STATE OF VERMONT
AGENCY OF TRANPORTATION

Scoping Report

FOR

Chelsea BHF 0169(10)

VT ROUTE 110, Bridge #11
OVER SOUTH WASHINGTON BROOK

January 10, 2012

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I. Site Information

Bridge 11 is located on VT Route 110 approximately 0.3 miles north of the junction with VT 113 and approximately 600 ft. upstream of the confluence of South Washington Brook with the First Branch of the White River. VT Route 110 passes through the downtown area of Chelsea at the location of this bridge. The existing conditions were gathered from a combination of a Site Visit, the Inspection Report, the Route Log, and the existing Survey. See correspondence in the Appendix for more detailed information.

Roadway Classification	Rural Major Collector, State Highway
Bridge Type	Cast in Place Concrete Deck on Rolled Beams, Cast-In-Place Abutments on Spread Footings, 5 ft. sidewalk on west side, skew 50 degrees
Bridge Length	81 Feet Long, Single Span
Year Built	1939
Ownership	State of Vermont

Need

Bridge 11 carries VT Route 110 across South Washington Brook, a tributary of the First Branch of the White River. The following is a list of the deficiencies of Bridge 11:

1. The deck is in poor condition with a rating of 4 (Poor) in the latest Inspection Report. Full depth patches have been made previously, and are likely to occur again soon. The Deficiency Status of Structure as shown on the Inspection Report is SD (structurally Deficient).

2. The bridge is hydraulically inadequate.

3. The existing bridge railings do not meet current standard.

4. The shoulder widths on the existing structure are substandard. The lanes are approximately 11 ft. and the shoulders approximately 0.5 ft. There is currently a 5 ft. sidewalk on the east side, but no sidewalks off either end of the bridge. Bicycle accommodations are substandard as well.

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. There are no high crash locations in Chelsea.

TRAFFIC DATA	2015	2035
ADT	1700	1800
DHV	210	220
ADTT	130	200
%T	7.9	11.9
%D	52	52

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 between 1500 and 2000 and a design speed of 30 mph.

Design Criteria	Source	Existing Condition	Minimum Standard	Comment
Approach Lane and Shoulder Widths	VSS Table 5.3	28’	10’/3’ (26’)	
Bridge Lane and Shoulder Widths	VSS Table 5.3	0.5-11-11-0.5 (23’)	10’/3’ (26’)	Substandard
Clear Zone Distance	VSS Table 5.5		14’ fill / 12’ cut	
Banking	2004 Structures Manual 13.1.4	Normal crown	Generally not used on low speed (45mph) village streets	Bridge will maintain normal crown.
Speed		30 mph (Posted)	30 mph (Design)	
Horizontal Alignment	AASHTO Green Book Table 3-10b	NA; bridge is located on straight section of road	NA	
Vertical Grade	VSS Table 5.6	(+)3.03% (-)1.51%	9% (max) for level terrain	
K Values for Vertical Curves	VSS Table 5.1	Bridge located on crest (K =36)	30 crest / 40 sag	
Vertical Clearance Issues	VSS Section 5.8	None noted	14’-3” (min)	
Stopping Sight Distance	VSS Table 5.1	320’	200’	
Bicycle/Pedestrian Criteria	VSS Table 5.8	5’ sidewalk east side, < 2’ west side	3’ Shoulder	Substandard
Bridge Railing	2010 Structures Manual Section 13	Decorative concrete rail with windows	TL-2	Substandard, deteriorating

Inspection Report Summary

Deck Rating	4 Poor
Superstructure Rating	6 Satisfactory
Substructure Rating	6 Satisfactory
Channel Rating	6 Satisfactory
Scour	8 Stable for scour

From Inspection Report:

"4/12/2011 The deck is in need of full replacement. Local deck failure may occur anytime anywhere. The concrete spindles on both sides are in need of full replacement. The steel is in need of full paint recoat. PLB"

"11/09/2009 – Confirm deck repair with full depth patch made by district forces. 04/09/2009 – The bridge deck needs replacement. Steel superstructure and the concrete abutments are still quite good and can easily be rehabilitated. C.M. sent regarding possible full depth hole formation in bay #3. MJ/DS"

Hydraulics

The preliminary hydraulics report states that the Bridge 11 does not meet the hydraulic standards for a State project on a Rural Major Collector. While the standard calls for passing Q_{50} (the 50 year event) with 1.0 ft. of freeboard, the existing bridge is capable of passing only the Q_{10} with approximately 1.0 ft. of freeboard. When the 50 year event is modeled, the water surface elevation is predicted to be more than 2.5 ft. above the low chord elevation of the existing bridge. In that event, water will overflow the channel and flow across the roadway on both ends of the bridge.

The hydraulics report recommends that, if the bridge is replaced, the full bank width is not restricted nor are hydraulic conditions made worse by inappropriate widening. A new bridge should have a 57 ft. span normal to and between abutments which are aligned with the river's edge. This translates to an approximately 81 ft. span along the roadway, basically the same as it is now. Low beam elevation is recommended to be 829.3 ft. (the approximate current elevation) with steeper Type 3 stone fill slope protecting the abutments. Improvements to the flow characteristics of the river are recommended as well. These improvements also reduce water surface elevations during Q_{50} by about 0.5 ft. due to the improved waterway characteristics.

Scour characteristics are typically reviewed later in the planning process. The Inspection Report indicates that the bridge is stable for scour.

Utilities

There are overhead utilities (telephone and electric) on the east side of the roadway and bridge. They do not cross the road at the bridge location, but they are close enough to the fascia that they may need to be moved during construction to comply with OSHA setbacks. There is a buried 12" water on the west side of the bridge and an unknown water line on the east side of the bridge. A utility plan obtained from the Town indicates that these lines are not carried across the river on the bridge. There is a sanitary sewer on the east side of the bridge, size unknown, but it does not appear on the bridge. There are two small diameter (+/-2" dia.) conduits cast into the east fascia crossing the bridge and visible only where the concrete is deteriorated away. They are believed to be abandoned and may be related to the light posts on the bridge. Also, (2) 5" OD conduits are on the west fascia beam and it is not known if they are in use. More investigation is continuing as the planning for Bridge 11 proceeds.

Right Of Way

The existing Right-of-Way is shown on the Layout sheet. Right-of-Way acquisition may be necessary depending on which alternative is chosen.

Environmental Resources

The environmental resources present at this project are shown on the layout sheets.

Agricultural:

Agricultural land has not been identified in the project area.

Archaeological:

No Archaeological Resources have been identified at this site.

Biological:

The only regulated resource in the area is the River. The River is also not classified as Essential Fish Habitat, and there are no wetlands present at the site.

Wetlands:

There are no wetlands present in the project area.

Wildlife Habitat:

There is no wildlife present in the project area, although it is possible that there is wildlife habitat nearby.

Rare, Threatened and Endangered Species:

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

Hazardous Materials:

According to the Vermont Agency of Natural Resources (VANR) Vermont Hazardous Sites List, there is a Hazardous Waste Site on the Section 4(f) property at the northwest area beyond the bridge. It is unknown whether the hazardous waste site is still active, but the intention would be to avoid direct disturbance of this property due to the waste site and its status as a 4(f) property. If a temporary bridge becomes the traffic maintenance method of choice, the east side only should be considered.

Historic:

The bridge is a historic bridge located within a historic district. Per the resource ID, the bridge has Section 106 and Section 4(f) properties. A 4(f) property exists northwest of and adjacent to the bridge site.

Stormwater:

There are no concerns of note related to stormwater for this project

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. This means that travelers would be expected to use off-site bypasses of their own choosing or designated detours, both of which are longer in length and time, and perhaps are lower class roadways. Trucks would be expected to travel on designated detours. 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 traveling public while maintaining project quality. The following options have been considered:

Option 1: Off-Site Detour

This option would close the bridge for a specific length of time while critical work is being done. It allows the project to be built using accelerated construction materials and methods to reduce the construction time to one season and reduce the length of time the road is closed. The shortest acceptable State detour route is:

- South on VT 110 to VT 14 or I 89 in Royalton.
- North on VT 14 or I 89 to Barre, where the two routes converge.
- North into the city, then west on US 302, back to VT 110.
- VT 110 south to Chelsea.

This route adds 14 miles to the through route of 27 miles and has an end to end distance of approximately 68 miles on this route. There are no good alternatives to this route due to the lack of Class 1 Town Highways and other State routes in the area.

There are other possible bypass routes that could be used by local travelers familiar with the area. A bypass route is not a designated, signed detour, but one that local traffic may utilize to get around the project site and avoid the longer official detour. 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 is west of Chelsea via VT 110 south, then turning west on E. Randolph Road (TH-1, Class 2), north on Brook Road (TH-3, Class 2), north on Pent Road (TH-33, Class 3), east on Lyford Hill Road (TH-4, Class 3), and back to VT 110. Lyford Hill Road may also be known as Bobbin Shop Road. The end to end distance of this bypass is less than 9 miles, and the additional travel distance would be 4 miles.

The off-site detour option eliminates the need for a temporary bridge, which would significantly decrease time and cost, both during project development and construction. This option would not require Right-of-Way for a temporary bridge. Due to the long detour route, the bridge closure would have to be very short to be considered acceptable.

Another consideration is emergency coverage. The primary fire coverage for the town comes from the Chelsea Fire Station, which is just south of Bridge 11. For coverage north of the bridge when closed, the closest fire departments are Washington or Corinth, approximately 9 to 9.5 miles away accessed from north of the bridge. The nearest ambulance service is either Barre or White River, which are some distance away from the project site. The nearest hospital would be in Randolph or Berlin. There is police coverage in Chelsea, but for calls north of the bridge when closed, police would need to utilize a bypass of the project to get north of the bridge. Coordination should occur so that coverage can be maintained if the bridge is closed.

Option 2: On-Site Detour via Temporary Bridge

A temporary bridge allows the closure of the bridge without a long detour imposed on the public. If a temporary bridge is chosen for traffic maintenance, a one lane bridge with traffic signals at each end meets the standard criteria. Traffic would alternate in each direction. The east side of the bridge would be preferred, as this avoids impacting the Section 4(f) property on the west side, as well as a potential hazardous waste site. There are historic properties on both sides which should be avoided. A temporary bridge would cause significant disturbance to these properties because the difference in grades is such that several feet of temporary fill would be required to establish the approaches on both ends. The short roadway leading to several houses on the east side, including the Health Center, appears to be private property. No evidence of a town highway is seen on the Town Highway Maps published by Vermont Agency of Transportation. On the east side, existing overhead utilities and a sanitary sewer line would be encountered. The overhead utilities would require relocation. The sewer line can probably be avoided. A temporary bridge in this location would need to utilize a portion of a private drive as part of the southern approach. There are also water lines to be avoided on the east side. Some trees would need to be removed.

A temporary bridge is costly both in time and dollars. Project development time would be increased by 2 years or more by temporary Right of Way requirements alone, and sensitive historical areas adjacent to the bridge may generate additional permit review and mitigation time, and conceivably prohibit this use. The cost of the temporary bridge itself is substantial, as is the cost and time to erect and remove the bridge and temporary approaches. The advantage of a temporary bridge is in the fact that traffic can continue to flow through the project area without a longer detour, although delays would occur regularly for alternating traffic.

Option 3: Phased Construction

Phased construction allows alternating traffic to be maintained on one lane of the bridge while work proceeds on the other. Temporary traffic signals would be necessary, allowing traffic in alternating directions. This option eliminates the lengthy detour and saves the cost of a temporary bridge and the associated temporary Right of Way. The time required for plan development is also shorter than that for the temporary bridge option due to simplification of the Right of Way process and reduced impacts on adjacent properties, some of them historically sensitive. However, the construction duration can still be quite lengthy because some construction tasks must performed more than once. The safety of the public and the construction workers is reduced due to close proximity of traffic to the work in progress, which also affects the pace of the work.

III. Alternatives Discussion

The intent of this project is to address the needs of the bridge at this river crossing. No improvements to the roadway are anticipated with the exception of blending any changes to the bridge geometry into the existing roadway.

