STATE OF VERMONT
AGENCY OF TRANPORTATION

Scoping Report

FOR

Castleton BRF 015-2(10)

VT ROUTE 30, BRIDGE #93 OVER THE CLARENDON & PITTSFORD RAILROAD

September, 2012 Structures STR4

Table of Contents

I. Site Information

Bridge 93 is located in a rural area along VT Route 30 approximately 0.3 miles south of the junction with VT 4A. The bridge is a steel beam and concrete deck structure on concrete abutments and piers that carries VT 30 over the Clarendon & Pittsford Railroad. All structural elements of the bridge are deteriorating and approaching the end of their useful life. The existing conditions were gathered from a combination of Site Visit, Inspection Report, Route Log, and existing Survey. See correspondence in the Appendix for more detailed information.

Functional Classification	Rural Minor Arterial
Year of Construction	1938, bridge rail replaced in 1968.
Bridge Type	Three span steel beam with cast-in-place concrete deck.
Bridge Length	3 Span - 36 ft. maximum span, 109 ft. total length.
Width of Bridge	Bridge curb to curb width 25.5 ft. Total fascia to fascia width 29 ft.
Width of Roadway Approach	26 ft.

The access road to the Town Wastewater Treatment Facility (WWTF) is at the SW corner of the bridge. Near the NW corner of the bridge, there is a residence, with a well located in the front yard within 30 ft. of the roadway. On the NE corner, there is a Vermont AOT garage and equipment yard. The SE corner is open, with an unimproved driveway located close to the beginning of the bridge.

Need

The deficiencies of Bridge 93 and VT Route 30 in this location are:

- The latest inspection report lists the structure as "structurally deficient".
- The deck and superstructure are in fair to poor condition. Multiple holes have been patched in the deck previously and there is concern that full depth holes will open in the deck at any time.
- The existing deck geometry is substandard.
- The current curb to curb width is 25.5 ft., which is substandard.
- The existing sight distance and "K" values are substandard due to the vertical geometry of the approaches.
- The bridge rails are steel beam on steel posts. The latest Inspection Report indicates that the existing bridge rails do not meet current standards. This report also has the following ratings:

Substructure:	5 Fair
Superstructure:	5 Fair
Deck:	4 Poor

Traffic

A traffic study of this site was performed in June, 2012 by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2015 and 2035.

TRAFFIC DATA	2015	2035	2055
AADT	4000	4200	~
DHV	450	470	~
ADTT	250	410	~
%T	5.8	8.9	~
%D	52	52	52
		2015-2035	2015-2055
FLEXIBLE ESAL	~	2,064,000	4,920,000

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 > 2000, DHV>400 and a design speed of 40 mph. Vermont 30 is a Minor Arterial in this area.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 4.3	11'/2' (approx 26')	11'/5'	Substandard
Bridge Lane and Shoulder Widths	VSS Table 4.3	11'/2' (approx 26')	11'/5'	Substandard
Clear Zone Distance	VSS Table 4.4		14' fill / 12' cut	
Banking	VSS Section 4.13	Normal crown	6%, To accommodate side road	Acceptable
Speed		40 mph (Posted)	40 mph (Design)	
Horizontal Alignment	2011 AASHTO Green Book Table 3-7	4 degree curve near south end of bridge has 1432' radius.	R_{min}=533'	Acceptable
Vertical Grade	VSS Table 4.6	Approx. 8.1% south of bridge, approx. neg. 0.25% north of bridge	8% (max) for rolling terrain Urban/Village Minor Arterial	Acceptable
K Values for Vertical Curves	VSS Table 4.1	Approx. 21 (crest)	60 crest / 60 sag	Substandard (crest)
Vertical Clearance Issues	VSS Section 4.8	20'-6"	20'-8" (min)	Railroad Rails - Substandard
Stopping Sight Distance	VSS Table 4.1	228 ft.	275'	Substandard
Bicycle/Pedestrian Criteria	VSS Table 4.7		3' Shoulder	
Bridge Railing		Steel beam and posts	TL-2 required	

Inspection Report Summary

"5/18/2011. Fair to poor condition deck continues to deteriorate along top and soffit. Steel continues to deteriorate and substructure continues to deteriorate. Structure needs major recon or full replacement in near future. Deck has potential full depth holes at anytime. MK PH"

"5/11/2009 – Structure's in fair to poor condition due to continuing deterioration pavement and deck soffit and substructure. Since last inspection majority of the holes along steel beam webs have been plated. Span 1 Beam 5 was not plated and repairs should be also done. Structure should be considered for extensive rehab or replacement. ~MJK"

Crash Data

According to the Vermont AOT 2006 – 2010 High Crash Location map (Sections) and (Intersections), there are two HCL (High Crash Locations) listed on Vermont Route 30 in Castleton. One is approximately one mile south of the project site, at the intersection of VT 30, Rice Willis Road (TH-41), and South Road Extension (TH-4). The other is north of the project site, approximately 0.3 miles, at the intersection of Vermont Route 30 and Vermont Route 4A. The bridge site itself is not a HCL.

If it is decided that traffic will be managed by closing the bridge and using an off-site detour, both of these sites are on what would be the designated detour route. It should be noted that improvements have been made at both intersections by VT AOT. At VT 4A and VT 30, new LED lenses were installed in the signal heads, and a new back plate installed, both for better visibility of the signal lights. Statistical data suggests that such improvements may achieve a 7% decrease in crashes. At VT 30 and Rice Willis Road/South Road Extension, a new flashing beacon and sign were installed at intersection to warn motorists about approaching traffic. It is believed that this type of improvement significantly improves safety, but it is unclear how much.

Hydraulics

Not applicable – the bridge is over Railroad tracks.

Utilities

There are overhead utilities on the east side of the bridge and roadway. At the south end of the bridge, three phase power and other services cross over VT 30 with other overhead services to the Wastewater Treatment Facility (WWTF) southwest of the bridge site. It is likely that these overhead utilities will need to be relocated for the project regardless of the alternative selected. There is a sewer manhole in the neighbor's yard northwest of the bridge. Buried sewer lines run from that point diagonally away from the roadway toward the WWTF. Sewer information is shown on the project layout plan in the Appendix. These lines are not expected to impact the project. No utilities were seen supported on the underside of the bridge.

Right Of Way

The existing Right-of-Way (ROW) is shown on the Layout sheet. The original ROW was 4 rods and was obtained circa 1784. In 1938, some additional ROW was acquired for a project done then. The Railroad ROW is also shown on the layout sheets.

Environmental Resources

The environmental resources present at this project are shown on the layout sheets and are described as follows:

Agricultural:

There are no prime agricultural soils north of the river. The project site is located north of the Castleton River.

Archaeological:

A preliminary site visit by Vt. AOT archaeological staff has determined that there are no archaeological resources of concern directly adjacent to the project site.

Biological:

From the preliminary Biological Report: "Wetlands are located to the south and east of the bridge, and they were picked up using GPS. A temporary bridge and detour on the eastern side of VT 30 would likely trigger the need for both state and federal wetland permits as they are Class II, and include a 50 ft. buffer."

The Castleton River is nearby, but in-stream activities are not anticipated.

Habitat:

A plant species of special concern has been identified within the wetlands east of the bridge. This plant should be avoided. Based on the information provided at this point, it is likely that impacts to this resource can be avoided, including impacts from a temporary bridge.

Hazardous Materials:

There are several hazardous waste sites located in Castleton. The closest site to the project is the Vermont AOT garage adjoining the project site northeast of the bridge. This site is identified as having been subject to a leaking underground gasoline storage tank. The Vermont ANR website lists the "Site Closure Date" as 8-1-1994. Most of the other sites in Castleton are along Vermont Route 4A, with the closest being more than one half mile away. It is not expected that the project will impact this closed site.

Historic:

A preliminary review has shown that the Clarendon & Pittsford Railroad, which is spanned by this project, is a linear historic district; however there are no contributing structures to this district in the project area, and therefore the project is not expected to be impacted by historic concerns,

Scenic Byways:

The Route 30 corridor through the project site is a designated Scenic Byway known as the Stone Valley Byway. At this time, no special consideration is required other than meeting State Highway Standards.

Stormwater:

There are no noteworthy concerns related to stormwater at this time.

II. Maintenance of Traffic

Several traffic control options were considered. All of these options will cause some form of disruption to travel during the work period.

Option 1: Close Bridge using Off-Site Detour

The current policy of the Vermont Agency of Transportation is to apply the Accelerated Bridge Program wherever appropriate to save money, minimize the construction period, and minimize disruption to travel. This program focuses on faster delivery of construction plans, permitting, and Right of Way, as well as faster construction of projects in the field. Closing a bridge for a portion of the construction period rather than providing a temporary bridge is a significant step in this direction. 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 closure option will be considered on most projects as we develop this approach to construction of new and/or rehabilitated bridges. The use of precast elements in new bridges may also expedite construction schedules. This can apply to decks, superstructures, and substructures. Measures will be in effect to ensure that the safety of workers, the safety of the traveling public, and project quality are not compromised.

Several possible routes for the official signed detour, which trucks would be required to use, were considered:

a. See map titled Proposed Detour Option A in the Appendix. Proceed from the bridge site northward to US 4, then west on US 4 to the Town of Fair Haven. Traffic would exit US 4 at VT 22A and proceed south through the Fair Haven Urban Compact to Bolger Road (Class 2 TH-7, FAS route 0572). The detour then enters the Town of Poultney and continues south to Main St. in Poultney Village, where it intersects VT 30. This detour option adds approximately 6 miles to the travel route.

   There are two short lengths of roadway on this detour that are neither State nor FAS routes, however both are Class 1 Town Highways and both are continuations of State Routes through village centers.

Advantages: This option avoids a temporary bridge and associated Right-of-Way, significantly decreasing cost and time of construction.

Disadvantages: The traveling public would be detoured around the project. There may be impacts in village centers in two other towns.

b. See map titled Proposed Detour Option B in the Appendix. This detour route is nearly identical to that described in a. above, except that instead of going north from the project location to US 4, the route goes north to VT 4A and then west to the Town of Fair Haven. The route then is the same as option a. above. This detour option adds approximately 4 miles to the travel route.

Advantages: This option avoids a temporary bridge and associated Right-of-Way, significantly decreasing cost and time of construction.

Disadvantages: The traveling public would be detoured around the project. There may be impacts in village centers in two other towns.

c. See map titled Proposed Detour Option C in the Appendix. Proceed from the bridge site northward to VT 4A, then go east to the Town of West Rutland. In the West Rutland Urban Compact, this route turns south and proceeds to VT 133, which runs briefly into Clarendon, and then into the Town of Ira. VT 133 then turns westward into the Town of Tinmouth, where it joins with VT 140. VT 140 runs into Poultney, where it intersects VT 30. This detour option adds approximately 22 miles to the travel route.

   There is one short length of roadway on this detour that is neither State nor FAS route, but is a Class 1 Town Highway and is a continuation of VT 30.

Advantages: This option avoids a temporary bridge and associated Right-of-Way, significantly decreasing cost and time of construction

Disadvantages: The traveling public would be detoured around the project. There may be impacts in village centers in two other towns.

There are two possible bypass routes that could be used by local traffic. A bypass route is a route that is not a designated, signed detour, but one that local traffic may utilize to get around the project site. There could be more than one bypass route and each could see increased traffic during the project. Bypass routes are frequently on Town roads. One potential bypass route lies to the east of VT 30 (north of the project site) via VT 4A to South St., which initially heads south, then curves toward the west. The route then turns onto Rice Willis Road and goes back to VT 30 south of the project. This bypass is not appropriate for trucks or large vehicles because of an 11'-3" high underpass under an abandoned Railroad bed on Rice Willis Road. There may be additional bypass options that see increased traffic during the project. Through trucks are generally required to follow designated detour routes as described in options a., b., and c. above.

