″
D = 26°02′37″
R = 220.00′
T = 107.13′
L = 199.39′
E = 24.70′

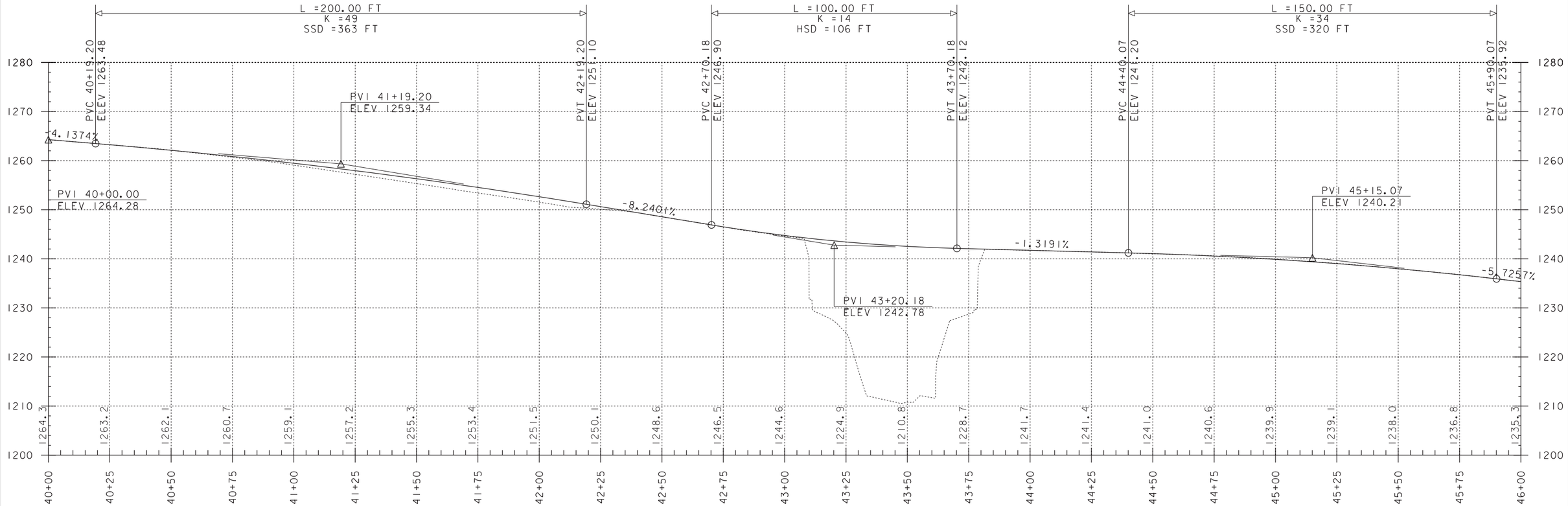
EXISTING CURVE 2
DELTA = 50°12′24″
D = 33°42′12″
R = 170.00′
T = 79.65′
L = 148.97′
E = 17.73′

EXISTING BRIDGE DATA
SINGLE SPAN CAST IN PLACE
DECK OVER ROLLED STEEL BEAMS
BUILT 1933
74 FEET LONG
24 FEEL FASCIA TO FASCIA

EXISTING CONDITIONS

SCALE 1" = 20′-0"
20 0 20

PROJECT NAME: DANBY	
PROJECT NUMBER: BF 0130(3)	
FILE NAME: 13j304/s13j304border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
EXISTING CONDITIONS	SHEET I OF II

