**STATE OF VERMONT**
**AGENCY OF TRANSPORTATION**

# Scoping Report

**FOR**

# Montpelier BO 1446(36)

**Bridge 13 on Cummings Street**
**Over**
**the North Branch of the Winooski River**

September 10, 2013

# I. Contents

# I. Site Information

Bridge 13 is located on Cummings St approximately 200 ft east of the intersection of Elm St and Cummings St. Cummings St is a dead end street located in the Lower Elm Street section of Montpelier. This section of the City is primarily residential although a local business, Johnson's Well Drilling, is located off the northwest corner of the bridge and a commercial warehouse is located further down Cummings St. 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 | Urban Local (City Maintained) |
| Bridge Type | Rolled Beam and Concrete Deck |
| Bridge Span | 64 feet long |
| Year Built | 1928 |
| Ownership | City of Montpelier |

**Need**

The following are needs of Cummings St near Bridge 13.

1. Bridge 13 is structurally deficient with a poor deck rating.

2. The lane and shoulders are too narrow for the roadway classification considering the vehicle and pedestrian traffic anticipated at the river crossing.

3. The approach railings are substandard surrounding the bridge.

4. The crest vertical curve on Cummings St over the river is substandard.

**Traffic**

A traffic study of this site was performed by the Vermont Agency of Transportation. The traffic volumes are projected for the years 2016 and 2036.

| TRAFFIC DATA | 2016 | 2036 |
|---|---|---|
| AADT | 220 | 240 |
| DHV | 50 | 55 |
| ADTT | 10 | 15 |
| %T | 1.6 | 2.0 |
| %D | 57 | 57 |

**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 100 and 400 and a design speed of 25 mph.

| Design Criteria | Source | Existing Condition | Minimum Standard | Comment |
|---|---|---|---|---|
| Approach Lane and Shoulder Widths | VSS Table 6.3 | 9'/1' (20') | 9'/2' (22') | Substandard |
| Bridge Lane and Shoulder Widths | VSS Table 6.3 | 8'/0.5' (17') | 9'/2' (22') | Substandard |
| Clear Zone Distance | VSS Table 6.5 | unshielded utility poles | 7' fill / 7' cut | Substandard |
| Banking | VSS Section 6.12 | normal crown | 8% (max) | |
| Speed | | 25 mph (Posted) | 25 mph (Design) | |
| Horizontal Alignment | AASHTO Green Book Table 3-11b | R = ∞ (straight) | $R_{min}$=134' @ 8% | |
| Vertical Grade | VSS Table 6.6 | 3.70% | 7% (max) for level terrain | |
| K Values for Vertical Curves | VSS Table 6.1 | 11 crest | 20 crest / 30 sag | Substandard |
| Vertical Clearance Issues | VSS Section 6.7 | none known | 14'-3" (min) | |
| Stopping Sight Distance | VSS Table 6.1 | 171' | 150' | |
| Bicycle/Pedestrian Criteria | VSS Table 6.7 & 6.8 | 1' Shoulder | 2' Shoulder | Substandard |
| Bridge Railing (and Approach Railing) | Structures Design Manual Section 13.2 | Concrete Bridge Rail w/ w-beam approach | TL-2 | Substandard Approach |
| Hydraulics | VTrans Hydraulic Section | Meets standard | Pass $Q_{25}$ storm event with 1.0' of freeboard | |
| Structural Capacity | S.M., Ch. 3.4.1 | Structurally Deficient | Design Live Load: HL-93 | Substandard |

**Inspection Report Summary**

| | |
|---|---|
| Deck Rating | 4 Poor |
| Superstructure Rating | 5 Fair |
| Substructure Rating | 6 Satisfactory |
| Channel Rating | 6 Satisfactory |

06/07/11 Structure deck & superstructure continues to deteriorate and structure needs major rehab or replacement in the near future. MJK & JG

**Hydraulics**
*From preliminary hydraulics report:*

Recommendations
Based on the hydraulic capacity of the existing bridge, the superstructure may be replaced if the substructure is deemed structurally sound.

In order to span bankfull width, a new structure would need to have an 80' clear span (normal to the river). The west abutment would need to be widened, if it is feasible to do so. Since the superstructure would be deeper than the existing, an average low beam elevation of 531.5' would still provide over 1.0' of freeboard at Q25.

**Utilities**

The utility information is shown in the Appendix.

There is an existing 4'' water main which extends from the Elm Street intersection, along Cummings Street to the housing complex beyond the project area. This water main is attached to the underside of the existing bridge.

There is an existing 8'' force sewer main which also extends from the Elm Street intersection just off the south edge of Cummings Street. According to the "As-Built" plans there is an existing sewer manhole at 3+45 (+/-) right. This sewer main passes under the river just downstream from the existing bridge and continues just off the south edge of Cummings Street to the manhole near centerline at 6+45 (+/-); this sewer main then extends along Cummings Street to the housing complex beyond the project area.

The only underground utilities within the project area are the underground service lines which extend from pole # 1 at 5+12 (+/-) left to the residence at 5+50 left.

There are aerial electric and telephone lines which extend from the Elm Street intersection to a pole in the northwest quadrant of the existing bridge and then along the north side of Cummings Street to a pole at 6+38 (+/-) right.

There are two aerial crossings of these facilities over Cummings Street; one is approximately 112 feet east of the existing bridge and the other is approximately 140 feet west of the existing bridge.

It is anticipated that the overhead utilities and water line will need to be temporarily relocated for any repair or replacement option considered in this report.

**Right Of Way**

The existing Right-of-Way is shown on the Layout sheet. Portions of the existing bridge are outside of the existing Right of Way, so it is anticipated that additional temporary rights will need to be acquired to either provide for a temporary bridge or allow access to repair or replace the substructure components.

**Resources**

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

***Archaeological:***
No archaeological resources or sensitive areas were identified within the immediate project area as defined by a 200 foot radius adjacent to the bridge.

***Historic:***
The only historic/4(f) resources in the project area are the concrete bridge and two houses fronting RT 12. Any adverse effects to the bridge will trigger reviews under 106 and 4(f), and easements or fee acquisitions from the historic house properties will trigger a 4(f) review.

***Natural Resources:***
Other natural resources such as species or habits of special concern are not present in the area, and the floodplain/floodway is controlled by the actions conducted at the Wrightsville Reservoir Dam.

Wetlands

Aside from the North Branch itself, the only other natural resource in the area is a wetland to the south of Cummings Street and on the eastern side of the river.

Wildlife Habitat

There are no known wildlife corridor issues within the project area.

Rare, Threatened and Endangered Species

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

Agricultural

There are no known prime agricultural soils within the project area.

***Hazardous Materials:***
There are no known hazardous materials within the project area.

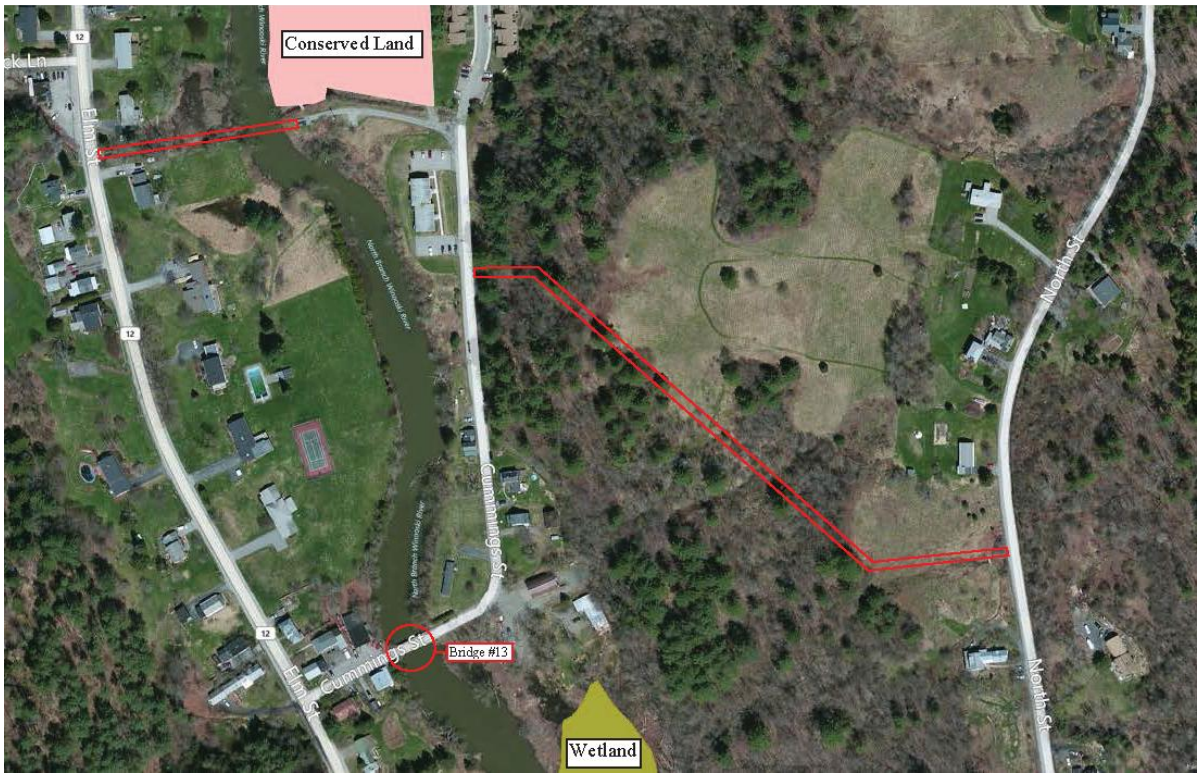
***Stormwater:***
There are no known stormwater issues within the project area.

## II. Maintenance of Traffic

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

### Option 1: Off-Site Detour

Cummings St is a dead end road with one access over Bridge 13. Thus, for an off-site detour one would need to provide alternative access to Cummings St. Two potential locations for connecting Cummings St to other roads were considered; both of these are shown in the image below.




Potential Alternative Access to Cummings St

#### *Option 1a: Northern Access*

Travelling farther north on Cummings St before turning on to Elm St would involve getting access through Conserved Land, which would be difficult to permit and justify the need. There is an existing narrow spur off Cummings St where the potential access is shown. However, the properties on the west side of the river are privately owned and the houses are spaced relatively tightly. Not only would it be difficult to justify and purchase access in this location, since a reasonable access already exists over Bridge #13, but it would be costly to construct in this location. Assuming that a new bridge in either the northern crossing or the existing location

would have similar costs, the costs associated with acquiring the new Right of Way, mitigating any environmental impacts and constructing the additional roadway, estimated around $500,000, would exceed the cost of Right of Way and a temporary bridge just upstream of the existing bridge.

Because of the difficulty in justifying the need for additional permanent Right of Way; the additional expense involved moving the river crossing north over utilizing a temporary bridge; and apparent absence of any benefit in future costs or traffic flow, this options will not be considered further in this report.

***Option 1b: Eastern Access***

The second option would eliminate the bridge entirely and connect Cummings St to North St. There does not appear to be environmentally sensitive lands in this location and the houses are spaced farther apart than those on Elm St. The terrain is very steep in this location and so the exact location and profile of the road would need to be better defined if this option were chosen. This option seems difficult and expensive as well, however, the development and construction costs would be similar to a typical bridge replacement project, on the order of $1.5 million dollars, but the future maintenance costs should be much lower without a bridge.

Breaking the connection with Elm St would change the nature of the neighborhood from Lower Elm Street to North St. The future land use designation would change from 5 and 10 year growth priority to low density rural. Eliminating a bridge that has been designated as historically significant can also be costly and time-consuming. Severing the connection to Elm St may also affect the ability of the GMTA Montpelier Circulator to reach the residents on Cummings St, which could necessitate the installation of a bicycle and pedestrian bridge in this location anyway.

Based on the drastic changes in land use and public transportation connections, this option will not be considered further in this report.