Detour Summary

For information on detour lengths, traffic volume, times of travel over detours, see the maps in the Appendix. Of the detour options described above, option a. is the favored one. Where traffic in option a. leaves State or FAS routes, it will continue to be on routes that are normally traveled by through traffic on VT 22A and VT 30. Option a. is approximately the same distance as option b., both going through Fair Haven, and much shorter than option c. through West Rutland, which has the same disadvantages. If a road closure and off-site detour is chosen, further review will be required of this route to confirm that roadway geometry and Level of Service are not inappropriate for the anticipated closure period. Crash data will need to be reviewed as well so that it can be determined whether mitigating measures may be necessary. Compensation to neighboring towns may be considered for those portions of the detour on Town maintained roads.

Option 2: Close Bridge Using On-Site Detour via Temporary Bridge

Utilizing a temporary bridge allows the closure of the bridge without a long detour imposed on the public. For the current ADT of 4000 and a DHV of 450, the Structures Process Manual indicates a one lane temporary bridge with traffic signals. However, the intersection of VT 30 and VT 4A, a location where crashes have been a concern, is 0.3 miles north of the project site. Therefore, a two lane temporary bridge would be proposed to avoid the possibility of congestion caused by the project. The east side would be preferred, avoiding the access road to the town Wastewater Treatment Facility and the residential property on the northwest corner, where there appears to be a well near the path of the temporary detour. Obstacles on the east side include the Vtrans garage, nearby wetlands, plants of concern, and residential buildings. The terrain on either side of the new bridge will require a large amount of earthwork to be placed and removed. Caution will be required to avoid impacts to wetlands and plants of special concern on the east side. It is believed that a temporary bridge could be located for this project that does not impact the Hazardous waste site mentioned earlier. The exact Hazardous site location will need to be determined if this option is chosen.

Advantages: This option avoids a long detour and allows traffic flow through the project area with minimal impact on the construction process.

Disadvantages: The main disadvantages with a temporary bridge are increased cost, increased construction time, and larger disturbed area. Additional expense for temporary Right of Way would be required. Additional time and expense would be incurred for possible impacts to wetlands and sensitive plants in the vicinity.

Option 3: Phased Construction

Phasing was considered for this project. This method of traffic maintenance allows traffic to be maintained on one lane of the bridge while work proceeds on the other. The advantages of phased construction include the avoidance of long detours and saving the cost of a temporary bridge and Right of Way. Disadvantages include longer construction duration and increased cost due to being able to only work on a portion of the project at a time and having to perform many tasks more than once, longer period of disruption to travel, and increased danger to workers and the public due to close proximity. Also, the use of precast or prefabricated units is difficult in phased construction because either the bridge superstructure ends up being non-symmetrical due to the phasing width requirements for traffic, or the centerline of the roadway shifts horizontally, neither of which is desirable. The phased construction option for traffic maintenance has not been developed further.

III. Alternatives Discussion

The alternatives initially considered for Castleton BRF 015-2(10) are:

No Action
Rehabilitation
Replace Superstructure, Deck, and Rails Only
Replace Entire Bridge
- Off-Site Detour
- On-Site Detour using Temporary Bridge

Alternative 1: No Action

The deck, superstructure, and substructure ratings on this bridge from the latest inspection report are 4, 5, and 5 respectively. This bridge was constructed in 1938, with railing replaced in 1968 (current railing does not meet standards). The lane widths are substandard. The inspection report recommends major reconstruction or full replacement in the near future. Given these conditions and the extent of cracking and deterioration, it is reasonable to conclude that improvements are necessary to continue to provide a safe condition at Bridge 93. The No Action alternative is not recommended.

Alternative 2: Repair and Rehabilitation

A rehabilitation project could be undertaken to repair existing cracks, spalls, and exposed, deteriorating reinforcing. However, the bridge is 75 years old and is nearing the end of its service life, with large cracks and spalls revealing deteriorating reinforcing bars. Certain proprietary manufacturers of repair materials imply that repairs could add perhaps 15-20 years to the remaining service life. At the end of this period, with the age of the structure 90-95 years, full bridge replacement would be anticipated. This alternative would not allow any improvement to existing lane and shoulder widths. This alternative was not further developed.

Alternative 3: Superstructure Replacement

Consideration of replacement of the superstructure and deck has been ruled out. It does not seem advisable to replace the deck and superstructure while leaving a 75 year old substructure with a rating of 5 and serious cracking and exposed and corroded reinforcing bars. This alternative was not further developed.

Alternative 4: Full Bridge Replacement

This alternative allows for all bridge elements to be replaced. The new deck should be wider than the existing to meet standards. New TL-2 bridge rails are recommended, and consideration should be given to a bare deck surface to economize on depth of section. A new bridge would have a single span of approximately 65 ft., and would be founded on integral abutments if bedrock conditions allow. If pile installation is not feasible, then geosynthetic-reinforced soil abutments or abutments on mechanically stabilized earth (MSE) walls could be considered. There may be some flexibility in span, since it will be important to minimize depth of superstructure. The superstructure is expected to consist of elements that can be prefabricated and installed rapidly. It is recommended that the vertical clearance below the bridge not be made any less than existing.

Two full replacement sub-alternatives were reviewed:

- 4A. Replace the entire bridge including substructure using accelerated bridge construction methods and off-site detour. Integral abutments, stabilized soil, or MSE walls would be proposed in locations between the existing abutments and piers, providing a new bridge with a single span of approximately 65 ft. The current pier foundations are approximately 16.5 ft. from the centerline of the track. The new integral abutments, reinforced soil abutments, or MSE walls would be located slightly farther away from the tracks than the current piers, thus the horizontal clear distance from the tracks would be increased and the American Railway Engineering and Maintenance-of-Way Association (AREMA) standard of 9.0 ft. clear from centerline of track would be comfortably maintained. New approach slabs are included along with cold planing and paving of the approaches.

- 4B. Replace the entire bridge including substructure with normal scheduling and an on-site detour with temporary bridge on the east side of the roadway. Construction type would be the same as the accelerated solution above.

<u>Discussion of Geometric Issues – Roadway and Railway</u>

There has been no alternative developed in this scoping report for which all geometric constraints and standards can be fully resolved. It was noted above that the roadway has substandard K Values and Sight Distance near the bridge. Also, the current vertical clearance over the railroad tracks is substandard. The following points define this discussion:

1. Raising the grade of the roadway south of the bridge and at the bridge to improve K Values and Sight Distance is impractical because the linear distance required to raise or lower the roadway profile would run several hundred of feet. Bridge 92 over the Castleton River is approximately 250 ft. south of Bridge 93, so Bridge 92 would have to be raised as part of the adjustment. This approach to the issue is not considered feasible at this time.
2. Conversely, lowering the grade at the bridge and north of the bridge as a means of improving K Values and Sight Distances is not acceptable either, because it reduces the already substandard vertical clearance over the railroad.
3. Raising the vertical clearance over the roadway makes the already substandard K Values and Sight Distance of the roadway worse.
4. Keeping the roadway grade unchanged allows for the project to be built without making any of the existing geometric deficiencies worse. A slight improvement to the railroad clearance would be proposed. This is by far the most cost-effective approach.

Therefore, a solution where all geometric standards are satisfied is not apparent. Neither railroad tracks nor bridge structural elements are straight, flat, or level, so the vertical clearances between tracks and bridge vary from 20’-6” to 21’-2”. The full AREMA standard, for which no variances or exceptions are required, is 23’-0” vertical clearance. In many previous cases, this clearance has been negotiated down to 20’-8”. Internal discussions and discussions with the Clarendon & Pittsford Railroad are under way to find determine the configuration that can work for all parties. It will be important to minimize the depth of the new bridge section for either full replacement alternative. It is expected that precast Next Beam sections could be used that have a total depth of less than 40 inches. Bare deck should be considered. Normally, Prefabricated Bridge Units are considered as well, but may not match precast sections for economy of depth. Additional considerations may include shortening the span for the sake of minimizing superstructure depth.

IV. Alternatives Summary

As mentioned previously, several possible alternatives have been ruled out; No Action, Repair and Rehabilitation, and Superstructure Replacement. It is assumed that the overhead utility relocation will be required. No buried utility relocation is anticipated. Note that these cost projections are preliminary and are for comparison purposes only.

Based on the existing site conditions and the condition of the bridge, there are two remaining viable alternatives:

Alternative 4A: Full Bridge Replacement with Off-Site Detour
Alternative 4B: Full Bridge Replacement with Temporary Bridge

A cost comparison of alternatives can be seen on the next page.

V. Cost Matrix

A cost comparison is shown below. Final design has not been completed and figures will vary.

		Alternative 4A	**Alternative 4B**
Castleton BRF 015-2(10)		Replace Bridge with Road Closure and Off-Site Detour	Replace Bridge with Road Closure and Temporary Bridge
COST	Bridge Cost	$675,000	$675,000
	Removal of Structure	$100,000	$100,000
	Roadway	$230,000	$280,000
	Erosion Control	$10,000	$10,000
	Temporary Bridge	$0	$250,000
	Total Construction Cost	**$1,015,000**	**$1,315,000**
	Construction Duration	6 months (4 week closure)	18 months
	Preliminary Engineering	$280,000	$330,000
	Right of Way	$0	$150,000
	Construction Engineering + Contingencies	$300,000	$350,000
	Project Development Duration	2 years	4 years
	Total Cost	***$1,595,000***	***$2,145,000***
	Premium		34%
	Design Life	80 years	80 years

ENGINEERING	Vertical Clearance	Substandard	Substandard
	K value, Sight Distance	Substandard	Substandard
	Typical Section - Roadway (ft)	2-11-11-2	2-11-11-2
	Typical Section - Bridge (ft)	5-11-11-5	5-11-11-5
	Traffic Safety	Improved	Improved
	Alignment Change	No	No
	Bicycle Access	Slight Improvement	Slight Improvement
	Hydraulic Performance	NA	NA
	Pedestrian Access	Slight Improvement	Slight Improvement
	Utility	Overhead Relocated	Overhead Relocated
OTHER	ROW Acquisition	None	Temporary
	Traffic Maintenance	Off-site Detour	Temporary Bridge

VI. Conclusion

A cost comparison is shown above for the two “Full Bridge Replacement” concepts, between Alternative 4A, a rapid construction alternative using precast components and off-site detour, and Alternative 4B, a normally scheduled alternative using integral abutments and on site detour (two lane temporary bridge). The rapid construction alternative seems more cost-effective, and there are serious undesirable impacts to neighboring properties with the use of a temporary bridge.

Therefore, since it is in alignment with Vtrans goals of utilizing accelerated replacement techniques and completing projects without temporary bridges, **Alternative 4A is recommended.** Note that geometric standards for vertical curves and sight distance will not be met with the new construction due to existing site constraints. Vertical clearance between the Clarendon & Pittsford Railroad tracks and low beam on the new bridge will also be substandard, but it is proposed that a vertical clearance of 20’-8” be provided by maintaining the existing vertical alignment and economizing on the depth of the superstructure as much as possible. Input and approval from the Clarendon & Pittsford Railroad will be very important early in the project. Further review of the detour route through the Fair Haven Urban Compact will be required to confirm that roadway geometry and Level of Service are not unduly compromised for the anticipated closure period. The detour proposals may be dependent on other Town approvals.

