STATE OF VERMONT
AGENCY OF TRANPORTATION

Scoping Report

FOR

Fairfield BRO 1448(41)

Town Highway 47, Bridge 46 OVER BLACK CREEK

August 21, 2012

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I. Site Information

The bridge is located on TH 47 approximately 0.05 miles west of the junction with VT 36. TH 47 is a dead end gravel road providing access to one residence as well as the Elm Brook Distillery. TH 47 crosses over the Lamoille Valley Rail Trail at the project site. 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 Local Road
Bridge Type	Open Grating Steel Deck on Rolled Beams
Bridge Length	31 feet long

Need

Bridge 46 is the only access across the Black Creek along TH 47 in this location. The following is a list of the deficiencies of Bridge 46 and TH 47 in this location.

1. The deck and substructure are in poor condition with the bridge having an overall Federal Sufficiency Rating of 18.7.

2. The original bridge and approach rail failed and the replacement bridge rail does not meet the current standard.

3. The existing bridge does not have adequate hydraulic capacity. Additionally, the existing bridge has obvious scour issues.

4. The horizontal and vertical curves of the approaches to the bridge do not meet the current standards.

Traffic

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2015 and 2035.

TRAFFIC DATA	2015	2035	2055
ADT	20	20	~
DHV	5	5	~
ADTT	5	5	~
%T	7.8	9.6	~
%D	60	60	~
FLEXIBLE ESAL	~	2015 ~ 2035	2035 ~ 2055
		4,000	8,000

Design Criteria

The design standards for this bridge project are the Vermont State Standards, dated October 22, 1997. Minimum standards are based on ADT < 25 and a design speed of 25 mph.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 6.3	8'/0' (16')	8'/0' (16')	
Bridge Lane and Shoulder Widths	VSS Section 6.6	7'/0' (14')	8'/0' (16')	Substandard
Clear Zone Distance	VSS Table 6.5		7' fill / 7' cut	
Banking			6% (max)	
Speed			25 mph (Design)	
Horizontal Alignment	AASHTO Green Book Exhibit 3-13b	R=60' and 186' , Bridge located on straight middle segment of an S-curve	R_{min}=167'	Substandard
Vertical Grade	VSS Table 6.6	(-)12.81% max	7% (max) for level terrain	Substandard
K Values for Vertical Curves	VSS Table 6.1	Bridge located on crest (K = 5), Approaches located on sag (K = 10)	20 crest / 30 sag	Substandard
Vertical Clearance Issues	VSS Section 6.7	None noted	14'-3" (min)	
Stopping Sight Distance	VSS Table 6.1	85'	150'	Substandard
Bicycle/Pedestrian Criteria	VSS Table 6.7	0' Shoulder	0' Shoulder	
Bridge Railing	Structures Design Manual Section 13	Non-Standard W-Beam Rail	TL-2	Substandard

Inspection Report Summary

Deck Rating	4 Poor
Superstructure Rating	5 Fair
Substructure Rating	4 Poor
Channel Rating	4 Poor

08/23/2010 – The deck grating throughout is in need of full replacement. The stemwall of abutment No. 2 is in need of realignment of the laid-up stones. The steel members throughout are in need of paint recoat. Please refer to Town Letter dated on 02/15/2011. ~PLB

07/02/2008 – This structure is in poor to satisfactory condition. Abutment #2 is somewhat unstable and the town should monitor the abutment after high water for any further movement. The widening of the bridge is a makeshift fix at best and doesn't add any strength to the bridge. ~DCP

Hydraulics
From preliminary hydraulics report:

Recommendations

"Based on initial discussions with the Structures Group, it was determined that the existing bridge will remain during construction and a new replacement bridge will be located off the existing alignment. There are 2 primary options for the new bridge alignment across Black Creek. One option would be to place a new bridge just upstream of the existing bridge between the existing bridge and an existing railroad bridge. The other option would be to place the replacement bridge downstream approximately 140' from the existing bridge. We reviewed both options of having a single span structure at these locations.

Based on the analysis of both possible replacement locations, it has been determined that either location could be used."

Utilities

There are overhead utility lines located at the project location. It is anticipated that these lines will not be disturbed. The existing overhead utilities are plotted on the Layout Sheet.

Right Of Way

There is an existing 3 rod Right-of-Way at the project location. All alternatives except the "Do Nothing" alternative, requires obtaining Right-of-Way. The existing Right-of-Way is plotted on the Layout Sheet.

Resources

The environmental resources present at this project are shown on the Layout Sheet.

Archaeological:

Archaeological Resources have been identified at the project site. It is anticipated that these resources will not be disturbed. The archeological resources present are mapped in the appendix.

Biological:

Wetlands

There are wetlands within the project area. Formal wetland delineation according to US Army Corps of Engineers Wetland Delineation Manual was not completed and wetlands were identified using best professional judgment for resource identification/planning purposes. The wetlands are located in all quadrants of the project except the SW. Wetlands in the project area are emergent and forested wetlands adjacent to the Black Creek. A shape file with approximate wetland boundaries is available for reference.

The Black Creek flows northerly through the project area. This river would support a variety of aquatic organisms including wild brook trout. Efforts to minimize water quality impacts during construction will need to be evaluated as the project design moves forward.

The US Corps of Engineers and the Agency of Natural Resources- Department of Environmental Conservation would regulate all activities below ordinary high water and to wetlands.

Wildlife Habitat

General Wildlife habitat exists within the surrounding area. The project area consists of agricultural lands.

There are no wildlife corridor issues within the project area.

Rare, Threatened and Endangered Species

There are no mapped rare, threatened or endangered species within the project area.

Agricultural:

There are prime agricultural soils within the project area. These soils are in the Podunk variant silt loam series.

Hazardous Materials:

According to the Vermont Agency of Natural Resources (VANR) Vermont Hazardous Sites List, there are two hazardous waste sites approximately 4,200 feet southeast of the bridge, along VT 36.

Historic:

Bridge 46 and the adjacent properties are not historic. Adjacent to project area is a former rail corridor and a historic bridge serves a current recreation path. In order to be considered a Section 4(f) resource, the trail must be on publicly owned land. At this point, I am unsure of the land ownership. If the project footprint extends across the field/wetland towards the rail bridge, then the impacts will need to be considered.

Stormwater:

The Black Creek is not listed as an impaired waterway according to the Vermont Department of Environmental Conservation, Water Quality Division.

II. Maintenance of Traffic

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

Option 1: Temporary Bridge

Initial investigations indicate that any temporary bridge should be located upstream of the existing structure. This is primarily due to the Class II wetlands located downstream of the structure. An upstream temporary structure would have the least impact to this sensitive wetland area. Based on the low traffic volumes at this site, a one-way temporary bridge is suitable. This option would require Right-of-Way acquisition resulting in a longer time before construction can begin.

Option 2: Phased Construction

This option involves constructing a portion of the new bridge next to the existing bridge, while maintaining traffic on the old bridge, and then switching traffic over to construct on the old side. During Phase 1, traffic would be reduced to one lane on half of the existing bridge, while half of the new bridge is built. During Phase 2, traffic would be re-routed onto the newly built section while the other half of the new bridge is built.

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 14 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.

Option 3: New Bridge off Alignment

This option involves building a completely new structure that is not on the existing alignment. This would allow traffic to be maintained on the existing bridge during the construction period. After the new bridge is constructed, the existing bridge is then removed.

The existing bridge has a substandard horizontal alignment. This option provides a great opportunity to realign the bridge at a reasonable cost. This option eliminates the need for a temporary bridge, which reduces costs. As with the temporary bridge option, constructing a new bridge off alignment would have project impacts outside of the Right-of-Way. Placement of the new bridge should be chosen carefully to minimize these impacts. This option would require Right-of-Way acquisition resulting in a longer time before construction can begin.

Option 4: Bridge Closure

The bridge is located on a dead end road; therefore, no detour route is available. At the discretion of the Town of Fairfield, the road may be closed during a portion of construction. This option

would be the least expensive and have the least impacts to the surrounding resources. If the Town chooses to close the road, the local share of funds would drop by 50%. A temporary bridge would not have to be purchased, and the Right-of-Way process would be avoided. Elm Brook Distillery is located on TH 47, and closing the road may have a disruption to business during the closure. The dates of the closure could be chosen by the property owner to minimize this disruption. Depending on the type of bridge chosen, a road closure would vary from approximately 3 days to 3 weeks.

III. Alternatives Discussion

The existing bridge is in a poor to fair condition. The horizontal alignment of the bridge approach is extremely poor. The bridge is located on the straight middle segment of an S-curve. The radius on one end is 60 feet, which is significantly substandard. Additionally, all flows, including the Q_{10} event, do not pass through the existing structure.

No Action

This alternative is not recommended. The deck and substructure are both rated poorly, and should be replaced in the near future. Additionally, the structure is not adequate hydraulically. This issue also needs to be addressed. Although the bridge is not in imminent danger of collapse, it will eventually be posted for lower traffic loads. In the interest of safety to the traveling public, the No Action alternative is not recommended.

Alternative 1: Superstructure Replacement

This alternative involves the replacement of the existing superstructure. A precast superstructure with a relatively low profile, such as box beams, would be chosen in order to provide the maximum hydraulic opening possible. The existing laid up stone abutments would remain in place for soil retention, and precast slabs would be placed behind the abutments. The new superstructure would then sit on the slabs. This bridge would have a design life of 30 years. Some form of scour mitigation will likely be required. The extent of this mitigation and whether or not it will be included in this project scope is unknown. Since this alternative would utilize a bridge closure, the town share of funds would be reduced to 5%. The existing approach geometry would remain the same for this option.

Alternative 2-4: New Structure on Existing Alignment

This option would involve constructing a new bridge on the existing alignment. This option will not have permanent impacts to the surrounding site.

This option would be a brand new bridge that addresses the current structural deficiencies of the existing bridge. Additionally, the new bridge would meet current geometric standards in regards to width. The substandard horizontal geometry of the approaches would remain the same for this alternative. In order to keep the bridge off of a horizontal curve, the new bridge would have a span of approximately 42 feet to 55 feet, depending on which option is chosen. A superstructure type with a shallow profile should be chosen for this option, to provide for a larger hydraulic capacity. The existing structure has an obvious scour issue. Thus, lining the channel at the bridge location with Type III or Type IV stone would be mandatory for scour protection.

Either a temporary bridge or a road closure would be appropriate measures for traffic control at this site. If the road is closed during construction, the local share of funds will be reduced by 50%. If a road closure is desired by the town, there are a couple options which utilize rapid bridge construction techniques, and will offer different closure periods:

a) *Integral Abutment Anchored into Bedrock*
This option would involve a precast superstructure with a span length of 55 feet, with precast pile caps on a single row piles for each abutment. It would take one to two days to bore into bedrock and drive piles for each row. The road closure for this option would be approximately 9am to 5pm daily for one to two weeks while driving piles and setting the pile caps, and then for a full 48 hours to set the superstructure. This is the more expensive, but also the least disruptive to traffic, of the closure options. This option would not have impacts to the surrounding environmental resources and would not require any right-of-way acquisition. Additionally, this option would provide a bridge that would have enough hydraulic capacity for the Q_{25} event.

b) *Spread Footings Founded on Bedrock*
This option would include a precast superstructure with a span length of 42 feet, on cast-in-place concrete footings. The closure period for this option would be approximately three weeks, with no access during that time. This is the least expensive of the 80 year design life bridge options with a closure, but has the longest bridge closure duration. Additionally, this bridge would not have enough hydraulic capacity for the Q_{25} event. This option would not have impacts to the surrounding environmental resources and would not require any right-of-way acquisition.