***Option 1c: Residential Relocation***

While soliciting feedback from the City about these potential off-site detour options, it was mentioned that one more option should be considered before the existing bridge location is abandoned permanently. This option would involve rehabilitating or reconstruction the existing bridge in an accelerated fashion, while the residents on the east side of the river were provided temporary housing in another location. Residents who did not want to relocate could be provided boat or pedestrian bridge access to parking on the west side of the river. Since a vehicular temporary bridge is an option at this site and the existing bridge is not currently being considered for abandonment, this option will not be considered further in this report.

**Option 2: Phased Construction**

Phased construction is the maintenance of one lane of two-way traffic on the existing bridge while building one lane at a time of the proposed structure. This allows one to maintain traffic along the corridor during construction while mitigating the extra expense and impacts required by a temporary bridge.

Bridge 13 has a curb to curb width of 17 feet. In order to provide adequate width on a one lane temporary bridge, the specifications require a curb to curb width of 14 feet 6 inches. Thus, the existing bridge is already essentially a one lane bridge. In order to build a new bridge one lane at

a time while maintaining traffic on the existing bridge, the centerline of the roadway would need to be shifted. The existing alignment through the current bridge is already straight, so adding a curve before the bridge would provide a less than ideal alignment for any proposed bridge. The houses and businesses on the west side of the river are close to the existing road and there is no room without moving or removing a house to realign the road to the south. There is room on the north side of the bridge to shift the alignment to that side.

Phased construction is usually considered when the benefits include reducing the impacts to resources and adjacent properties and decreasing the costs and development time by not requiring the purchase of additional ROW. The downsides of phased construction include the increase in time and money to build a structure in phases because some of the construction tasks have to be performed multiple times. The costs also increase for phased construction because of the inconvenience of working around traffic and the effort involved in coordinating the joints between the phases. Another negative aspect of phased construction is the decreased safety of the workers and vehicular traffic, which is caused by increasing the proximity and extending the duration that workers and moving vehicles are operating in the same confined space.

Since none of the benefits of utilizing phased construction over a temporary bridge are realized and all of the inconveniences are still present, there is no reason to consider phasing construction in this location when an off-alignment temporary can be used instead. Thus, it will not be considered further in this report.

**Option 3: Temporary Bridge**

That leaves a temporary bridge as the only reasonable option for maintaining traffic in this location while work is done on the bridge. As mentioned in the phasing discussion, this location is less than ideal for a temporary bridge because there are houses and businesses, some of which are historic, close to the existing roadway. However, there is room on the north side of the bridge to place a temporary bridge outside the footprint of the existing and proposed bridge during construction. Based on the traffic volume on Cummings St, an unsignalized one lane bridge with alternating traffic should be sufficient at this site. The location available for potentially utilizing a temporary bridge for this site is shown in the Appendix. This is the option that will be considered further in this report.

## III. Alternatives Discussion

Bridge 13 is structurally deficient with a poor deck rating. The lane and shoulders are too narrow and the approach rail and terminal sections are substandard. The hydraulic flood stage standard is met, but the waterway opening is severely restricted on the west bank of the river. And while the sight distance is sufficient along this stretch, the change in grade of the crest vertical curve is substandard for the speed and roadway classification over the bridge.

**No Action**

This alternative would involve leaving the bridge in its current condition. A good rule of thumb for the "No Action" alternative is whether the bridge can stay in place without any work being performed on the bridge in the next 10 years. Since the deck is in poor condition and the city already installed a steel plate to span the void between the bridge deck and back wall, it is safe to

assume that the bridge will not last another 10 years without further work being performed on the bridge. Thus, the No Action alternative will not be considered further in this report.

**Alternative 1: Rehabilitation**

***Alternative 1a: Deck Replacement***

A rehabilitation option would include a deck replacement at a minimum. The bridge deck is too narrow by 5 feet to meet the Standards and the City expressed a concern with the existing width. Thus, a wider deck should be considered in a deck replacement. The existing exterior girders are close enough to the fascia that it is not unreasonable to have a new deck overhang the existing beams in their current configuration to accommodate a wider deck. However, the existing beams are deteriorated and rusting along their entire length, so it does not make sense to place a brand new deck on old beams without cleaning, patching and painting the existing steel. In addition to any minor substructure patching required under this alternative, the northwestern wing wall will have to be reconfigured to accommodate the extra width and the northeastern wing wall will have to be rebuilt to contain the extra roadway fill created by the wider typical section. Since the existing structure is hydraulically adequate, this alternative would be able to accommodate all of the substandard features except the tight crest vertical curve.

***Alternative 1b: Superstructure Replacement***

This alternative is similar to the deck replacement, except the existing steel beams would be replaced at the same time. The beams have been rated as fair and after being cleaned, patched and painted, they would still be 80+ years old. The cost associated with salvaging and restoring the existing beams is not much lower than supplying brand new steel for the project. Replacing the entire superstructure would also allow the bridge seats to be lowered so the substandard crest vertical curve could be rectified at the same time.

While this would provide the least expensive alternative for fixing many of the deficiencies located at this site, there are still a handful of disadvantages to this alternative. The substructure units would still be old and only in satisfactory condition when the project was complete, and the channel constriction would not be eliminated. The extra time and cost associated with a temporary bridge would still be required to maintain traffic for these rehabilitation options.

**Alternative 2: Complete Replacement**

This last alternative would address all of the substandard issues at this site and remove the river constriction while replacing the existing bridge with a brand new structure. Some of the different considerations that can be evaluated for a new structure in this location are listed below.

*a. Alignment*

The horizontal alignment is straight and ideal over the bridge and 100 feet east and west of the bridge. However, 100 feet off the east end of the bridge the road turns sharply north in a substandard curve. While there was one reported accident in this location in 2007, the overall need is low based on the traffic volumes on Cummings St. No comments were received indicating that the curve is a major issue worth rectifying with this project. The location of the curve is outside the project limits of a bridge replacement project; and the alignment could be rectified with a 200 foot radius curve at a later date if it was deemed worthwhile without affecting

the alignment of the existing or proposed structure. Thus, modifying the road alignment to fix the substandard curve will not be considered further in this report.

The vertical alignment over the bridge will be addressed in this alternative. However, the steep curve at the intersection of Cummings St and Elm St will not be addressed in this report. The grade would need to be raised approximately 2.25 feet between the bridge and Elm St to fix the substandard curve. This would require full depth reconstruction, extensive retaining walls or regrading of the accesses to Cummings St along with potential drainage issues with the buildings that are currently level with the existing elevations. Once again, based on the lack of comments received regarding the need to regrade this section of road, the scope of the fix versus the scope of the need, addressing the substandard curve at the intersection to Elm St will not be considered further.

The proposal is to maintain the existing horizontal alignment while slightly flattening the vertical curve over the bridge to meet the design crest curve parameters in this location.

*b. Bridge Width*

The existing bridge is a narrow 17 feet curb to curb. An ideal cross-section width for a Montpelier street is 32 feet from curb to curb, with any raised sidewalk outside that width. The Vermont State Design Standards list a minimum 22 foot curb to curb for the speed, traffic volume and roadway classification on Cummings St. While there is a raised sidewalk on Elm St north and south of Cummings St, there are no raised sidewalks on Cummings St outside the housing development. Since one of the main non-vehicular users of Cummings St is bicycle traffic and bicycles are not supposed to use raised sidewalks and the existing available width is restricted to the west of the bridge, it is proposed that adequately sized paved shoulders are provided to accommodate both bicycle and pedestrian traffic with any motorized vehicular traffic traveling over the bridge.

The existing Right of Way is larger on the north side of Cummings St and could accommodate a raised sidewalk between Elm St and the bridge. Providing a raised sidewalk would requiring restricting the fairly open access from the residential and commercial drives in this location. Raising the grade would require regrading the drives and lawns in a relatively tight distance between the road and the building faces. Doing this would also require modifying the drainage in this area. The funds to do this work and connect the Elm St sidewalk with any sidewalk on the bridge would be borne by the City without State and Federal money on a bridge project. As such and with no further guidance, it is proposed that the bridge provide a curb to curb bridge width of 22 feet with no raised sidewalk. If it is desired to fund the connecting sidewalk and provide a raised 5' sidewalk to the north side of the bridge, the bridge construction costs are estimated to increase by approximately $125,000 while the costs for the portion off the bridge would be approximately $25,000.

*c. Bridge Type, Length and Skew*

The existing bridge is 64 feet long and constricts the river channel by about 20 feet on the western bank. Thus, the proposal is to provide an 85 foot long bridge in this location. The road crosses the river almost perpendicularly in this location so the proposed bridge would not need to have any skew. There are no major restrictions on the type of structure that can be used in this location. A fairly typical composite concrete and steel beam or precast concrete tee beam

superstructure would be appropriate in this location. It is assumed that the western abutment is founded on shallow rock and thus a replacement abutment would also be a spread footing on bedrock in this location. It is also assumed that the bedrock is deeper on the eastern side of the river and thus it would be appropriate to provide a deep foundation on driven piles under the eastern abutment. If the bedrock is within 6 feet of the finish grade surface at the western abutment, the bridge abutment may be moved forward to eliminate blasting rock while still meeting the scope and design criteria of this alternative. This can be determined when borings are taken for this project.

## IV. Alternatives Summary

Based on the existing site conditions, bridge condition, and recommendations from hydraulics, the alternatives being considered are:

Alternative 1a: Deck Replacement with Traffic Maintained on a Temporary Bridge
Alternative 1b: Superstructure Replacement with Traffic Maintained on a Temporary Bridge
Alternative 2: Complete Replacement with Traffic Maintained on a Temporary Bridge

# V. Cost Matrix

| Montpelier BO 1446 (36) | | Do Nothing | Alt 1a | Alt 1b | Alt 2b |
|---|---|---|---|---|---|
| | | | Deck Replace | Super Replace | Bridge Replace |
| | | | with Traffic Maintained on a Temporary Bridge | | |
| COST[1] | Bridge Cost | $0 | $278,000 | $331,000 | $510,000 |
| | Removal of Structure | $0 | $26,000 | $26,000 | $52,000 |
| | Roadway | $0 | $123,000 | $128,000 | $292,000 |
| | Maintenance of Traffic | $0 | $150,000 | $150,000 | $150,000 |
| | Construction Costs | $0 | $577,000 | $635,000 | $1,004,000 |
| | Construction Engineering + Contingencies | $0 | $173,100 | $190,500 | $251,000 |
| | Total Construction Costs w CEC | $0 | $750,100 | $825,500 | $1,255,000 |
| | Preliminary Engineering[2] | $0 | $155,800 | $171,500 | $251,000 |
| | Right of Way | $0 | $74,000 | $74,000 | $74,000 |
| | Total Project Costs | $0 | $979,900 | $1,071,000 | $1,580,000 |
| | City Share | $0 | $48,995 (5%) | $53,550 (5%) | $158,000 (10%) |
| SCHEDULING | Project Development Duration[3] | N/A | 4 years | 4 years | 4 years |
| | Construction Duration | N/A | 18 months | 18 months | 18 months |
| | Closure Duration (If Applicable) | N/A | N/A | N/A | N/A |
| ENGINEERING | Typical Section - Roadway (feet) | 1-9-9-1 | 2-9-9-2 | 2-9-9-2 | 2-9-9-2 |
| | Typical Section - Bridge (feet) | 0.5-8-8-0.5 | 2-9-9-2 | 2-9-9-2 | 2-9-9-2 |
| | Geometric Design Criteria | No Change | Increased Width | Increased Width | Increased Width |
| | Traffic Safety | No Change | Improved | Improved | Improved |
| | Alignment Change | No | No Change | Slight Vertical | Slight Vertical |
| | Bicycle Access | No Change | Improved | Improved | Improved |
| | Hydraulic Performance | No Change | No Change | No Change | Increased Span |
| | Pedestrian Access | No Change | Improved | Improved | Improved |
| | Utility | No Change | Relocation | Relocation | Relocation |
| OTHER | ROW Acquisition | No | Yes | Yes | Yes |
| | Road Closure | No | No | No | No |
| | Design Life | <10 years | 30 years | 40 years | 80 years |

[1] Costs are estimates only, used for comparison purposes.