VII. Appendices

Site Pictures
Town Map
Bridge Inspection Report
Preliminary Geotechnical Report
Natural Resources Memo
Archeology Memo
Historic Memo
Proposed Detour Route
Existing Conditions Layout
Proposed Plans

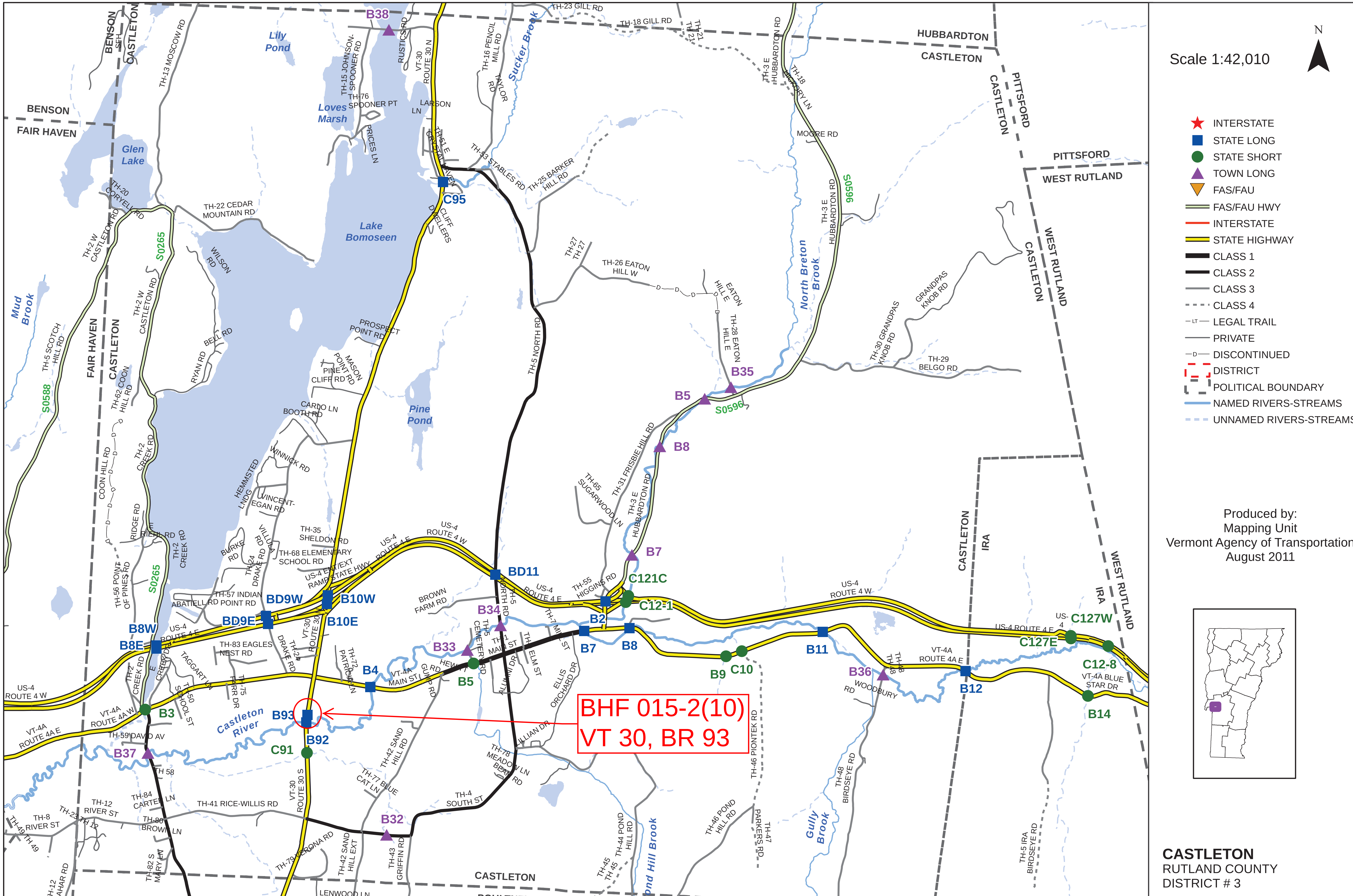
- Typical Sections
- Alternative 4a
    - Layout
    - Profile
- Alternative 4b
    - Layout
    - Profile

East side of bridge looking north – Deteriorating Deck Overhang

Underside of bridge looking north – Deteriorating Superstructure

Underside of bridge looking north

Close-up, west side of bridge deck looking south


BHF 015-2(10)
VT 30, BR 93
Scale 1:42,010
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
CASTLETON
RUTLAND COUNTY
DISTRICT # 3
Lake Bomoseen
Glen Lake
Lily Pond
Loves Marsh
Pine Pond
Castleton River
HUBBARDTON
CASTLETON
PITTSFORD
WEST RUTLAND
BENSON
FAIR HAVEN
POULTNEY
IRA
B93
B92
C91
B3
B4
B5
B7
B8
B9
C10
B11
B12
B14
B2
BD11
B10W
B10E
BD9W
BD9E
B8W
B8E
C95
B38
B37
B36
B35
B34
B33
B32
C121C
C12-1
C127W
C127E
C12-8
S0265
S0588
S0596

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for CASTLETON *bridge no.:* 00093 *District:* 3

Located on: VT 00030 ML *over* CLARENDON PITTSFO *approximately* 0.3 MI S JCT. VT.4A *Owner:* 01 STATE-OWNED

CONDITION

Deck Rating: 4 POOR

Superstructure Rating: 5 FAIR

Substructure Rating: 5 FAIR

Channel Rating: N NOT APPLICABLE

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200015009311032

Federal Sufficiency Rating: 38.5

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1938 *Year Reconstructed:* 1968

Service On: 1 HIGHWAY

Service Under: 2 RAILROAD

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 25

ADT: 003600 *% Truck ADT:* 09

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0036

Structure Length (ft): 000109

Lt Curb/Sidewalk Width (ft): 0

Rt Curb/Sidewalk Width (ft): 0

Bridge Rdwy Width Curb-to-Curb (ft): 25.5

Deck Width Out-to-Out (ft): 29

Appr. Roadway Width (ft): 026

Skew: 00

Bridge Median: 0 NO MEDIAN

Min Vertical Clr Over (ft): 99 FT 99 IN

Feature Under: RAILROAD BENEATH STRUCTURE

Min Vertical Underclr (ft): 20 FT 02 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: 3 SP ROLLED BEAM

Number of Approach Spans: 0000 *Number of Main Spans:* 003

Kind of Material and/or Design: 3 STEEL

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 6 BITUMINOUS

Type of Membrane 0 NONE

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 0 DOES NOT MEET CURRENT STANDARD

Transitions: 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: 2 INTOLERABLE, REPLACEMENT NEEDED

Underclearances Vertical and Horizontal: 4 MEETS MINIMUM TOLERABLE CRITERIA

Waterway Adequacy: N NOT OVER WATER

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: N NOT OVER WATERWAY

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: 01 NO LOAD POSTING SIGNS EXIST NEAR BRIDGE

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 2 H 15

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 052011 *Insp. Freq. (months)* 24 *X-Ref. BrNum:*

INSPECTION SUMMARY and NEEDS

5/18/11 Fair to poor condition deck continue to deteriorate along top and soffit. Steel continues to deteriorate and sub structure continues to deteriorate. Structure needs major recon or full replacement in near future. Deck has potential full depth holes at anytime MK PH

05/11/09 Structure's in fair to poor condition due to continuing deterioration pavement and deck soffit and substructure. Since last inspection majority of the holes along steel beam webs have been plated. Span 1 beam 5 was not plated and repairs should be also done. Structure should be considered for extensive rehab or replacement. ~MJK

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: June 21, 2012

Subject: Castleton BRF 015-2(10) Bridge #93 VT-Route 30 Over Clarendon-Pittsford RR 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 Bridge No. 93 on Vermont State Highway 30 which crosses over the Clarendon-Pittsford rail tracks in Castleton, Vermont. Figure 1 show a view of the railroad grade and adjacent land that Bridge 93 crosses over and Figure 2 shows the bridge and approach roadway as seen facing south.

Figure 1 View of railroad grade at Bridge 93.

Figure 2 Photograph of bridge as viewed looking south.

This review included the examination of possible historical in-house bridge boring files, as-built record plans, 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.

No boring log data were found in the Soils & Foundations project database or in-house historical boring log records in the vicinity of this bridge.

As-built plans show that there were ten borings drilled in 1939 in preparation for the design of the current bridge (Figures 3 and 4). These borings show that the area of the bridge is underlain by sandy loam, sand and gravel and clay. Bedrock was not encountered to depths of approximately elevation 140 feet.

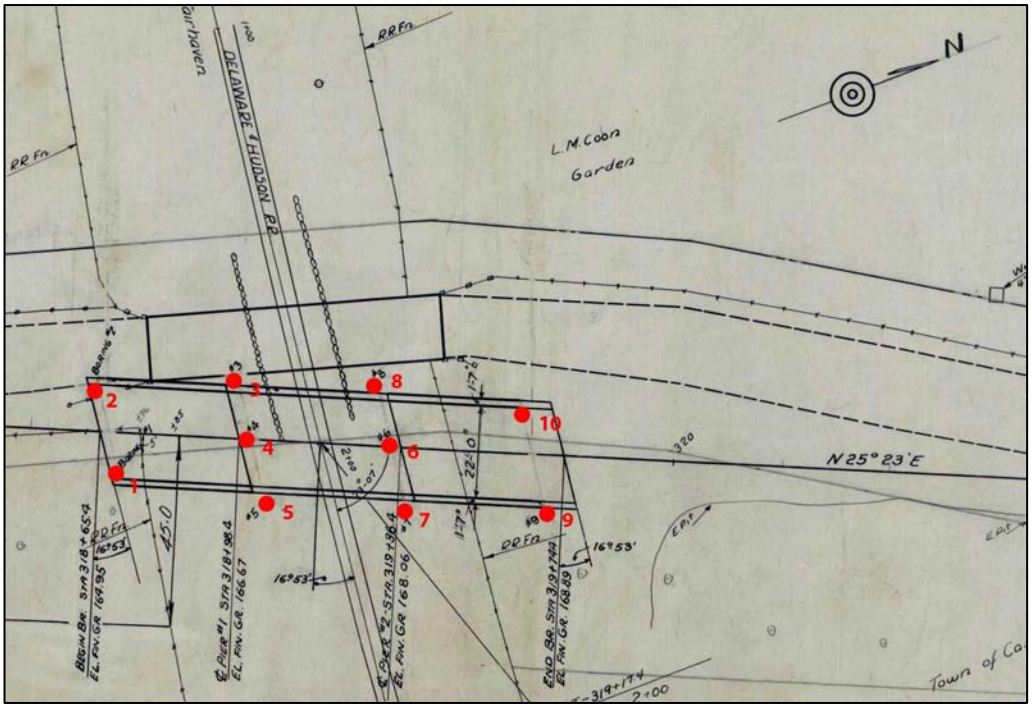


Figure 3 Part of 1938 plan set showing location of borings.

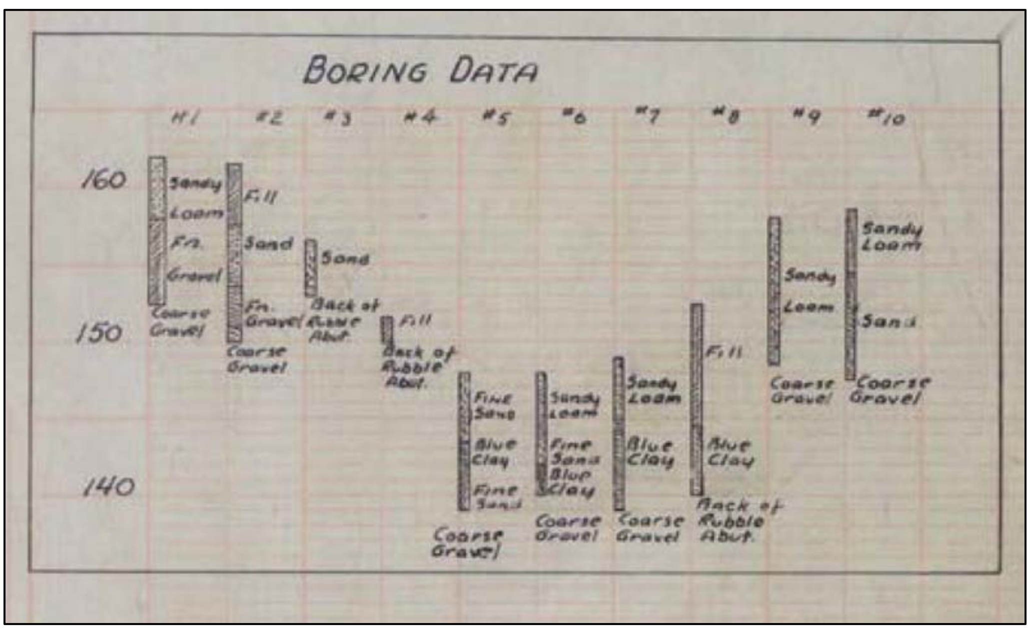


Figure 4 Borings from 1939 As-Built plans.