Alternative 5: New Structure off Alignment
The existing bridge has a substandard horizontal and vertical alignment. This option provides a great opportunity to realign the bridge. This project site is a good candidate for the realignment option, since the surrounding land is relatively flat. Thus, the roadway of a new alignment would not require a huge amount of fill.

Hydraulics has identified two proposed options for an improved alignment; an upstream option, and a downstream option. Placement of the new bridge should be chosen carefully to minimize impacts to identified resources. Whichever option is chosen, Right-of-Way will need to be acquired, resulting in a longer time before construction can begin.

Downstream Option: This option would involve constructing a new bridge approximately 140 feet downstream of the existing bridge, while maintaining traffic on the existing bridge. This option would require Right-of-Way acquisition, which would be very costly. Additionally, this option would have large impacts to Class II wetlands located downstream of the existing bridge, and therefore will not be considered any further. See the attached existing conditions map in the appendices for a plot of the wetlands present at the project location.

Upstream Option: This option would involve constructing a new bridge approximately 50 feet upstream of the existing bridge, while maintaining traffic on the existing bridge. This alternative would improve the alignment of TH 47 by eliminating the sharp curve in the section of roadway after the bridge. It would also allow for the building of the new structure while allowing traffic to utilize the existing structure, eliminating any need for a temporary bridge, or a bridge closure. Hydraulics has identified a number of benefits of the upstream alignment option versus the downstream alignment. Utilizing the upstream alignment, the west abutment, as well as the upstream wingwall, would be able to be tied into existing bedrock, which would provide better scour protection. Additionally, the clear span structure length would be slightly less, and the amount of fill required constructing the bridge approaches would also be less. The upstream

option would not have significant impact to the class II wetlands located at the project site, as well as require less Right-of-Way acquisition.

The project limits of the off alignment option will be farther out than those of the on alignment option. This will create greater costs, due to an increase in materials. Additionally, this means that the impacts will be greater. After a discussion with the Railroad Section, it was determined that the upstream re-alignment would result in the intersection of TH 47 and the rail corridor to have a substandard sight distance. Although the railroad is currently being used as a recreational path, The Lamoille Valley Rail Trail, it is possible that it could be converted back into an operational railway. If this were the case, it would be ideal for TH 47 to intersect the rail corridor as perpendicular as possible, for sight distance. The re-alignment option would put TH 47 at a skew to the rail trail. Thus, a more detailed analysis by the Vermont Agency of Transportations Railroad Section would need to be undertaken if this option were chosen.

IV. Alternatives Summary

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

Alternative 1: Superstructure Replacement with a 55 foot span precast structure and a 72 hour traffic closure. The Alignment of the bridge and approaches are substandard, and would remain the same. The new superstructure will rest on precast slabs, and the existing abutments would remain in place for soil retention. Since the channel constriction would not be improved, the Bridge would still be overtopped at all flows including Q_{10}. Some form of scour mitigation would be needed for this alternative.

Alternative 2: Three week bridge closure with a precast 42 foot span superstructure and cast-in-place spread footings. The alignment of the approaches is substandard, and would remain the same. This option would slightly improve the hydraulic opening, but would still not provide adequate hydraulic capacity for the Q_{25} event.

Alternative 3: Dailey 9am to 5pm bridge closures leading up to a continuous 48 hour bridge closure, with a precast 55 foot span superstructure and precast integral abutment caps with piles anchored into bedrock. This option would improve the hydraulic opening, and have adequate hydraulic capacity for the Q_{25} event.

Alternative 4: Conventional 42 foot span bridge on existing alignment with a temporary bridge to maintain traffic throughout construction. The alignment of the approaches is substandard, and would remain the same. This option would require right-of-way acquisition.

Alternation 5: New bridge off alignment with traffic maintained on the existing bridge. In order to meet current geometric standards, the new bridge would be a 66 foot span curved girder bridge upstream from the existing bridge. This option would have small impacts to surrounding class II wetlands.

V. Cost Matrix

Fairfield BRO 1448(41)		Do Nothing	Alt 1 Superstructure Replacement	Alt 2 Rapid Bridge with cast in place spread footings	Alt 3 Rapid Bridge with Integral Abutment Anchored into Bedrock	Alt 4 New Bridge On Alignment w/ Temporary Bridge	Alt 5 New Bridge Off Alignment
COST	Bridge	$0	$138,200	$201,600	$264,000	$201,600	$374,400
	Removal of Structure	$0	$7,000	$25,000	$25,000	$25,000	$25,000
	Channel Work	$0	$8,000	$22,000	$8,000	$8,000	$8,000
	Roadway	$0	$27,581	$35,825	$35,825	$58,881	$197,200
	Erosion Control	$0	$20,000	$20,000	$20,000	$30,000	$30,000
	Temporary Bridge	$0	$0	$0	$0	$75,000	$0
	Total Construction Costs	$0	$200,781	$304,425	$352,825	$398,481	$634,600
	Construction Duration		3 months, with 3 day closure	6 months, with 3 week closure	6 months, with 2 weeks of daily closures followed by a 3 day closure	18 months	12 months
	Preliminary Engineering[1]	**$0**	**$70,273**	**$91,328**	**$88,206**	**$99,620**	**$126,920**
	Right of Way	**$0**	**$0**	**$0**	**$0**	**$35,863**	**$82,498**
	Construction Costs + Construction Engineering + Contingencies	**$0**	**$261,016**	**$395,753**	**$458,673**	**$518,026**	**$824,980**
	Total Cost	$0	$331,289	$487,080	$546,879	$653,509	$1,034,398
	Project Development Duration		1 year	2 years	2 years	3 years	3 years
	Total Costs	$0	$331,289	$487,080	$546,879	$653,509	$1,034,398
	Premium				12.28%	34.17%	112.4%
TOWN SHARE	Town Share		$16,564 (5%[2])	$24,354 (5%)	$27,344 (5%)	$65,351 (10%)	$103,440 (10%)
	Design Life		30 Years	80 Years	80 Years	80 Years	80 Years
	Town Cost per Year		$552	$304	$342	$817	$1,293
ENGINEERING	Typical Section - Roadway (feet)	16'	16'	16'	16'	16'	16'
	Typical Section - Bridge (feet)	0 - 7 - 7 - 0	0 - 8 - 8 - 0	0 - 8 - 8 - 0	0 - 8 - 8 - 0	0 - 8 - 8 - 0	0 - 8 - 8 - 0
	Geometric Design Criteria	Substandard	Substandard	Substandard	Substandard	Substandard	Meets Criteria
	Traffic Safety	No Change	Slightly Improved	Slightly Improved	Slightly Improved	Slightly Improved	Improved
	Alignment Change	No	No	No	No	No	Yes
	Bicycle Access	No Change	No Change	No Change	No Change	No Change	No Change
	Hydraulic Performance	No Change	Slightly Improved	Slightly Improved	Improved	Slightly Improved	Improved
	Pedestrian Access	No Change	No Change	No Change	No Change	No Change	No Change
	Utility	No Change	No	No	No	No	No
OTHER	ROW Acquisition	No	No	No	No	Yes	Yes
	Road Closure	No	Yes	Yes	Yes	No	No

[1] Preliminary Engineering costs are estimated from the end of the Scoping phase.
[2] Possible reduction to 2.5% town share pending interpretation of Act 153

VI. Conclusion

The option to reconstruct the bridge on alignment utilizing rapid bridge construction techniques is recommended. Of these alternatives, the integral abutment anchored into bedrock is the best choice. This is the least expensive bridge, with an 80 year design life, that will have hydraulic capacity for the Q_{25} event. Since the existing bridge is scour critical, it is important that a new bridge have adequate hydraulic capacity, and that the new channel be armored with Type III or IV stone for scour protection.

This option will not have permanent impacts to surrounding environmental resources and will not require Right-of-Way acquisition. Since this bridge provides access to only one residence, it is reasonable to close the road to traffic for a portion of the construction time. By not providing a temporary bridge, both the project development time and the project cost are significantly reduced. Of the bridges with an 80 year design life, the integral abutment option will have the shortest duration closure.

The project limits should be kept as close to the bridge as possible, in order to avoid disturbing the bridge approaches. Since the bridge approaches will not be disturbed, a design exception for their substandard geometry will not be needed. The bridge should be raised approximately 3 inches to provide greater hydraulic capacity, and a precast superstructure type that is relatively shallow should be chosen.

VII. Appendices

- Site Pictures
- Town Map
- Bridge Inspection Report
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources Memo
- Archeology Memo
- Historic Memo
- Stormwater Memo
- Resource ID Completion Memo
- Plans
    - Proposal
        - Typical Sections
        - Existing Conditions Layout
        - Alternative 1 – 5 Layouts
        - Downstream Layout
        - Profile