Alternative 1: No Action

This alternative involves leaving the bridge in its current condition. If no action is taken, the deck will continue to deteriorate and the geometric deficiencies will not be corrected. Many temporary repairs to the deck have already been made, and additional repairs will be more involved, costly, and more short-lived. Maintenance efforts would steadily increase and emergency lane closures should be expected to occur more frequently for repairs.

From the standpoint of safety, economics, and convenience, the No Action alternative is not recommended.

Alternative 2: Minor Rehabilitation

Minor rehabilitation would include repairs to the deck, removal of corrosion and new coating on the beams, repairs to any cracking and surface deficiencies on the abutments, replacement of the bridge and approach railings, and new membrane and pavement. However, difficulties in anchoring new replacement bridge railings would be anticipated due to the deterioration of the deck. The geometric deficiencies (shoulder width) would not be corrected. It should be noted that the extent of needed repairs to the deck is not fully known, and could be so extensive as to be unreasonable. Further repairs to the deck would be considered temporary and of short service life due to the poor overall condition of the deck. The deck, rated on the inspection report as 4 (poor) is basically at a point where further patching is nearly ineffective.

This alternative is not recommended and will not be considered further.

Alternative 3: Superstructure and Deck Replacement

An alternative that includes saving the abutments, saving the superstructure, and replacing the deck was considered. However, the existing paint on the beams will almost certainly contain lead. In this case, experience tells us that the cost of removing the existing paint, containing it in the river environment, and disposing of it will cost about as much as a whole new superstructure. Add the risk of accidental releases of lead contaminated paint into the river, and replacing the superstructure seems the more attractive way to deal with the superstructure.

Alternative 3 includes rehabilitation of the substructure and replacement of the superstructure and deck. The substructure cracks and surface deficiencies could be repaired with traffic on the bridge. The 81 ft. span would be unchanged. Although there is an existing sidewalk on the bridge, we propose to accommodate pedestrian travel in the proposed 3 ft. wide shoulder since bridge sidewalks are not maintained in the winter and there are no sidewalks leading to and from the bridge. The addition of standard shoulders provides for pedestrian travel on both sides of the

road and eliminates the need for a crosswalk. Prefabricated Bridge Units would be appropriate structurally and consideration should be given to designing shallower beams or girders to maintain or improve the waterway under the bridge. The existing 50 degree skew may be too much for precast NEXT Beams or precast box beams. The existing fascia to fascia width is 32 ft. By eliminating the sidewalk, the 3-10-10-3 the standards for land and shoulder widths can be met, resolving the deck geometry deficiencies. New bridge and approach railings would be constructed.

Traffic maintenance for Alternative 3 could be any of the three options discussed previously. This alternative is anticipated to add approximately 40-50 years to the life of the bridge.

Alternative 4: Full Bridge Replacement

The final alternative considered was the replacement of all bridge components; substructure, superstructure, deck, and railing. This alternative is the most costly, but provides the full 80 year service life estimated for new bridge construction. Integral abutments would be the foundation type of choice, and if installed, a skew of 20 degrees maximum would be recommended. In this case, the integral abutments would be placed back from the edge of stream so that the stream bank could be maintained at the natural 50 degree skew. Minor channel work would be expected to minimize erosive flow characteristics. The preliminary geotechnical report indicates that shallow bedrock may be found at the site. In this case, cantilevered stemwalls on spread footings would be installed at a 50 degree skew and a deck expansion joint would be considered. The lane and shoulder widths would be proposed at 3-10-10-3. See Alternative 3 for a discussion for eliminating the sidewalk on the new construction.

Prefabricated Bridge Units would be appropriate structurally, and could be designed shallower than normal to avoid a reduction in the waterway under the bridge This alternative would resolve the deck structural and geometry deficiencies, and a small amount of channel work is proposed to minimize any channel restrictions at the bridge. Even with a full bridge replacement, building to meet hydraulic standards would be very difficult due to numerous nearby features, terrain, and resource impacts. Raising the bridge grades significantly would also possibly cut off the relief overflow channels beyond both ends of the bridge, possibly making flooding worse nearby. Water surface elevations are also in part due to backwater from flooding downstream as well, which would be unaffected by the size of the waterway under the bridge.

The proposed features would include:

Span:	95 ft. if integral abutments, 81 ft. if abutments on footings.
Deck Width:	28 ft. total; 3-10-10-3 lane and shoulder
Skew	Reduced to 20 degrees for integral abutments, otherwise 50 degrees.
Horizontal Alignment:	Unchanged
Vertical Alignment:	Unchanged
Railing:	Combination Rail; Crash-tested, TL-4.

Traffic maintenance could be by any of the three options discussed previously; off-site detour, on-site detour via temporary bridge, or phased construction. Note that this alternative does not provide a configuration that meets the hydraulic standard.

IV. Alternatives Summary

Based on the existing site conditions and the condition of the bridge, the following alternatives were compared on a cost basis:

Alternative 3:	Superstructure/Deck Replacement, Phased Construction
Alternative 4a:	Full Bridge Replacement, Phased Construction
Alternative 4b:	Full Bridge Replacement, Temporary Bridge

A cost comparison for each of the alternatives is shown on the next page. Note that no detailed design has been done and all costs are preliminary estimates.

V. Costs

Chelsea BHF 0169(10)		Alt 3 Superstructure and Deck Replacement, Phased	Alt 4a Full Bridge Replacement, Phased	Alt 4b Full Bridge Replacement, temp. bridge
COST	Bridge Cost	$460,000	$792,700	$739,500
	Removal of Structure	$60,000	$105,000	$78,700
	Channel Work	$20,000	$20,000	$20,000
	Roadway	$206,700	$396,000	$396,000
	Erosion Control	$6,400	$6,400	$10,000
	Traffic Maintenance	$90,000	$90,000	$150,000
	Construction Costs	$828,100	$1,330,600	$1,394,200
	Preliminary Engineering	$248,400	$399,200	$418,000
	Right of Way	$0	$0	$115,900
	Construction Costs + Construction Engineering + Contingencies	$993,700	$1,729,800	$1,812,500
	Total Costs	**$1,242,100**	**$2,129,000**	**$2,346,400**
	Annualized Cost	**$24,850**	**$26,600**	**$29,400**
ENGINEERING	Typical Section - Roadway (feet)	3-10-10-3	3-10-10-3	3-10-10-3
	Typical Section - Bridge (feet)	3-10-10-3	3-10-10-3	3-10-10-3
	Traffic Safety	Improved	Improved	Improved
	Alignment Change	No	No	No
	Bicycle Access	Yes	Yes	Yes
	Hydraulic Opening	Substandard	Substandard	Substandard
	Pedestrian Access	Yes	Yes	Yes
	Utility Impacts	Yes	Yes	Yes
SCHEDULING	Project Development Duration	2 years	2 years	4 years
	Construction Duration	3 months	8 months	18 months
	Road Closure Duration	3 days	None	None
OTHER	ROW Acquisition	No	No	Temporary
	Design Life	40-50 years	80 years	80 years

VI. Conclusion

The proposed alternatives were reviewed with respect to cost effectiveness, property impacts, and time requirements for both project delivery and construction schedules.

Alternative 3 is recommended. This alternative would include repairs to the abutments and replacement of the superstructure and deck. Traffic would be phased, with a short, 3 day closure to get the initial lane in place. The following characteristics are proposed:

- The existing abutments would be retained. The current skew is roughly 50 degrees.
- New superstructure and deck, 28 ft. total width, 3-10-10-3 lanes and shoulders.
- Unchanged span of 81 ft. Prefabricated Bridge Units should be considered, and efforts should be made to design the beams to be shallower than the standard depth for hydraulic considerations. The standard PBU sections would be modified to meet the width requirements for this project.
- A combination concrete/steel railing (TL-4) is proposed.
- Current horizontal and vertical alignments are maintained.
- Functional and structural deficiencies would be improved with this alternative and a 40-50 year service life provided.
- Hydraulic standards would not be met with any of the alternatives considered. It is not feasible to raise the bridge several feet to meet the standards, and in fact raising the bridge this much would make matters worse by damming up the river overflow.
- Phased construction is proposed for maintenance of traffic. Due to the width of the existing bridge, the first phase is proposed to be built using a 3 day bridge closure with off-site detour.

VII. Appendices

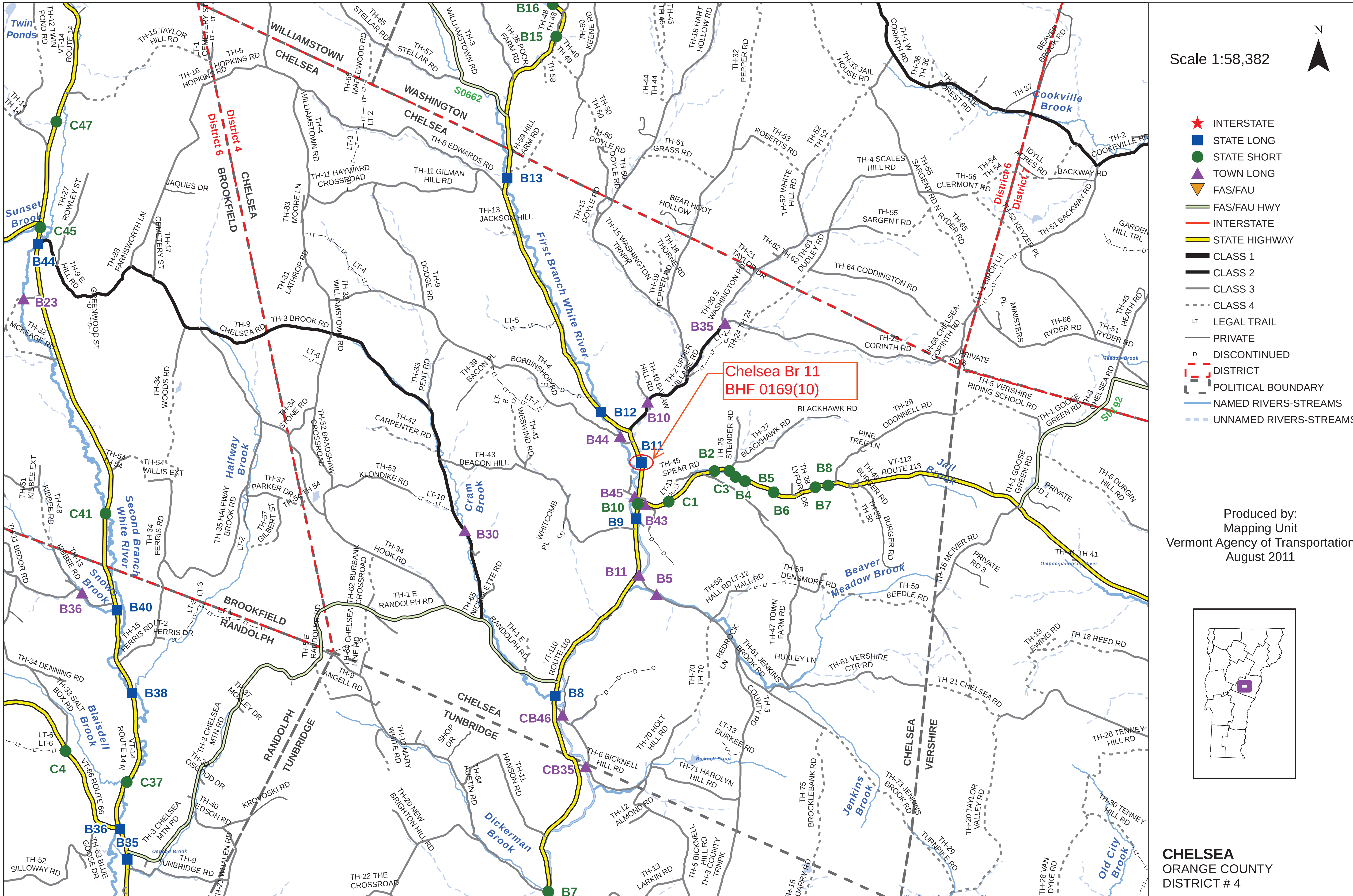
- Site Pictures
- Town Map
- Bridge Inspection Report
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources Memo
- Archaeology Memo
- Historic Memo
- Stormwater Memo
- Resource ID Completion Memo
- Plans
    - Local Detour Route
    - Truck Detour Route
    - Typical Sections
    - Layout
    - Profile
    - Existing Conditions
    - Phasing Plans
    - Temporary Bridge Layout