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. A number of private water wells are located in the vicinity of the bridge. These private water well locations are depicted in Figure 3. Depth to bedrock values as reported by ANR are labeled on the figure. Well driller reports on file at the Vermont Agency of Natural Resources indicate that the top of bedrock within the project area is at depths ranging from 12 to 180 feet below ground surface. The closest water well located approximately 225 feet west northwest of the bridge reported top of bedrock to be at 15 feet. Based on the distribution of depth to bedrock depths in the area, the depth to top of bedrock is quite variable and it appears that there is a bedrock high trending east-west through the area of the bridge. The closest well to the project reports fine sand from ground surface to 15 feet. These sands reportedly overly green and purple colored slate (bedrock).

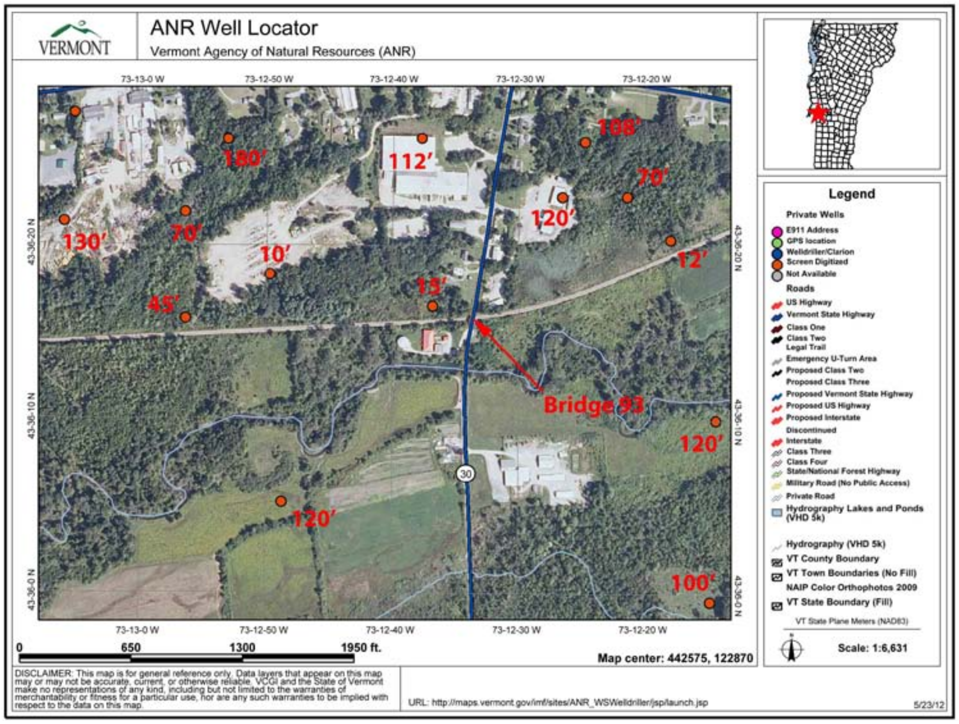


Figure 5 Private water wells in vicinity of Bridge 93. Depth to bedrock is noted.

Surficial mapping conducted for the 1970 Surficial Geologic Map of Vermont indicates that the subject area is underlain by glacial sand deposits. Recent alluvial sands and gravels overly the glacial deposits within the Castleton River floodplain. A portion of the original surficial geology field mapping is presented as Figure 4.

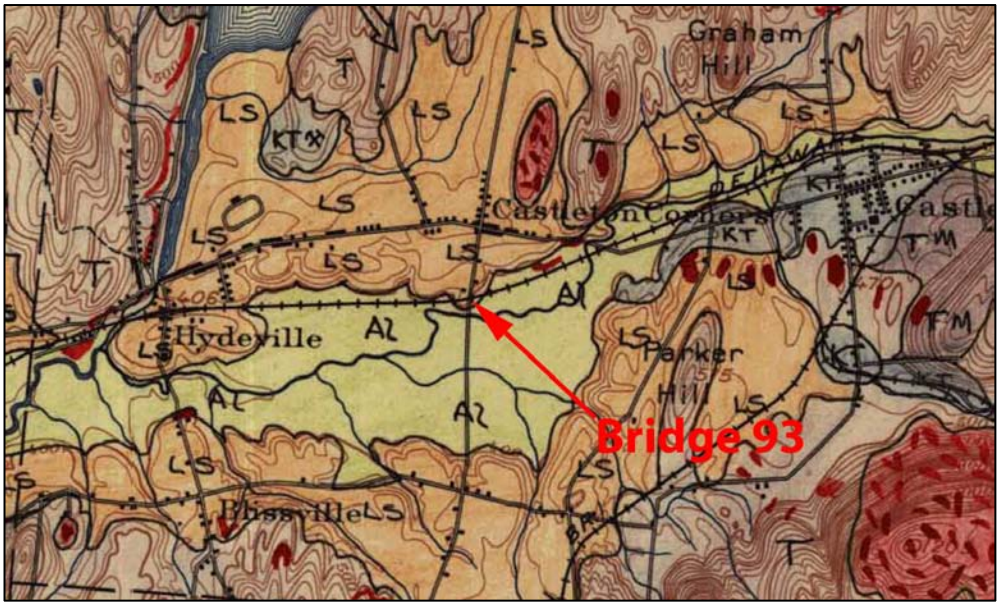


Figure 6 Surficial geologic map showing distribution of soil. AL=Alluvium, LS= Glacial Lake Sand, T= Glacial Till.

No exposed bedrock outcrops were observed in the area of Bridge 93. Based on recent bedrock mapping for the 2011 State bedrock geologic map, the rock type underlying this area is the Bull Formation that is described as "Greenish-gray to pale-lustrous-green chlorite-muscovite-quartz phyllite, and green and purple, bedded and mottled phyllite. Locally contains boudins and thin beds of limestone and pods of pinkish-gray to cream-white dolostone, and minor quartzite".

USDA Natural Resources Conservation soil survey records indicate that surficial soils in the area of the bridge consist of Sandy glaciofluvial deposits of the Windsor Loamy Sand complex. Figure 5 shows the portion of the USDA NRCS soil map.

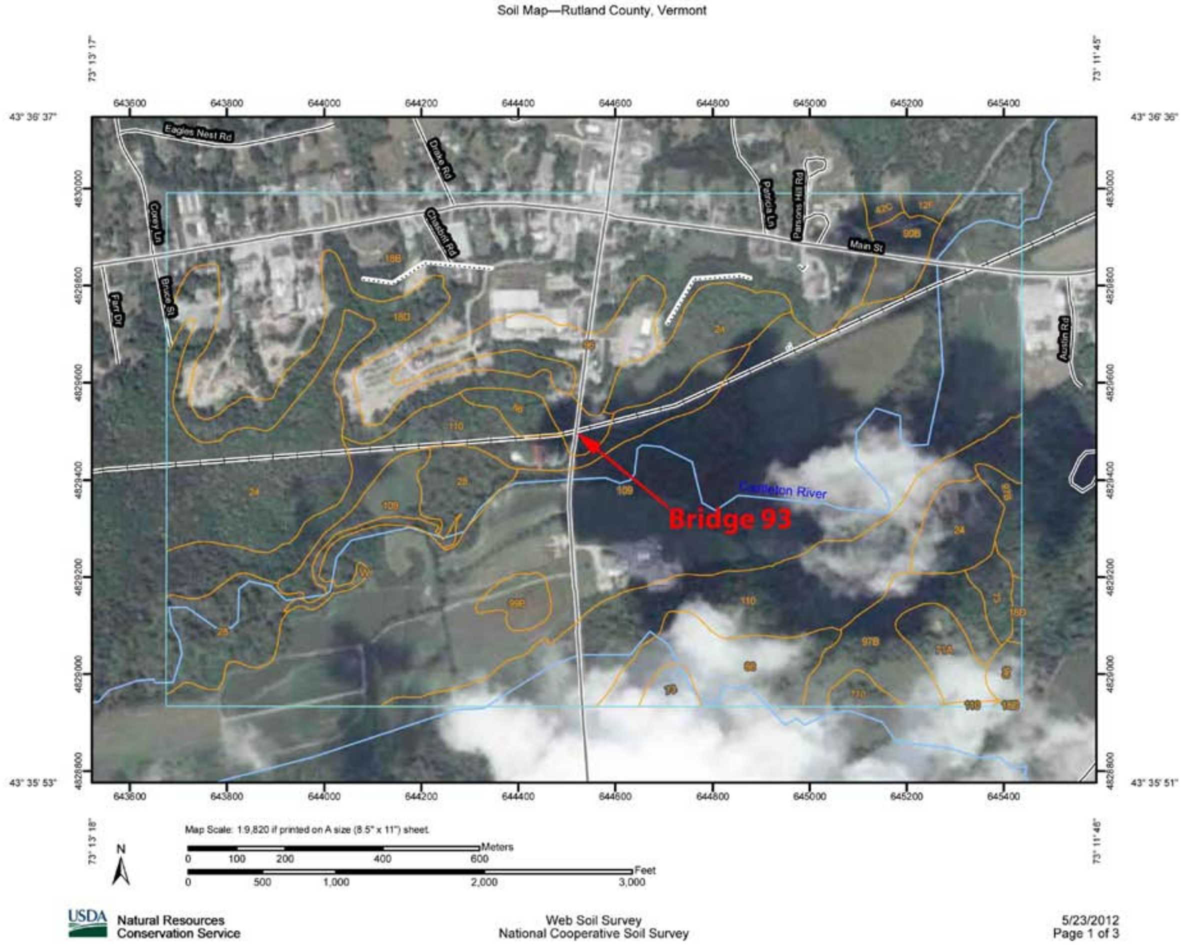


Figure 7 USDA NRC Soil; Survey map showing distribution of soil complexes in the vicinity of Bridge 93.

The potential for utilities in the area of the bridge was assessed during the Structures Section initial scoping visit on May 7, 2012. Notes from that visit are available at Z:\Projects-Engineering\CastletonBRF015-2(10)12b138\Structures\Memos\2012\Bridge Initial Scoping Visit.docx. Access for drilling borings appears good although coordination with the railroad may be necessary.

Since the depth to top of bedrock may be relatively shallow in the area of Bridge 93, we recommend that four borings be conducted (two at each abutment). Borings should extend into bedrock.

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

- Stub abutment on MSE walls
- Geosynthetic Reinforced Soil Abutments

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

c: WEA/Read File
CCB/Project File

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

TO: James Brady, Environmental Specialist

FROM: John Lepore, Transportation Biologist

DATE: May 9, 2012

SUBJECT: CASTLETON BRF 015-2 (10)
VT 30, BR 93 over the railroad

The purpose of this memorandum is to let you know that I have completed the initial resource identification which included a site visit using GPS and ArcMap..