Eastbound Approach

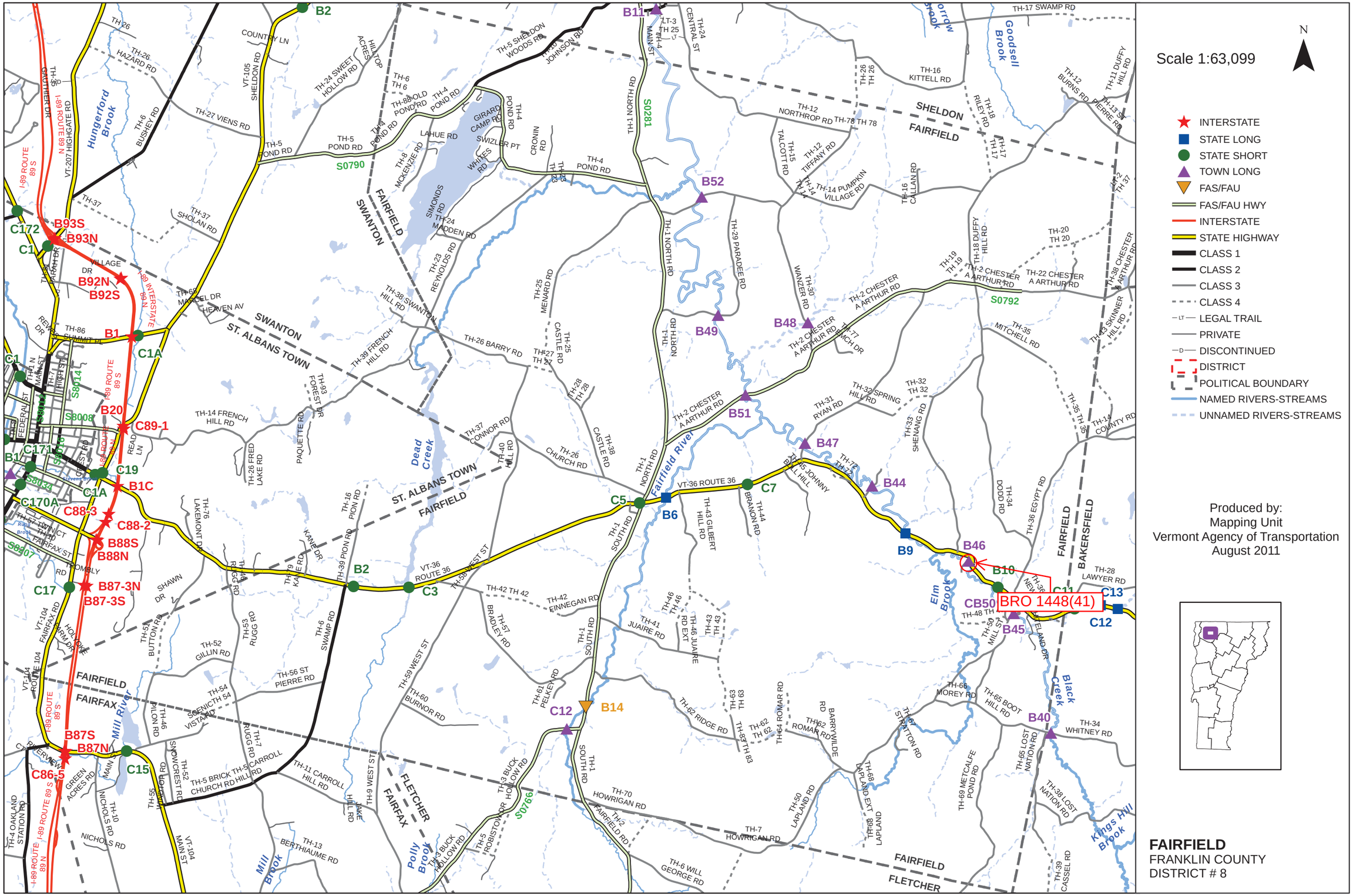
Looking West After Bridge

Looking Downstream

Looking Upstream (@ Rail Trail Bridge)

Laid up Stone West Abutment

Upstream Bridge Fascia


Scale 1:63,099
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
BRO 1448(41)
FAIRFIELD
FRANKLIN COUNTY
DISTRICT # 8
SHELDON
FAIRFIELD
SWANTON
ST. ALBANS TOWN
FAIRFAX
FLETCHER
BAKERSFIELD
Hungerford Brook
Fairfield River
Dead Creek
Mill River
Elm Brook
Black Creek
Kings Hill Brook
Polly Brook
Mill Brook
Goodsell Brook
B2
B11
B52
B49
B48
B51
B47
B44
B9
B46
B10
CB50
B45
B40
B6
C5
C7
C3
C11
C13
C12
B14
C15
B87N
B87S
C86-5
C17
B87-3N
B87-3S
C88-2
C88-3
B88S
B88N
C19
B1C
C1A
C170A
C171
B1
C1
C20
B20
C89-1
B1
C1A
B92N
B92S
B93S
B93N
C172
C1
S0790
S0281
S0792
S0766
VT-36 ROUTE 36
I-89 ROUTE 89 N
I-89 ROUTE 89 S
I-89 INTERSTATE 89 N
VT-207 HIGHGATE RD
VT-104 FAIRFAX RD
VT-105 SHELDON RD
TH-1 NORTH RD
TH-1 SOUTH RD
TH-2 CHESTER A ARTHUR RD
TH-4 POND RD
TH-5 POND RD
TH-6 BUSHEY RD
TH-26 HAZARD RD
TH-27 VIENS RD
TH-37 SHOLAN RD
TH-38 SWANTON HILL RD
TH-39 FRENCH HILL RD
TH-14 FRENCH HILL RD
TH-26 BARRY RD
TH-37 CONNOR RD
TH-42 FINNEGAN RD
TH-42 TH 42
TH-59 WEST ST
TH-70 HOWRIGAN RD
TH-7 HOWRIGAN RD
TH-6 WILL GEORGE RD
TH-2 FAIRFIELD RD
TH-11 CARROLL HILL RD
TH-5 BRICK CHURCH RD
TH-9 WEST ST
TH-13 BERTHIAUME RD
TH-10 NICHOLS RD
TH-4 OAKLAND STATION RD
TH-55 VT-104 MAIN ST
TH-52 SNOWCREST RD
TH-54 SENECHTH 54 VISTA RD
TH-52 GILLIN RD
TH-56 ST PIERRE RD
TH-53 RUGG RD
TH-46 PILON RD
TH-51 BUTTON RD
TH-76 LAKEMONT DR
TH-6 SWAMP RD
TH-16 PION RD
TH-38 PION RD
TH-49 KANE RD
TH-46 RUGG RD
TH-26 FRED LAKE RD
TH-93 FOREST DR
PAQUETTE RD
TH-40 HILL RD
TH-26 CHURCH RD
TH-38 CASTLE RD
TH-28 TH 28
TH-27 TH 27
TH-25 CASTLE RD
TH-25 MENARD RD
TH-23 REYNOLDS RD
TH-24 MADDEN RD
TH-8 MCKENZIE RD
LAHUE RD
GIRARD CAMP RD
SWIZLER PT
WHITES RD
CRONIN RD
SIMONDS RD
TH-5 SHELDON WOODS RD
TH-10 JOHNSON RD
TH-24 SWEET HOLLOW RD
HILLTOP ACRES
TH-6 TH 6
TH-88 OLD POND RD
COUNTRY LN
TH-26 HAZARD RD
TH-35 GAUTHIER DR
TH-68 MARCEL DR
HEAVEN AV
VILLAGE DR
TH-86 SUMMIT PL
TH-7 HIGH ST
TH-1 N MAIN ST
TH-57 TWIN CT
TH-10 FAIRFAX ST
TROMBLY RD
SHAWN DR
HOLYOKE FARM DR
GREEN ACRES RD
NICHOLS RD
READ LN
TH-24 TH 24
TH-24 CENTRAL ST
TH-1 NORTH RD
TH-4 MAIN ST
LT-3 TH 25
TH-29 PARADEE RD
TH-30 WANZER RD
TH-19 TH 19
TH-18 DUFFY HILL RD
TH-20 TH 20
TH-22 CHESTER A ARTHUR RD
TH-38 CHESTER A ARTHUR RD
TH-13 SKINNER HILL RD
TH-35 MITCHELL RD
TH-32 SPRING HILL RD
TH-32 TH 32
TH-31 RYAN RD
TH-33 SHENANG RD
TH-35 TH 35
TH-14 COUNTY RD
TH-36 EGYPT RD
TH-34 DODD RD
TH-45 JOHNNY BULL HILL
TH-72 TH 72
TH-44 BRANON RD
TH-43 GILBERT HILL RD
TH-41 JUAIRE RD
TH-46 JUAIRE RD EXT
TH-46 TH 46
TH-43 TH 43
TH-63 TH 63
TH-83 TH 83
TH-62 TH 62
TH-62 RIDGE RD
TH-64 ROMAR RD
TH-62 ROMAR RD
BARRYWILDE RD
TH-67 STRATTON RD
TH-68 LAPLAND EXT
TH-68 LAPLAND
TH-50 LAPLAND RD
TH-69 METCALFE POND RD
TH-66 MOREY RD
TH-65 BOOT HILL RD
TH-34 WHITNEY RD
TH-65 LOST NATION RD
TH-38 LOST NATION RD
TH-39 CASSEL RD
TH-28 LAWYER RD
TH-48 TH
TH-50 MILL ST
TH-12 BURNS RD
TH-11 DUFFY HILL RD
TH-13 ST PIERRE RD
TH-18 RILEY RD
TH-17 TH 17
TH-17 SWAMP RD
TH-16 KITTELL RD
TH-12 NORTHROP RD
TH-78 TH 78
TH-15 TALCOTT RD
TH-12 TIFFANY RD
TH-14 PUMPKIN VILLAGE RD
TH-16 CALLAN RD
TH-2 TH 37
TH-61 PELKEY RD
TH-60 BURNOR RD
TH-57 BRADLEY RD
TH-53 BUCK HOLLOW RD
TH-5 ROBISTOW DR
TH-5 BUCK HOLLOW RD
TH-3 BUCK HOLLOW RD
TH-7 RUGG RD
TH-54 TH 54
TH-5 CARROLL
TH-52 TH 52
TH-55 TH 55
TH-4 OAKLAND STATION RD
Mill River
Mill Brook
Polly Brook
Dead Creek
Fairfield River
Elm Brook
Black Creek
Kings Hill Brook
Goodsell Brook
Hungerford Brook
FAIRFIELD
SWANTON
ST. ALBANS TOWN
FAIRFAX
FLETCHER
BAKERSFIELD
SHELDON
FAIRFIELD
FLETCHER

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for FAIRFIELD **bridge no.:** 00046 **District:** 8

Located on: C3047 **over** BLACK CREEK **approximately** 0.05 MI TO VT W VT36 **Owner:** 03 TOWN-OWNED

CONDITION

Deck Rating: 4 POOR

Superstructure Rating: 5 FAIR

Substructure Rating: 4 POOR

Channel Rating: 4 POOR

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 100605004606051

Federal Sufficiency Rating: 18.7

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1919 **Year Reconstructed:** 0000

Service On: 1 HIGHWAY

Service Under: 5 WATERWAY

Lanes On the Structure: 01

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 99

ADT: 000010 **% Truck ADT:** 02

Year of ADT: 2008

GEOMETRIC DATA

Length of Maximum Span (ft): 0031

Structure Length (ft): 000035

Lt Curb/Sidewalk Width (ft): 0

Rt Curb/Sidewalk Width (ft): 0

Bridge Rdwy Width Curb-to-Curb (ft): 13.7

Deck Width Out-to-Out (ft): 14

Appr. Roadway Width (ft): 016

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: 3 OPEN GRATING

Type of Wearing Surface: 9 NONE

Type of Membrane 0 NONE

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 0 DOES NOT MEET CURRENT STANDARD

Transitions: 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail: 0 DOES NOT MEET CURRENT STANDARD

Approach Guardrail Ends: 0 DOES NOT MEET CURRENT STANDARD

Structural Evaluation: 4 MEETS MINIMUM TOLERABLE CRITERIA

Deck Geometry: 5 BETTER THAN MINIMUM TOLERABLE CRITERIA

Underclearances Vertical and Horizontal: N NOT APPLICABLE

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

Approach Roadway Alignment: 3 INTOLERABLE, CORRECTIVE ACTION NEEDED

Scour Critical Bridges: 2 SCOUR CRITICAL - IMMEDIATE ACTION REQUIR

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: 0 OTHER OR UNKNOWN

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 082010 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

08/23/10 The deck grating throughout is in need of full replacement. The stemwall of abutment No.2 is in need of realignment of the laid-up stones. The steel members throughout are in need of paint recoat. Please refer to Town Letter dated on 02/15/2011. PLB

7/02/08 This structure is in poor to satisfactory condition. Abutment #2 is some what unstable and the town should monitor the abutment after high water for any further movement. The widening of the bridge id a make shift fix at best and doesn't add any strength to the bridge. DCP

VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION

HYDRAULICS UNIT

TO: Chris Williams, Structures Project Manager

FROM: Brian Bennett, Hydraulics Project Engineer (McFarland Johnson)
via Nick Wark, VTrans Hydraulic Engineer

DATE: April 25, 2012

SUBJECT: FAIRFIELD 1448(41) - TH 47 Bridge 46 over Black Creek

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

Existing Bridge Information

The existing bridge was originally constructed in 1919 based on available information. The bridge is single-lane having an approximate width of 14 feet, owned by the Town and services a "dead end" road. It is single span rolled beam bridge with open grated steel decking. The clear span between abutments is approximately 27 feet. The abutments are vertical dry laid stone masonry. The west abutment has a concrete cap on top of the stone masonry. The structure is perpendicular across a relatively straight section of Black Creek between two large bends in the stream. Also, there is an old Railroad (Rails-to-Trails) bridge located immediately upstream and does not appear to have any major affect on the TH 47 bridge.