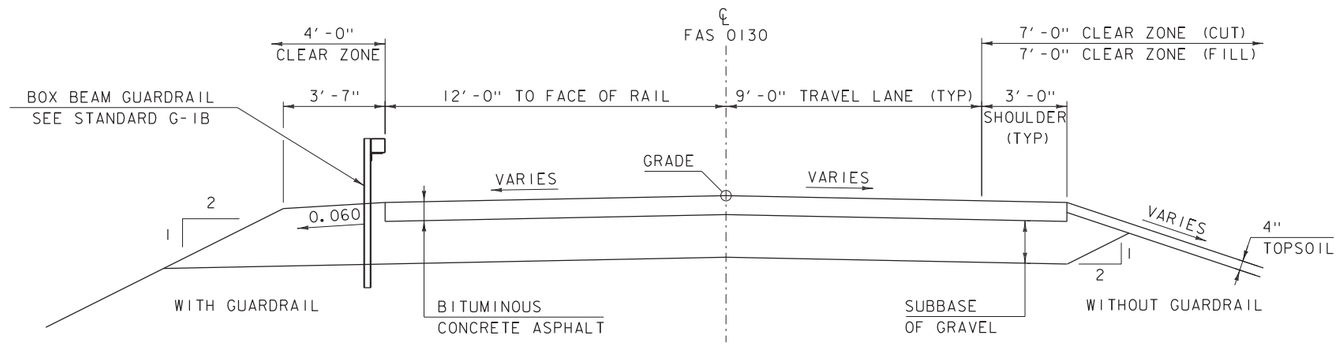


TH 1 PROFILE

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

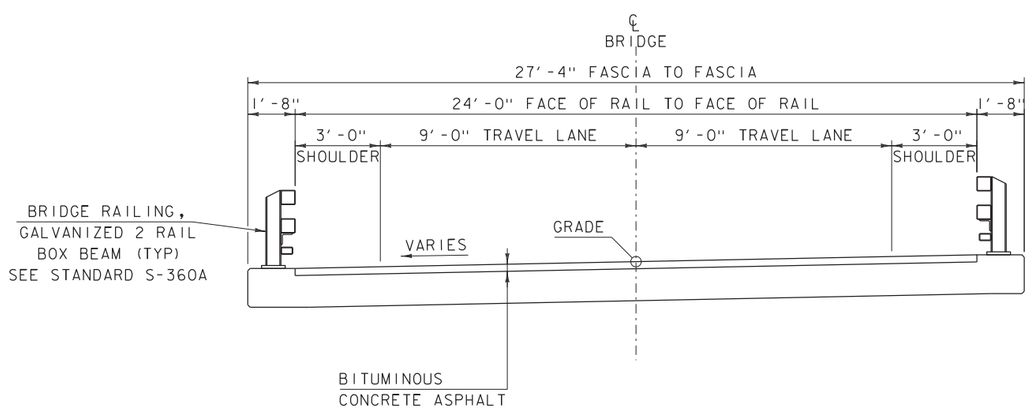
NOTE:
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄
GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: DANBY	
PROJECT NUMBER: BF 0130(3)	
FILE NAME: 13j304/s13j304profile.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PROFILE SHEET	SHEET 2 OF 11



PROPOSED FAS 0130 TYPICAL SECTION

SCALE 3/8" = 1'-0"



FLOW

PROPOSED BRIDGE TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

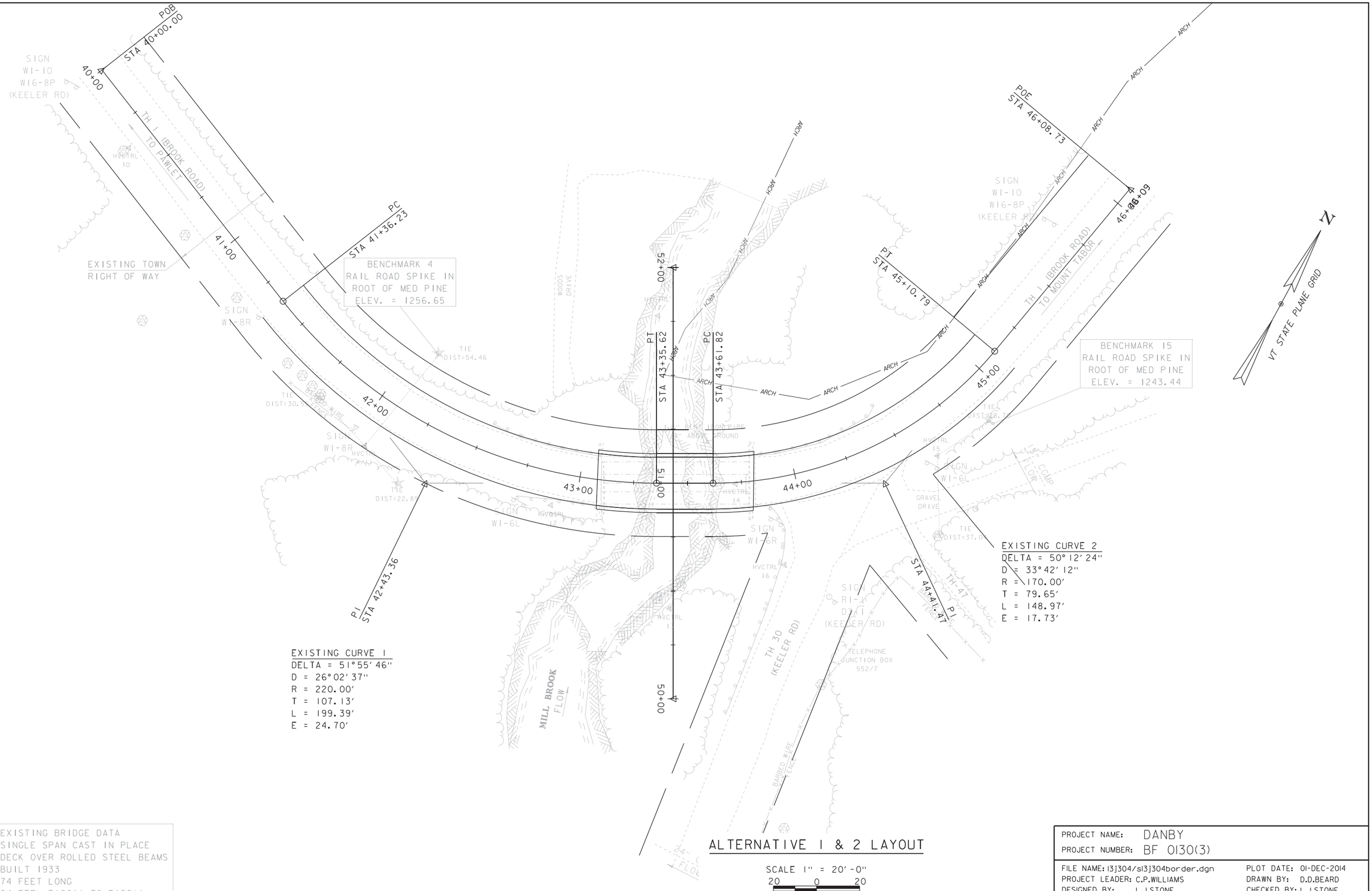
(IF USED ON PROJECT)