WETLANDS & FLOODPLAINS

Wetlands are located to the south and east of the bridge, and they were picked up using GPS. A temporary bridge and detour on the eastern side of VT 30 would likely trigger the need for both state and federal wetland permits as they are Class II, and include a 50' Buffer.

AGRICULTURAL SOILS

Prime agricultural soils are not to the north of the Castleton River

SPECIES / HABITAT OF SPECIAL CONCERN

According to the Significant Habitat Map for the Town of Castleton, there is a plant species of special concern in the wetlands that are to the east of VT 30, between Bridge 93 and the Castleton River. This plant was observed right up to the existing roadway toe-of-slope and should be avoided.

FISHERIES

The Castleton River is a cold-water stream known to host a variety of native fish species, but it is not classified as *Essential Fish Habitat*. Standard time-of-year restrictions will apply for any and all in-stream work activities.

PERMITS

The Castleton River is not classified as either a *Navigable Waterway* or *Essential Fish Habitat* but any in-stream impacts would need both state and federal permits. Any fill in the river or the adjacent wetlands will trigger additional permit concerns from both the ANR and Corps of Engineers.

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

Agency of Transportation

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

To: James Brady, VTrans Environmental Specialist

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

Date: 4/20/2012

Subject: Castleton BRF 015-2(10) – Archaeological Resource ID

I have completed my initial resource identification for Castleton BRF 015-2(10). A field visit conducted on 4/18/2012 as part of the 2012 GPS scoping initiative was adequate to identify potential resources in the project area. There are *no archaeological resources* present in the APE, and likewise no concerns for archaeology.

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

Brady, James

From: O'Shea, Kaitlin
Sent: Thursday, April 12, 2012 4:13 PM
To: Brady, James
Cc: Williams, Chris; Newman, Scott
Subject: Pilot Project - Castleton BRF 015-2(10) Historic Resource ID

Good afternoon,

I have completed the historic resource ID for Castleton BRF 015-2(10): Bridge 93 is not historic; however, it spans the Clarendon & Pittsford Railroad, which is a linear historic district. However, there are no contributing historic structures to this district in the project area.

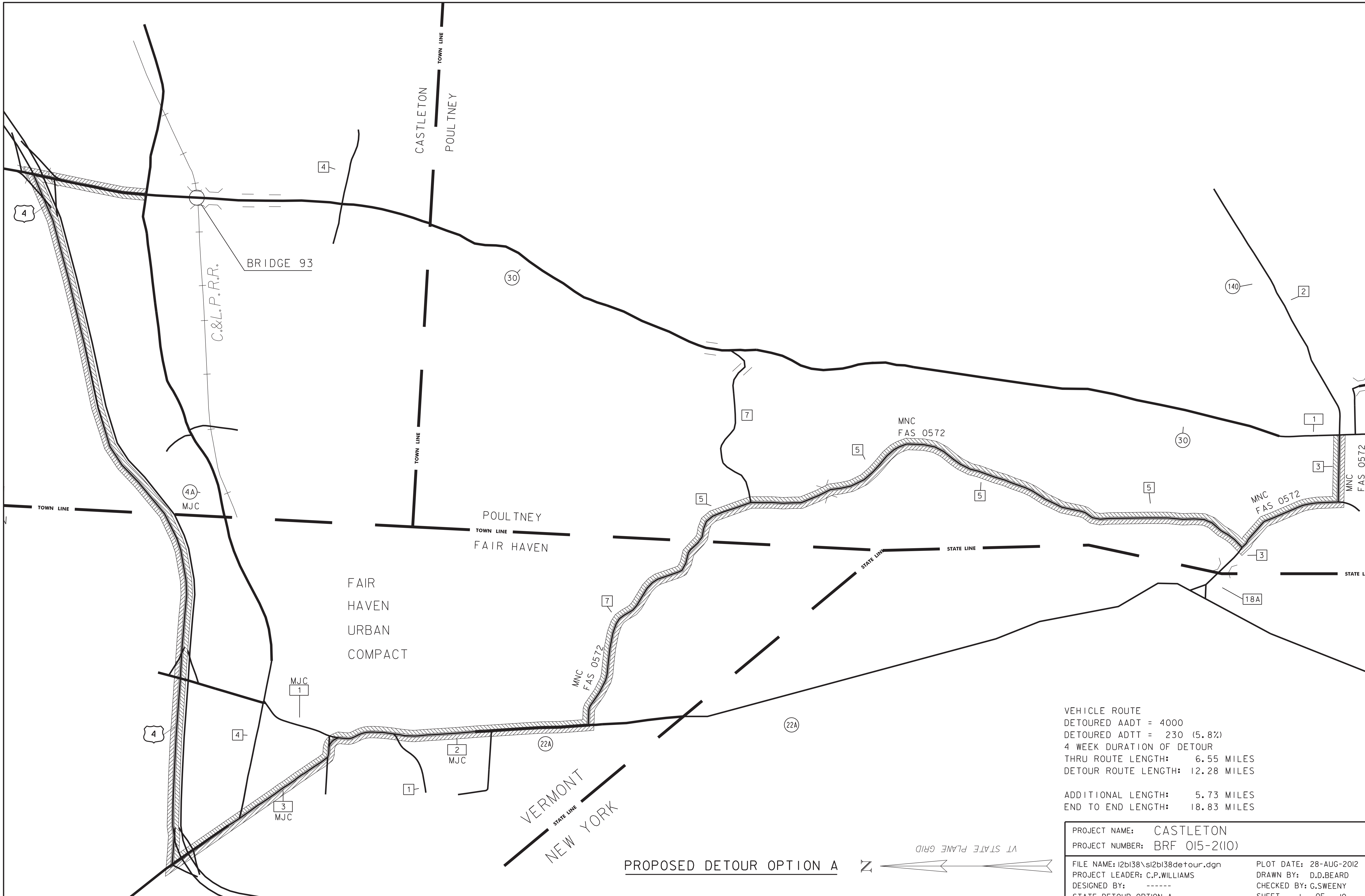
This resource ID is part of the GPS/GIS Pilot Project. As discussed, initial review for historic resources is completed via desk review (maps, bridge inspection photos, Google Earth) and can be determined to have no historic resources without site visits. Other projects will require a site visit in order 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

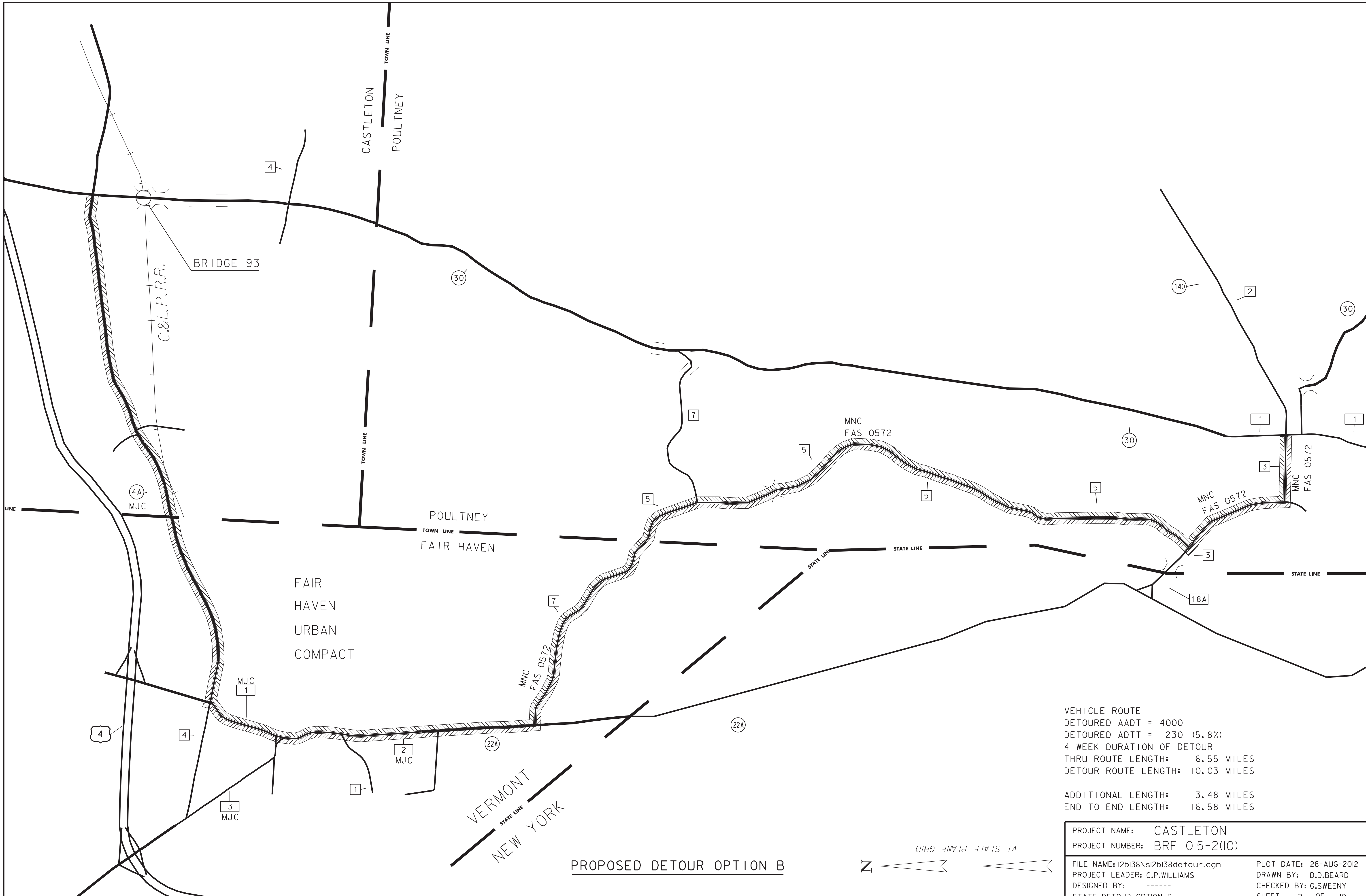
802-279-0869
Kaitlin.O'Shea@state.vt.us



VEHICLE ROUTE
DETOURED AADT = 4000
DETOURED ADTT = 230 (5.8%)
4 WEEK DURATION OF DETOUR
THRU ROUTE LENGTH: 6.55 MILES
DETOUR ROUTE LENGTH: 12.28 MILES