All flows, including even the Q_{10} event, do not pass through the existing structure. Therefore, the existing bridge does not have adequate hydraulic capacity based on our review. The existing bridge has obvious scour issues, as evidenced by the scour hole just downstream of the structure based on the field survey and field observation. We did not evaluate the existing bridge for scour as part of the preliminary design, but intend on performing an analysis during final design for the proposed configuration of the replacement bridge.

Recommendations

Based on initial discussions with the Structures Group, it was determined that the existing bridge will remain during construction and a new replacement bridge will be located off the existing alignment. There are 2 primary options for the new bridge alignment across Black Creek. One option would be to place a new bridge just upstream of the existing bridge between the existing bridge and an existing railroad bridge. The other option would be to place the replacement bridge downstream approximately 140' from the existing bridge (see attached sketches). We reviewed both options of having a single span structure at these locations. It has been assumed all replacement options will have a wider bridge deck (i.e. 20'± wide) since the existing deck width appears to be too narrow.

Based on the analysis of both possible replacement locations, it has been determined that either location could be used. In the upstream location, a 55-foot clear span bridge with a low chord elevation above 367.6 feet will provide adequate hydraulic capacity for the Q_{25} event. Whereas in the downstream location, a 60-foot clear span bridge with a low chord elevation above 368 feet will provide adequate hydraulic capacity for the Q_{25} event.

However, the upstream location appears to provide some other benefits, such as being able to tie the

west abutment into existing bedrock and extend the upstream wing wall to also tie into the existing bedrock which will provide better scour protection. Also, the clear span structure length is less (55 feet compared to 60 feet) and the amount of fill required to construct the bridge approaches would also be less. Another hydraulic benefit is that the relocation of the structure upstream is that the existing left overbank downstream will remain open and not translate the new embankment further downstream and potentially having flood stages closer to VT 36 during very large storm events (i.e. Q_{100} and Q_{500}).

Therefore, we would recommend that the preferable replacement location be the 55-foot single span bridge located approximately 50 feet upstream of the existing TH 47 bridge.

As noted above, scour was not reviewed at this time for either of the options, but will definitely need to be investigated during final hydraulic design. However based on the velocities from the analyses, it is anticipated that Type 3 or 4 Stone Fill will be necessary for armoring the channel banks near the replacement structure.

Temporary Bridge
The existing bridge will be maintained and used during the construction of the new bridge.

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

BMB
cc: Hydraulics Project File via NJW
Hydraulics Chrono File

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Chris Williams, Project Manager, Structures

CEE CCB

From: Callie Ewald, Geotechnical Engineer, via Christopher C. Benda, P.E., Soils and Foundations Engineer

Date: April 25th, 2012

Subject: Fairfield BRO 1448(41) – TH 47, BR 46 Preliminary Geotechnical Information

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 TH 47 (Elm Brook Rd) crossing over the Black Creek in Fairfield, Vermont. This review included our in-house bridge boring files, record plans, USDA Natural Resources Conservation soil survey records, surficial geology and bedrock maps of the State and the Agency of Natural Resources Well logs.

Figure 1, USDA Soil Survey Data near Bridge 15

Based on subsurface information reported by well drilling reports on file at ANR and the USDA web soil survey, the surficial geology in the vicinity of the subject area is expected to consist of a

mixture of silt, sand, and gravel. USDA soil descriptions are shown in Figure 1. Seven wells were found to be about a half mile southeast of the bridge location in East Fairfield. Depths to bedrock found in these wells ranged from 8 feet to 110 feet below the ground surface. Based on the variability of depth and distance from the bridge, we do not consider this information pertinent for the scoping of this particular location.

The Natural Resources Conservation Service USDA soil descriptions from Figure 1 indicate that the subject area is classified as coarse-loamy alluvium over sandy and gravelly alluvium. These deposits are evidenced in the water well records nearby and the 1970 Surficial Geologic Map of Vermont. Bedrock in the area is expected to be foliated schist according to the new 2012 Bedrock Map of Vermont. Some bedrock can be seen in the stream bank just upstream of the bridge (see Figure 2). A very large outcrop of bedrock can also be seen approximately 300 ft from the bridge location adjacent to VT Route 36 just west of Elm Brook Rd.

Figure 2, Bedrock can be seen upstream of Bridge 46

Based on this information, and the likelihood of shallow bedrock, possible foundation options for a bridge replacement include the following:

- Reinforced concrete abutments on spread footings
- Stub abutments with spread footings founded on mechanically stabilized earth (MSE) walls.

When considering MSE Walls, please recognize that open graded backfill should be used below the flood elevation to limit the possibility of excess pore pressure build up behind the walls. Also, the addition of steel sheeting for scour protection should be evaluated.

Due to the location of the well logs being half a mile away, we recommend two borings be taken at opposite corners of the proposed bridge, 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 of bedrock. If shallow bedrock is present, borings should be performed at all four corners of the bridge to get an idea of the bedrock profile across the abutment.

Figure 3, Bridge 46 Looking Southeast toward VT Route 36

Borings in opposite corners either in or just off of the roadway appears to be feasible (see Figure 3). Due to the low volume of traffic on Elm Brook Rd, one drill crew could drill and be responsible for traffic control when needed. However, final recommendations for borings can be provided once an alignment and preliminary structure type have been selected.

If you have any questions, please feel free to call us at 828-1235.

c: WEA/Read File
CCB/Project File
CEE

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

[phone] 802-828-3979
[fax] 802-828-2334
[ttd] 800-253-0191

Agency of Transportation

To: Jeff Ramsey, VTrans Environmental Specialist

From: Glenn Gingras, VTrans Environmental Biologist

Date: 4/16/2012

Subject: Fairfield BRO 1448(41) - 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.

Wetlands/Watercourses
There are wetlands within the project area. Formal wetland delineation according to US Army Corps of Engineers Wetland Delineation Manual was not completed and wetlands were identified using best professional judgment for resource identification/planning purposes. The wetlands are located in all quadrants of the project except the SW. Wetlands in the project area are emergent and forested wetlands adjacent to the Black Creek. A shape file with approximate wetland boundaries is available for reference.

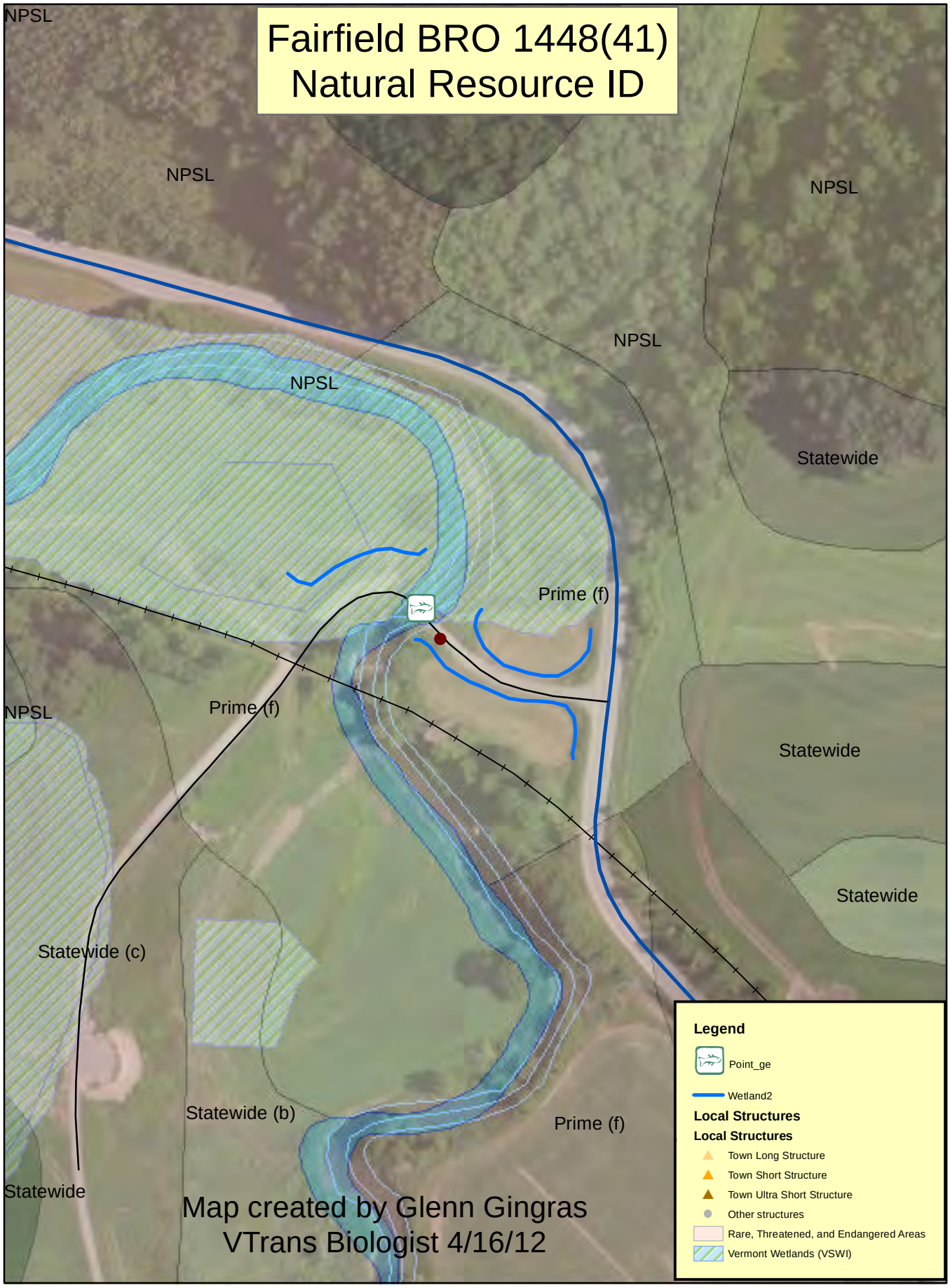
The Black Creek flows northerly through the project area. This river would support a variety of aquatic organisms including wild brook trout. Efforts to minimize water quality impacts during construction will need to be evaluated as the project design moves forward.

The US Corps of Engineers and the Agency of Natural Resources- Department of Environmental Conservation would regulate all activities below ordinary high water and to wetlands.

Wildlife Habitat
General Wildlife habitat exists within the surrounding area. The project area consists of agricultural lands. There are no wildlife corridor issues within the project area.