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

PROJECT NAME: DANBY
PROJECT NUMBER: BF 0130(3)

FILE NAME: 13j304\s13j304typical.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: L.J.STONE
TYPICAL SECTIONS

PLOT DATE: 01-DEC-2014
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 3 OF 11

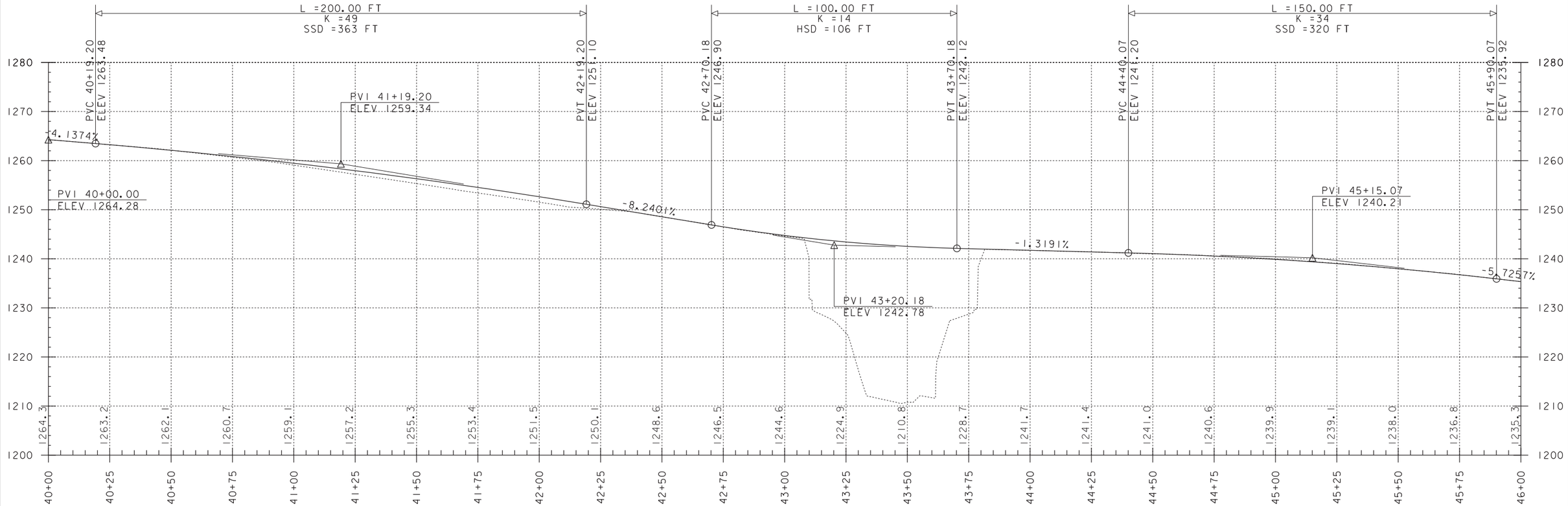


ALTERNATIVE 1 & 2 LAYOUT

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

EXISTING BRIDGE DATA
SINGLE SPAN CAST IN PLACE
DECK OVER ROLLED STEEL BEAMS
BUILT 1933
74 FEET LONG
24 FEEL FASCIA TO FASCIA

PROJECT NAME: DANBY	
PROJECT NUMBER: BF 0130(3)	
FILE NAME: 13j304/s13j304border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
ALTERNATIVE 1 & 2 LAYOUT	SHEET 4 OF 11