[2] Preliminary Engineering Costs are estimated starting from the end of the Project Definition Phase.

[3] Project Development Durations start from the end of the Project Definition Phase.

# VI. Conclusion

We recommend Alternative 2: Complete Replacement with Traffic Maintained on a Temporary Bridge.

The proposed solution would include a completely new bridge that is 85 feet long and 22 feet wide curb to curb. Traffic would be maintained on a temporary bridge to the north of the existing structure, while the remaining work would include removing the existing structure; regrading the channel banks to match the full width up and down stream; and the necessary roadwork to match the new bridge into the existing alignment.

**Discussion**

This alternative would address all of the existing deficiencies at the river crossing with a new structure designed to last another 80+ years. The rehabilitation options would eliminate the most serious concerns at this location but leave the substructure in a less than ideal condition. Many of the costs for Right of Way acquisition and temporary bridge construction would need to be outlaid again in the future when the structure is completely replaced.

The overhead utilities should be relocated before construction to allow room for a temporary bridge. When the utilities are placed in their final location, they should be placed outside the clear zone requirements or appropriately shielded behind guardrail to rectify that substandard feature.

The proposal would remedy all of the substandard design criteria at the bridge. The vertical curve at the intersection of Cummings St and Elm St and the tight horizontal curve to the east of the bridge are outside of the proposed project limits and would remain substandard. However, the horizontal curve could be fixed by the City at a later date without affecting the proposed bridge.

## VII. Appendices

- Site Pictures
- City Map
- Bridge Inspection Report
- Hydraulics Memo
- Preliminary Geotechnical Information
- Natural Resources Memo
- Hazardous Waste Sites
- Archaeology Memo
- Historic Memo
- Utility Information
- Local Input
- Crash Data
- Plans
    - Existing Conditions
    - Proposal
        - Typical Sections
        - Layout
        - Profile
    - Temporary Bridge Layout

**Deck and Girder Deterioration**

**Girder Deterioration and Water Main Enclosure**

**Abutment Deterioration**

**Looking downstream at waterway constriction**

Looking east over the bridge at the narrow roadway

Looking west over the bridge at the patched joint

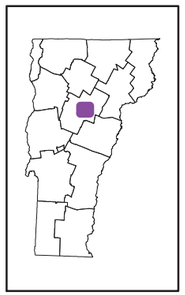
CITY OF MONTPELIER,
CUMMINGS ST, BR 13.

Scale 1:34,298

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



**MONTPELIER CITY**
WASHINGTON COUNTY
DISTRICT # 6

# STRUCTURE INSPECTION, INVENTORY and APPRAISAL SHEET

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

**Inspection Report for** MONTPELIER **bridge no.:** 00013 **District:** 6

**Located on:** C30CU **over** N. BR. WINOOSKI RIVE **approximately** 0.1 MI TO JCT W CL1 TH5 **Owner:** 04 CITY-OWNED

## CONDITION

**Deck Rating:** 4 POOR

**Superstructure Rating:** 5 FAIR

**Substructure Rating:** 6 SATISFACTORY

**Channel Rating:** 6 SATISFACTORY

**Culvert Rating:** N NOT APPLICABLE

**Federal Str. Number:** 101211001312111

**Federal Sufficiency Rating:** 047.3

**Deficiency Status of Structure:** SD

## AGE and SERVICE

**Year Built:** 1929 **Year Reconstructed:** 0000

**Service On:** 1 HIGHWAY

**Service Under:** 5 WATERWAY

**Lanes On the Structure:** 02

**Lanes Under the Structure:** 00

**Bypass, Detour Length (miles):** 99

**ADT:** 000300 **% Truck ADT:** 02

**Year of ADT:** 2007

## GEOMETRIC DATA

**Length of Maximum Span (ft):** 0061

**Structure Length (ft):** 000064

**Lt Curb/Sidewalk Width (ft):** 0.6

**Rt Curb/Sidewalk Width (ft):** 0.7

**Bridge Rdwy Width Curb-to-Curb (ft):** 16.9

**Deck Width Out-to-Out (ft):** 19.1

**Appr. Roadway Width (ft):** 020

**Skew:** 00

**Bridge Median:** 0 NO MEDIAN

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

**Feature Under:** FEATURE NOT A HIGHWAY OR RAILROAD

**Min Vertical Underclr (ft):** 00 FT 00 IN

## STRUCTURE TYPE and MATERIALS

**Bridge Type:** ROLLED BEAM

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

**Kind of Material and/or Design:** 3 STEEL

**Deck Structure Type:** 1 CONCRETE CIP

**Type of Wearing Surface:** 6 BITUMINOUS

**Type of Membrane** 0 NONE

**Deck Protection:** 0 NONE

## APPRAISAL *AS COMPARED TO FEDERAL STANDARDS

**Bridge Railings:** 1 MEETS CURRENT STANDARD

**Transitions:** 1 MEETS CURRENT STANDARD

**Approach Guardrail:** 1 MEETS CURRENT STANDARD

**Approach Guardrail Ends:** 1 MEETS CURRENT STANDARD

**Structural Evaluation:** 5 BETTER THAN MINIMUM TOLERABLE CRITERIA

**Deck Geometry:** 2 INTOLERABLE, REPLACEMENT NEEDED

**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:** 5 STABLE FOR CALCULATED SCOUR

## DESIGN VEHICLE, RATING, and POSTING

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

**Posting Status:** A OPEN, NO RESTRICTION

**Bridge Posting:** 5 NO POSTING REQUIRED

**Load Posting:** 10 NO LOAD POSTING SIGNS ARE NEEDED

**Posted Vehicle:** POSTING NOT REQUIRED

**Posted Weight (tons):**

**Design Load:** 2 H 15

## INSPECTION and CROSS REFERENCE

**X-Ref. Route:**

**Insp. Date:** 062011 **Insp. Freq. (months)** 24 **X-Ref. BrNum:**

## INSPECTION SUMMARY and NEEDS

*06/07/11 Structure deck & superstructure continues to deteriorate and structure needs major rehab or replacement in the near future. MJK & JG*

*06/18/09 This structure is in poor to good condition. The deck is in poor condition and full depth holes could occur any time, any place. The steel beams have heavy rust scale through out and holes will occur in the beams in the near future. The city should be thinking about replacing the structure or have a major rehab project soon. DCP*

**VT AGENCY OF TRANSPORTATION PROGRAM DEVELOPMENT DIVISION**

# HYDRAULICS UNIT

**TO:** Chris Williams, Structures Project Manager

**FROM:** Leslie Russell, P.E., Hydraulics Project Engineer

**DATE:** 2 July 2013

**SUBJECT:** Montpelier BO 1446(36) - Cummings Street Bridge 13 over North Branch Winooski River

---

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 1929 based on available information. The bridge is owned by the Town. The original bridge is a 2-lane single span rolled beam bridge with a concrete deck having a width of approximately 18 feet. The perpendicular clear span between the abutment faces is approximately 59 feet with vertical cast-in-place concrete abutment walls on spread footings. The approximate height to the bottom of the superstructure over the streambed is approximately 12 feet average. The channel is basically perpendicular to the roadway and the clear span of the bridge is normal to the channel at its current location.

All of the calculated flows pass through the existing structure. However, because the bridge is in the floodplain of the North Branch, water does overtop the roadway around the bridge. Therefore, the existing bridge is hydraulically adequate and does have adequate hydraulic capacity for the design flow ($Q_{25}$) event based on our analysis of the existing conditions. The existing bridge appears to constrict the channel on the west side (abutment 1) by about 20'. We did not evaluate the scour for the existing or proposed bridge configurations as part of the preliminary design. Scour calculations will be performed during final hydraulics.

Recommendations

Based on the hydraulic capacity of the existing bridge, the superstructure may be replaced if the substructure is deemed structurally sound.

In order to span bankfull width, a new structure would need to have an 80' clear span (normal to the river). The west abutment would need to be widened, if it is feasible to do so. Since the superstructure would be deeper than the existing, an average low beam elevation of 531.5' would still provide over 1.0' of freeboard at Q25.

Any structure between the existing span of 59' and the proposed span of 80' will be hydraulically adequate at this site as long as average low beam is at 531.5' or above. Because there is a Flood Insurance Study at this site, the site is governed by the National Flood Insurance Program. This means that the waterway area cannot be made any smaller than it currently is and that the base flood elevation (Q100) cannot be raised.

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 Stone Fill, Type II will be necessary for armoring the channel banks near the replacement structure.

**AGENCY OF TRANSPORTATION** **OFFICE MEMORANDUM**

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

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

**Date:** June 21, 2013

**Subject:** Montpelier BO 1446(36) 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. 13, located on Cummings St. near VT 12 in the city of Montpelier, VT. This report includes a review of available historical subsurface data and field observations made during a recent site visit. The materials referenced in this investigation include: VTrans boring files and record plans, Agency of Natural Resources (ANR) water well logs, ANR Environmental Interest Locator, USDA Natural Resources Conservation soil survey records and USGS bedrock and Vermont Geological Survey surficial geologic maps.

## 2.0 HISTORICAL SUBSURFACE INFORMATION

### 2.1 Previous Projects

No boring information was noted on the record plans recovered for Bridge No. 13. No boring log data were found in the Soils & Foundations project database or the in-house historical boring log records in the vicinity of this bridge.

### 2.2 ANR Water Well Logs

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 strata. The Agency of Natural Resources (ANR) Private Well Locator interactive map was reviewed for these purposes. The data provided estimates the depth to bedrock and expected soils types encountered on the site. It should be noted that these logs were developed and provided by well drilling companies whose employees may have had little to no formal training in identifying soil and rock. Water wells in close proximity of the subject bridge are highlighted in Figure 1.


**Figure 1** Site map with well locations.

Three wells were identified within an approximate radius of 2,000 feet, and the information for each is listed in Table 1.

**Table 1.** Well log descriptions of surrounding sites.

| Well Tag Number | Distance From Project (feet) | Depth to Bedrock (feet) | Material Description |
|---|---|---|---|
| 9K | 1000 | 24 | Sand and Hardpan; Shale |
| 18289 | 1200 | 29 | Hardpan and Clay; Shale |
| 21421 | 1400 | 110 | Clay, Sand; Granite |
| --- | 1800 | 18 | Clay, Gravel, Sand; Quartz |

### 2.3 USDA Environmental Interest Locator

The U.S. Department of Agriculture (USDA) provides online maps with data locating potential environmental hazards. It was determined that there were currently no hazardous waste sites or designated wetlands within the project vicinity. There are currently no land use restrictions on this area.

### 2.4 USDA Soil Survey

The U.S. Department of Agriculture (USDA) Natural Resources Conservation (NRC) soil survey records provide online published soil data. These indicated that the existing soils

at the project site consist of both Rumney fine sandy loam on the west side of the site and Sunday fine sand on the east side. The Rumney soils are typically very deep to bedrock and poorly drained, while the Sunday soils are very deep to bedrock and excessively well drained; with a shallow seasonal water table ranging from 0.0-1.5 feet.

**2.5 USGS Bedrock Maps**

Based on recent bedrock mapping for the 2011 State bedrock geologic map (Ratcliffe, N.M., Stanley, R.S, Gale, M.H., Thompson, P.J., and Walsh, G.J., 2011, Bedrock Geologic Map of Vermont: U.S. Geological Survey Scientific Investigations Map 3184, 3 sheets, scale 1:100,000), the rock type underlying this area consists of phyllite and metalimestone, 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".*

Some potential bedrock outcrops were identified on the eastern side of the bridge, however, stone rip rap lined the channel making it difficult to discern bedrock from buried rip rap. The bedrock information in the surrounding area indicates that the depth to ledge could vary greatly within the vicinity so additional information in this should be obtained.