Looking South

Looking Northwest

Formwork for Previous Patch

Rail Deterioration at Southwest corner


Scale 1:58,382
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
CHELSEA
ORANGE COUNTY
DISTRICT # 4
Chelsea Br 11
BHF 0169(10)
WILLIAMSTOWN
CHELSEA
WASHINGTON
BROOKFIELD
RANDOLPH
TUNBRIDGE
VERSHIRE
District 4
District 6
District 7
First Branch White River
Second Branch White River
Twin Ponds
Sunset Brook
Halfway Brook
Cram Brook
Snows Brook
Blaisdell Brook
Dickerman Brook
Jenkins Brook
Beaver Meadow Brook
Jail Brook
Cookville Brook
Old City Brook
Bicknell Brook
Osgood Brook
Meadow Brook
Ompompanoosuc River
West Branch Ompompanoosuc River
VT-14 ROUTE 14
VT-110 ROUTE 110
VT-113 ROUTE 113
VT-66 ROUTE 66
S0662
S0192
B16
B15
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B5
B8
CB46
CB35
B7
B2
C3
B4
B6
C1
B35
B30
C47
C45
B23
C41
B36
B40
B38
C4
C37
TH-3 BROOK RD
TH-9 CHELSEA RD
TH-45 SPEAR RD
TH-21 CHELSEA RD
TH-2 COOKEVILLE RD
TH-22 CORINTH RD
TH-5 VERSHIRE RIDING SCHOOL RD
TH-1 E RANDOLPH RD
TH-9 TUNBRIDGE RD
TH-6 BICKNELL HILL RD

STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

Inspection Report for CHELSEA **bridge no.:** 00011 **District:** 4

Located on: VT 00110 ML **over** BROOK **approximately** 0.3 MI N JCT. VT.113 **Owner:** 01 STATE-OWNED

CONDITION

Deck Rating: 4 POOR

Superstructure Rating: 6 SATISFACTORY

Substructure Rating: 6 SATISFACTORY

Channel Rating: 6 SATISFACTORY

Culvert Rating: N NOT APPLICABLE

Federal Str. Number: 200169001109042

Federal Sufficiency Rating: 78

Deficiency Status of Structure: SD

AGE and SERVICE

Year Built: 1939 **Year Reconstructed:** 0000

Service On: 5 HIGHWAY-PEDESTRIAN

Service Under: 5 WATERWAY

Lanes On the Structure: 02

Lanes Under the Structure: 00

Bypass, Detour Length (miles): 35

ADT: 002500 **% Truck ADT:** 06

Year of ADT: 1998

GEOMETRIC DATA

Length of Maximum Span (ft): 0082

Structure Length (ft): 000086

Lt Curb/Sidewalk Width (ft): 0.5

Rt Curb/Sidewalk Width (ft): 5

Bridge Rdwy Width Curb-to-Curb (ft): 29.5

Deck Width Out-to-Out (ft): 32

Appr. Roadway Width (ft): 028

Skew: 50

Bridge Median: 0 NO MEDIAN

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

Feature Under: FEATURE NOT A HIGHWAY OR RAILROAD

Min Vertical Underclr (ft): 00 FT 00 IN

STRUCTURE TYPE and MATERIALS

Bridge Type: ROLLED BEAM

Number of Approach Spans: 0000 **Number of Main Spans:** 001

Kind of Material and/or Design: 3 STEEL

Deck Structure Type: 1 CONCRETE CIP

Type of Wearing Surface: 6 BITUMINOUS

Type of Membrane 0 NONE

Deck Protection: 0 NONE

APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

Bridge Railings: 0 DOES NOT MEET CURRENT STANDARD

Transitions: 1 MEETS CURRENT STANDARD

Approach Guardrail: 1 MEETS CURRENT STANDARD

Approach Guardrail Ends: 1 MEETS CURRENT STANDARD

Structural Evaluation: 6 EQUAL TO MINIMUM CRITERIA

Deck Geometry: 4 MEETS MINIMUM TOLERABLE CRITERIA

Underclearances Vertical and Horizontal: N NOT APPLICABLE

Waterway Adequacy: 7 SLIGHT CHANCE OF OVERTOPPING BRIDGE & ROADWAY

Approach Roadway Alignment: 8 EQUAL TO DESIRABLE CRITERIA

Scour Critical Bridges: 8 STABLE FOR SCOUR

DESIGN VEHICLE, RATING, and POSTING

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

Posting Status: A OPEN, NO RESTRICTION

Bridge Posting: 5 NO POSTING REQUIRED

Load Posting: 10 NO LOAD POSTING SIGNS ARE NEEDED

Posted Vehicle: POSTING NOT REQUIRED

Posted Weight (tons):

Design Load: 2 H 15

INSPECTION and CROSS REFERENCE

X-Ref. Route:

Insp. Date: 042011 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

INSPECTION SUMMARY and NEEDS

04/12/2011 The deck is in need of full replacement. Local deck failure may occur anytime anywhere. The concrete spindles on both sides are in need of full replacement. The steel is in need of full paint recoat. PLB

11/09/2009 - Confirm deck repair with full depth patch made by district forces. 04/09/2009 - The bridge deck needs replacement. Steel superstructure and the concrete abutments are still quite good and can easily be rehabilitated. C.M. sent regarding possible full depth hole formation in bay #3. - MJ/DS

11/05/2007 - The bridge is in fairly good condition with the exception of the concrete deck which is relatively poor. Leakage and deterioration along the soffit indicates possible full depth failure may form in beam bay #2 or #3 adjacent to beam #3. Bridge needs major reconstruction with full deck replacement and extensive cleaning and painting of the structural steel. In the meantime the sidewalk could use concrete patch repair work and the deck drains should be eliminated to deter further deterioration to the steel superstructure. The original Westinghouse light poles could also be salvaged to retain for the new deck/rail system. - MLJ

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: September 25, 2012

SUBJECT: CHELSEA – BHF-0169(10) – VT 110 Bridge 11 over South Washington Brook

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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 original bridge was constructed in 1939 based on available information. The bridge is owned by the State. The bridge is a 2-lane single-span constructed of rolled beams having a concrete deck with an asphalt surface. There is also a sidewalk on the East side of the bridge. The total width of bridge is approximately 32 feet normal to the roadway. The normal clear span to the river between the abutment faces is approximately 50 feet, but the bridge is significantly askew to the river at approximately 50° which has a clear span of approximately 77 feet along the roadway. The effective width of the bridge along the river when accounting for the skew is approximately 42 feet. The total existing superstructure depth is approximately 4 feet based on record information and verified with field measurements. The existing abutments are cast-in-place concrete. These abutments are basically parallel with the stream channel at this location. The approximate maximum height to the bottom of the superstructure to the streambed varies between approximately 5.5 - 7 feet. The structure is located on an incised channel just downstream of a small bend in the river having a wide floodplain area downstream of the bridge located approximately 600 feet upstream of its confluence with the 1st Branch of the White River.

The Q_{50} design event flow does not pass through the existing structure with large events going around the Left (South) abutment with overtopping of the roadway and upstream overtopping of the roadway on the Right (North) Bank. However, the Q_{10} flow event passes through the structure based with approximately 1.0-foot of freeboard based on our analysis of the Existing Conditions. There are a significant amount of site constraints for this bridge location which include existing utilities, streets, a multiple building access road and houses located adjacent to the bridge location. We did not evaluate the scour for the existing conditions or any proposed bridge configurations as part of the preliminary design. Scour calculations will be performed during final hydraulics.

Recommendations

When reviewing possible options, it is apparent that a replacement bridge meeting the hydraulic standard cannot be achieved for this location without significant modifications to the area surrounding the bridge (i.e. remove buildings, modify roadways, relocate utilities, etc.). The bridge location has an extreme number of site constraints by being located in a village setting with a major multiple building access road, utilities and houses which limit the bridge span and vertical roadway geometry. To further restrict the site conditions, the existing bridge is located just upstream of a very flat natural floodplain area at the confluence of the South Washington Brook and the 1st Branch of the White River. Therefore, the bridge option selection criteria should be to provide a bridge opening that does not restrict the bank full width, nor provide an unrealistic widening, of the existing

channel, as well as not create any worse backwater flooding conditions than the existing conditions.

It has been assumed a replacement structure will be located in the existing roadway alignment based on the site constraints. It is also anticipated the proposed deck elevations will be similar to the Existing Conditions. For a replacement structure, we have anticipated that the proposed abutments will be vertical face concrete abutments with sloped stone fill scour protection placed in front of the abutments.

Based on our analysis using a new structure, the recommendation will be to use a bridge having a 52-foot clear span normal to the stream channel (between the abutment faces) with a low beam elevation at or above 829.3 feet with stone fill protection in front of the abutments. The actual clear span of the bridge along the roadway will be approximately 81 feet based on the 50° skew of the bridge. To match the existing roadway alignment along the 50° skew, the bridge should also have the abutments parallel to the stream. The proposed wider structure will not constrict the stream channel width and be within the recommended VANR Bank Full Width criterion (i.e. no greater than 1.2 x Bank Full Width estimated at 44 feet by the equation). The access road near the Left (South) abutment will continue to allow large flood events to overtop the roadway and act as a relief channel for flooding events or in the event of a blockage of the bridge opening. The roadway will also continue to overtop VT 110 approach on the Right (North) bank during large flood events. It is noted that this option passes the Q_{10} flow event with about 1.0 foot of freeboard which is basically the same as the Existing Conditions. The recommended option also has stage elevations which are approximately 0.5 feet lower than the Existing Conditions for Q_{50} flow event, but still approximately 2.2 feet above the low beam elevation. The stage reduction from the Existing Conditions is due to the minor widening of the span and the proposed minor modifications of steepening the stone slope fill on the Left (South) abutment.

As noted above, scour was not reviewed during the preliminary design. However based on the velocities from the analyses and evidence from the site, it is anticipated that Type 3 Stone Fill will be necessary for armoring the abutments and channel banks near the replacement structure.