Rare, Threatened and Endangered Species
There are no mapped rare, threatened or endangered species within the project area.

Agricultural Soils
There are prime agricultural soils within the project area. These soils are in the Podunk variant silt loam series.


Fairfield BRO 1448(41)
Natural Resource ID
NPSL
NPSL
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NPSL
NPSL
Statewide
Prime (f)
NPSL
Prime (f)
Statewide
Statewide
Statewide (c)
Statewide (b)
Prime (f)
Statewide
Map created by Glenn Gingras
VTrans Biologist 4/16/12
Legend
Point_ge
Wetland2
Local Structures
Local Structures
Town Long Structure
Town Short Structure
Town Ultra Short Structure
Other structures
Rare, Threatened, and Endangered Areas
Vermont Wetlands (VSWI)

VERMONT

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

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

Agency of Transportation

To: Jeff Ramsey, VTrans Environmental Specialist

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

Date: 6/18/2012

Subject: Fairfield BRO 1448(41) – Archaeological Resource ID

I have completed my initial resource identification for Fairfield BRO 1448(41). A field visit conducted on 4/10/2012 as part of the 2012 GPS scoping initiative was adequate to identify potential resources in the project area. There is one section of archaeological sensitivity in the NE quadrant. This has been mapped and uploaded to the archaeology geodatabase for inclusion in future CADD plans.

Please feel free to contact me with any questions or concerns.

~Brennan

Brennan Gauthier
VTrans Assistant Archaeologist
tel. 802-828-3965
Brennan.Gauthier@state.vt.us

VTrans Working to Get You There
Vermont Agency of Transportation

Fairfield BRO 1448(41)
Arch Resource ID

Ramsey, Jeff

From: O'Shea, Kaitlin
Sent: Tuesday, June 05, 2012 10:34 AM
To: Ramsey, Jeff
Cc: Williams, Chris; Newman, Scott
Subject: Fairfield BRO 1448(41)

Good morning,

I have completed the historic resource ID for Fairfield BRO 1448(41): Bridge 46 and the adjacent properties are not historic. Adjacent to project area is a former rail corridor and a historic bridge serves a current recreation path. In order to be considered a Section 4(f) resource, the trail must be on publicly owned land. At this point, I am unsure of the land ownership. If the project footprint extends across the field/wetland towards the rail bridge, then the impacts will need to be considered.

This resource ID is part of the GPS/GIS Pilot Project. As discussed, initial review for historic resources is completed via desk review (maps, bridge inspection photos, Google Earth) and can be determined to have no historic resources without site visits. Other projects will require a site visit in order to determine if there are historic resources located within the project area. Historic resources will continue to be identified on a map and scanned for the project files. When appropriate, historic resources will be mapped by the GPS in order to compare and contrast the effectiveness and application of these resource ID procedures.

I am keeping a spreadsheet for these pilot projects which outlines review methods, resource notes, resource ID and how the ID is submitted (GPS data, email memo, resource map, etc.) I'll bring this to the next project meeting.

Let me know if you have any questions.
Thanks,
Kaitlin

Kaitlin O'Shea
Historic Preservation Specialist
Vermont Agency of Transportation

802-279-0869
Kaitlin.O'Shea@state.vt.us

Ramsey, Jeff

From: Armstrong, Jon
Sent: Wednesday, May 23, 2012 12:47 PM
To: Ramsey, Jeff
Subject: RE: Environmental Request NOTIFICATION: FAIRFIELD BRO 1448(41)

Hi Jeff,
I have no stormwater related concerns of note to offer at this time for this project.

Jonathan B. Armstrong, PE
VTrans Stormwater Management Engineer
(802) 828-1332

"*We forget that the water cycle and the life cycle are one*."
- Jacques Cousteau

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From: Ramsey, Jeff
Sent: Wednesday, March 28, 2012 4:10 PM
To: Armstrong, Jon; Gingras, Glenn; Gauthier, Brennan; O'Shea, Kaitlin
Cc: Williams, Chris
Subject: FW: Environmental Request NOTIFICATION: FAIRFIELD BRO 1448(41)

Hi all,
This project is one of the Chris Williams Pilot Projects. The entire pilot group will go out to visit a site to work through the process so they all know how to do it and what to look for. That visit will happen in the very near future.

Comments: The resource ID will be conducted by a pilot group under PDWP GIS/GPS work plan. This group is part of the GIS Experimental work plan and is researching innovative ways to streamline the ID process.

Folder Link:
Z:\Projects-Engineering\FairfieldBRO1448(41)12j170\Environmental\ResourceIDandClearances\ResourceID

Please let me know if you have any questions.
Thanks,
Jeff

Jeff Ramsey
Environmental Specialist - North Region
Vermont Agency of Transportation
Program Development Division
Environmental Section
1 National Life Drive
Montpelier, VT 05633
tel. 802-828-1278
jeff.ramsey@state.vt.us

OFFICE MEMORANDUM

AOT - PROGRAM DEVELOPMENT DIVISION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Chris Williams, Project Manager
FROM: Jeff Ramsey, Environmental Specialist
DATE: June 18, 2012

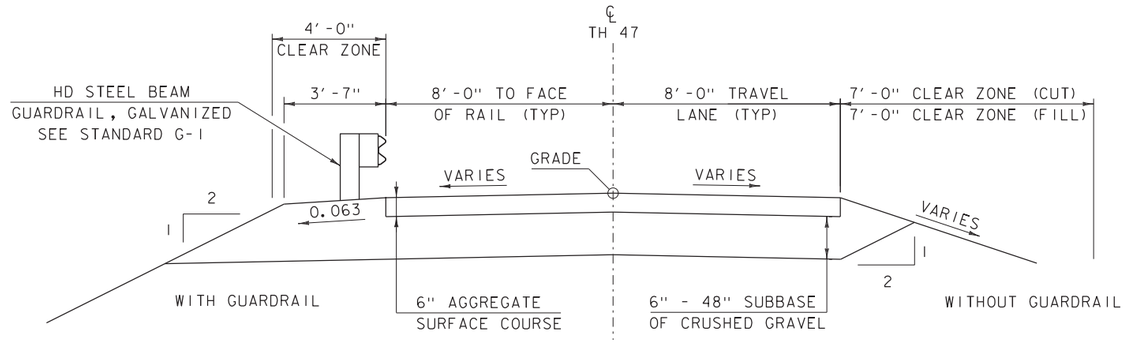
Project: Fairfield BRO 1448 (41)

ENVIRONMENTAL RESOURCES:

Wetlands:	X Yes	___ No	See fairfield_41naturalresources
Historic/Historic District:	___ Yes	X No	
Archaeological Site:	X Yes	___ No	one section of archaeological sensitivity in the NE quadrant, see Fairfield BRO 1448(41) Arch Resource ID
4(f) Property:	___ Yes	X No	
6(f) Property:	___ Yes	X No	
Agricultural Land:	X Yes	___ No	See fairfield_41naturalresources
Fish & Wildlife Habitat:	X Yes	___ No	Black Creek, See fairfield_41naturalresources
Endangered Species:	___ Yes	X No	
Hazardous Waste:	___ Yes	X No	
Stormwater:	___ Yes	X No	
USDA-Forest Service Lands:	___ Yes	X No	
Wildlife Habitat Connectivity:	___ Yes	X No	
Scenic Highway/ Byway:	___ Yes	X No	
Act 250 Permits:	___ Yes	X No	

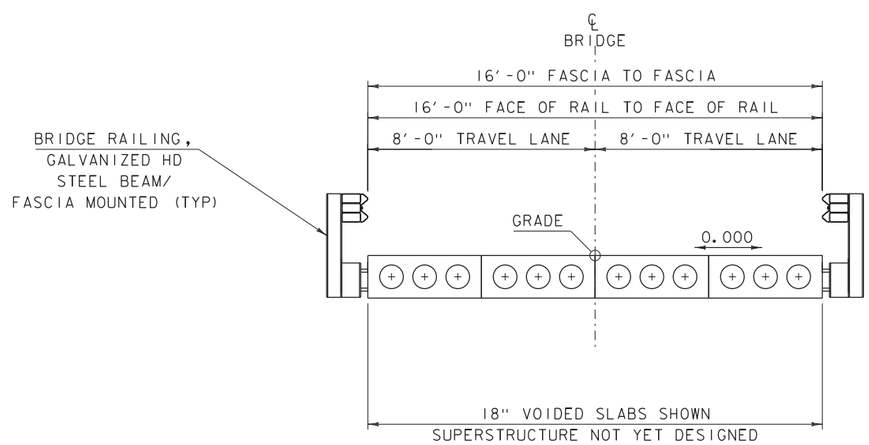
If you have any questions or need additional information please let me know.
Thanks,
Jeff

cc:
Project File



PROPOSED TH 47 TYPICAL SECTION

SCALE 3/8" = 1'-0"



FLOW

PROPOSED BRIDGE TYPICAL SECTION

SCALE 3/8" = 1'-0"

MATERIAL TOLERANCES

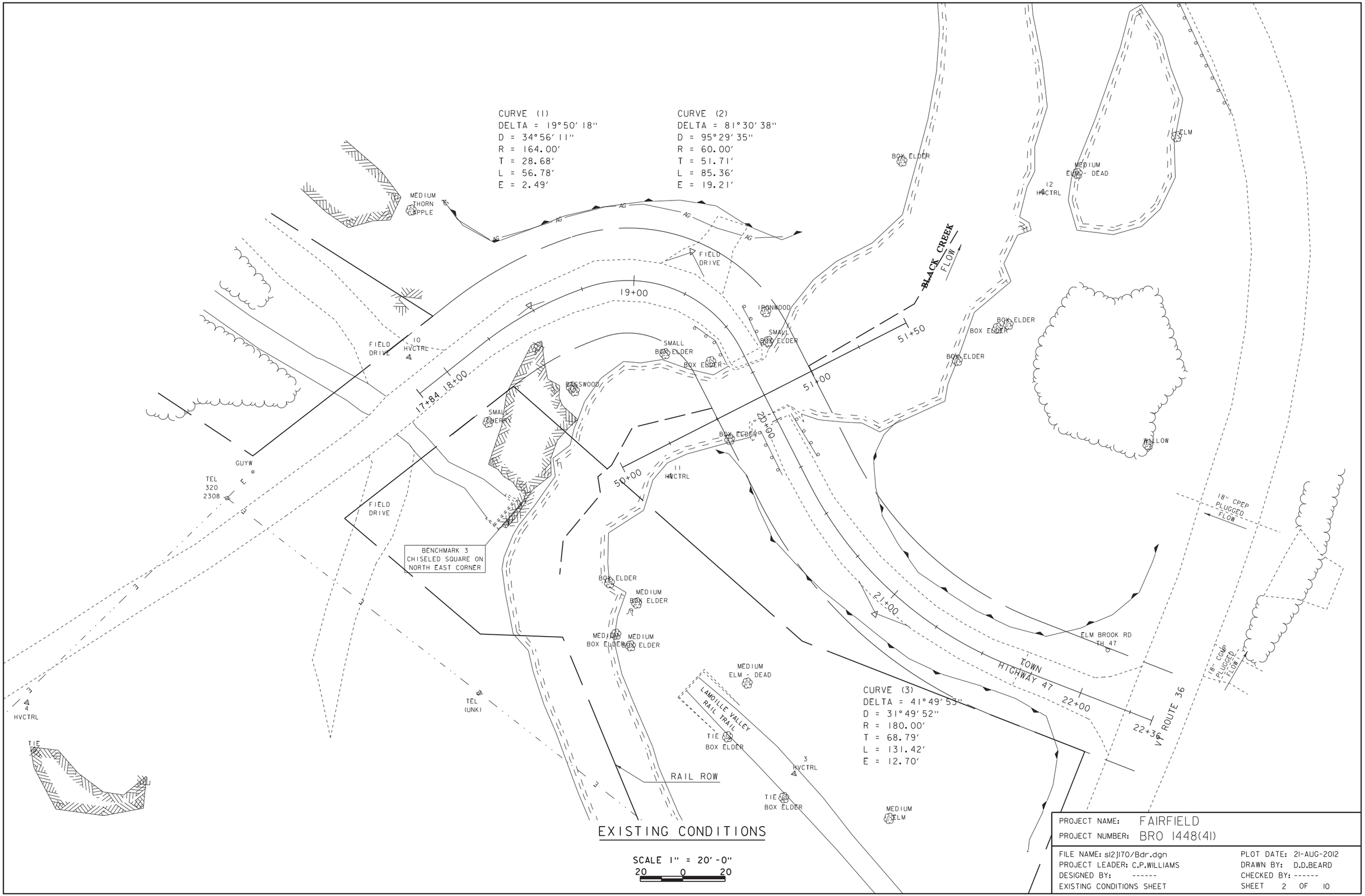
(IF USED ON PROJECT)