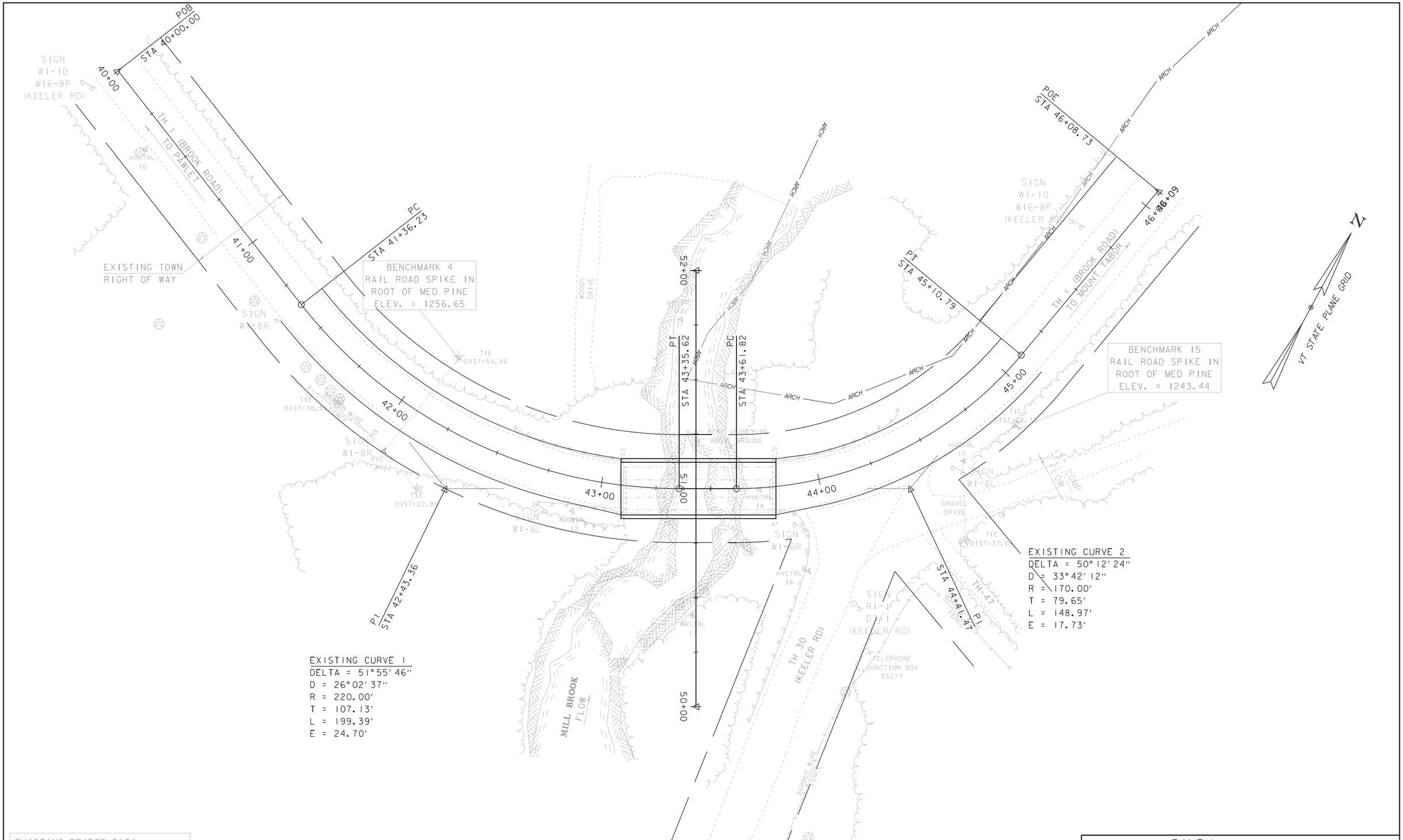


TH 1 PROFILE

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

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

PROJECT NAME: DANBY	
PROJECT NUMBER: BF 0130(3)	
FILE NAME: 13j304/s13j304profile.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PROFILE SHEET	SHEET 5 OF 11