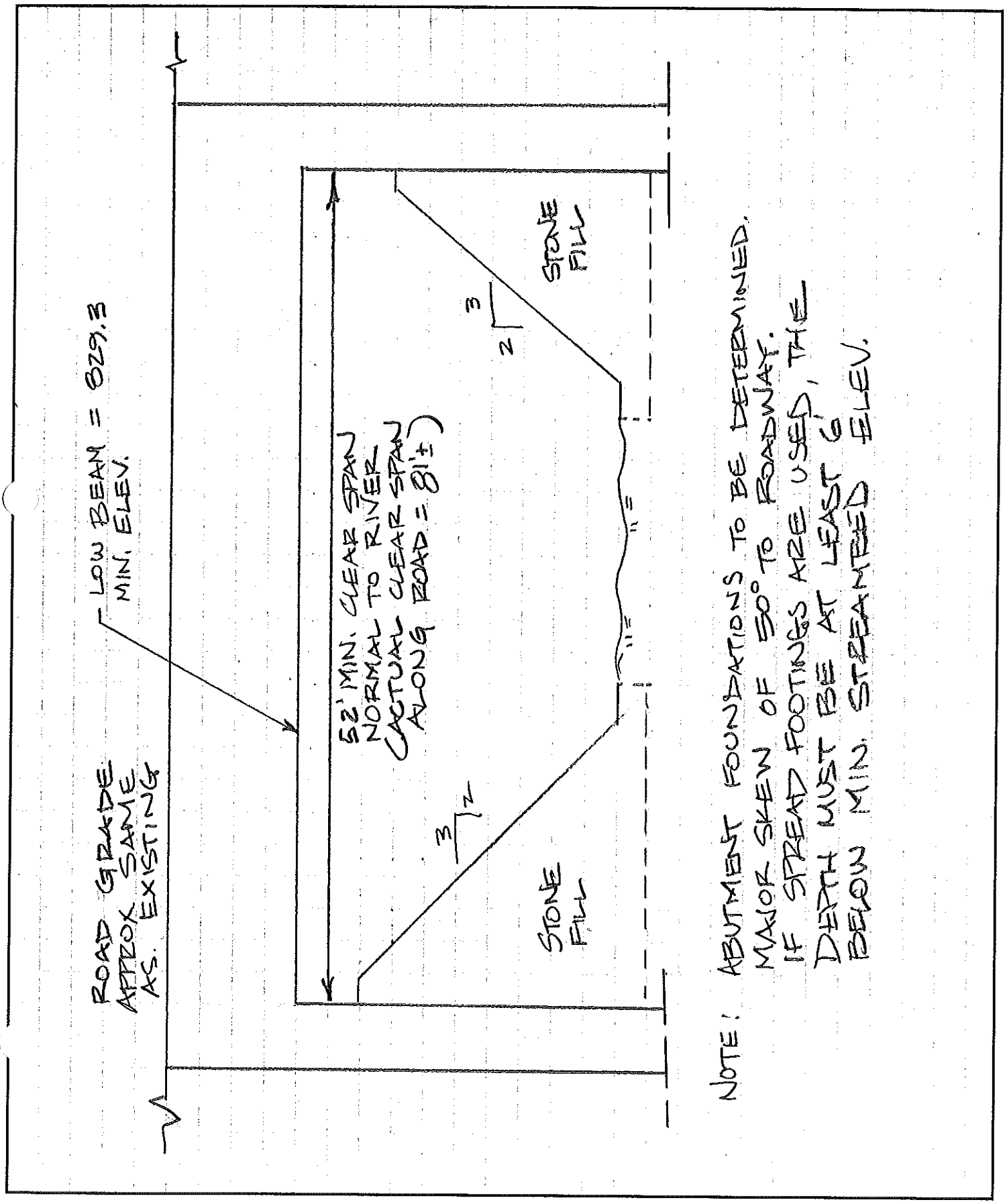
<u>Temporary Bridge</u>
It is unclear whether a temporary bridge will be used during the construction of the new bridge, but this issue will need to be resolved prior to final hydraulics.

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

VTrans Working to Get You There
Vermont Agency of Transportation

JOB CHELSEA VT110 BR11
BHF-0169(10) 12C152
CALCULATED BY BMB DATE 9-13-12
CHECKED BY NJW DATE 9-25-12
SCALE N.T.S.



AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Chris Williams, P.E., Structures Project Manager

LAR CCB

From: Laura Ripley, Geotechnical Intern, via Christopher C. Benda P. E., Soils and Foundations Engineer

Date: June 18, 2012

Subject: Chelsea BHF 0169(10) Preliminary Geotechnical Information

1.0 INTRODUCTION

The Soils and Foundations Unit within the Materials and Research Section has performed a preliminary geotechnical investigation for Bridge No. 11, located on Route 110 in the town of Chelsea, VT. This structure is located about 0.3 miles north the intersection of VT 110 and VT 113 and crosses over the first branch of the White River. This report includes a site description, available data, and any field observations that were pertinent. The materials referenced in this investigation include: VTrans boring files and record plans, Agency of Natural Resources (ANR) water well logs, USDA Surficial Geologic maps, and VTrans Bridge Inspection Photos.

2.0 SUBSURFACE INVESTIGATION

2.1 Previous Projects

Record plans were recovered for Bridge No. 11, however no subsurface information was available. The plans provide details for the abutments on either side of the bridge, which contain steel reinforced bulkheads for bank protection. The associated records also indicated that a detour of 3.6 additional miles was available.

2.2 Water Well Logs

The Agency of Natural Resources (ANR) provides published water well logs, which were referenced with data from wells that were within a 2000 foot radius. The data provided estimated for the depth to bedrock and expected soils types encountered on the site. It should be noted that these boring logs were developed and provided by drilling companies whose employees may have had little to no formal training in identifying soil and rock. The corresponding well locations are highlighted in Figure 1.

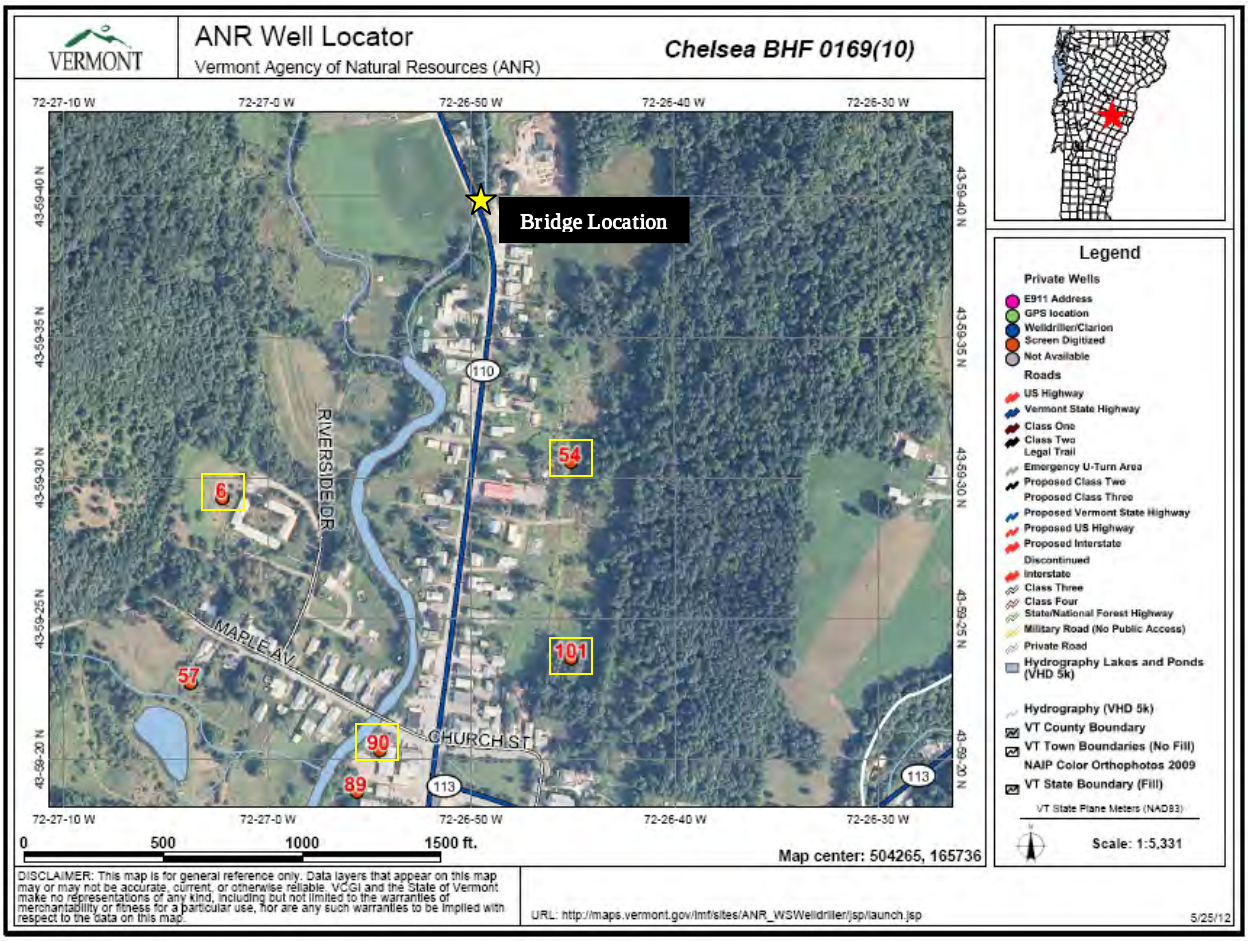


Figure 1. Site map with well locations.

Four wells were identified within the radius, and the information for each is listed in Table 1.

Table 1. Well log descriptions of surrounding sites.

Well Number	Distance From Project (feet)	Depth to Bedrock (feet)	Overburden Material
6	1400	15	Topsoil broken rock and much
54	950	26	Boney sandy gravel
101	1650	12	Dirty sandy gravel; wet sand
90	1800	15	Gravel; course sand

2.3 USDA Environmental Interest Locator

The U.S. Department of Agriculture (USDA) provides online maps with data locating potential environmental hazards. A hazardous waste site was identified approximately 150 feet from the bridge, as seen in Figure 2.

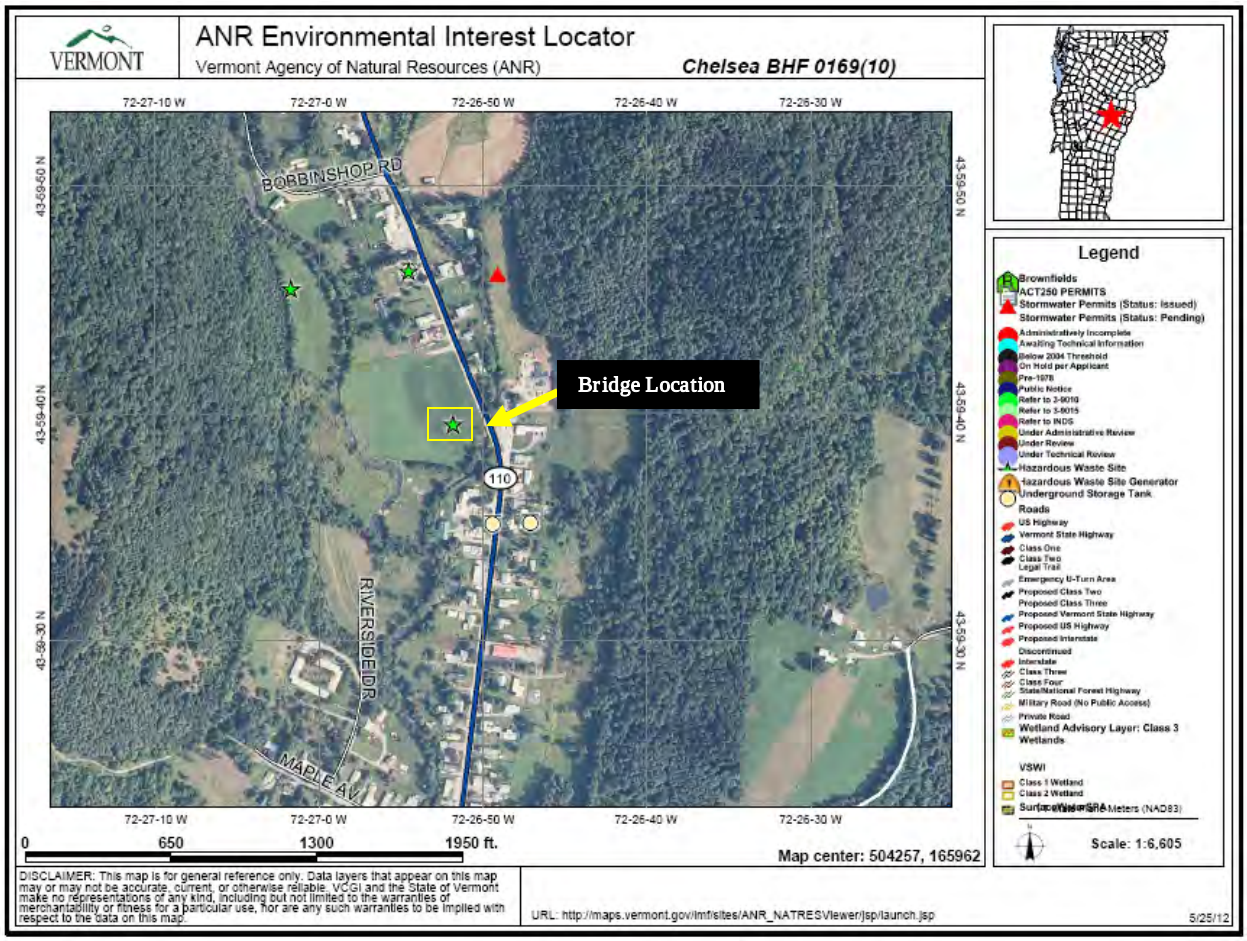


Figure 2. Hazardous waste site in proximity to Bridge No. 11.