**Figure 3.** Potential bedrock outcrop and rip rap stone lining the eastern side of the bridge.

## 3.0 FIELD OBSERVATIONS

Pertinent information was gathered in order to determine any potential issues with boring observations or design considerations.


**Figure 3.** View of existing site. Photograph was taken facing east.

Overhead utilities were noted both on the northern and western sides of the road, as seen in Figure 3. Placement of the borings should take into consideration a minimum 10 foot clearance from these utilities.

## 4.0 RECOMMENDATIONS

Based on the limited information gathered during this investigation, possible foundation options for a bridge replacement include the following:

- Reinforced concrete abutment on spread footings
- Precast arch on spread footings
- Pile caps on a single row of H-piles (Integral Abutments)

It is recommended that a minimum of two borings be drilled to bedrock at opposite ends of the bridge in order to assess the subsurface conditions. If variable conditions are noted or shallow bedrock is encountered, additional borings should be advanced to establish a more detailed bedrock profile.

## Fillbach, Tim

**From:** Lepore, John
**Sent:** Wednesday, April 17, 2013 10:57 AM
**To:** Ramsey, Jeff; Williams, Chris
**Cc:** Lepore, John; Russell, Jeannine
**Subject:** RE: MONTPELIER BO 1446(36) Resource ID request

**Jeff / Chris,**

Hey, just so you know, I did both an office review and site visit of this project, and aside from the North Branch itself, the only other natural resource in area is a wetland to the south of Cummings Street and on the eastern side of the river. Please note that the boundary was NOT picked up today as the area was inundated due to water releases up at the Wrightsville Reservoir, which controls the flows. Again, other natural resources such as species or habits of special concern are not present in the area, and the floodplain/floodway is controlled by the actions conducted at the Wrightsville Reservoir Dam. In any event, I will revisit this site in coming weeks for the purpose of delineating the wetlands, but any shift of the bridge or roadway (downstream / south) would cause impacts.

**RE: Constructability**

This bridge is in a tight location, but the replacement or repair of it on existing location makes sense. Controlling traffic is somewhat problematic due to the structures on the right bank (western side of the river), but it appears that a one-way detour MIGHT be able to be squeezed in immediately upstream of the existing structure. The only other way I could see making this bridge work would be to use phased construction (one lane at a time) with a slight widening to the north (upstream) to accommodate construction and traffic. Some utility relocation is likely, and should be moved north (upstream) of the bridge to avoid impacts to the wetland.

**RE: Permits**
If the structure was widened to provide a somewhat wider hydraulic opening, and there was no shift of the roadway or bridge to the south (downstream), the permitting for this project will be pretty simple. Of course, I'd need to have OHW and the new slopes depicted on the plans to make the final call, but I wouldn't expect any unforeseen permit hang-ups…

Anyhow, that's all the news fit to print. Come see me if you have questions…

~ John ~

---

**From:** Ramsey, Jeff
**Sent:** Wednesday, April 10, 2013 12:35 PM
**To:** Armstrong, Jon; Lepore, John; Russell, Jeannine; Gauthier, Brennan; O'Shea, Kaitlin; Newman, Scott
**Cc:** Williams, Chris
**Subject:** MONTPELIER BO 1446(36) Resource ID request

Hi it's me again,
The PM would like resources identified for this project.

**From**: Jeff Ramsey, Environmental Specialist
**Date**: April 10, 2013

# ANR Atlas - Hazardous Waste Sites

Vermont Agency of Natural Resources

**vermont.gov**



## LEGEND

- Landfills
  - OPERATING
  - CLOSED
- Hazardous Waste Site
- Hazardous Waste Generators
- Brownfields
- Underground Storage Tank (w

## NOTES

Map created using ANR's Natural Resources Atlas

468.0 0 234.00 468.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 767 Ft. 1cm = 92 Meters



THIS MAP IS NOT TO BE USED FOR NAVIGATION

VERMONT

**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: Jeff Ramsey, Environmental Specialist

From: Jeannine Russell, VTrans Archaeology Officer

Date: April 19, 2013

Subject: Montpelier BO 1446(36) – Archaeological Resource ID

A field visit was conducted on 4-17-13 for the above bridge project. No archaeological resources or sensitive areas were identified within the immediate project area as defined by a 200 foot radius adjacent to the bridge.

Project plans will be reviewed when available to confirm that the project area has not differed from that which was reviewed during the Resource ID. A formal clearance will be issued upon review of the plans.

Thank you,
Jen Russell
VTrans Archaeology Officer

VTrans Working to Get You There
Vermont Agency of Transportation

**Fillbach, Tim**

**From:** Newman, Scott
**Sent:** Tuesday, May 14, 2013 8:58 PM
**To:** Ramsey, Jeff
**Cc:** Williams, Chris; O'Shea, Kaitlin; Newman, Scott
**Subject:** Montpelier BO 1446 (36)

Jeff,

I've concluded the resource ID for the above subject project. The only historic/4(f) resources in the project area are the concrete bridge and two houses fronting RT 12. Any adverse effects to the bridge will trigger reviews under 106 and 4(f), and easements or fee acquisitions from the historic house properties will trigger a 4(f) review. The resource ID has been digitized in ArcMap and bookmarked under the project number.

Thanks,
Scott

D. Scott Newman M.Sc.
Historic Preservation Officer
Vermont Agency of Transportation
1 National Life Drive
Montpelier, VT 05633

Cell: 802-595-5119
Fax: 802-828-2334

## Fillbach, Tim

**From:** Wheeler, Lawrence
**Sent:** Monday, June 10, 2013 7:26 AM
**To:** Williams, Chris
**Cc:** Covey, Nathan; Symonds, Wayne
**Subject:** Montpelier Cummings Street BO 1446(36) - Request for Utility Information
**Attachments:** montpelier cummings street utility plan_0001.pdf

***Sorry Chris … I forgot to include the GMP Contact with my first message. I have now included that information as well.***

On 6/6/13 I conducted an on-site investigation of the existing utility locations within the referenced project area. Since that time I have been in contact with the utility companies to determine ownership and location of their facilities and met with employees from Montpelier's Public Works to view the record plans for the municipal water and sewer systems. The following summarizes my observations and discussions:

**Municipal Utilities (Refer to the attached utility plan)**

- There is an existing 4'' water main which extends from the Elm Street intersection, along Cummings Street to the housing complex beyond the project area. This water main is attached to the underside of the existing bridge.
- There is an existing 8'' force sewer main which also extends from the Elm Street intersection just off the south edge of Cummings Street. According to the "As-Built" plans there is an existing sewer manhole at 3+45 (+/-) right. This sewer main passes under the river just downstream from the existing bridge and continues just off the south edge of Cummings Street to the manhole near centerline at 6+45 (+/-); this sewer main then extends along Cummings Street to the housing complex beyond the project area.
- As alternatives are developed, the exact location/depth of these municipal utilities can be fine tuned by obtaining copies of the record plans.

**Public Utilities**

**Underground:**

- The only underground utilities within the project area are the underground service lines which extend from pole # 1 at 5+12 (+/-) left to the residence at 5+50 left.

**Aerial:**

- There are aerial electric and telephone lines which extend from the Elm Street intersection to a pole in the northwest quadrant of the existing bridge and then along the north side of Cummings Street to a pole at 6+38 (+/-) right.
- There are two aerial crossing of these facilities over Cummings Street; one is approximately 112 feet east of the existing bridge and the other is approximately 140 feet west of the existing bridge.

Following is a list of the contacts for this project:

**Water System and Sewer System:**

**Todd Law, P.E. , Public Works Director**

**City of Montpelier Public Works**

**Telephone: (802) 223-9200**

**Montpelier – Cummings St. Bridge, Community Considerations**

- Are there any scheduled public events in the community that will generate increased traffic (e.g. vehicular, bicycles and/or pedestrians), or may be difficult to stage if the bridge is closed during construction? Examples include: a bike race, festivals, cultural events, farmers market, concerts, etc. that could be impacted? If yes, please provide date, location and event organizers' contact info. *No*

- Is there a "slow season" or period of time from May through October where traffic is less? *No*

- Please describe the location of emergency responders (fire, police, ambulance) and emergency response routes. *Montpelier emergency responders are located in Downtown Montpelier on Main St. (VT 12), and they would reach the area via Elm St. (VT 12)*

- Where are the schools in your community and what are their schedules? *All the City schools are in the Downtown. Union Elementary School is located on School St, Main St. Middle School is on Main St, and Montpelier High School is on School Dr. which is off of Bailey Ave. Ext. School starts the last week in August and end the second or third week of June.*

- Is the proposed project on an established or planned school bus or public transit route(s)? *We believe the school bus crosses the bridge to serve the residential areas. The GMTA Montpelier Circulator will pull into the Cumming St. Apts a 6:45 am by phone-in request only. GMTA reports that these requests happen frequently during the school year. The Circulator will deviate anytime during the day.*

- Are there any businesses (including agricultural operations) that would be adversely impacted either by a detour or due to work zone proximity? *The city has a record of two properties in commercial use including a warehouse, cleaning business, and sand / earth materials. On the west side of the river, Johnson Artesian Wells is doing business with an office, work shop & equipment storage located immediately adjacent to the bridge.*

- Are there any important public buildings (town hall or community center) or community facilities (recreational fields or library) in close proximity to the proposed project? *The Montpelier Pool & Recreation Fields are in close proximity, just north of Cummings St. on Elm St.(VT 12) The Montpelier Housing Authority (Capital City Housing) maintains & operates a public housing facility at the end of Cummings St and there is also an 8 unit multi-family apartment building located on the street.*

- Are there any town highways that might be adversely impacted by traffic bypassing the construction on another local road? *No*.

- Are there any other municipal operations that could be adversely impacted if the bridge is closed during construction? If yes, please explain. *The city operates a waste water pump station at the end of the street and must have continuous access. The city also operates a winter snow storage area on municipal property at the north end of the street.*

- Please identify any local communication channels that are available—e.g. weekly or daily newspapers, blogs, radio, public access TV, Front Porch Forum, etc. Also include any unconventional means such as local low-power FM. *The Times Argus, Bridge, & World are daily or weekly newspapers. WNCS The Point & WDEV are radio stations. ORCA Media is the public access TV. Montpelier isn't in Front Porch Forum.*

- Is there a local business association, chamber of commerce or other downtown group that we should be working with? *The Central Vermont Chamber of Commerce and the Central Vermont Economic Development Corp, are other business associations. "Montpelier Alive" serves the downtown business district.*

**Design Considerations**

- Are there any concerns with the alignment of the existing bridge? For example, if the bridge is located on a curve, has this created any problems that we should be aware of? *No concerns the bridge is straight.*

- Are there any concerns with the width of the existing bridge? *Yes*

- What is the current level of bicycle and pedestrian use on the bridge? *Unknown. The bridge serves as a secondary and alternative access to the City's North Branch Park which contains bike & pedestrian trails. This alternative may be considered by some as a safer route than Elm St for bike travel.*

- If a sidewalk or wide shoulder is present on the existing bridge, should the new structure have one? *There is no sidewalk or wide shoulder but one or the other should be provided to allow alternative transportation means to connect with the public sidewalk system.*

- Is there a need for a sidewalk or widened shoulder if one does not currently exist? Please explain. *There are a number of residential units on the east side of the bridge that could benefit from the addition of a sidewalk to reach the sidewalks on Elm St.(VT 12)*

- Does the bridge provide an important link in the town or statewide bicycle or pedestrian network such that bicycle and pedestrian traffic should be accommodated during construction? *The city is actively promoting bike facilities and seeking opportunities for expanding and improving these facilities. At the north end of the street, there is a pedestrian/bicycle path and bridge to the Recreation Fields that could be used during construction.*

- Are there any special aesthetic considerations we should be aware of? *The bridge has a decorative concrete railing and is located in a primarily residential setting.*