EXISTING CURVE 1
DELTA = 51°55′46″
D = 26°02′37″
R = 220.00′
T = 107.13′
L = 199.39′
E = 24.70′

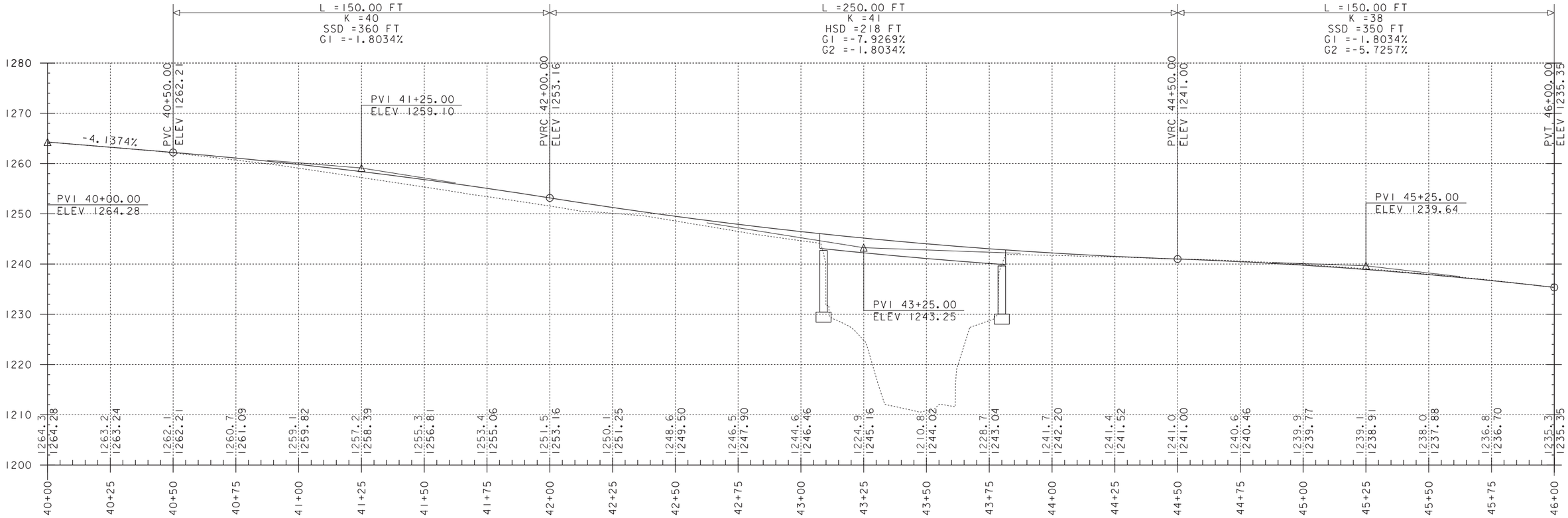
EXISTING CURVE 2
DELTA = 50°12′24″
D = 33°42′12″
R = 170.00′
T = 79.65′
L = 148.97′
E = 17.73′

EXISTING BRIDGE DATA
SINGLE SPAN CAST IN PLACE
DECK OVER ROLLED STEEL BEAMS
BUILT 1933
74 FEET LONG
24 FEEL FASCIA TO FASCIA

ALTERNATIVE 3 LAYOUT

SCALE 1" = 20′-0"
20 0 20

PROJECT NAME: DANBY	
PROJECT NUMBER: BF 0130(3)	
FILE NAME: 13j304/s13j304border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
ALTERNATIVE 3 LAYOUT	SHEET 6 OF 11