This site (No. 951809) was contaminated with gasoline in 1995; but as of 2005 the groundwater monitoring showed no signs of contamination and it was assigned a "Site Management Activity Completed". Further details may need to be obtained from the Department of Environmental Control, should this area directly obstruct construction and boring retrieval.

2.4 USDA Soil Survey

The U.S. Department of Agriculture provides online geology maps with published soil data. These indicated that the existing soils at the project site consist of Hadley very fine sandy loam. These soils are typically very deep to bedrock and well draining, with a water table around 4.0 – 6.0 feet.

2.5 USGS Bedrock Maps

The United States Geologic Survey (USGS) publishes online bedrock maps with subsurface information. The data corresponding to this site location indicates that the bedrock conditions consist of phyllite and metalimestone, and are described as "*dark-gray to silvery-gray, lustrous, carbonaceous muscovite-biotite-quartz (+/-garnet) phyllite containing abundant beds of punky-brown-weathering, dark-bluish-gray micaceous quartz-rich limestone in beds ranging from 10 cm to 10 m thick.*"

3.0 FIELD OBSERVATIONS

A site visit was conducted on June 7, 2012. Pertinent information was gathered in order to determine any potential issues with boring observations or design considerations.

Figure 3. View of existing bridge, facing north.

Overhead utilities were noted on the east side of the road, as well as a water main near the northeast corner of the site on the surrounding private property. A 2-inch electrical conduit cast in concrete was noted along the east side of the structure, as well as two 5-inch conduits along the west side. A posted sign marking an underground telephone in the northwest corner to the site, offset about 10 feet from pavement. The streambed consisted of many medium sized cobbles, with little to no boulders. There was medium to large sized rip-rap placed along the banks, however bedrock was not noted anywhere along the stream.

This bridge is located in an urban area of Chelsea and there exists several nearby houses, which could also pose a potential issue during construction and drilling; this proximity is displayed in Figure 4.

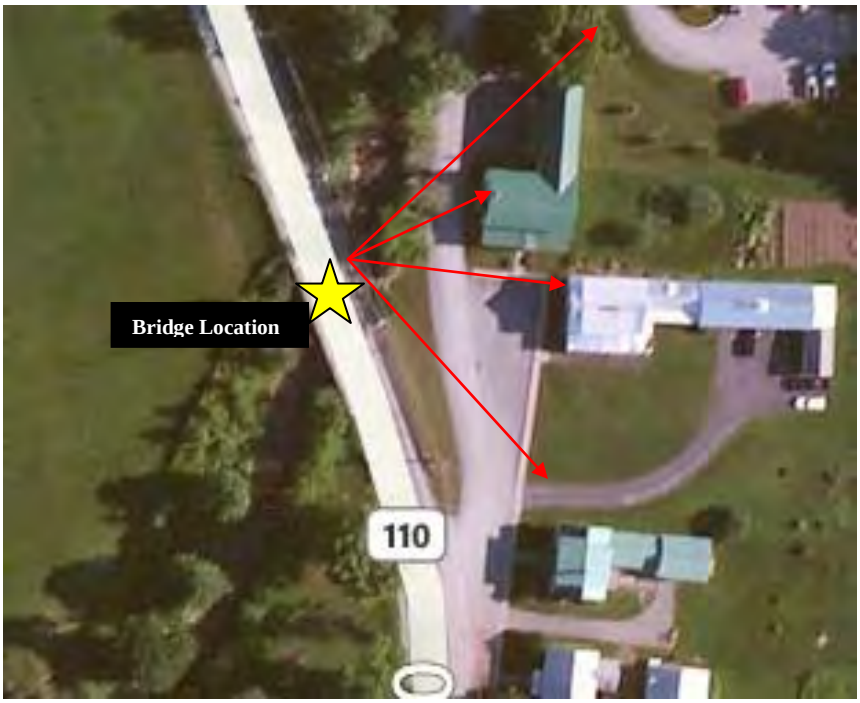


Figure 4. Bridge proximity to residential neighborhoods.

4.0 RECOMMENDATIONS

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

- Cantilevered stemwall on spread footings
- Pile caps on a single row of H-piles
- Stub abutment on MSE walls

It is recommended that a minimum of two borings drilled to bedrock be taken at opposite ends of the bridge be taken in order to assess the subsurface conditions. The suggested location of these samples is in the roadway, with the relative area pending on the location of the underground utility lines marked by Dig-Safe. An additional two hand steel soundings can be taken at opposite corresponding ends in order to obtain more accurate bedrock information if bedrock is encountered at shallow depths. If any variable conditions are noted, the recommendations should be reevaluated.

5.0 CONCLUSION

If you have any questions or would like to discuss this report, please contact us by phone at (802) 828-2561.

cc: Project File/CCB
LAR

OFFICE MEMORANDUM

AOT - PROGRAM DEVELOPMENT DIVISION

RESOURCE IDENTIFICATION COMPLETION MEMO

TO: Chris Williams, Project Manager
FROM: Lee Goldstein, Environmental Specialist
DATE: April 12, 2012

Project: **Chelsea BHF 0169(10); VT 110, BR 11—First Branch White River**

ENVIRONMENTAL RESOURCES:

Wetlands:	____ Yes	X No	
Historic/Historic District:	X Yes	____ No	6/26/12
Archaeological Site:	____ Yes	X No	6/1/12
4(f) Property:	X Yes	____ No	6/26/12
6(f) Property:	____ Yes	X No	
Agricultural Land:	____ Yes	X No	
Fish & Wildlife Habitat:	____ Yes	X No	
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	possible nearby--see ArcMap for linkage info
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,

cc:
Project File

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: Lee Goldstein, VTrans Environmental Specialist

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

Date: 6/1/2012

Subject: Chelsea BHF 0169(10) – Archaeological Resource ID

Lee,

A field visit for Chelsea BHF 0169(10) was conducted on 5/25/2012 with a finding of no archaeological resources within the general project area. The overall site rates low on the environmental predictive model for precontact archaeology. Therefore, there are *no archaeological resources* present within the current project area.

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

Goldstein, Lee

From: O'Shea, Kaitlin
Sent: Tuesday, June 26, 2012 3:13 PM
To: Goldstein, Lee
Subject: Chelsea BHF 0169(10) Historic Resource ID

Lee,

I have completed the historic resource ID for Chelsea BHF 0169(10): Bridge 11 is a historic concrete bridge and is located within a historic district. These are Section 106 and Section 4(f) properties. There is a town owned park/playing fields at the northwest corner of the bridge. This is a Section 4(f) resource. All of these resources have been digitally mapped in Arcmap in the historic preservation database.

Thanks,
Kaitlin

Kaitlin O'Shea
Historic Preservation Specialist
Vermont Agency of Transportation

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

Goldstein, Lee

From: Armstrong, Jon
Sent: Thursday, May 17, 2012 3:42 PM
To: Goldstein, Lee
Subject: RE: Environmental Request NOTIFICATION: CHELSEA BHF 0169(10)

Hi Lee,
I have no stormwater related concerns of note 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: Goldstein, Lee
Sent: Tuesday, March 27, 2012 4:43 PM
To: Gingras, Glenn; Armstrong, Jon; O'Shea, Kaitlin; Gauthier, Brennan
Subject: FW: Environmental Request NOTIFICATION: CHELSEA BHF 0169(10)

Hi Pilot team—resource ID requested!
Thanks…
Lee

Lee D.R. Goldstein, MLA
Environmental Specialist, SE Region
VTrans PDD, Environmental Section
Vermont Agency of Transportation
1 National Life Drive--Drawer 33
Montpelier, VT 05633
e-mail: lee.goldstein@state.vt.us
Tel.: 802-828-3985 Fax: 802-828-2334

From: EnterpriseSQL@state.vt.us [mailto:EnterpriseSQL@state.vt.us]
Sent: Tuesday, March 27, 2012 12:06 PM
To: Goldstein, Lee; Narowski, John; Ramsey, Jeff; Slesar, Chris
Cc: Magnan, Steph; Spencer, Lisa
Subject: Environmental Request NOTIFICATION: CHELSEA BHF 0169(10)

Please do not reply to this email.

NOTIFICATION EMAIL

The following Environmental\Hydraulic Request has been successfully submitted:

Date Requested: Mar 27 2012 12:06PM
Project Request Type: Capital Program

Pin: 12C152

Project Name and Number: CHELSEA BHF 0169(10)

Request Activity: Arch\Hist\Bio Resource Identification

Other Request Activity Description: N/A

Proposed Due Date: May 2 2012 12:00AM

File(s): Z:\Projects-Engineering\ChelseaBHF0169(10)12c152\Structures\Memos\2012\CHELSEA_Town_Map_BR11.pdf

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.

Contact Information:

Name: WILLIAMS, CHRISTOPHER (Structures)

Phone Number: (802) 828-0051

Email: chris.williams@state.vt.us;

Additional Contact(s): gary.sweeny@state.vt.us;

AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

TO: Lee Goldstein, Environmental Specialist

FROM: John Lepore, Transportation Biologist

DATE: April 2, 2012

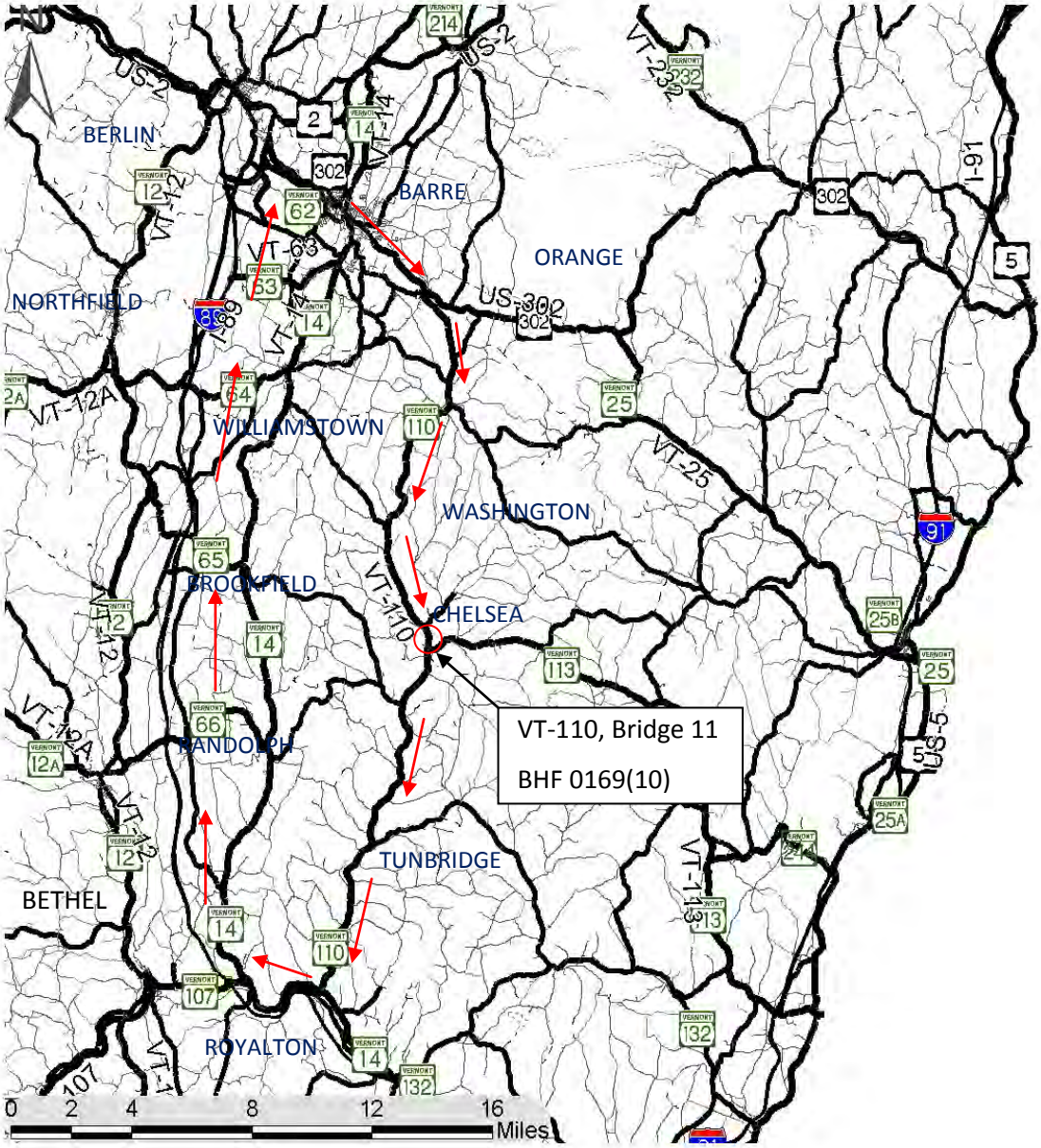
SUBJECT: Chelsea BHF 0169 (9) & (10)
VT 110 Br. 9 & 11 over First Branch White River

The purpose of this memorandum is to let you know that only regulated resource in this immediate area is the First Branch itself. Wetlands, species/habitat(s) and agricultural soils are all absent.