- Are there any traffic, pedestrian or bicycle safety concerns associated with the current bridge? If yes, please explain. *See answers to questions 3 & 4 above. Providing adequate sight distance to the bridge approaches would be expected to enhance safety. Appropriate lighting levels, either on or adjacent to the bridge, could also enhance convenience and safety.*

- Does the location have a history of flooding? If yes, please explain. *No known flooding events other than 1927.*

- Are you aware of any nearby Hazardous Material Sites? *Unknown*

- Are you aware of any historic, archeological and/or other environmental resource issues? *The westerly bridge abutment is believed to date back to the original covered bridge in this location. The bridge was once commonly known as the "Ice House Bridge" which is believed to be because a former ice storage building was located on the easterly side of the river (NE Corner). Last, the steel beams used for the current bridge are flat (not cambered) which is thought to be an unusual design.*

- Are there any other comments you feel are important for us to consider that we have not mentioned yet? *Cummings Street is a dead end street, and the bridge is the only vehicle access for residents, businesses and activities on the east side of the river. As a dead end street, the bridge is also the only means of access for emergency service vehicles and equipment.*

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

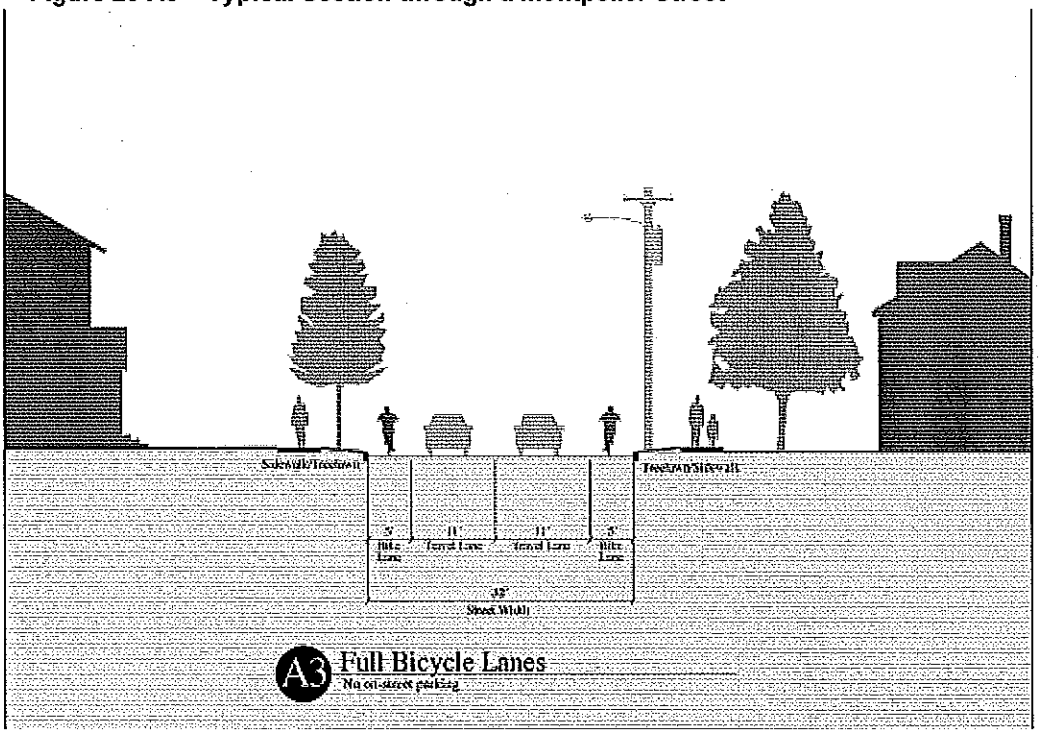
- Does your municipal land use plan reference the bridge in question? If so please provide a copy of the applicable section or sections of the plan. *See attached.*

- Please provide a copy of your existing and future land use map, if applicable. *See attached.*

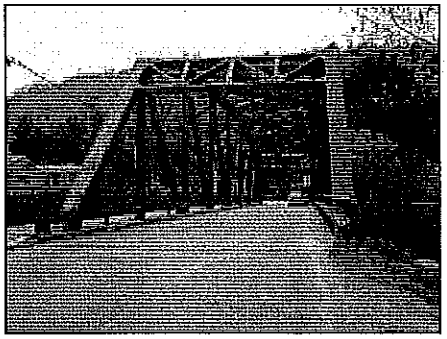
- Are there any existing, pending or planned development proposal that would impact future transportation patterns near the bridge? If so please explain. *Unknown*

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

**Figure 20 A3 – Typical Section through a Montpelier Street**




## Montpelier's Bridges



The combination of Montpelier's location at the confluence of two branches of the Winooski River and its dense network of streets and activity result in a large number of bridges in the City. Many of these bridges are aging, and may require costly rehabilitation or replacement in the coming years. The table on the following page lists the bridges in Montpelier that are the responsibility of the City.

Sufficiency ratings, which rank the structural and functional condition of the bridge on a scale of 0 to 100 (worst to best), are also provided for the recently rated bridges. These ratings are based on a breakdown of 50 points for the bridge's structural condition, 25 points for its traffic safety (i.e. the width of the bridge, whether or not there are sharp curves on its approaches), and finally 25 points for the bridge's importance in terms of the local transportation network, which considers nearest crossing or detour distance if the bridge was to be closed. Sufficiency ratings are not conducted for short bridges of less than 20 feet in length, nor for pedestrian bridges.

**Table 4-1: Inventory of Montpelier's City Owned Bridges**

Data from Montpelier Department of Public Works and VTrans

| # | Location | Year Built | Type | Length in Ft +/- | Crosses | Rating | Status | Historic Status |
|---|---|---|---|---|---|---|---|---|
| 1 | Rialto Bridge, State Street | 1915 | concrete encased steel beam | 70 | North Branch | 76.0 | ND | |
| 2 | Main Street | 1976 | steel beam, concrete | 147 | Winooski | 73.2 | ND | |
| 4 | Montpelier Junction Road | 2002 | steel beam, concrete | 90 | Dog River | | | |
| 5 | Taylor Street | 1929 | Parker through-truss | 165 | Winooski | 42.2 | RP | On Nat'l Reg |
| 6 | Pioneer Street | 2002 | steel beam, concrete | 167 | Winooski | 100.0 | ND | |
| 10 | School Street | 1991 | steel beam, concrete, rehab truss | 77 | North Branch | 80.3 | ND | Possibly Eligible |
| 11 | Langdon Street | 2007 | Warren pony truss | 68 | North Branch | new | ND | On Nat'l Reg |
| 12 | Vine Street Foot Bridge | 1974 | steel beam, wood deck | 70 | North Branch | | | |
| 13 | Cummings Street | 1928 | steel beam, concrete | 64 | North Branch | 48.5 | RP | |
| 14 | Gould Hill Road | 1983 | steel beam, concrete | 105 | North Branch | 90.1 | ND | |
| 15 | Grout Road | 1977 | concrete, wood deck | 69 | North Branch | 55.3 | ND | |
| 16 | Haggett Road | 1984 | concrete, wood deck | 87 | North Branch | 68.3 | FD | |
| 17 | Granite Street | 1902 | Baltimore through-truss, wood deck | 205 | Winooski | 53.2 | FD | Eligible |
| 60 | Bailey Avenue | 1994 | steel beam, concrete | 255 | Winooski | 87.5 | ND | |
| 62 | East Mont. Road near Route 302 | 1971 | steel beam, concrete | 236 | Winooski | 85.5 | ND | |
| 64 | East Mont. Road at City Line | 1962 | steel beam, concrete | 106 | Winooski | 67.7 | FD | |
| 73 | Spring Street | 1972 | steel beam, concrete | 83 | North Branch | 91.2 | ND | |
| 74 | Elm Street (City Dump Road) | 1983 | concrete box | 12 | Dump Brook | | | |
| * | Poolside Drive Rec Field Foot Bridge | 1975 | Steel prefabricated, wood deck | 80 | North Branch | | | |
| * | Winooski West Bike Path Bridge | 1998 | Steadfast prefabricated, wood deck | 178 | Winooski | | | |
| * | North Branch Foot Bridge | 2001 | Pratt prefabricated half through-truss | 120 | North Branch | | | |

*Notes: ND= No Deficiency; FD= Functionally Deficient; SD= Structurally Deficient; RP=Restoration in Progress*

Bridge sufficiency ratings ("Rating" column in the above table) are used as a starting point in identifying bridge replacement and rehabilitation priorities by VTrans. Table 4-1 above also indicates "deficiency status" ("Status" column in the above table), depending on whether the bridge's structural rating is low, or its combined service/safety rating is low. Several years ago, VTrans developed a preservation plan for all the historic steel truss bridges in the state, in order

to get an overview of which bridges should remain in place for limited use, and which should be replaced. This study concluded that the Taylor and Granite Street bridges should be preserved for limited vehicular use, and that the School and Langdon Street bridges should be modified for either limited or unlimited vehicular use. The old Pioneer Street bridge trusses are in storage for adaptive re-use on the Central Vermont Bike Path.

Given the number of bridges in Montpelier, and their age, condition, and importance to City's transportation network, a plan for the cost effective, preventative maintenance should be developed and carried out by the City.

## Journey to Work Data

The 2000 U.S. Census Journey to Work Data provides a picture of the current commuting patterns in Montpelier, and how they have changed in the past few decades. The US Census collects data on their long form on residents' work commuting trip, including mode and average length of trip.

Figure 21 and Table 4-2 below compare the mode shares (% using each major mode of transportation) for residents of Montpelier's trips to work for 1980, 1990 and 2000.