ADDITIONAL LENGTH: 5.73 MILES
END TO END LENGTH: 18.83 MILES

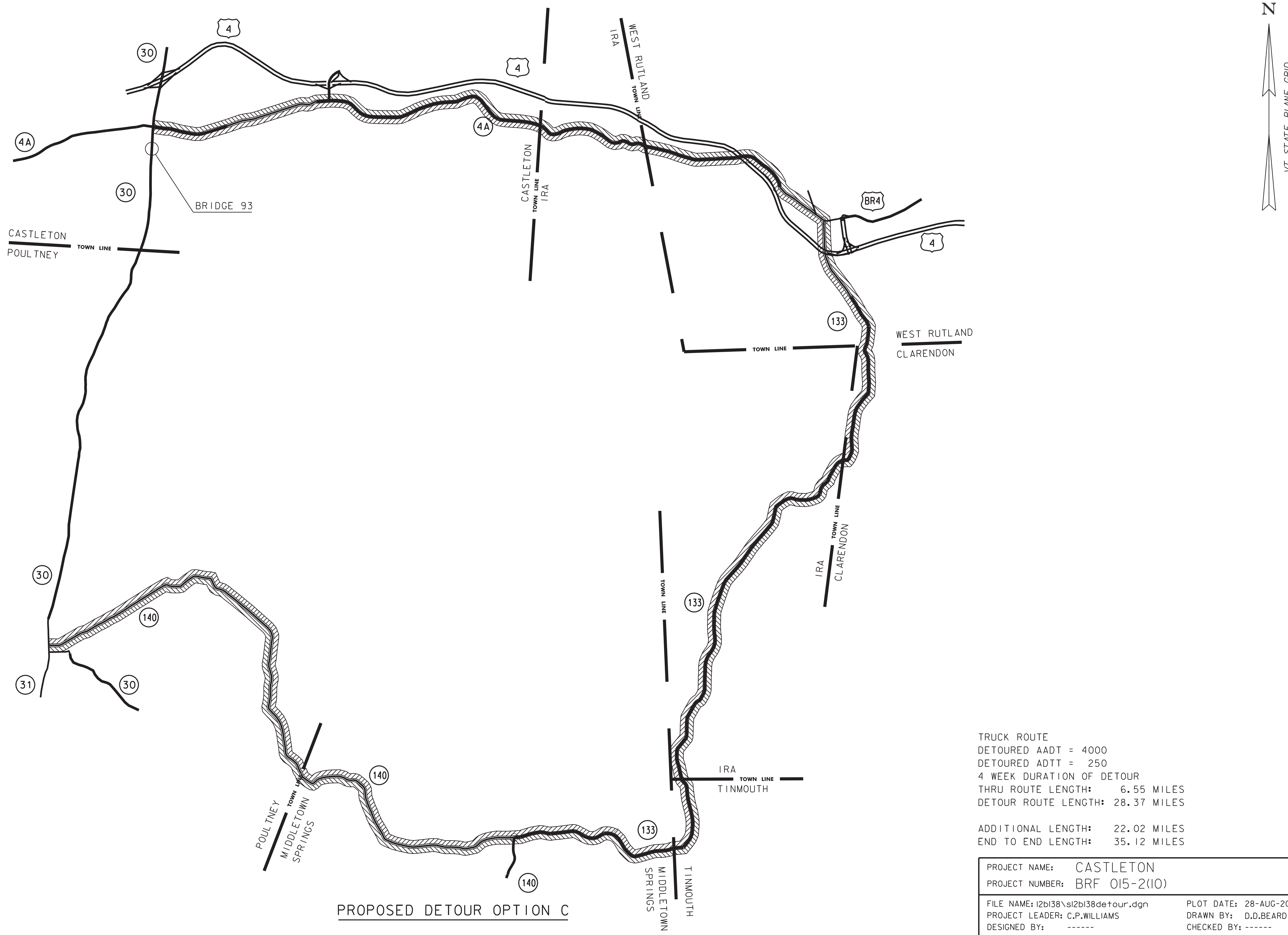
PROJECT NAME: CASTLETON	
PROJECT NUMBER: BRF 015-2(10)	
FILE NAME: 12b138\s12b138detour.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: G.SWEENY
STATE DETOUR OPTION A	SHEET 1 OF 10



VEHICLE ROUTE
DETOURED AADT = 4000
DETOURED ADTT = 230 (5.8%)
4 WEEK DURATION OF DETOUR
THRU ROUTE LENGTH: 6.55 MILES
DETOUR ROUTE LENGTH: 10.03 MILES

ADDITIONAL LENGTH: 3.48 MILES
END TO END LENGTH: 16.58 MILES

PROJECT NAME: CASTLETON	
PROJECT NUMBER: BRF 015-2(10)	
FILE NAME: 12b138\s12b138detour.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: G.SWEENY
STATE DETOUR OPTION B	SHEET 2 OF 10

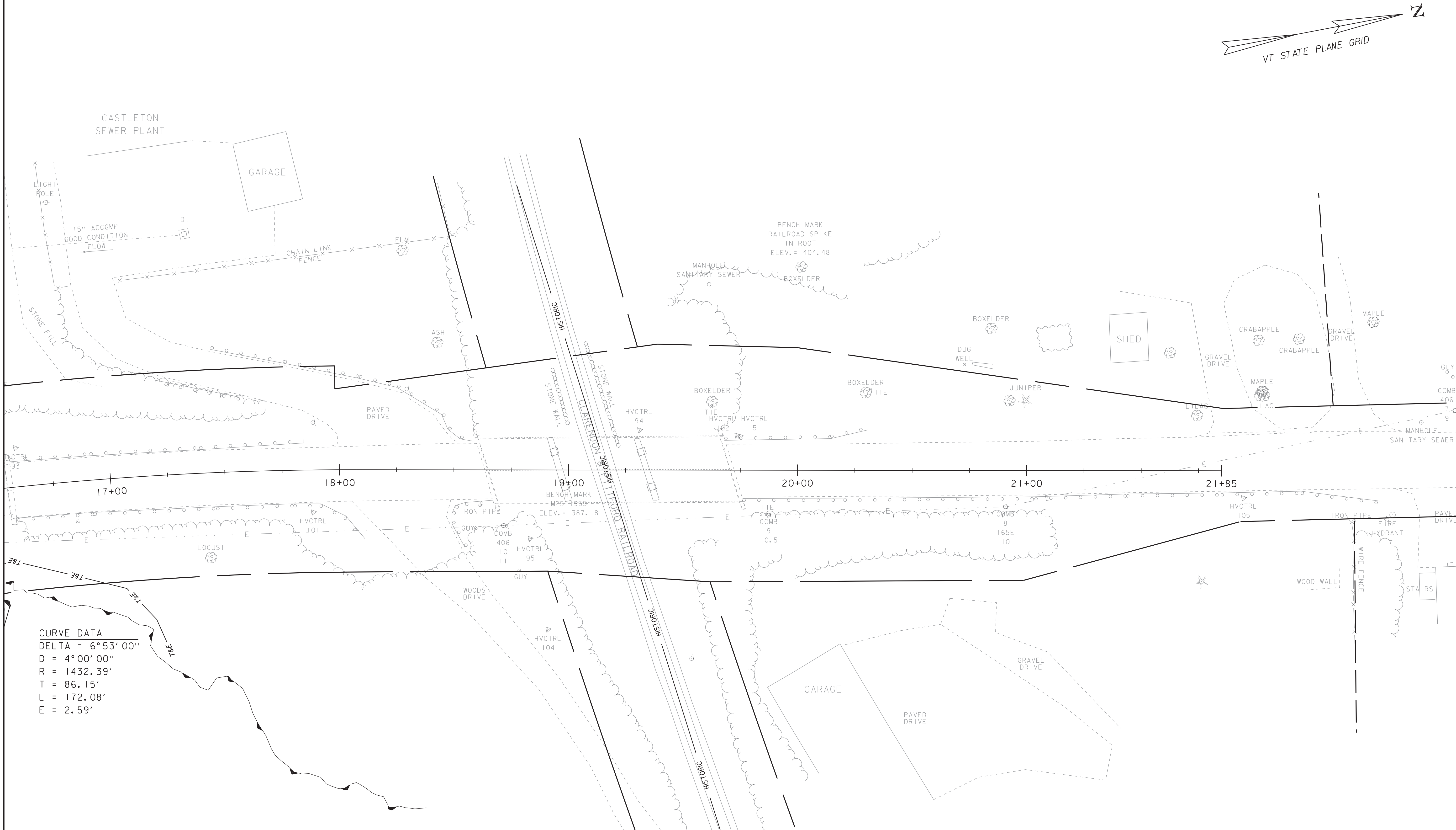


PROPOSED DETOUR OPTION C

TRUCK ROUTE
DETOURED AADT = 4000
DETOURED ADTT = 250
4 WEEK DURATION OF DETOUR
THRU ROUTE LENGTH: 6.55 MILES
DETOUR ROUTE LENGTH: 28.37 MILES

ADDITIONAL LENGTH: 22.02 MILES
END TO END LENGTH: 35.12 MILES

PROJECT NAME: CASTLETON	
PROJECT NUMBER: BRF 015-2(10)	
FILE NAME: 12b138\s12b138detour.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
STATE DETOUR OPTION C	SHEET 3 OF 10



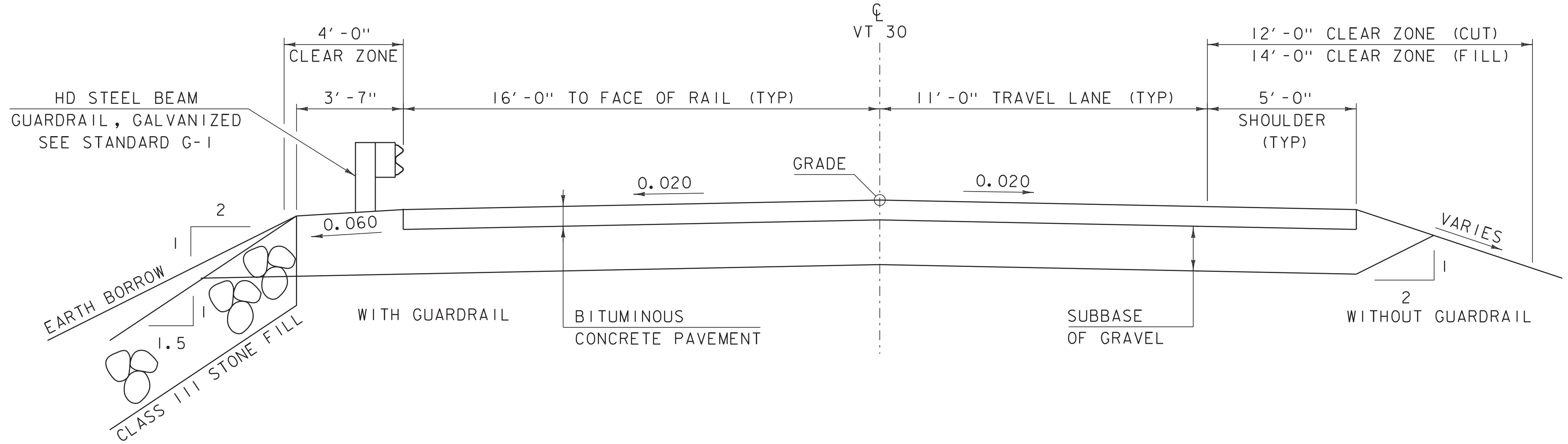
CURVE DATA
DELTA = 6°53′00"
D = 4°00′00"
R = 1432.39′
T = 86.15′
L = 172.08′
E = 2.59′

EXISTING CONDITIONS

SCALE 1" = 20′-0"
20 0 20

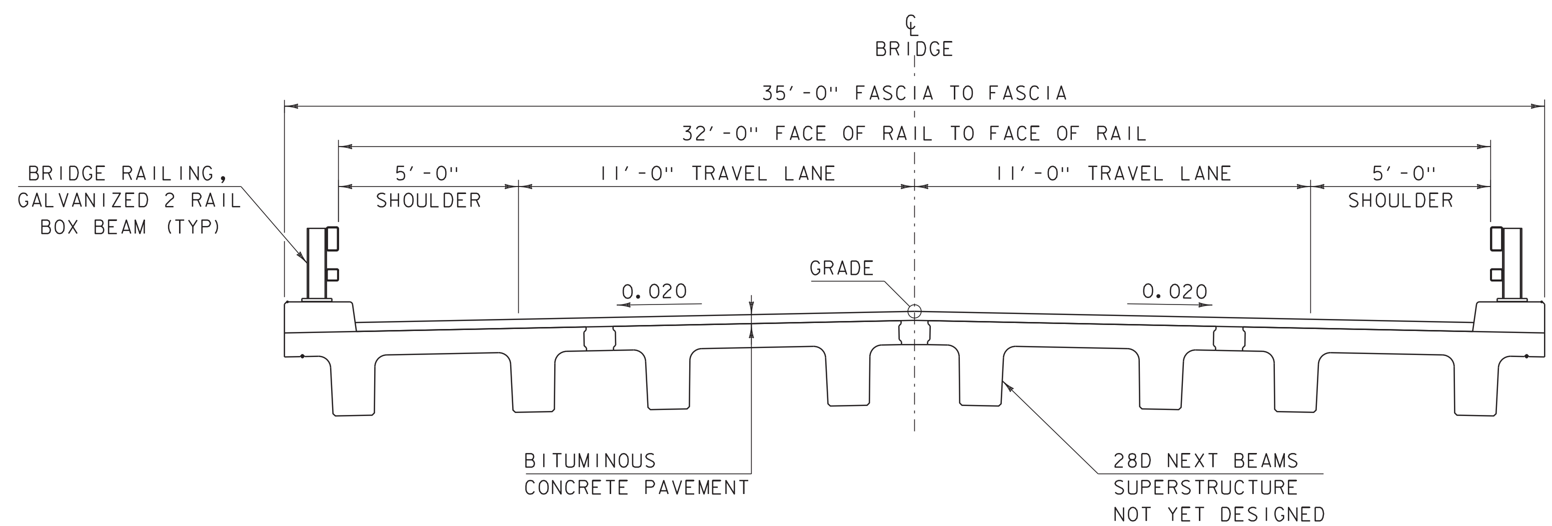
PROJECT NAME:	CASTLETON
PROJECT NUMBER:	BRF 015-2(10)