There First Branch is also not classified as Essential Fish Habitat.

There is no preference as to the where a temporary structure would be placed, but I do ask that the entire channel (beyond OHW) be spanned for ease of permitting…

If you have any questions about this, call me at 828-3963.



Detour Route: VT 110 to VT 14 to VT 107 to Interstate 89 North (Exit 3) to Route 62 (Exit 7) to US 302 South in Barre, back to VT 110.

Distance for

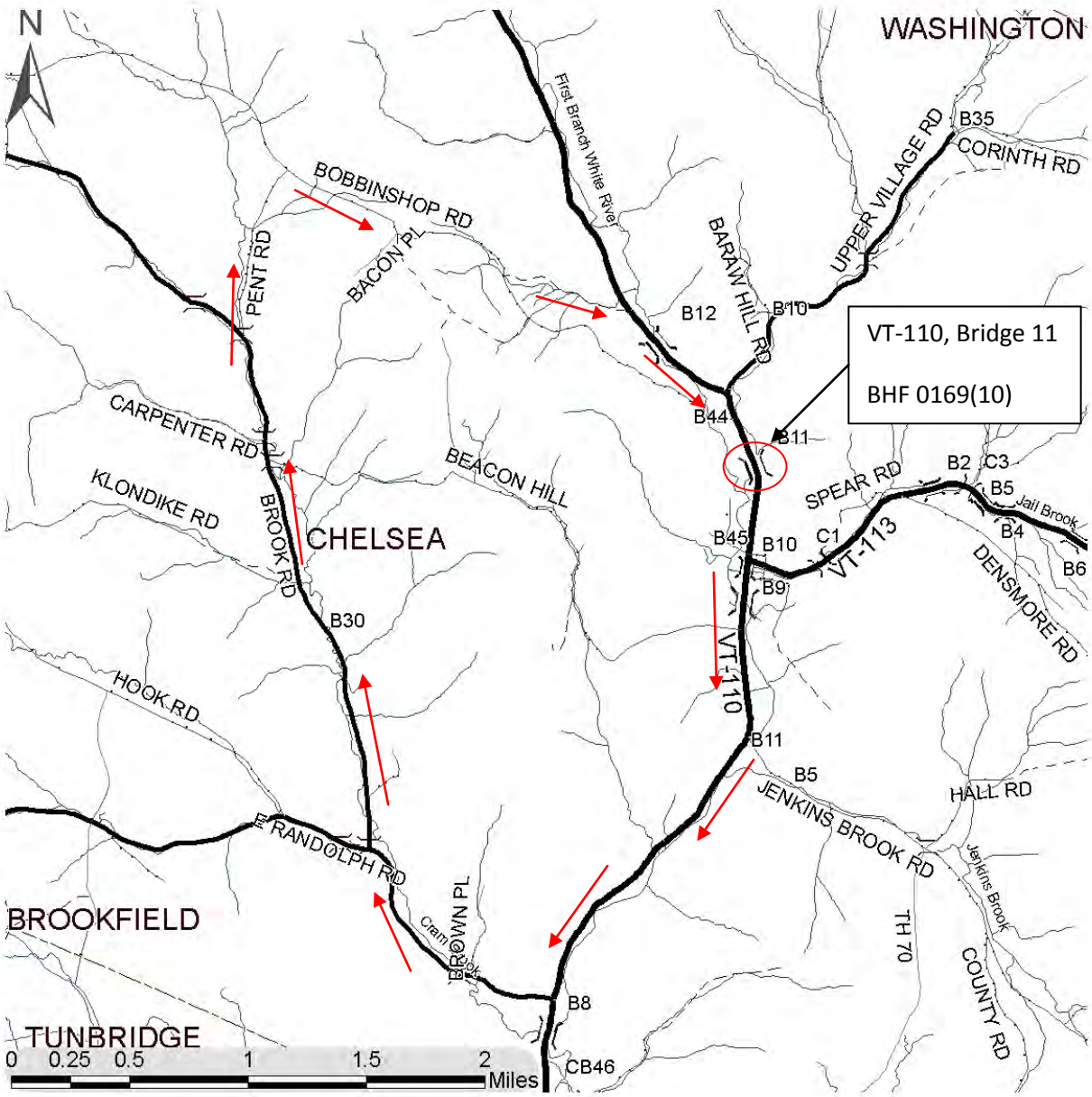
Thru Route:	27 miles
Detour Route:	41 miles
Additional Distance:	14 miles
End to End Distance:	68 miles

<u>Chelsea, Bridge 9</u>

Detoured ADT: 1500

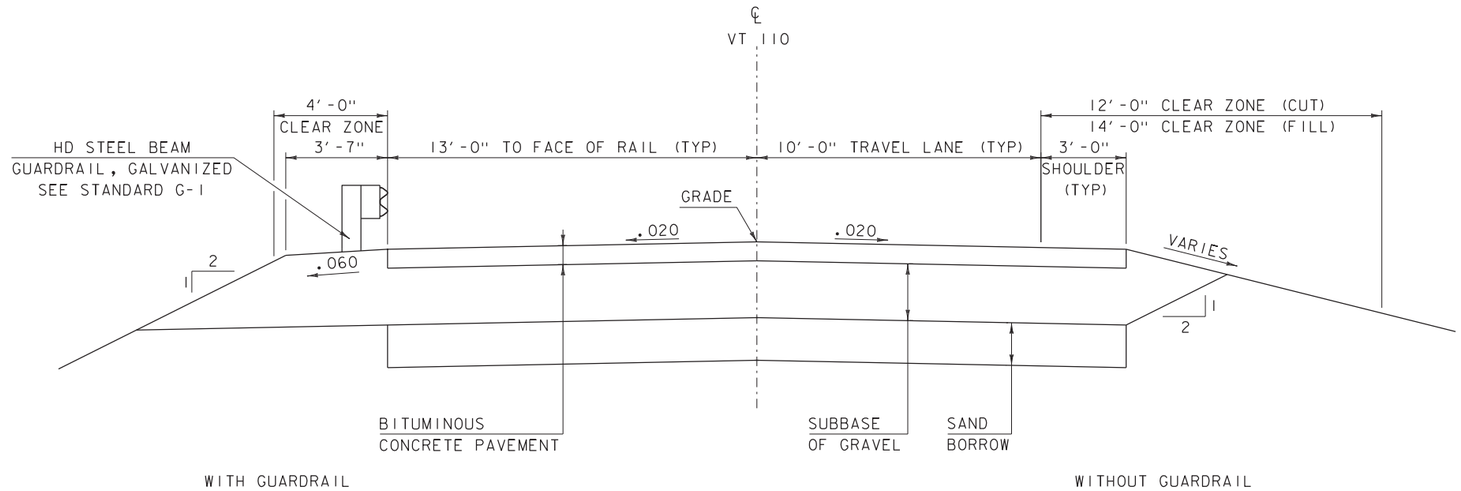
Detoured %T: 0.6%

4 week closure duration



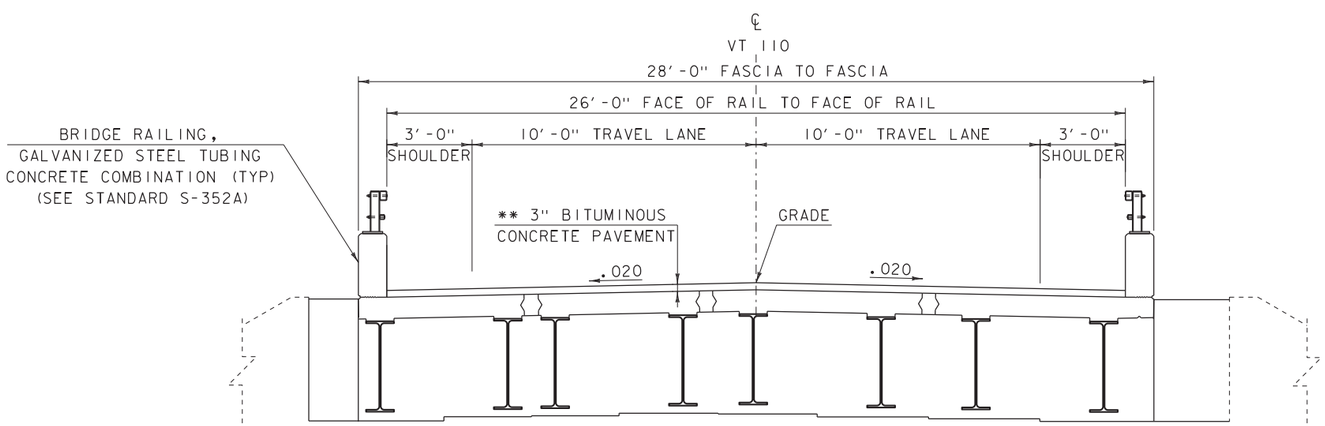
Bypass Route: VT 110 to East Randolph Road (TH-1, FAS 0264, Class 2, Paved) to
Brook Road (TH-3, Class 2, Gravel) to
Pent Road (TH-33, Class 3, Gravel) to
Bobbin Shop Road (TH-4, Class 3, Gravel), back to VT 110.