**Figure 21 – Mode of Transportation in Montpelier**

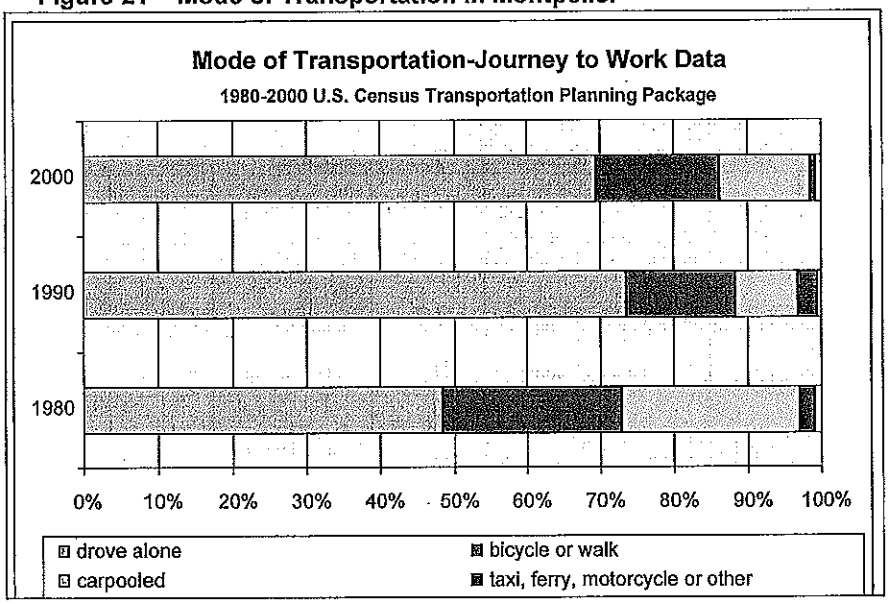
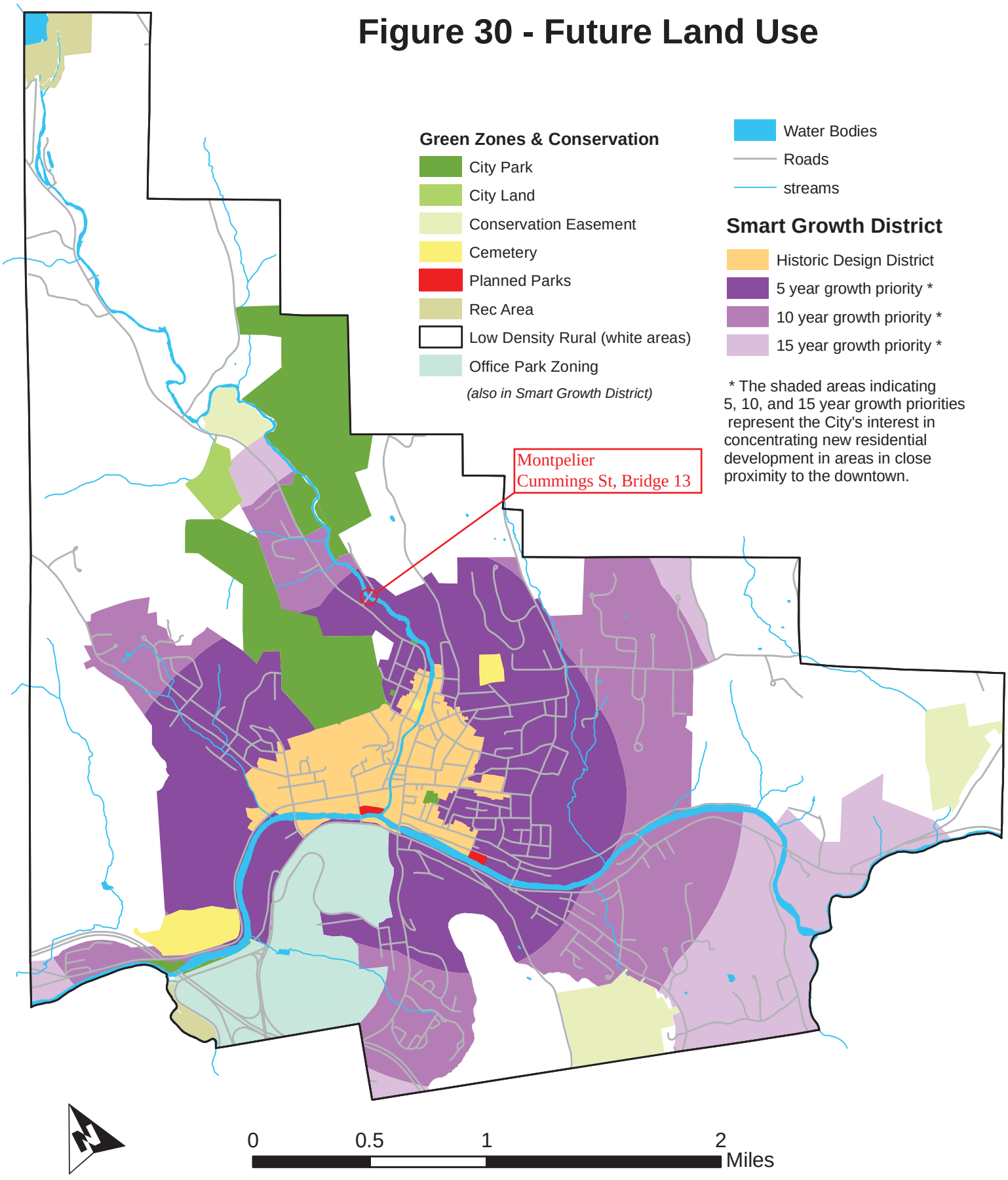



**Table 4-2: Mode of Transportation in Montpelier - Journey to Work Data**

| Mode of Transportation | 1980 | 1990 | 2000 |
|---|---|---|---|
| drove alone | 1,737 | 2,916 | 2,865 |
| bicycle or walk | 877 | 591 | 695 |
| carpooled | 863 | 335 | 505 |
| taxi, ferry, motorcycle or other | 78 | 110 | 30 |
| public transportation (not taxi, ferry, motorcycle) | 33 | 22 | 30 |