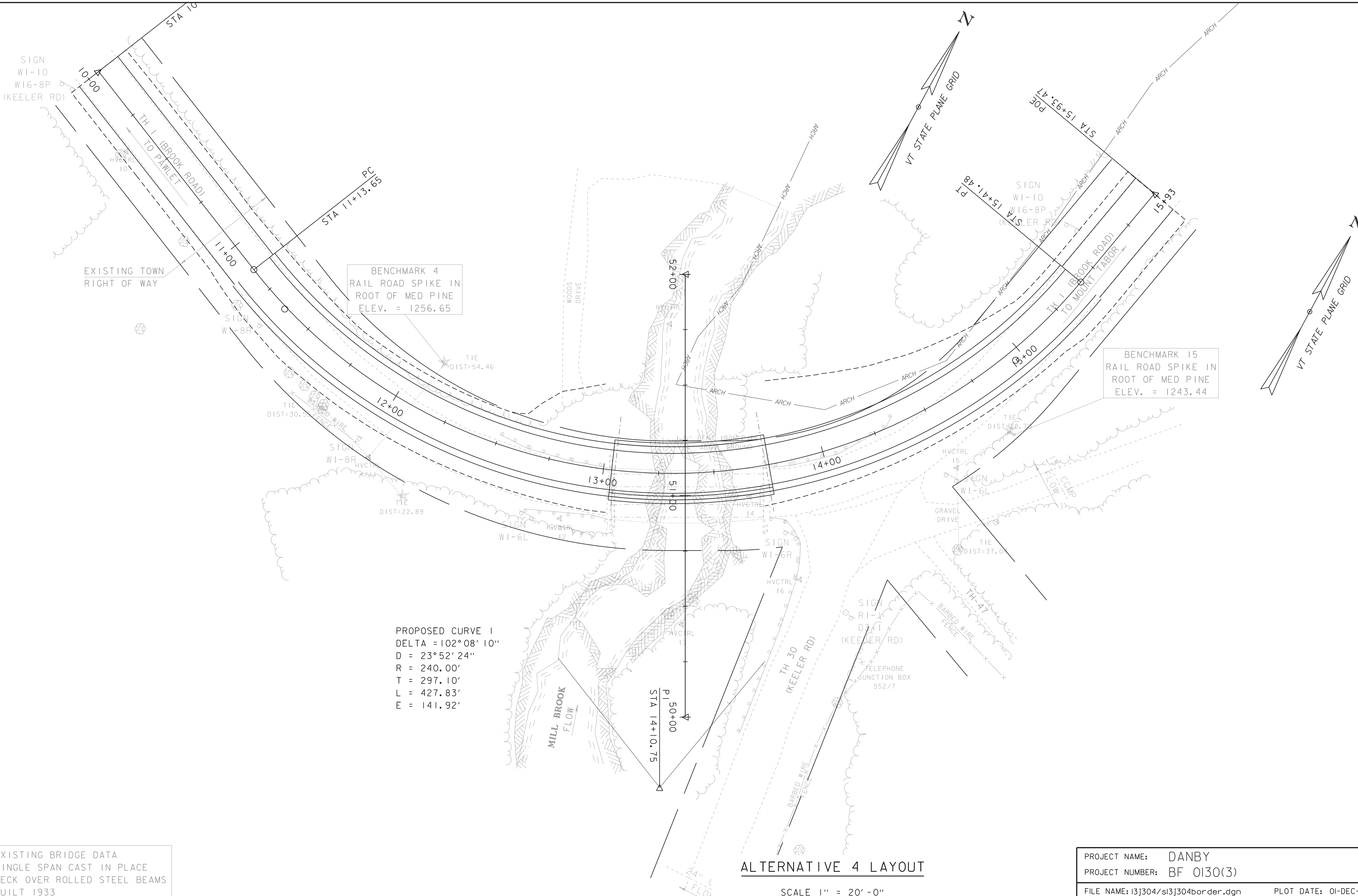


TH 1 PROFILE ALTERNATIVE 3

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

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

PROJECT NAME: DANBY	
PROJECT NUMBER: BF 0130(3)	
FILE NAME: 13j304/s13j304profile.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
ALTERNATIVE 3 PROFILE SHEET	SHEET 7 OF 11



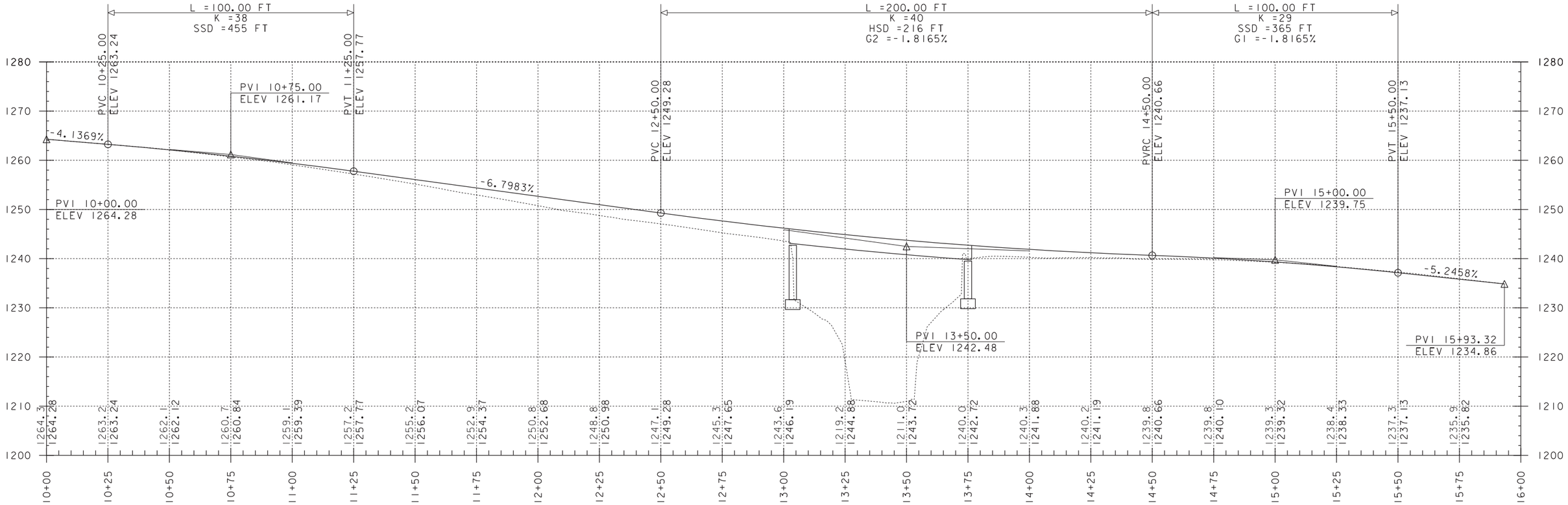
PROPOSED CURVE I
DELTA = 102°08′10″
D = 23°52′24″
R = 240.00′
T = 297.10′
L = 427.83′
E = 141.92′

EXISTING BRIDGE DATA
SINGLE SPAN CAST IN PLACE
DECK OVER ROLLED STEEL BEAMS
BUILT 1933
74 FEET LONG
24 FEEL FASCIA TO FASCIA

ALTERNATIVE 4 LAYOUT

SCALE 1" = 20′-0"
20 0 20

PROJECT NAME: DANBY	
PROJECT NUMBER: BF 0130(3)	
FILE NAME: 13j304/s13j304border.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
ALTERNATIVE 4 LAYOUT	SHEET 8 OF 11