Distance for	Thru Route:	2.79 miles
	Bypass Route:	6.59 miles
	Additional Distance:	3.80 miles
	End to End Distance:	9.38 miles



PROPOSED VT 110 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"

FLOW

PROPOSED BRIDGE TYPICAL SECTION

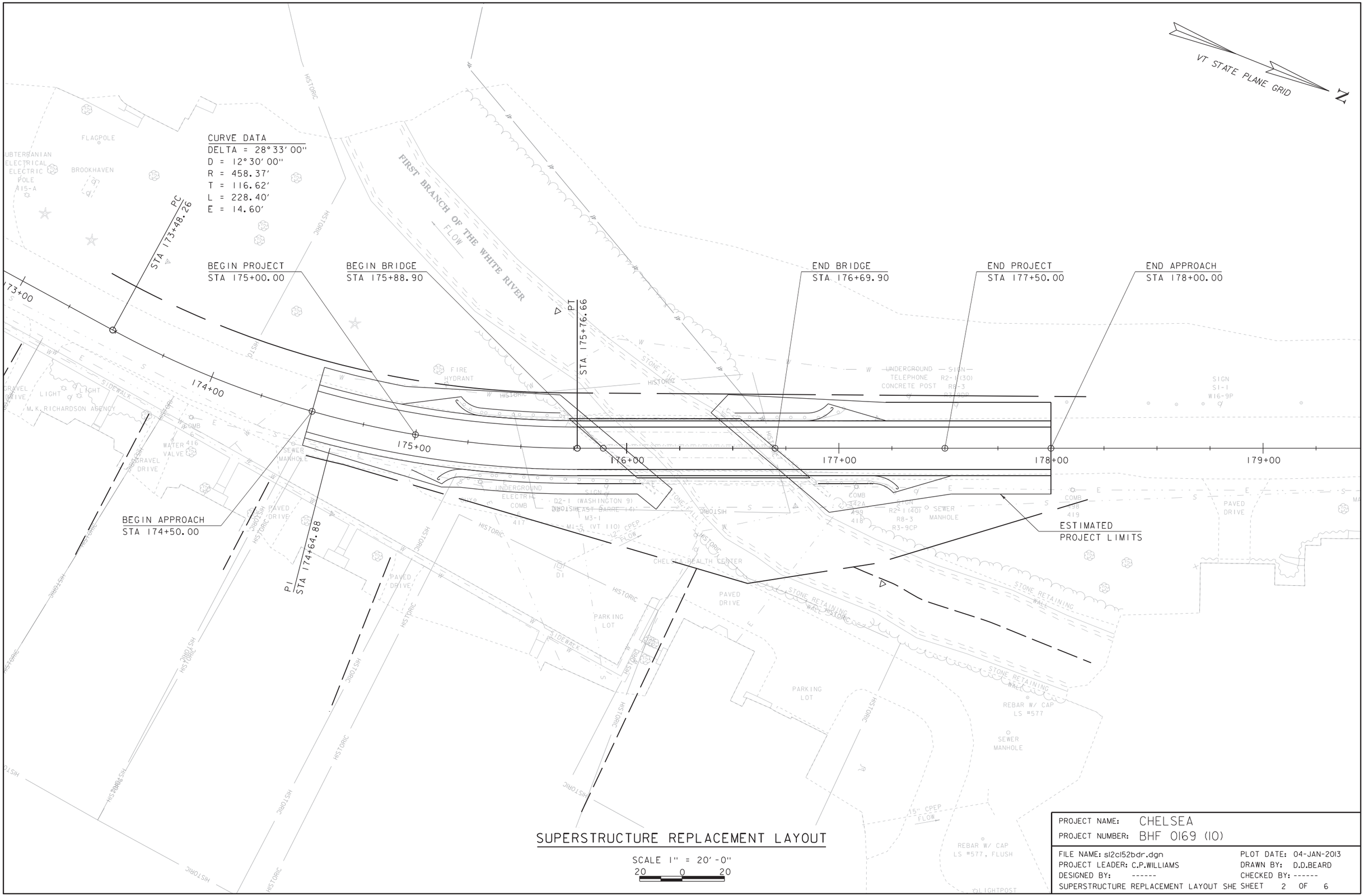
SCALE 3/8" = 1'-0"

NOTE: L100 PRECAST BRIDGE UNITS SHOWN,
SUPERSTRUCTURE NOT YET DESIGNED.
SUPERSTRUCTURE MAY CHANGE.

PROJECT NAME: CHELSEA
PROJECT NUMBER: BHF 0169(10)

FILE NAME: 12c150/s12c152typical.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: G.SWEENY
TYPICAL SECTIONS

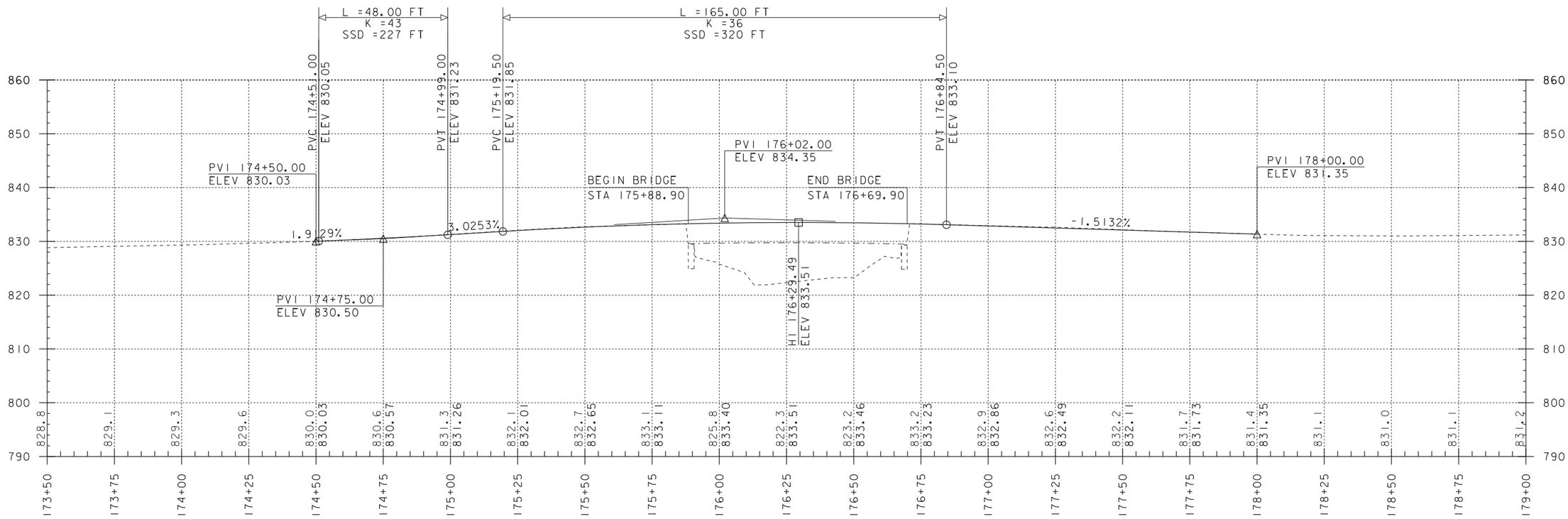
PLOT DATE: 04-JAN-2013
DRAWN BY: D.D.BEARD
CHECKED BY: G.SWEENY
SHEET 1 OF 6



SUPERSTRUCTURE REPLACEMENT LAYOUT

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

PROJECT NAME: CHELSEA	
PROJECT NUMBER: BHF 0169 (10)	
FILE NAME: sl2cl52bdr.dgn	PLOT DATE: 04-JAN-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
SUPERSTRUCTURE REPLACEMENT LAYOUT SHE	SHEET 2 OF 6



VT RT 110 PROFILE

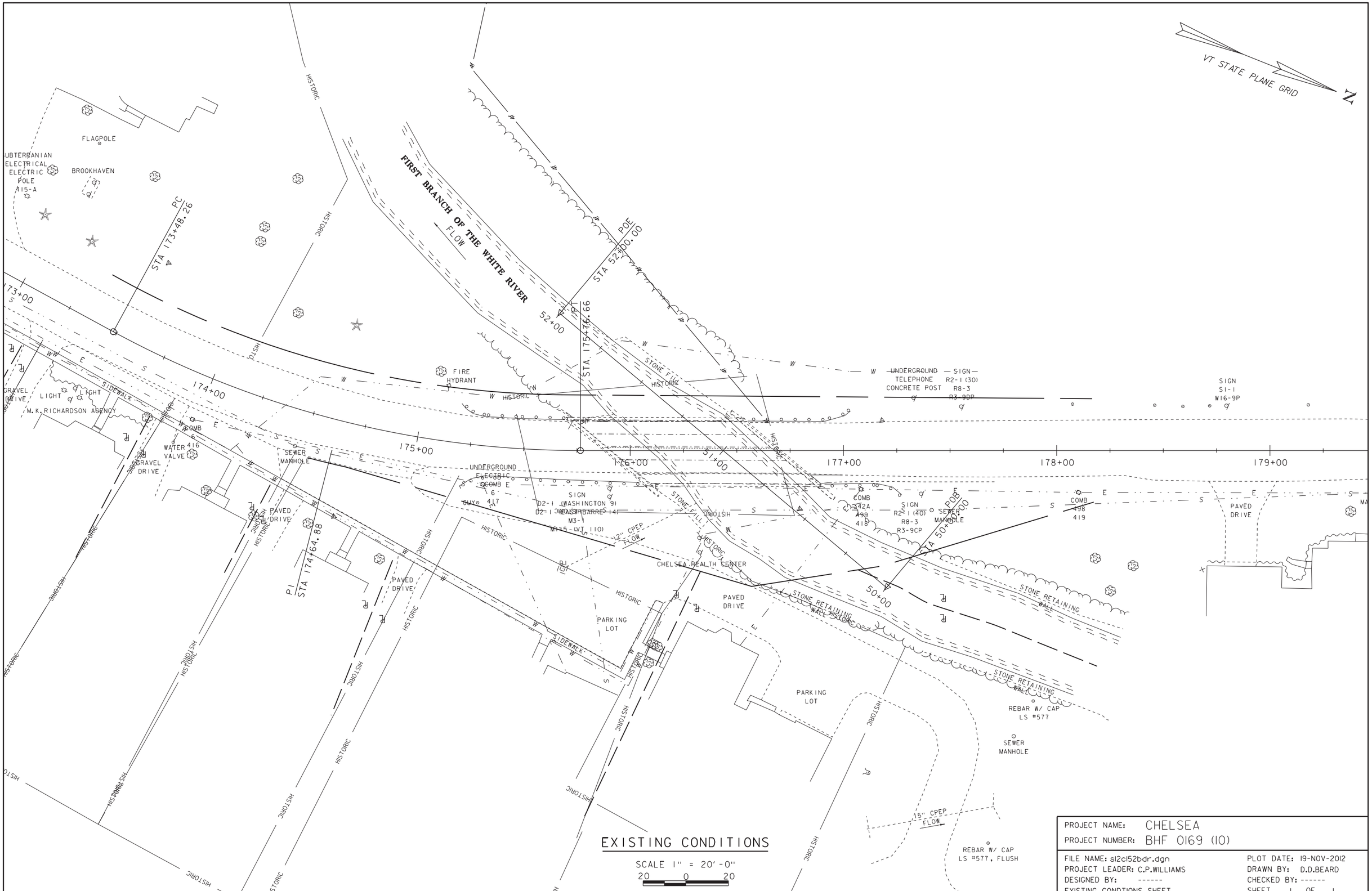
SCALE: HORIZONTAL 1"=20'
VERTICAL 1"=10'

NOTE:

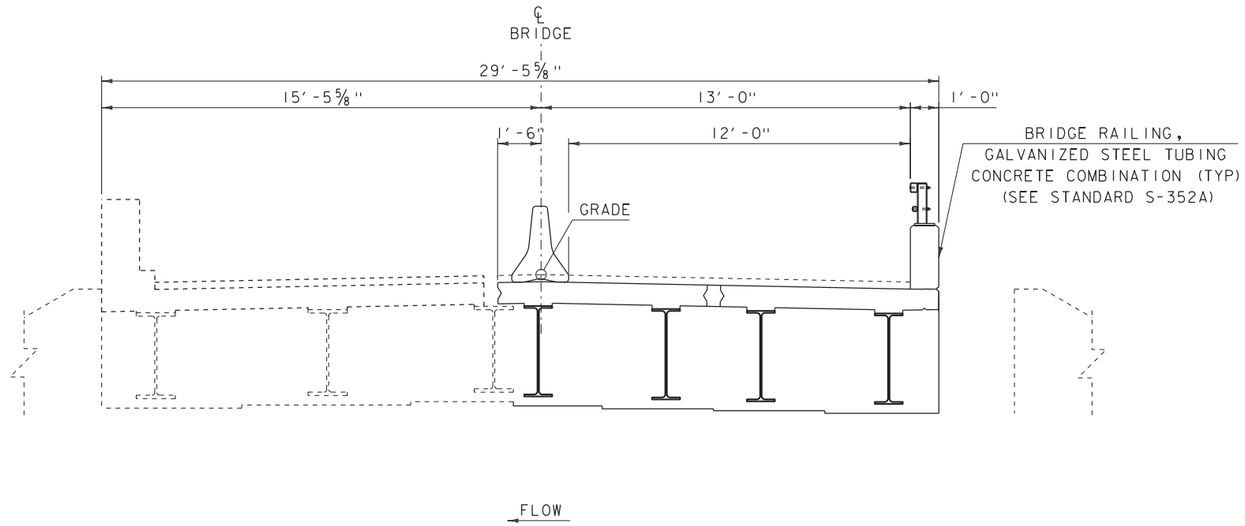
GRADES SHOWN TO THE NEAREST TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: CHELSEA	
PROJECT NUMBER: BHF 0169(10)	
FILE NAME: s12c152profile.dgn	PLOT DATE: 04-JAN-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PROFILE SHEET	SHEET 3 OF 6