# CITY OF MONTPELIER
# 2010 MASTER PLAN
## Figure 30 - Future Land Use



**Vermont Agency of Transportation**

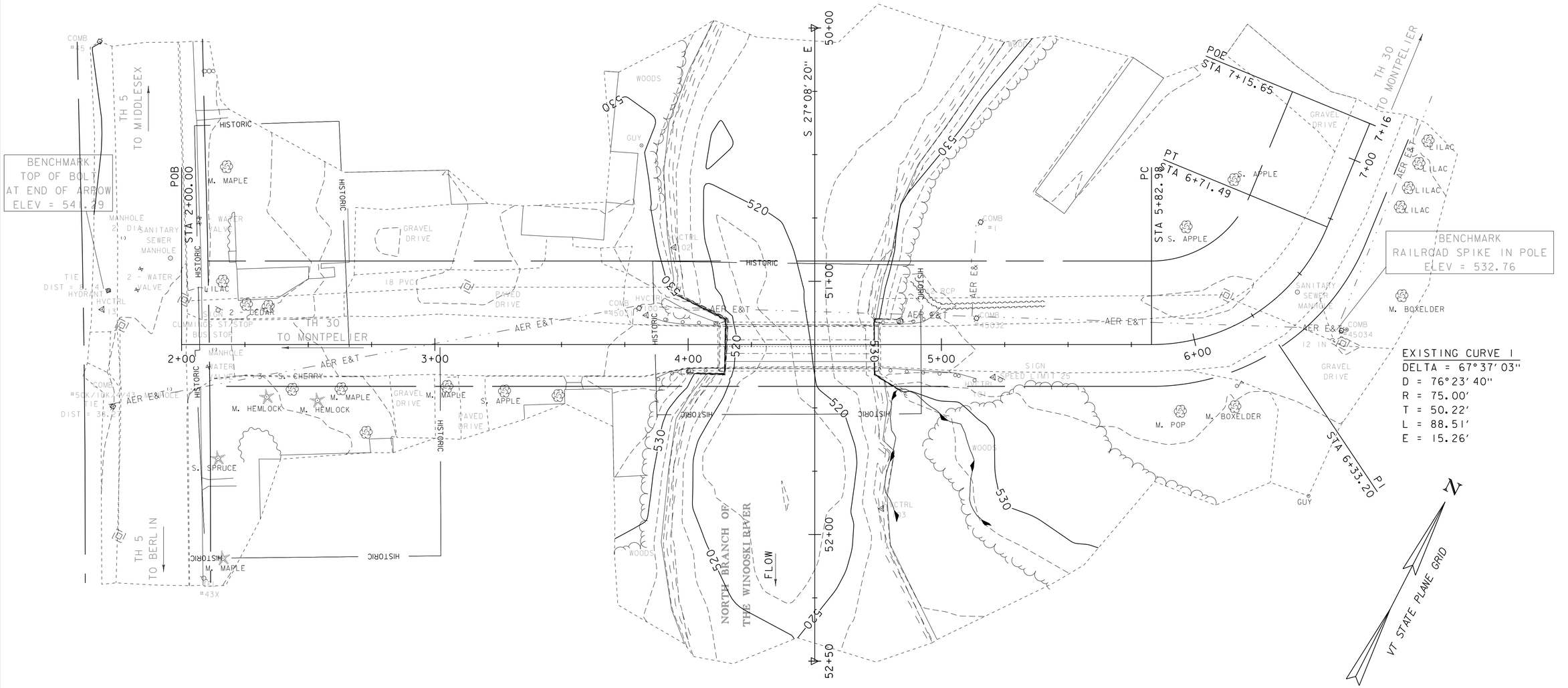


# General Yearly Summaries - Town Highway Crash Listing: Non-Federal Aid Highways-Local

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

| Reporting Agency/ Number | County | Town | Route | Date MM/DD/YY | Time | Weather | Contributing Circumstances | Direction Of Collision | Number Of Injuries | Number Of Fatalities | Location |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VTVSP1200/11 A305256 | Washington | Marshfield | T0071 | 12/20/2011 | 14:51 | Clear | Failure to keep in proper lane, No improper driving | Opp Direction Sideswipe | 0 | 0 | TH-71 Bunker Hill Circle at Hollister Hill Road |
| VTVSP1200/09 A300590 | Washington | Middlesex | 0000 | 02/04/2009 | 12:40 | Clear | Unknown | Left Turn and Thru, Broadside v<-- | 0 | 0 | 46 East Hill Road * |
| VTVSP1200/11 A300836 | Washington | Middlesex | T0001 | 02/18/2011 | 16:30 | Cloudy | Driving too fast for conditions | Single Vehicle Crash | 0 | 0 | TH-1 (114 Three Mile Bridge Road) at Cross Road |
| 1210/3866-07 | Washington | Middlesex | T0005 | 02/02/2007 | 20:00 | Snow | Driving too fast for conditions, Failure to keep in proper lane | Single Vehicle Crash | 0 | 0 | TH 5 (Story Rd) at Shady Rill Rd |
| 1210/1832-07 | Washington | Middlesex | T0007 | 02/07/2007 | 15:11 | Clear | Driving too fast for conditions, Failure to keep in proper lane, No improper driving | Head On | 1 | 0 | TH 7 (N Bear Swamp Rd) at Residence #43 |
| VTVSP1200/08 A300126 | Washington | Middlesex | T0010 | 01/08/2008 | 10:55 | Cloudy | Failure to keep in proper lane, Driving too fast for conditions, No improper driving | Head On | 2 | 0 | TH-10 (Norton Road) at Vermont Route 12 |
| 1210/8672-07 | Washington | Middlesex | T0016 | 06/15/2007 | 10:48 | Clear | Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner | Single Vehicle Crash | 1 | 0 | Th 16 (West Hill Rd) at TH 42 (Ellen Ln) |
| VTVSP1200/08 A300400 | Washington | Middlesex | T0017 | 01/23/2008 | 07:40 | Clear | Inattention, No improper driving | Other - Explain in Narrative | 0 | 0 | TH-17 (Government Hill Road) at Shady Rill Road |
| 1210/15251-07 | Washington | Middlesex | T0018 | 09/30/2007 | 18:36 | Clear | Failure to keep in proper lane, Unknown | Opp Direction Sideswipe | 0 | 0 | TH-18 (Horn Of Moon Road) at #2416 |
| VTVSP1200/08 A303101 | Washington | Middlesex | T0018 | 07/14/2008 | 19:15 | Clear | Driving too fast for conditions, Failure to keep in proper lane | Single Vehicle Crash | 0 | 0 | TH-18 (Portal Road) at Portal Road |
| 1210/740-07 | Washington | Middlesex | T0022 | 01/11/2007 | 08:30 | Clear | Driving too fast for conditions, Failure to keep in proper lane | Single Vehicle Crash | 0 | 0 | TH-22 Center Rd at House # 562 |
| 1210/1198-07 | Washington | Middlesex | T0025 | 01/27/2007 | 15:54 | Clear | Failure to keep in proper lane, Driving too fast for conditions | Single Vehicle Crash | 1 | 0 | TH 25 Portal Rd at Residence #24 |
| 1210/6996-07 | Washington | Middlesex | T0025 | 04/24/2007 | 14:02 | Clear | Driving too fast for conditions, Other improper action, No improper driving | Head On | 1 | 0 | TH 25 (Bolduc Rd) at Portal Rd |
| VTVSP1200/09 A302440 | Washington | Middlesex | T0025 | 06/15/2009 | 08:01 | Cloudy | Failed to yield right of way, Visibility obstructed, No improper driving | No Turns, Thru moves only, Broadside ^< | 1 | 0 | TH-25 (41 Bolduc Road) at 41 Bolduc Road |
| 1210/3858-07 | Washington | Middlesex | T0027 | 02/03/2007 | 21:00 | Clear | Driving too fast for conditions, Under the influence of medication/drugs/alcohol | Single Vehicle Crash | 0 | 0 | TH-27 (Portal Rd) at House #110 |
| 1210/13558-07 | Washington | Middlesex | T0029 | 10/23/2007 | 00:02 | Clear | Unknown | Single Vehicle Crash | 0 | 0 | TH-29 at Center Road |
| 1210/2748-07 | Washington | Middlesex | T0036 | 02/21/2007 | 14:20 | Clear | Other improper action | Single Vehicle Crash | 0 | 0 | Th 36 (89 McCullough Hill) at East Hill Rd |
| 1210/15413-07 | Washington | Middlesex | T0045 | 12/01/2007 | 06:40 | Clear | Other improper action, Failure to keep in proper lane | Opp Direction Sideswipe | 0 | 0 | TH-45 (Brook Road) at House #528 |
| 1211/2602-07 | Washington | Montpelier | 0000 | 02/21/2007 | 05:11 | Snow | Other improper action | Single Vehicle Crash | 0 | 0 | 25 Cummings St |
| 1211/3785-07 | Washington | Montpelier | 0000 | 03/01/2007 | 17:17 | Clear | No improper driving, Failed to yield right of way | No Turns, Thru moves only, Broadside ^< | 0 | 0 | National Life at National life Drive / Roundabout |
| 1211/5731-07 | Washington | Montpelier | 0000 | 04/24/2007 | 11:34 | Clear | Failed to yield right of way, No improper driving | Other - Explain in Narrative | 0 | 0 | (4 Longmeadow Dr.) |
| 1211/11099-07 | Washington | Montpelier | 0000 | 08/30/2007 | 11:38 | Unknown | Driving too fast for conditions | Other - Explain in Narrative | 0 | 0 | Clarendon Ave at Bailey Ave |
| 1211/12238-07 | Washington | Montpelier | 0000 | 09/24/2007 | 13:56 | Clear | Inattention | Same Direction Sideswipe | 0 | 0 | 37 School St at Loomis St |
| 1211/12258-07 | Washington | Montpelier | 0000 | 09/25/2007 | 16:33 | Clear | Other improper action | Other - Explain in Narrative | 0 | 0 | #4 Pleasant View at Phelps Street |
| 1211/13923-07 | Washington | Montpelier | 0000 | 10/27/2007 | 19:20 | Rain | Distracted, Other improper action, No improper driving | Rear End | 0 | 0 | College St at Main St |
| 1211/14518-07 | Washington | Montpelier | 0000 | 11/16/2007 | 17:02 | Snow | Followed too closely, No improper driving | Other - Explain in Narrative | 0 | 0 | National Life Drive at Memorial Drive |
| 1121/18073-07 | Washington | Montpelier | 0000 | 12/13/2007 | 14:24 | Snow | Driving too fast for conditions | Other - Explain in Narrative | 0 | 0 | Wake Ronin Dr at Bostwick Rd |
| 1211/16475-07 | Washington | Montpelier | 0000 | 12/17/2007 | 11:59 | Cloudy | Inattention, Other improper action, No improper driving | Other - Explain in Narrative | 0 | 0 | Stone Cutters Way at Citizen's Bank |
| 1211/16633-07 | Washington | Montpelier | 0000 | 12/20/2007 | 11:40 | Snow | Inattention | Other - Explain in Narrative | 0 | 0 | Summit Street at Edwards Street |
| 1211/16707-07 | Washington | Montpelier | 0000 | 12/20/2007 | 15:13 | Snow | No improper driving | Opp Direction Sideswipe | 0 | 0 | Prospect St at Northfield St |
| 1211/16635-07 | Washington | Montpelier | 0000 | 12/21/2007 | 09:44 | Cloudy | Other improper action | Other - Explain in Narrative | 0 | 0 | 26 Loomis St at Liberty St |
| VT0120200/33 7207 | Washington | Montpelier | 0000 | 03/13/2008 | 12:51 | Clear | Inattention | Other - Explain in Narrative | 0 | 0 | School Avenue at Berlin Street / Parkin's |
| VT0120200/34 3732 | Washington | Montpelier | 0000 | 06/30/2008 | 15:00 | Clear | No improper driving | Single Vehicle Crash | 0 | 0 | 19 Pinewood Dr |
| VT0120200/34 8153 | Washington | Montpelier | 0000 | 09/11/2008 | 09:34 | Clear | Visibility obstructed, Inattention, No improper driving | Left Turn and Thru, Angle Broadside -->v-- | 0 | 0 | School Ave. at Berlin St. |
| VT0120200/08-348294 | Washington | Montpelier | 0000 | 09/13/2008 | 17:45 | Cloudy | Operating vehicle in erratic, reckless, careless, negligent, or aggressive manner, Under the influence of medication/drugs/alcohol | No Turns, Thru moves only, Broadside ^< | 0 | 0 | Bailey Avenue at Terrace Street |
| VT0120200/35 1384 | Washington | Montpelier | 0000 | 11/07/2008 | 16:13 | Cloudy | Failure to keep in proper lane | Same Direction Sideswipe | 0 | 0 | Liberty Street at St Paul Street |
| VT0120200/35 3630 | Washington | Montpelier | 0000 | 12/17/2008 | 10:26 | Snow | Other improper action, No improper driving | Other - Explain in Narrative | 0 | 0 | Greenwood Terr. at Court St. |
| VT0120200/12 11-08-353729 | Washington | Montpelier | 0000 | 12/18/2008 | 20:16 | Clear | Inattention | Other - Explain in Narrative | 0 | 0 | Bailey Av. at Terrace St. |
| VT0120200/35 4451 | Washington | Montpelier | 0000 | 12/31/2008 | 03:10 | Clear | Driving too fast for conditions | Single Vehicle Crash | 0 | 0 | Gould Hill Rd at Elm Street |
| VT0120200/35 4785 | Washington | Montpelier | 0000 | 01/06/2009 | 10:02 | Clear | Other improper action | Same Direction Sideswipe | 0 | 0 | 27 Kent Street |

*Source: SQL Server VCSG*

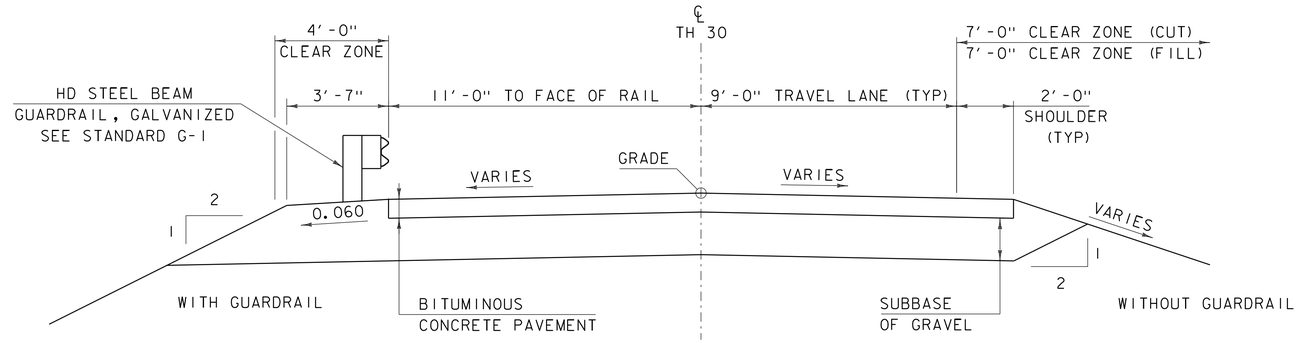



## EXISTING CONDITIONS

SCALE 1" = 20'-0"

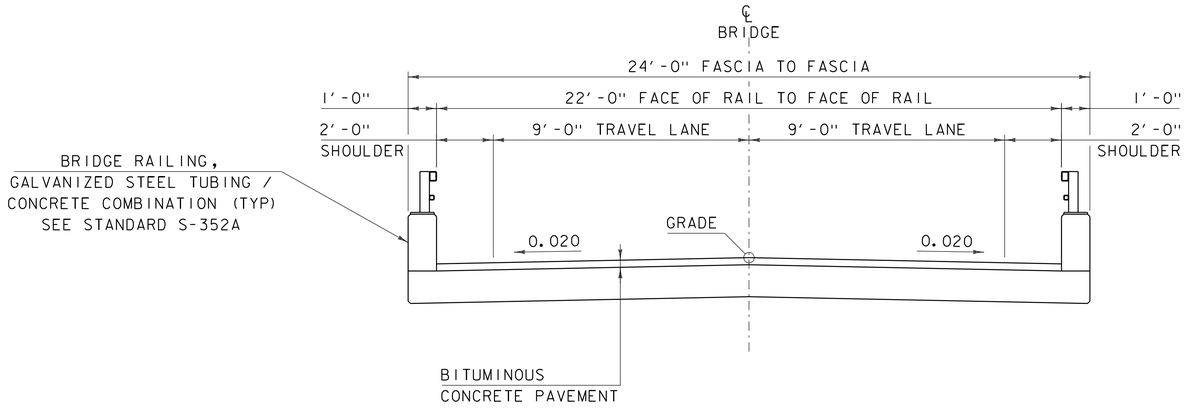
20 0 20

| | |
|---|---|
| PROJECT NAME: | MONTPELIER |
| PROJECT NUMBER: | BO 1446(36) |
| FILE NAME: 13J082/s13J082bdr.dgn | PLOT DATE: 10-SEP-2013 |
| PROJECT LEADER: C.P.WILLIAMS | DRAWN BY: L.J.STONE |
| DESIGNED BY: L.J.STONE | CHECKED BY: ------ |
| EXISTING CONDITIONS | SHEET 1 OF 12 |




## PROPOSED TH 30 TYPICAL SECTION

SCALE 3/8" = 1'-0"




## PROPOSED BRIDGE TYPICAL SECTION

SCALE 3/8" = 1'-0"

## MATERIAL TOLERANCES

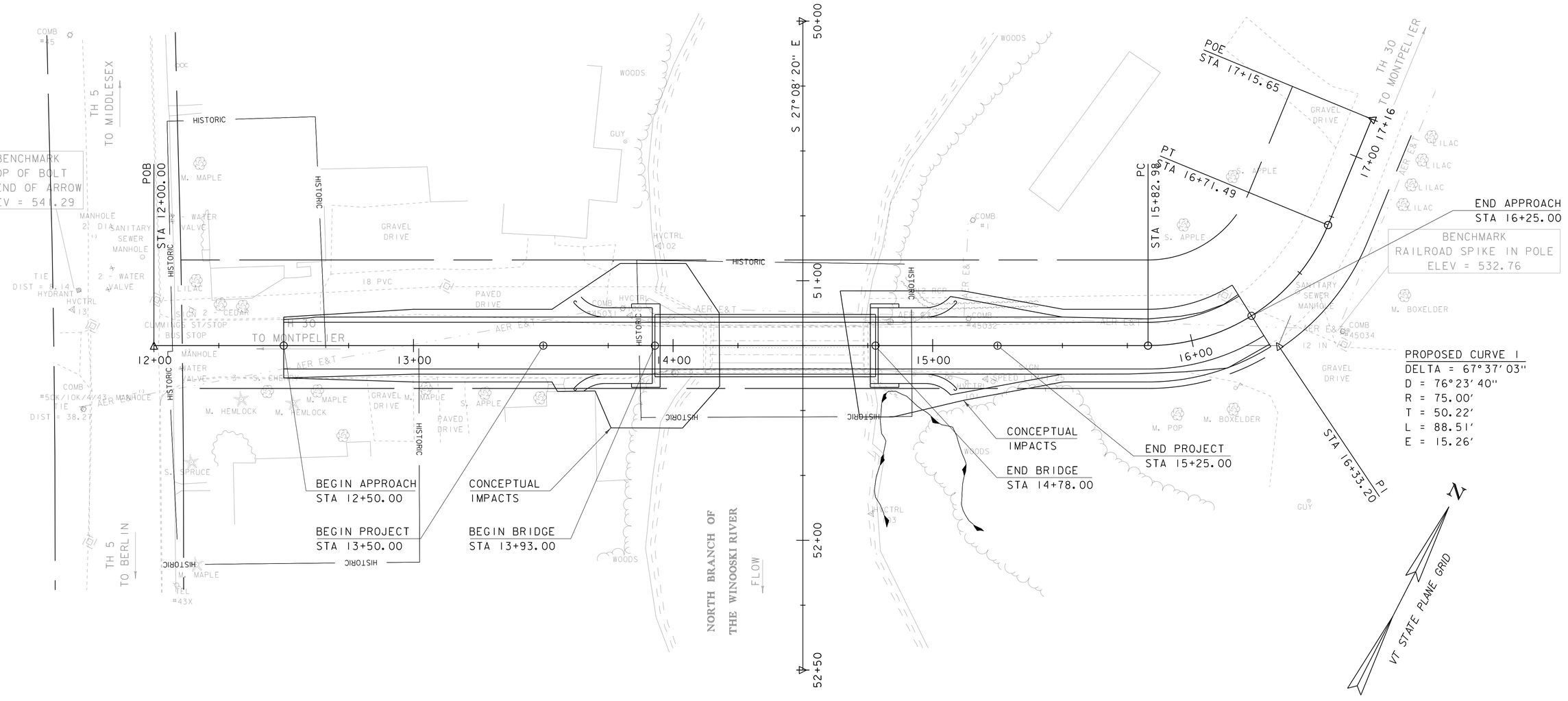
(IF USED ON PROJECT)