FILE NAME: s12b138bdr.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
EXISTING CONDITIONS	SHEET 4 OF 10



PROPOSED VT 30 TYPICAL SECTION

SCALE ⅜" = 1'-0"



MATERIAL TOLERANCES

(IF USED ON PROJECT)

SURFACE	
- PAVEMENT (TOTAL THICKNESS)	+/- ¼"
- AGGREGATE SURFACE COURSE	+/- ½"
SUBBASE	+/- 1"
SAND BORROW	+/- 1"

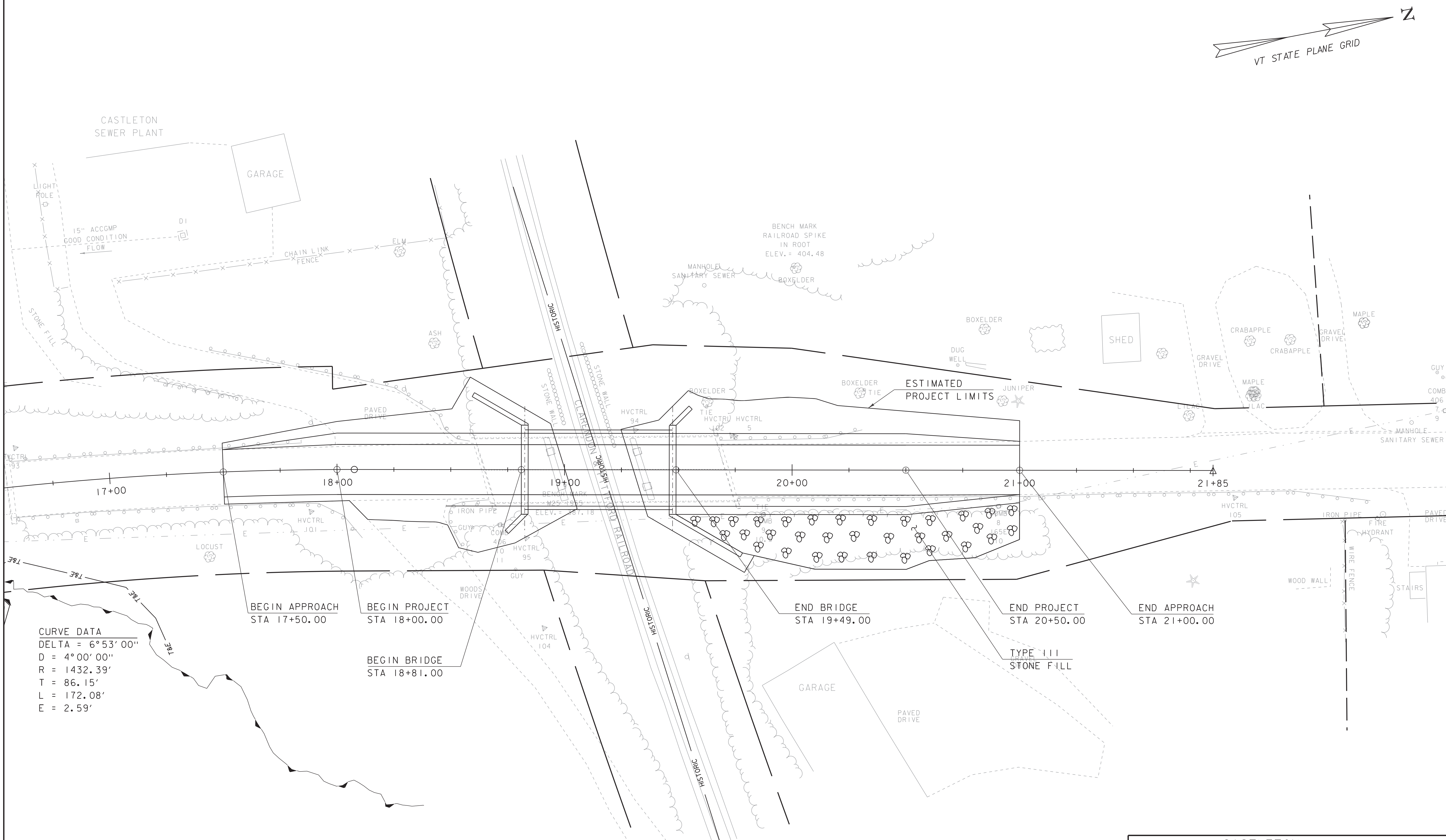
PROPOSED BRIDGE TYPICAL SECTION

SCALE ⅜" = 1'-0"

PROJECT NAME: CASTLETON
PROJECT NUMBER: BRF 015-2(10)

FILE NAME: 12b138\s12b138typical.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: G.SWEENY
TYPICAL SECTIONS

PLOT DATE: 28-AUG-2012
DRAWN BY: D.D.BEARD
CHECKED BY: G.SWEENY
SHEET 5 OF 10



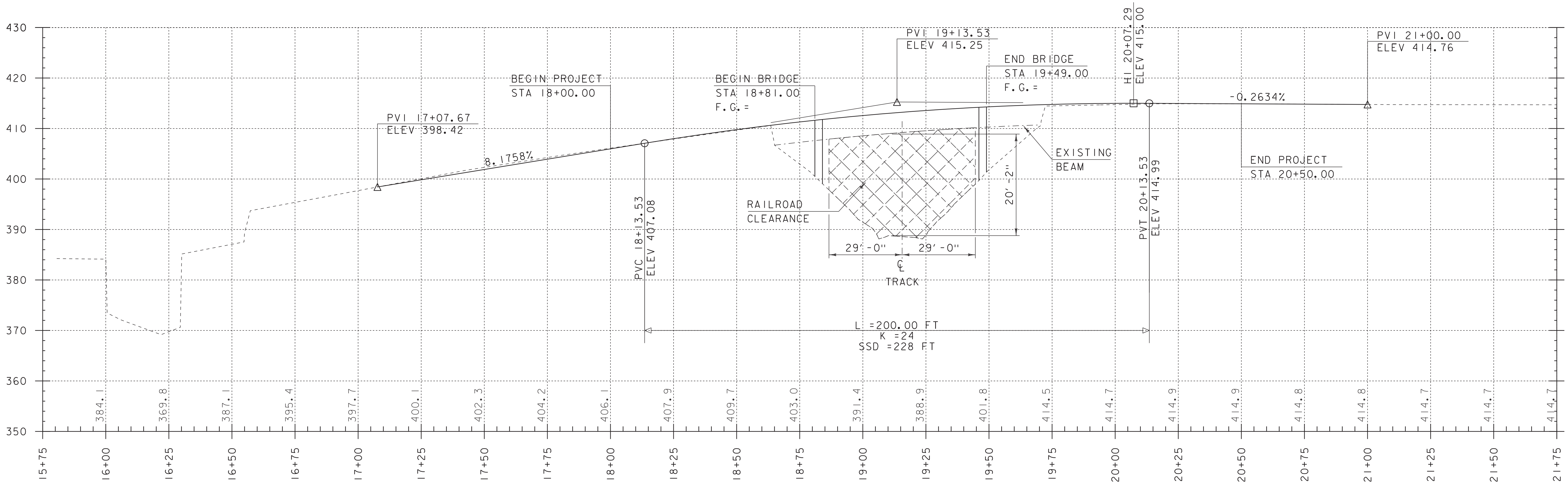
ALTERNATIVE #4A

SCALE 1" = 20′-0"

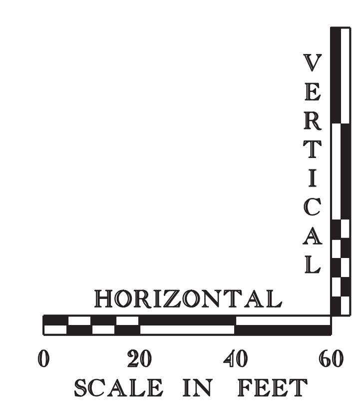
20 0 20

PROJECT NAME:	CASTLETON
PROJECT NUMBER:	BRF 015-2(10)

FILE NAME: s12b138bdr.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
ALTERNATIVE #4A	SHEET 6 OF 10



VT RT 30 PROFILE

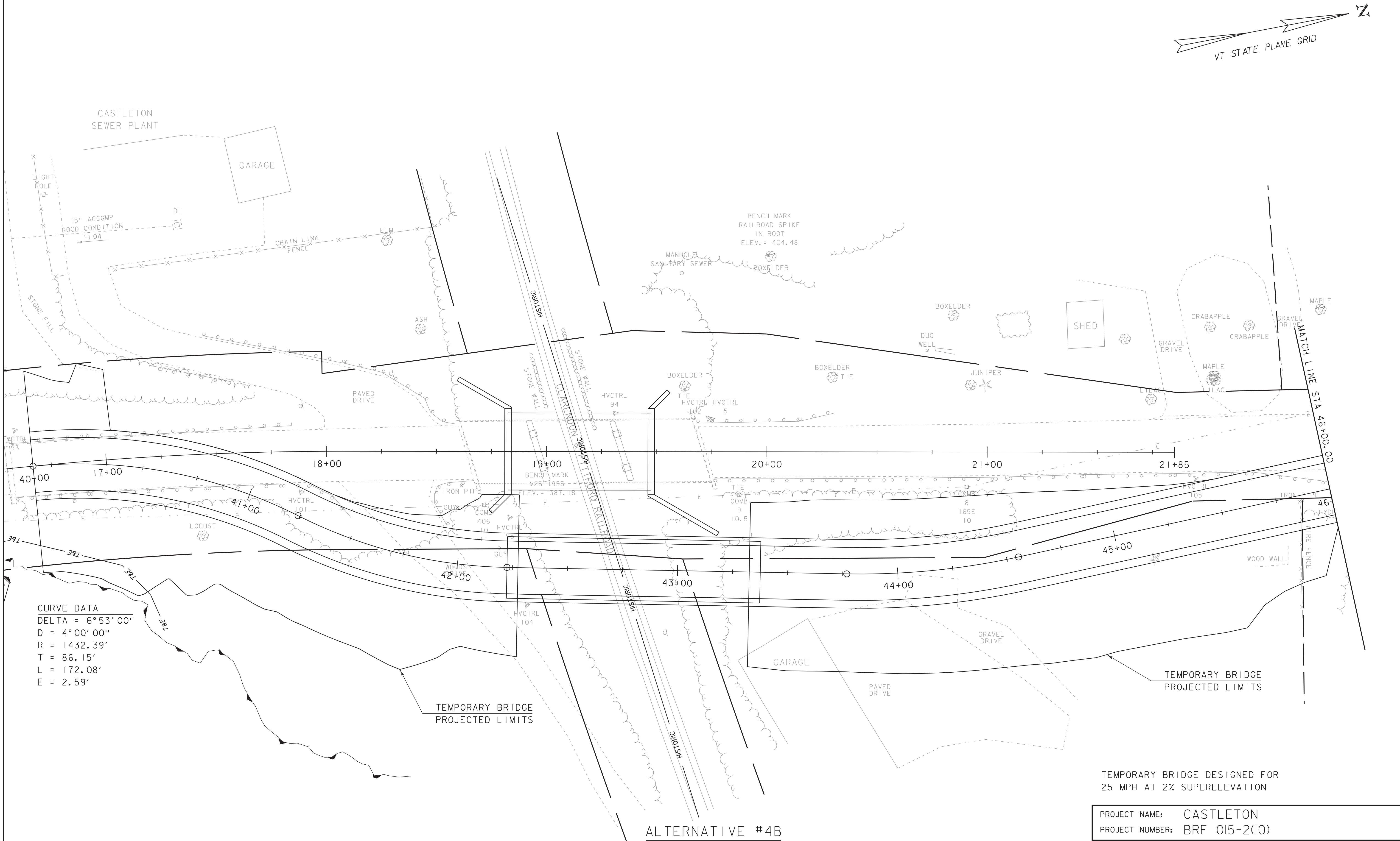


NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: CASTLETON	
PROJECT NUMBER: BRF 015-2(10)	
FILE NAME: s12b138profile.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PROFILE SHEET	SHEET 7 OF 10