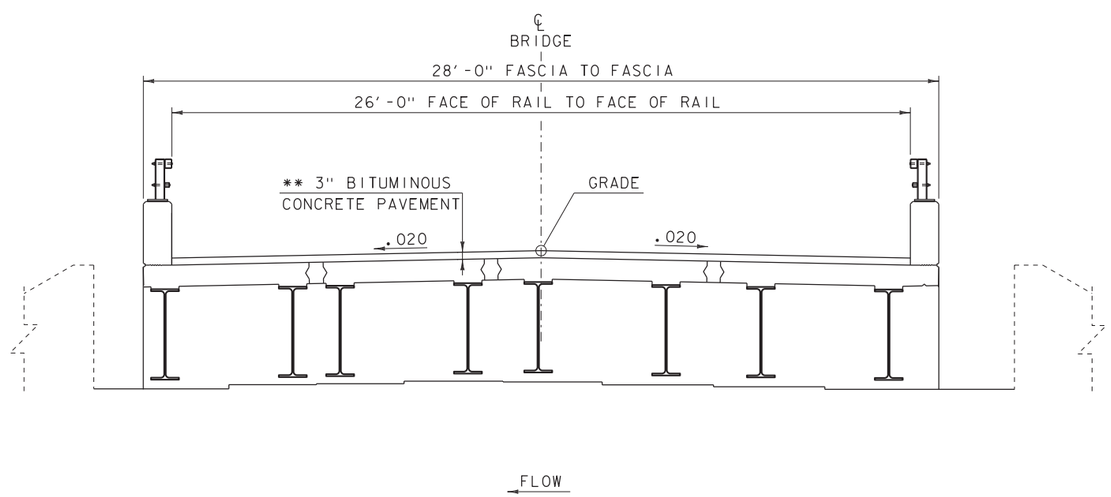
PROJECT NAME: CHELSEA	
PROJECT NUMBER: BHF 0169 (10)	
FILE NAME: s12c152bdr.dgn	PLOT DATE: 19-NOV-2012
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
EXISTING CONDTIONS SHEET	SHEET 1 OF 1



PHASE #1 TYPICAL SECTION

SCALE ⅜" = 1'-0"

NOTE: BRIDGE WILL BE CLOSED PRIOR TO THIS PHASE

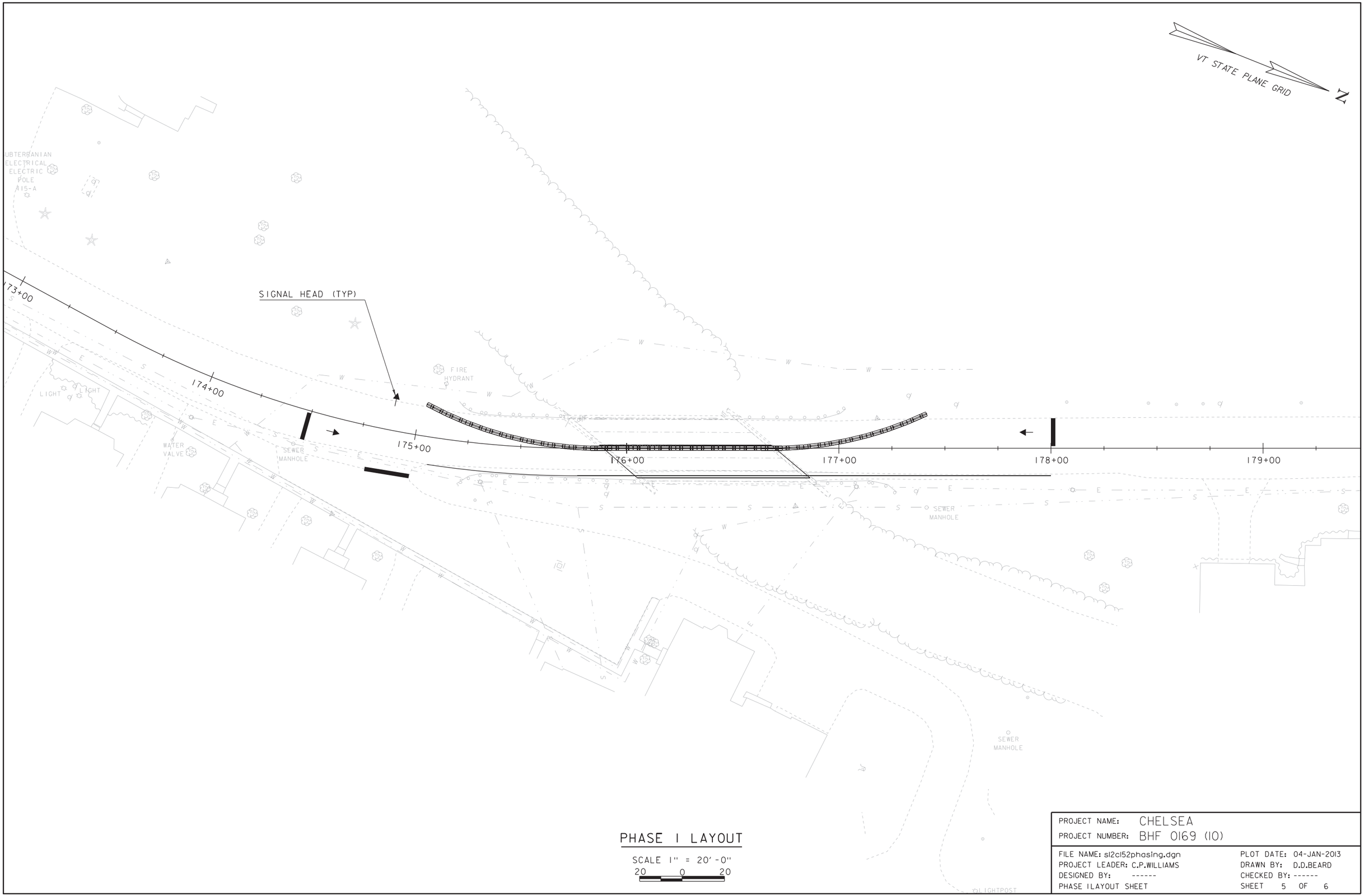


PHASE #2 TYPICAL SECTION

SCALE ⅜" = 1'-0"

NOTE: L100 PRECAST BRIDGE UNITS SHOWN,
SUPERSTRUCTURE NOT YET DESIGNED.
SUPERSTRUCTURE MAY CHANGE.

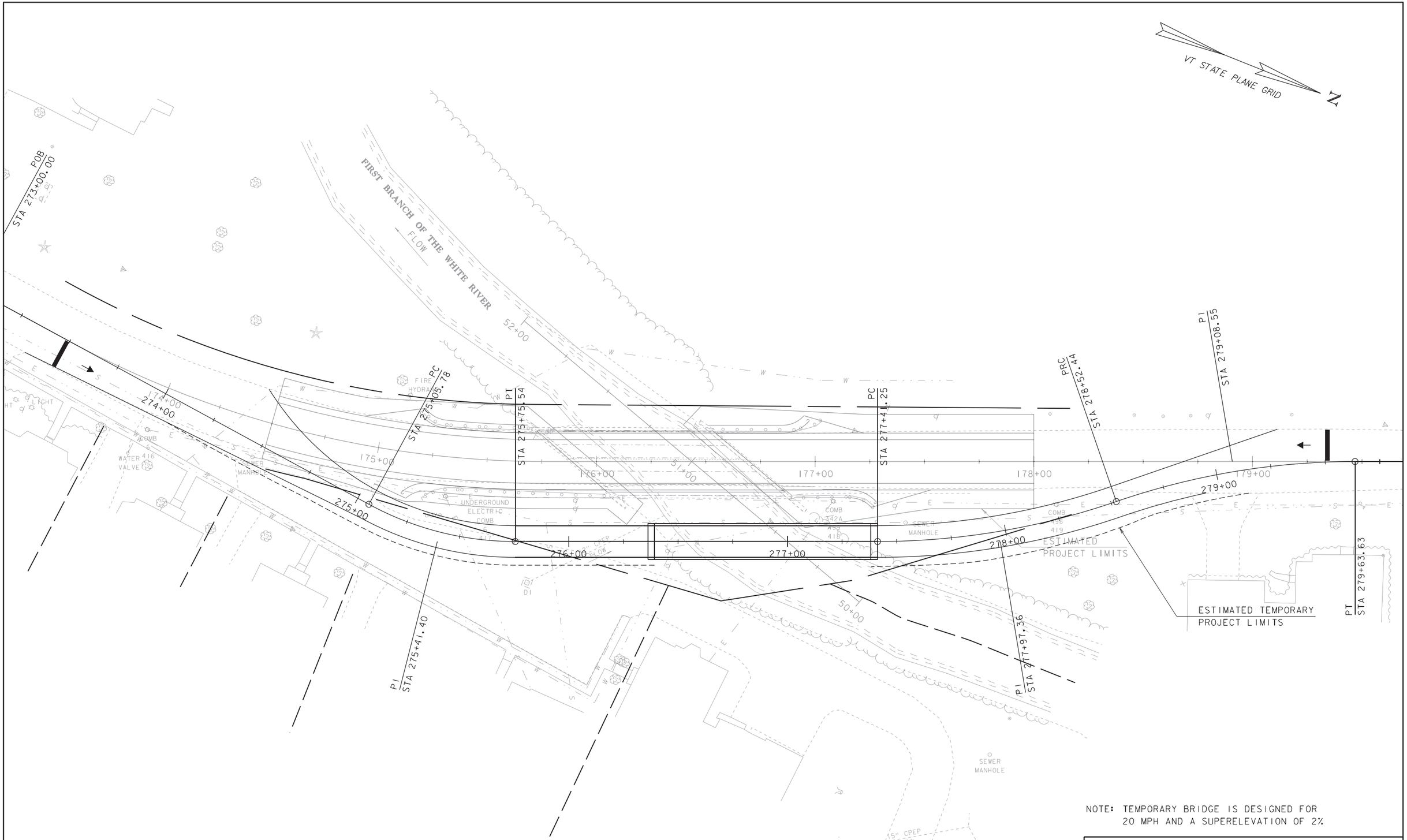
PROJECT NAME: CHELSEA	
PROJECT NUMBER: BHF 0169(10)	
FILE NAME: 12c152\s12c152Phasing.dgn	PLOT DATE: 04-JAN-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: G.SWEENY	CHECKED BY: ------
PHASING TYPICAL SECTIONS	SHEET 4 OF 6



PHASE I LAYOUT

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

PROJECT NAME: CHELSEA	
PROJECT NUMBER: BHF 0169 (10)	
FILE NAME: s12c152phasing.dgn	PLOT DATE: 04-JAN-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
PHASE I LAYOUT SHEET	SHEET 5 OF 6



NOTE: TEMPORARY BRIDGE IS DESIGNED FOR 20 MPH AND A SUPERELEVATION OF 2%

ONE WAY TEMPORARY BRIDGE LAYOUT

SCALE 1" = 20'-0"

20 0 20

PROJECT NAME: CHELSEA	
PROJECT NUMBER: BHF 0169 (10)	
FILE NAME: s12c152TempBridge.dgn	PLOT DATE: 04-JAN-2013
PROJECT LEADER: C.P.WILLIAMS	DRAWN BY: D.D.BEARD
DESIGNED BY: ------	CHECKED BY: ------
ONE WAY TEMPORARY BRIDGE LAYOUT SHEET	SHEET 6 OF 6