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

PROJECT NAME: MONTPELIER
PROJECT NUMBER: BO 1446(36)

FILE NAME: 13J082/sl3J082Typical.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: ----------
TYPICAL SECTIONS

PLOT DATE: 10-SEP-2013
DRAWN BY: D.D.BEARD
CHECKED BY: ------

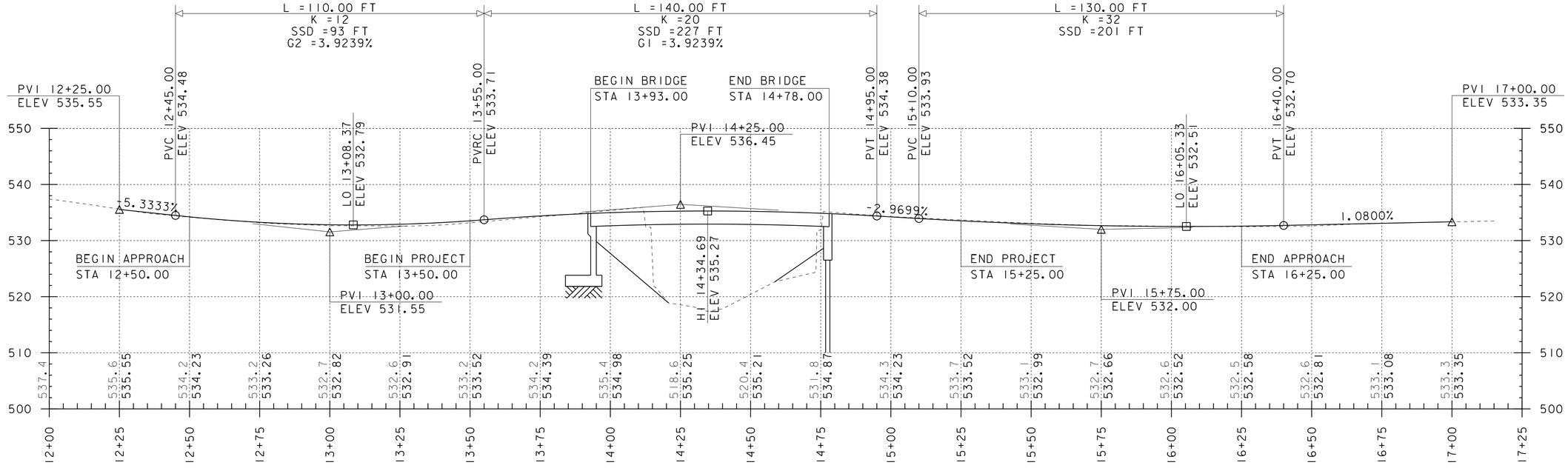



## LAYOUT SHEET

SCALE 1" = 20'-0"

20 0 20

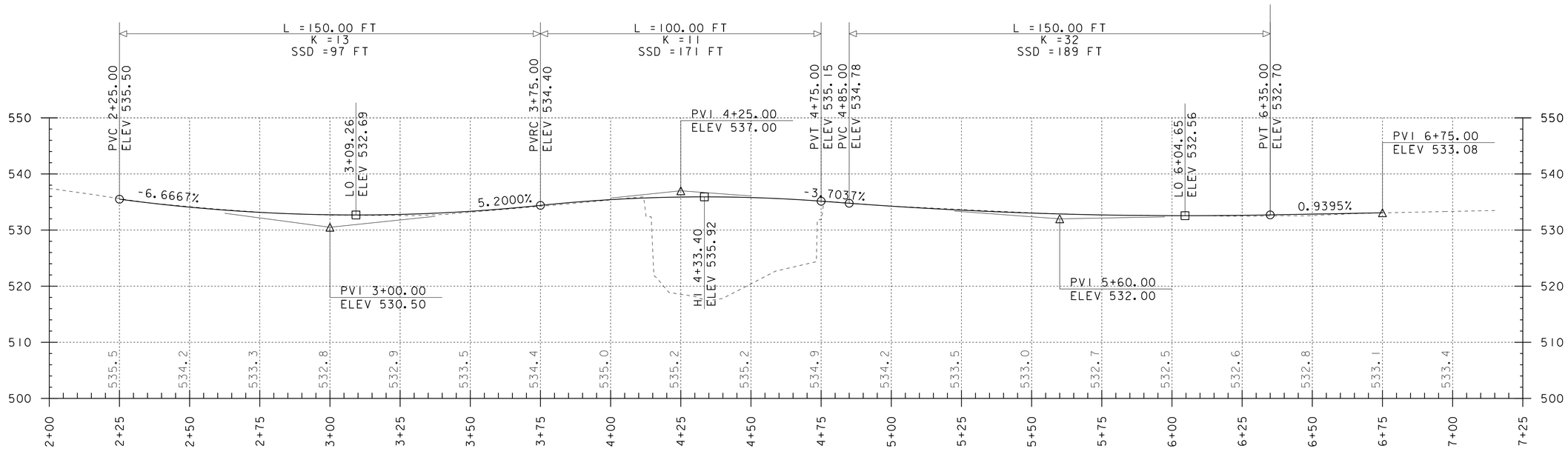
| | |
|---|---|
| PROJECT NAME: | MONTPELIER |
| PROJECT NUMBER: | BO 1446(36) |
| FILE NAME: 13J082/sl3J082bdr.dgn | PLOT DATE: 10-SEP-2013 |
| PROJECT LEADER: C.P.WILLIAMS | DRAWN BY: L.J.STONE |
| DESIGNED BY: L.J.STONE | CHECKED BY: ------ |
| LAYOUT SHEET | SHEET 3 OF 12 |




## TH 30 PROPOSED PROFILE

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

CONCEPTUAL ABUTMENTS SHOWN.
BORINGS HAVE NOT BEEN TAKEN AND
ABUTMENTS HAVE NOT BEEN DESIGNED.




## TH 30 EXISTING PROFILE

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

NOTE:

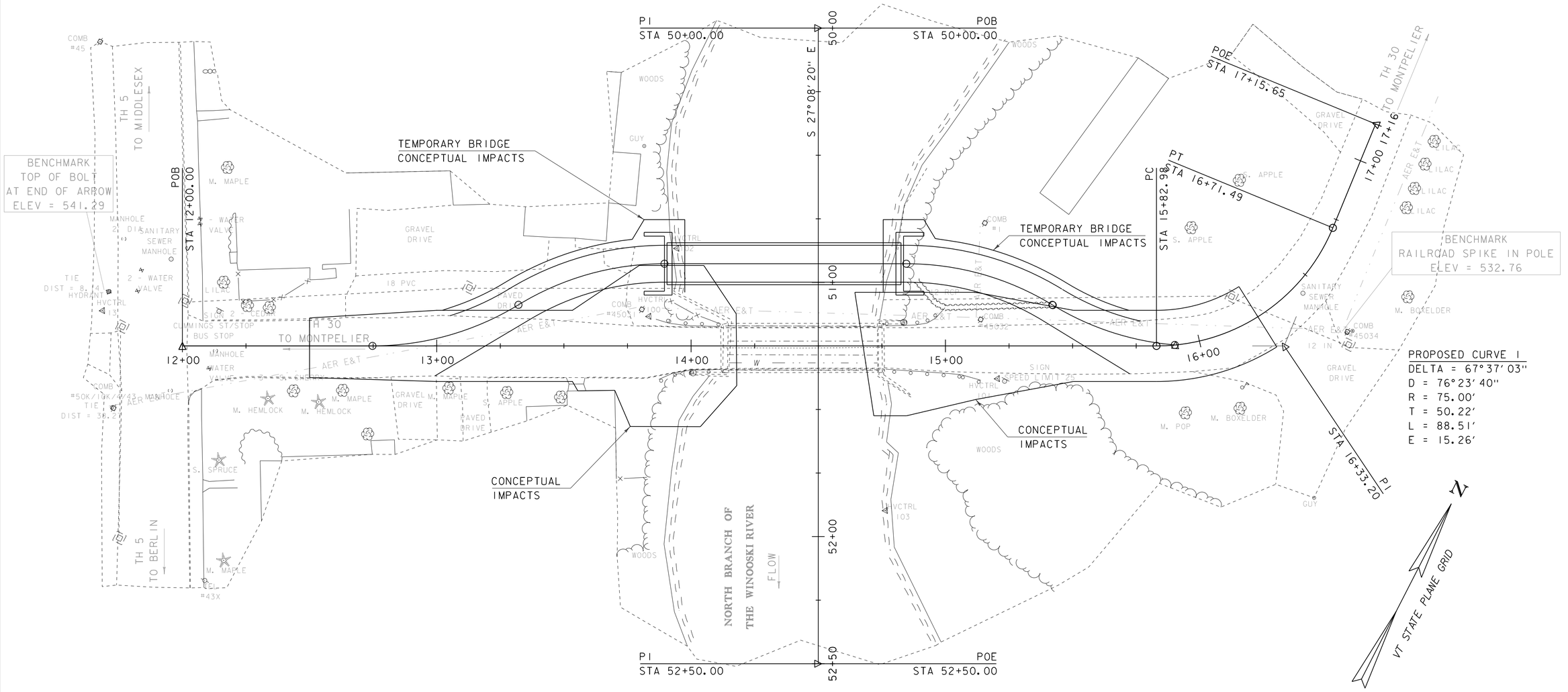
GRADES SHOWN TO THE NEAREST
TENTH ARE EXISTING GROUND ALONG ℄

GRADES SHOWN TO THE NEAREST
HUNDREDTH ARE FINISH GRADE ALONG ℄

PROJECT NAME: MONTPELIER
PROJECT NUMBER: BO 1446(36)

FILE NAME: Structures/13j082pro.dgn
PROJECT LEADER: C.P.WILLIAMS
DESIGNED BY: L.J.STONE
PROFILE SHEET

PLOT DATE: 10-SEP-2013
DRAWN BY: L.J.STONE
CHECKED BY: ------
SHEET 4 OF 12




## UPSTREAM TEMPORARY BRIDGE LAYOUT

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

NOTE: TEMPORARY BRIDGE APPROACHES ARE DESIGNED TO MEET A 15 MPH DESIGN SPEED (DOWN FROM A POSTED 25 MPH) WITH SUPERELEVATION OF 5.9%.

| | |
|---|---|
| PROJECT NAME: | MONTPELIER |
| PROJECT NUMBER: | BO 1446(36) |
| FILE NAME: 13j082/sl3j082tempbridge.dgn | PLOT DATE: 10-SEP-2013 |
| PROJECT LEADER: C.P.WILLIAMS | DRAWN BY: D.D.BEARD |
| DESIGNED BY: T.FILLBACH | CHECKED BY: ------ |
| UPSTREAM TEMPORARY BRIDGE LAYOUT SHEET | SHEET 5 OF 12 |