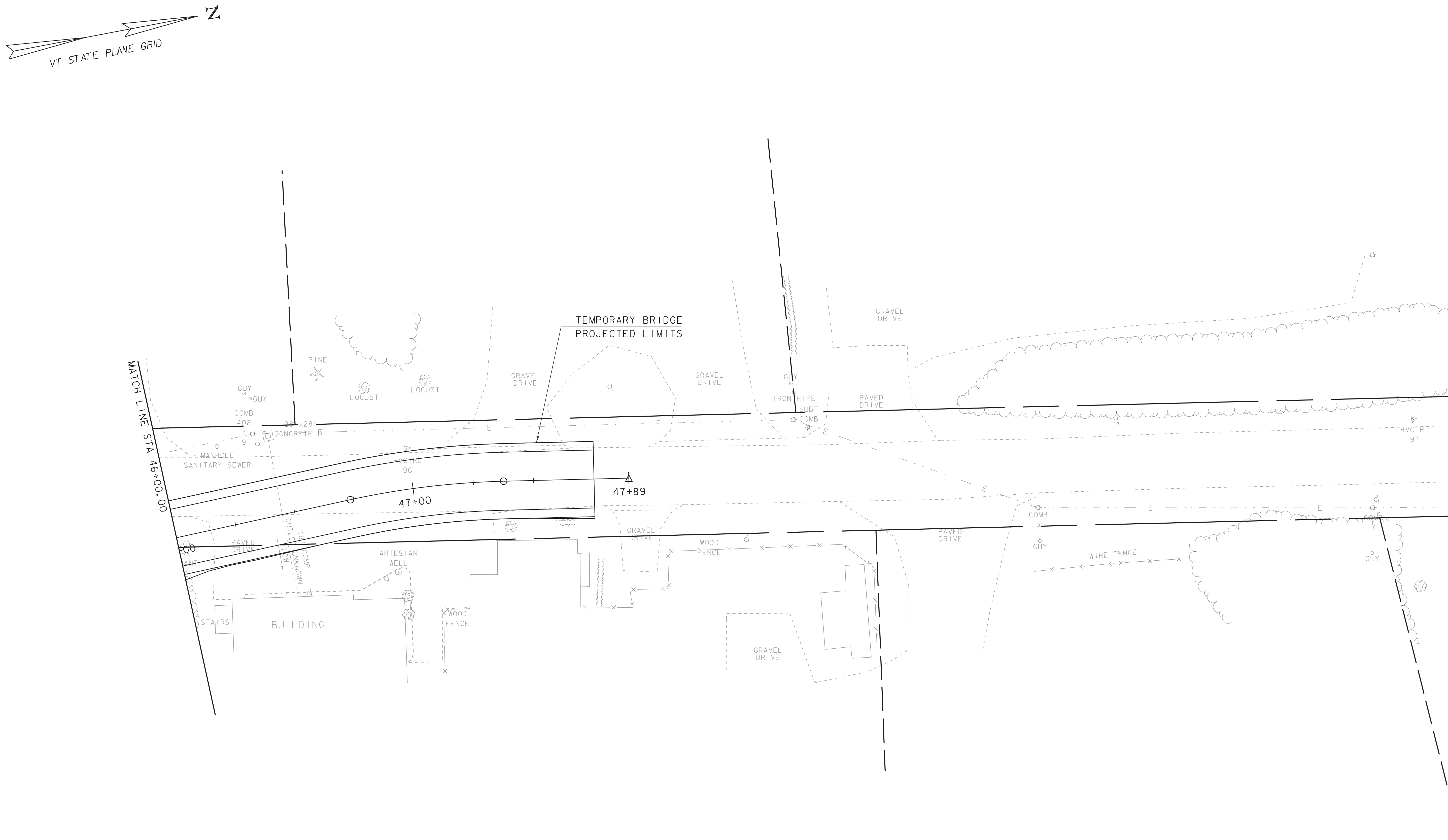


TEMPORARY BRIDGE DESIGNED FOR
25 MPH AT 2% SUPERELEVATION

ALTERNATIVE #4B

SCALE 1" = 20′-0"
20 0 20

PROJECT NAME: CASTLETON	
PROJECT NUMBER: BRF 015-2(10)	
FILE NAME: s12b138bdr.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
ALTERNATIVE #4B-1	SHEET 8 OF 10

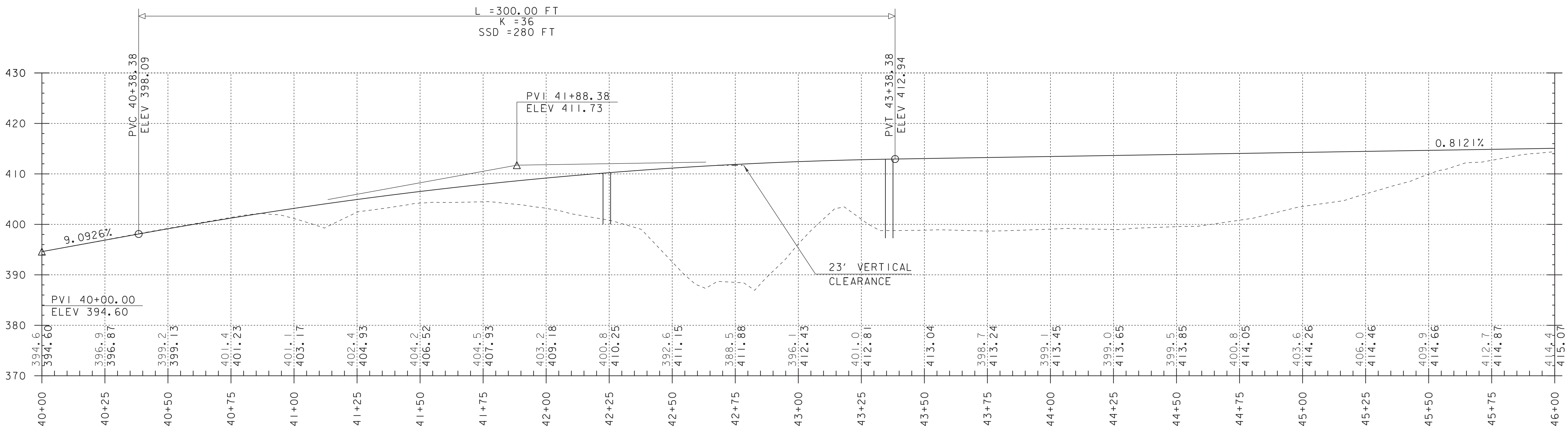


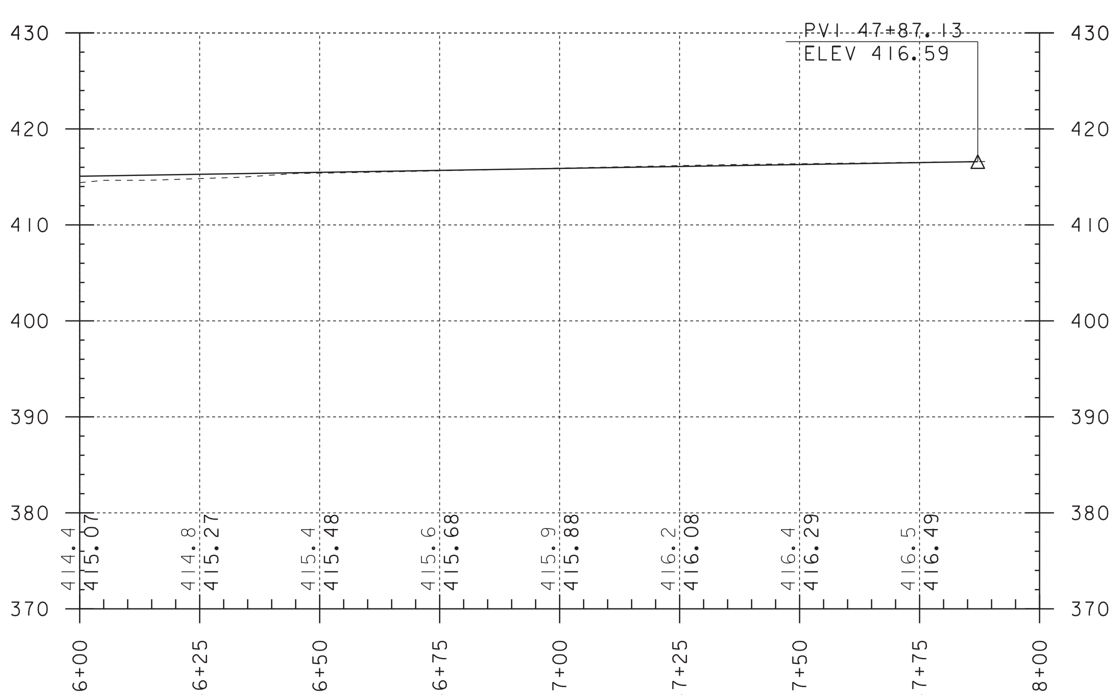
ALTERNATIVE #4B

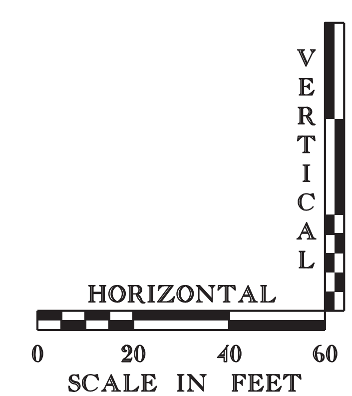
SCALE 1" = 20'-0"

20 0 20

PROJECT NAME: CASTLETON	
PROJECT NUMBER: BRF 015-2(10)	
FILE NAME: 12b138\s12b138bdr.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: G.SWEENY	CHECKED BY: G.SWEENY
ALTERNATIVE #4B-2	SHEET 9 OF 10







NOTE:

GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

TEMPORARY BRIDGE PROFILE

PROJECT NAME: CASTLETON	
PROJECT NUMBER: BRF 015-2(10)	
FILE NAME: 12b138\s12b138tempbridge.dgn	PLOT DATE: 28-AUG-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: G.SWEENY	CHECKED BY: G.SWEENY
TEMPORARY BRIDGE PROFILE	SHEET 10 OF 10