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

PROJECT NAME: FAIRFIELD
PROJECT NUMBER: BRO 1448(41)

FILE NAME: 12j170\s12j170typical.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: L.J.STONE
TYPICAL SECTIONS

PLOT DATE: 21-AUG-2012
DRAWN BY: D.D.BEARD
CHECKED BY: L.J.STONE
SHEET 3 OF 10



EXISTING CONDITIONS

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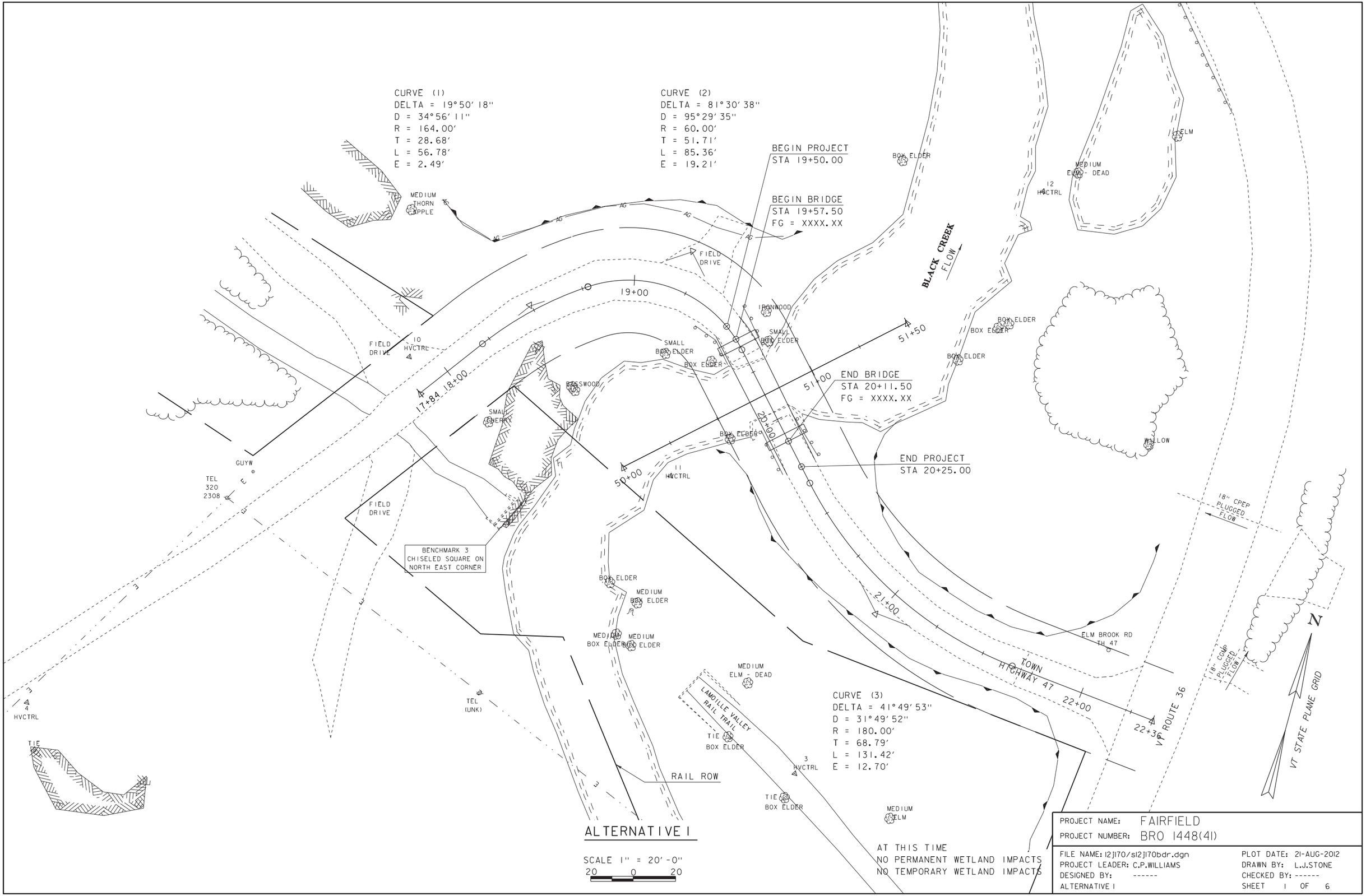
PROJECT NUMBER: BRO 1448(41)	
FILE NAME: s12j170/Bdr.dgn	PLOT DATE: 21-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
EXISTING CONDITIONS SHEET	SHEET 2 OF 10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L = 56.78′
E = 2.49′
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E = 19.21′
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STA 19+57.50
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END BRIDGE
STA 20+11.50
FG = XXXX.XX
END PROJECT
STA 20+25.00
BLACK CREEK
FLOW
MEDIUM THORN APPLE
FIELD DRIVE
10 HVCTRL
12 HVCTRL
11 HVCTRL
4 HVCTRL
3 HVCTRL
GUYW
TEL 320 2308
TEL (UNK)
BENCHMARK 3
CHISELED SQUARE ON
NORTH EAST CORNER
BOX ELDER
SMALL BOX ELDER
MEDIUM BOX ELDER
IRONWOOD
BASSWOOD
SMALL CHERRY
MEDIUM ELM - DEAD
ELM
WILLOW
TIE
RAIL ROW
LAMOILLE VALLEY RAIL TRAIL
18" CPEP PLUGGED FLOW
18" CGMP PLUGGED FLOW
ELM BROOK RD
TH 47
TOWN HIGHWAY 47
VT ROUTE 36
VT STATE PLANE GRID
N
17+84
18+00
19+00
20+00
21+00
22+00
22+36
50+00
51+00
51+50
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L = 131.42′
E = 12.70′
ALTERNATIVE I
SCALE 1″ = 20′-0″
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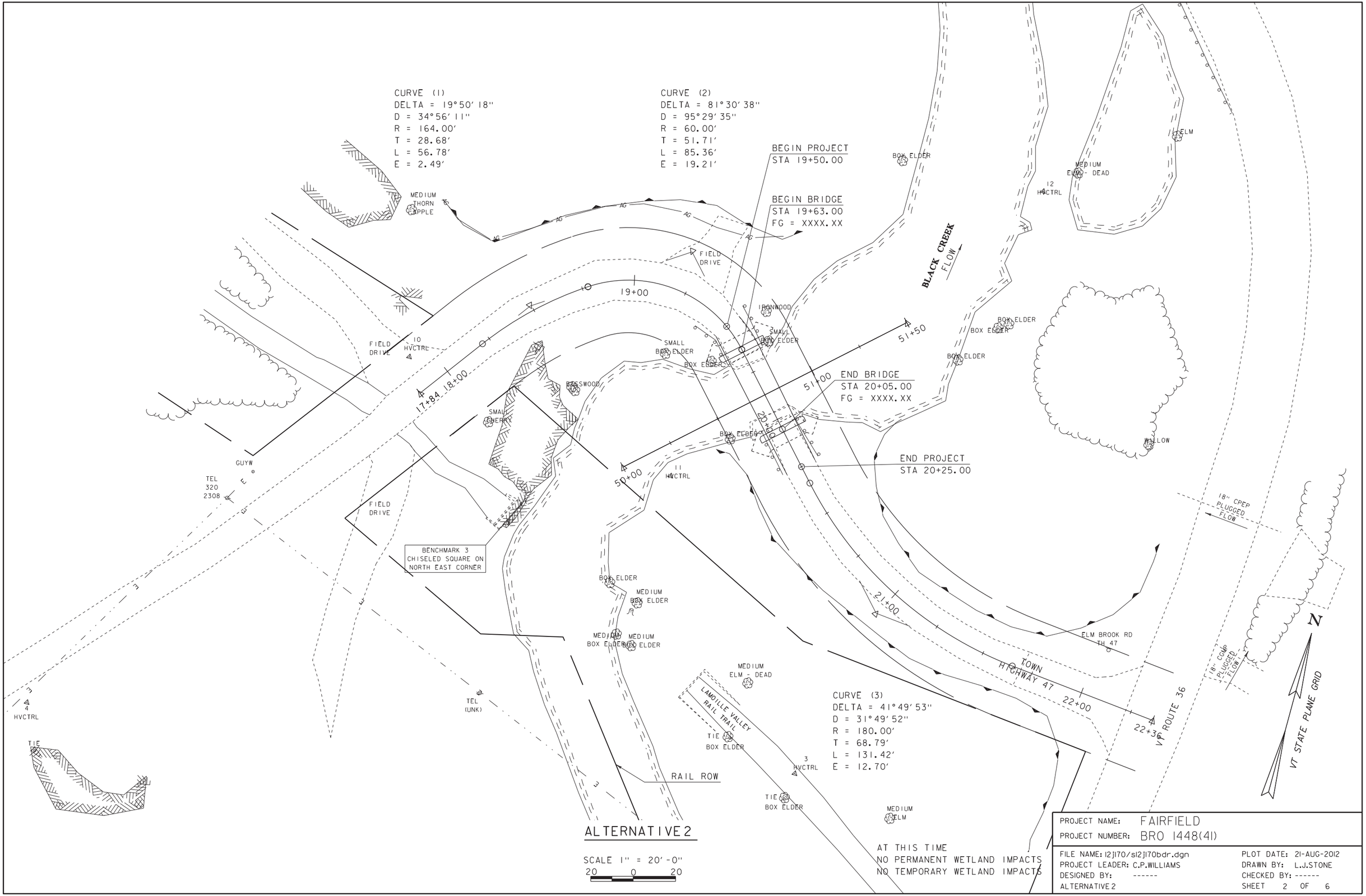
NO PERMANENT WETLAND IMPACTS
NO TEMPORARY WETLAND IMPACTS
PROJECT NAME: FAIRFIELD
PROJECT NUMBER: BRO 1448(41)
FILE NAME: 12j170/s12j170bdr.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ------
ALTERNATIVE I
PLOT DATE: 21-AUG-2012
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 1 OF 6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R = 60.00′
T = 51.71′
L = 85.36′
E = 19.21′
BEGIN PROJECT
STA 19+50.00
BEGIN BRIDGE
STA 19+63.00
FG = XXXX.XX