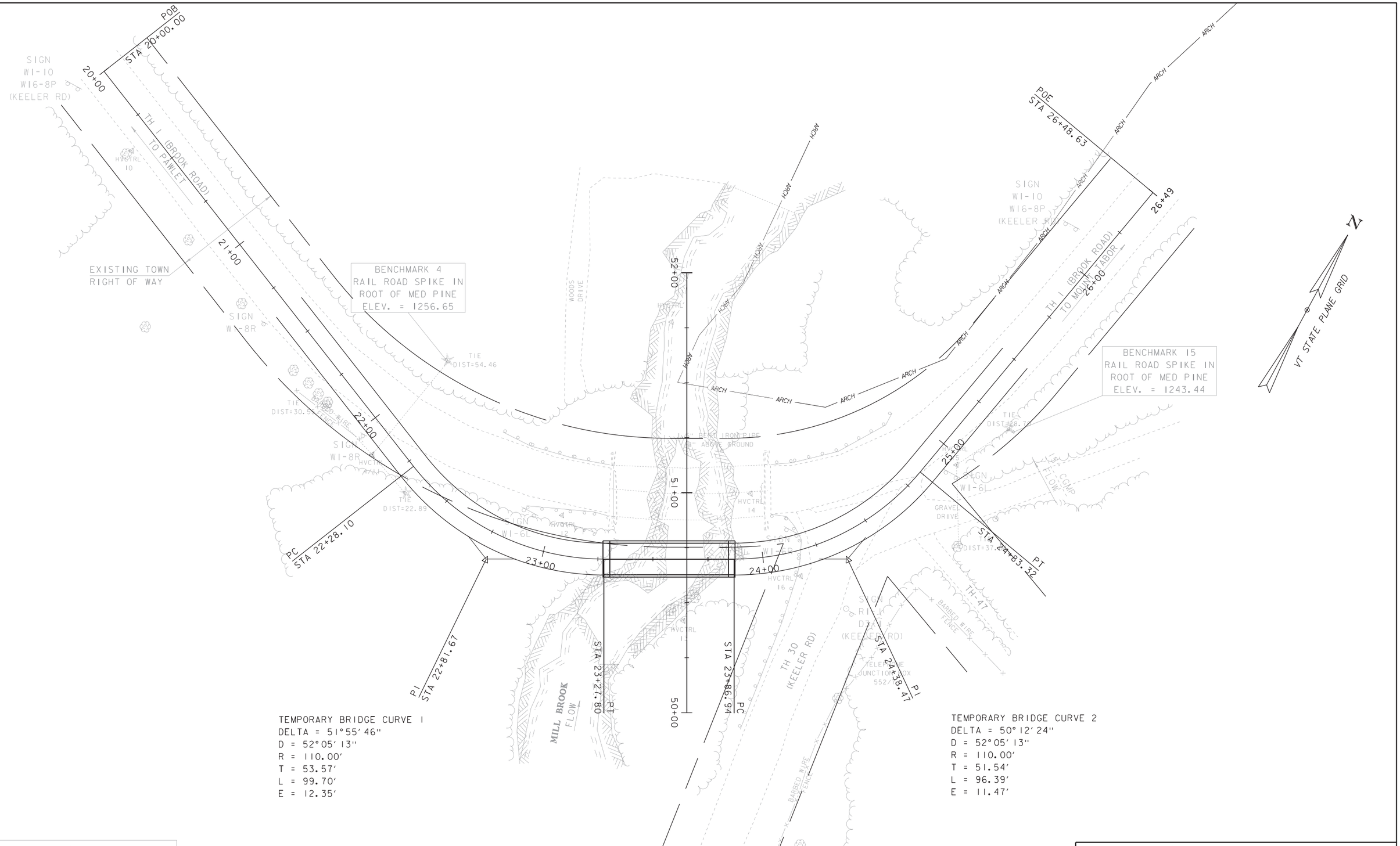


TH 1 PROFILE ALTERNATIVE 4

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

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

PROJECT NAME: DANBY	
PROJECT NUMBER: BF 0130(3)	
FILE NAME: 13j304/s13j304profile.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
ALTERNATIVE 4 PROFILE SHEET	SHEET 9 OF 11



TEMPORARY BRIDGE CURVE 1
DELTA = 51°55′46″
D = 52°05′13″
R = 110.00′
T = 53.57′
L = 99.70′
E = 12.35′

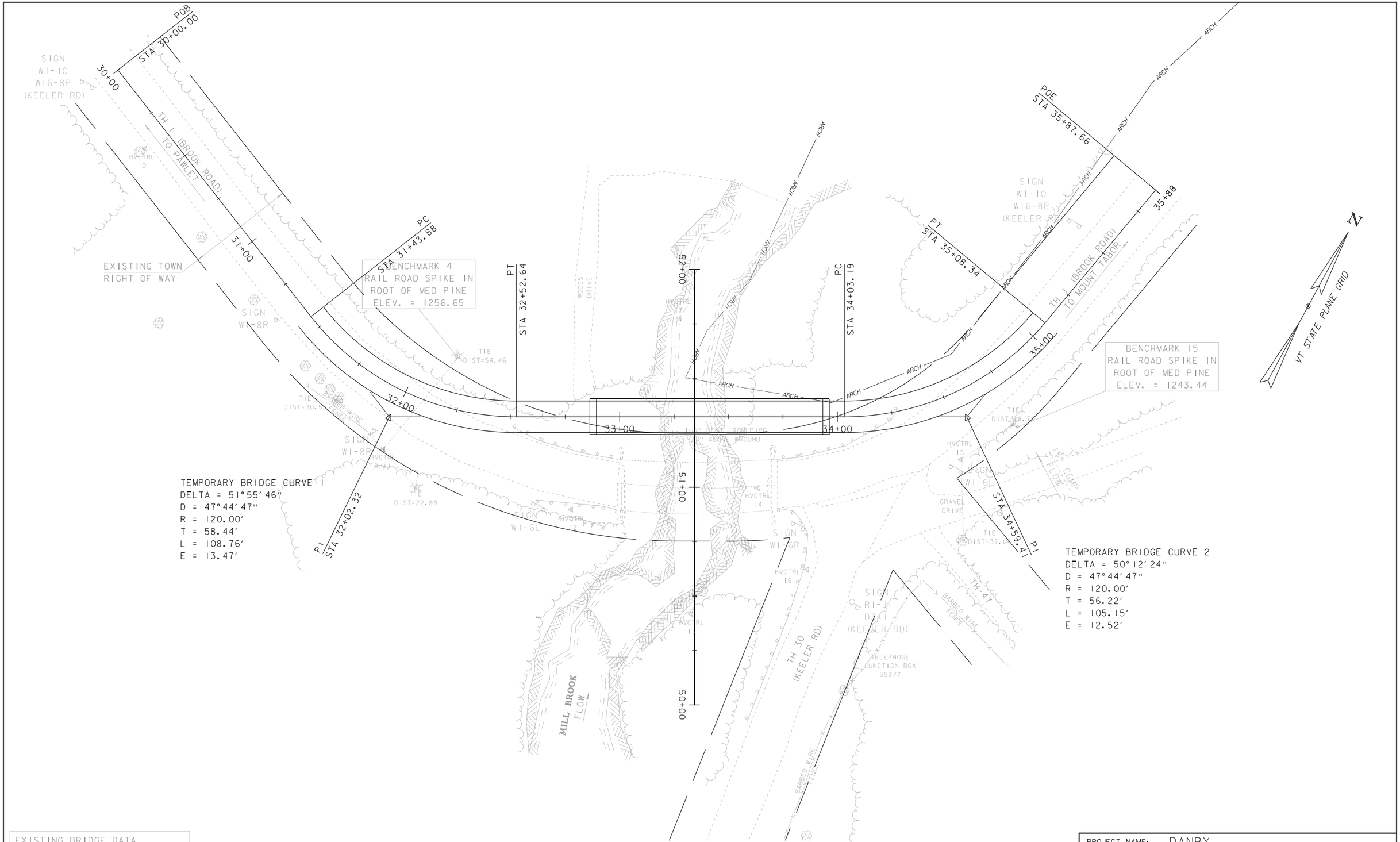
TEMPORARY BRIDGE CURVE 2
DELTA = 50°12′24″
D = 52°05′13″
R = 110.00′
T = 51.54′
L = 96.39′
E = 11.47′

EXISTING BRIDGE DATA
SINGLE SPAN CAST IN PLACE
DECK OVER ROLLED STEEL BEAMS
BUILT 1933
74 FEET LONG
24 FEEL FASCIA TO FASCIA

UPSTREAM TEMPORARY BRIDGE

SCALE 1" = 20′-0"
20 0 20

PROJECT NAME: DANBY	
PROJECT NUMBER: BF 0130(3)	
FILE NAME: 13j304/s13j304borderTempbridge.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
UPSTREAM TEMPORARY BRIDGE	SHEET 10 OF 11



EXISTING BRIDGE DATA
SINGLE SPAN CAST IN PLACE
DECK OVER ROLLED STEEL BEAMS
BUILT 1933
74 FEET LONG
24 FEEL FASCIA TO FASCIA

DOWNSTREAM TEMPORARY BRIDGE

SCALE 1" = 20′-0"
20 0 20

PROJECT NAME: DANBY	
PROJECT NUMBER: BF 0130(3)	
FILE NAME: 13j304/s13j304borderTempbridge.dgn	PLOT DATE: 01-DEC-2014
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: L.J.STONE
DOWNSTREAM TEMPORARY BRIDGE	SHEET 11 OF 11