END BRIDGE
STA 20+05.00
FG = XXXX.XX
END PROJECT
STA 20+25.00
BLACK CREEK
FLOW
MEDIUM THORN APPLE
FIELD DRIVE
10 HVCTRL
12 HVCTRL
11 HVCTRL
4 HVCTRL
3 HVCTRL
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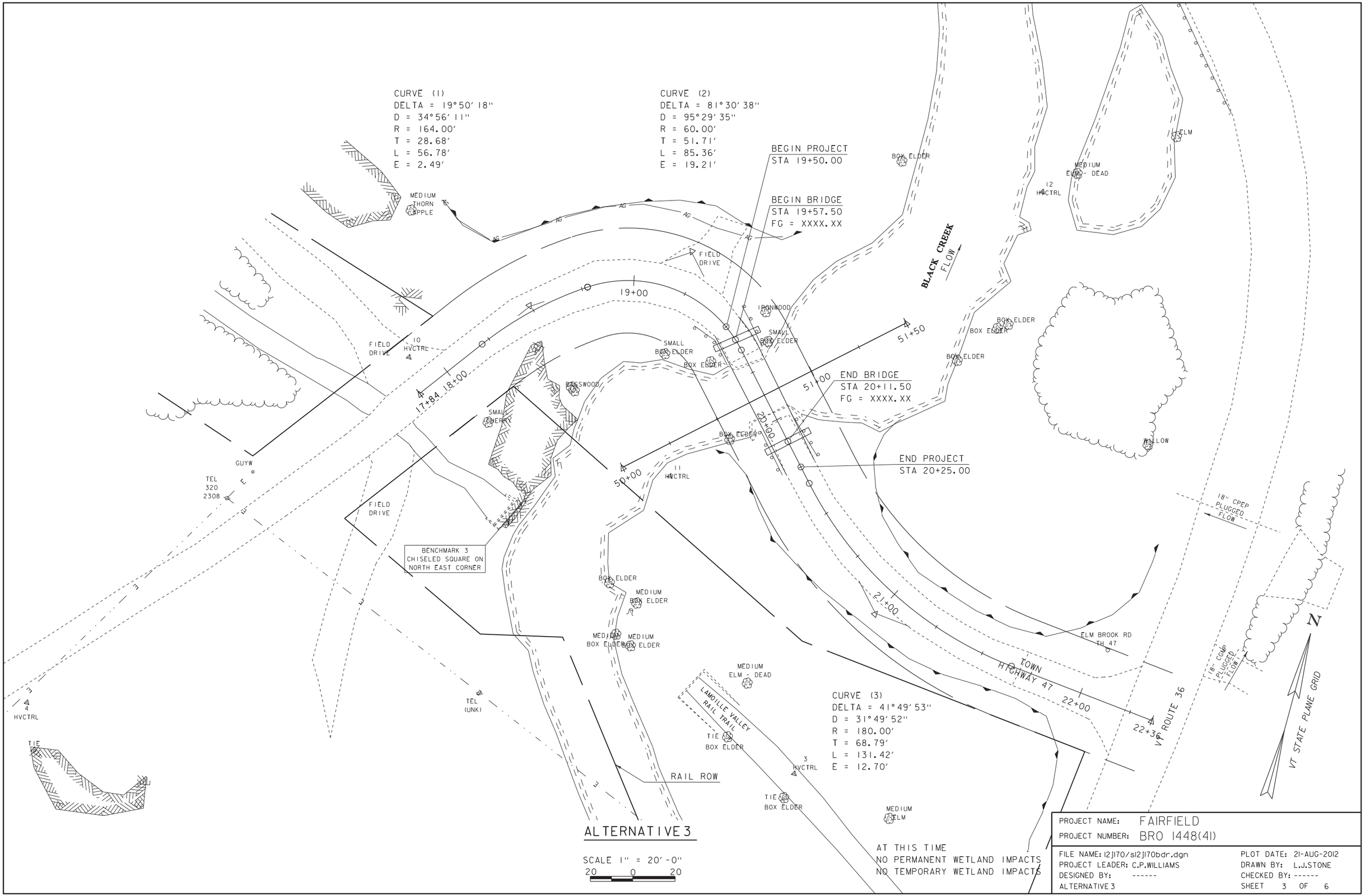
TEL (UNK)
TIE
BENCHMARK 3
CHISELED SQUARE ON
NORTH EAST CORNER
BOX ELDER
SMALL BOX ELDER
MEDIUM BOX ELDER
IRONWOOD
BASSWOOD
SMALL CHERRY
MEDIUM ELM - DEAD
ELM
WILLOW
LAMOILLE VALLEY RAIL TRAIL
RAIL ROW
18" CPEP PLUGGED FLOW
18" CGMP PLUGGED FLOW
ELM BROOK RD
TH 47
TOWN HIGHWAY 47
VT ROUTE 36
VT STATE PLANE GRID
N
17+84
18+00
19+00
20+00
21+00
22+00
22+36
50+00
51+00
51+50
CURVE (3)
DELTA = 41°49′53"
D = 31°49′52"
R = 180.00′
T = 68.79′
L = 131.42′
E = 12.70′
AT THIS TIME
NO PERMANENT WETLAND IMPACTS
NO TEMPORARY WETLAND IMPACTS
ALTERNATIVE 2
SCALE 1" = 20′-0"
20 0 20
PROJECT NAME: FAIRFIELD
PROJECT NUMBER: BRO 1448(41)
FILE NAME: 12j170/s12j170bdr.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ------
ALTERNATIVE 2
PLOT DATE: 21-AUG-2012
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 2 OF 6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D = 34°56'11"
R = 164.00'
T = 28.68'
L = 56.78'
E = 2.49'
CURVE (2)
DELTA = 81°30'38"
D = 95°29'35"
R = 60.00'
T = 51.71'
L = 85.36'
E = 19.21'
BEGIN PROJECT
STA 19+50.00
BEGIN BRIDGE
STA 19+57.50
FG = XXXX.XX
END BRIDGE
STA 20+11.50
FG = XXXX.XX
END PROJECT
STA 20+25.00
BLACK CREEK
FLOW
FIELD DRIVE
BENCHMARK 3
CHISELED SQUARE ON
NORTH EAST CORNER
RAIL ROW
LAMOILLE VALLEY
RAIL TRAIL
TOWN
HIGHWAY 47
VT ROUTE 36
ELM BROOK RD
TH 47
18" CPEP
PLUGGED
FLOW
18" CMP
PLUGGED
FLOW
VT STATE PLANE GRID
N
CURVE (3)
DELTA = 41°49'53"
D = 31°49'52"
R = 180.00'
T = 68.79'
L = 131.42'
E = 12.70'
AT THIS TIME
NO PERMANENT WETLAND IMPACTS
NO TEMPORARY WETLAND IMPACTS
ALTERNATIVE 3
SCALE 1" = 20'-0"
20 0 20
PROJECT NAME: FAIRFIELD
PROJECT NUMBER: BRO 1448(41)
FILE NAME: 12j170/s12j170bdr.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ------
ALTERNATIVE 3
PLOT DATE: 21-AUG-2012
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 3 OF 6

CURVE (1)
DELTA = 19°50′18″
D = 34°56′11″
R = 164.00′
T = 28.68′
L = 56.78′
E = 2.49′

TEMP BRIDGE CURVE (1)
DELTA = 101°26′06″
D = 124°33′22″
R = 46.00′
T = 56.24′
L = 81.44′
E = 26.65′

CURVE (2)
DELTA = 81°30′38″
D = 95°29′35″
R = 60.00′
T = 51.71′
L = 85.36′
E = 19.21′

BEGIN PROJECT
STA 19+50.00

BEGIN BRIDGE
STA 19+63.00
FG = XXXX.XX

END BRIDGE
STA 20+05.00
FG = XXXX.XX

END PROJECT
STA 20+25.00

TEMP BRIDGE CURVE (3)
DELTA = 14°03′18″
D = 31°49′52″
R = 180.00′
T = 22.19′
L = 44.16′
E = 1.36′

TEMP BRIDGE CURVE (2)
DELTA = 27°51′44″
D = 154°41′55″
R = 37.04′
T = 9.19′
L = 18.01′
E = 1.12′

CURVE (3)
DELTA = 41°49′53″
D = 31°49′52″
R = 180.00′
T = 68.79′
L = 131.42′
E = 12.70′

BENCHMARK 3
CHISELED SQUARE ON
NORTH EAST CORNER

BLACK CREEK
FLOW

TEMP BRIDGE

TOWN HIGHWAY 47

VT ROUTE 36

ELM BROOK RD
TH 47

LAMOILLE VALLEY
RAIL TRAIL

RAIL ROW

18" CPEP
PLUGGED
FLOW

18" CONC
PLUGGED
FLOW

VT STATE PLANE GRID

N

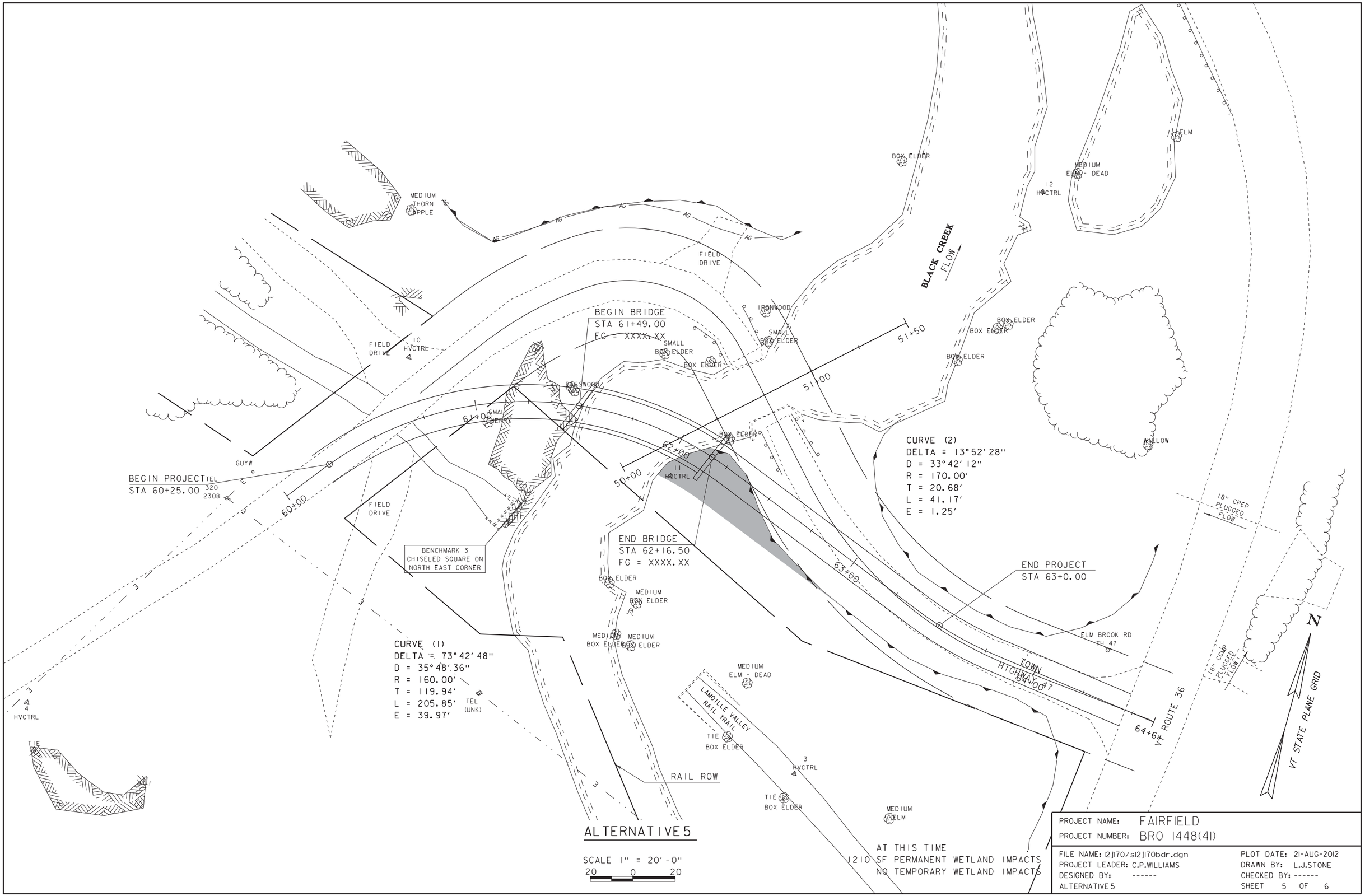
AT THIS TIME
NO PERMANENT WETLAND IMPACTS
1025 SF TEMPORARY WETLAND IMPACTS

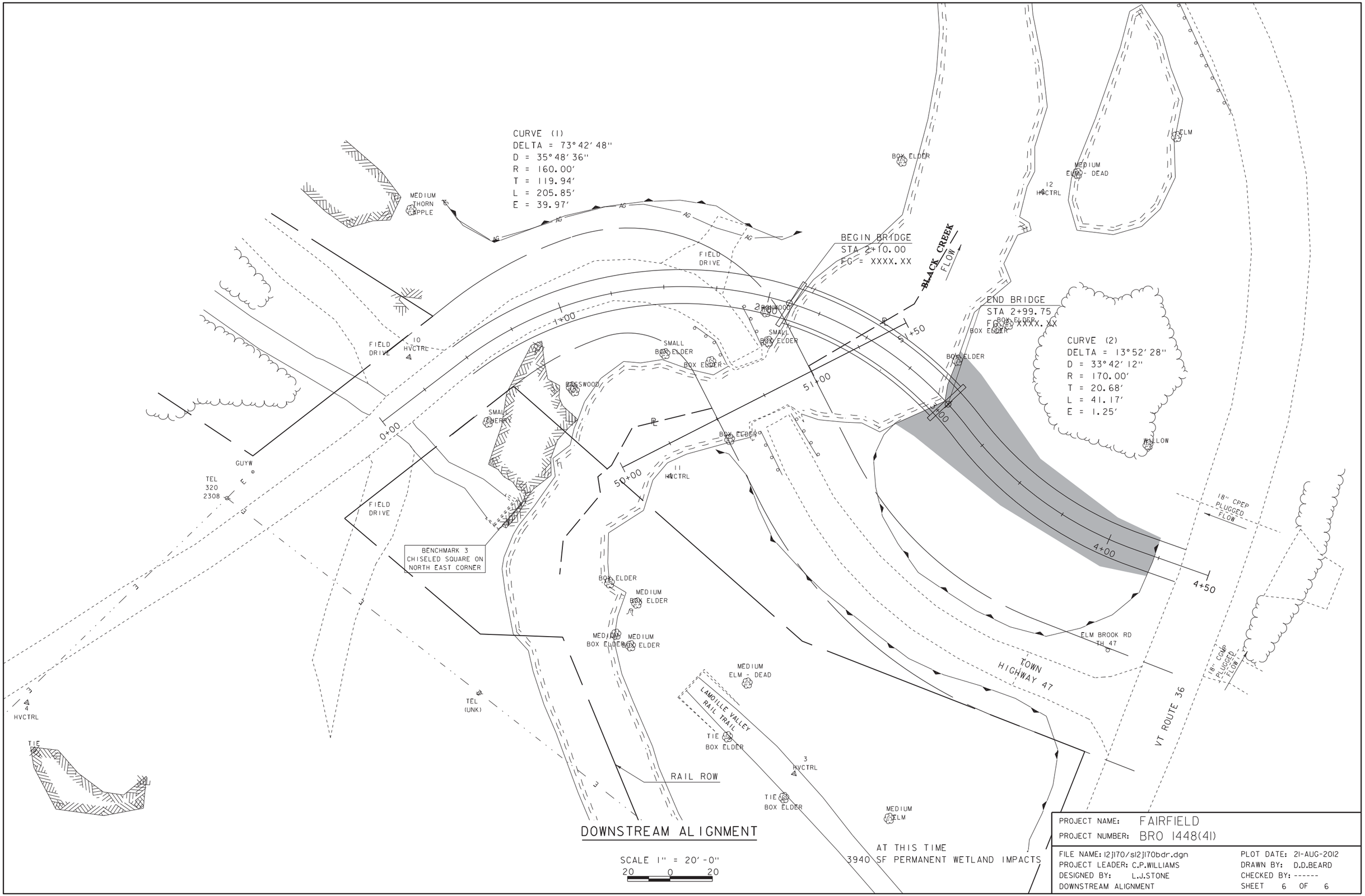
ALTERNATIVE 4

SCALE 1" = 20′-0"
20 0 20

PROJECT NAME:	FAIRFIELD
PROJECT NUMBER:	BRO 1448(41)

FILE NAME: 12j170/s12j170bdr.dgn	PLOT DATE: 21-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: L.J.STONE
DESIGNED BY: ------	CHECKED BY: ------
ALTERNATIVE 4	SHEET 4 OF 6

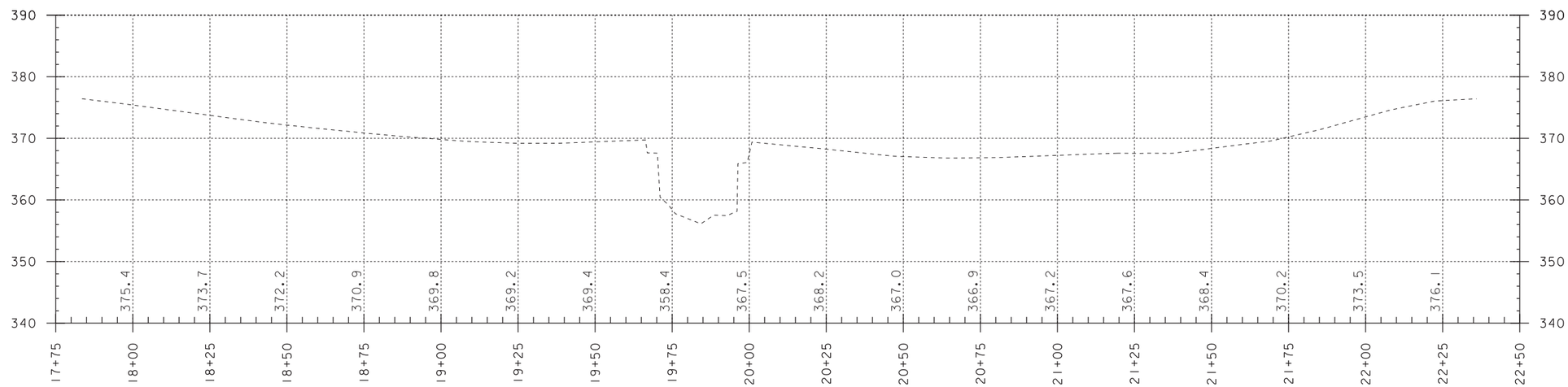

BEGIN BRIDGE
STA 61+49.00
FG = XXXX.XX
END BRIDGE
STA 62+16.50
FG = XXXX.XX
BEGIN PROJECT
STA 60+25.00
END PROJECT
STA 63+0.00
CURVE (1)
DELTA = 73°42'48"
D = 35°48'36"
R = 160.00'
T = 119.94'
L = 205.85'
E = 39.97'
CURVE (2)
DELTA = 13°52'28"
D = 33°42'12"
R = 170.00'
T = 20.68'
L = 41.17'
E = 1.25'
BENCHMARK 3
CHISELED SQUARE ON
NORTH EAST CORNER
BLACK CREEK
FLOW
FIELD DRIVE
MEDIUM THORN APPLE
BOX ELDER
IRONWOOD
BASSWOOD
SMALL HENRY
ELM
MEDIUM ELM - DEAD
WILLOW
18" CPEP PLUGGED FLOW
18" CONP PLUGGED FLOW
ELM BROOK RD TH 47
TOWN HIGHWAY 47
VT ROUTE 36
LAMOILLE VALLEY RAIL TRAIL
RAIL ROW
MEDIUM ELM
VT STATE PLANE GRID
N
60+00
61+00
62+00
63+00
64+00
50+00
51+00
51+50
64+6
ALTERNATIVE 5
SCALE 1" = 20'-0"
20 0 20
AT THIS TIME
1210 SF PERMANENT WETLAND IMPACTS
NO TEMPORARY WETLAND IMPACTS
PROJECT NAME: FAIRFIELD
PROJECT NUMBER: BRO 1448(41)
FILE NAME: 12j170/s12j170bdr.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ------
ALTERNATIVE 5
PLOT DATE: 21-AUG-2012
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 5 OF 6



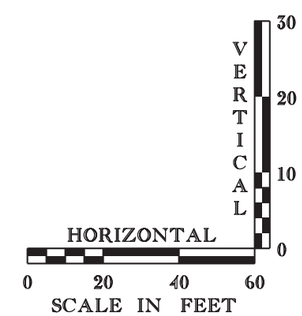
DOWNSTREAM ALIGNMENT

PROJECT NAME:	FAIRFIELD
PROJECT NUMBER:	BRO 1448(41)

FILE NAME: 12j170/s12j170bdr.dgn	PLOT DATE: 21-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: L.J.STONE	CHECKED BY: ------
DOWNSTREAM ALIGNMENT	SHEET 6 OF 6



TH 47 EXISTING PROFILE



NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: FAIRFIELD	
PROJECT NUMBER: BRO 1448(41)	
FILE NAME: s12j170profile.dgn	PLOT DATE: 06-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PROFILE SHEET	SHEET 4 OF 10